Εθνικο Μετσοβιο Πολυτεχνειο

Σχολη Ηλεκτρολογων Μηχανικων Και Μηχανικων Υπολογιστων

Τομεας Ηλεκτρικων Βιομηχανικων Διαταξεων Και Συστηματων Αποφασεων

Αξιολόγηση εργαλείων διαχείρισης Δεδομένων Μεγάλης Κλίμακας για αξιοποίησή τους από το Δημόσιο Τομέα

ΔΙΠΛΩΜΑΤΙΚΗ ΕΡΓΑΣΙΑ

του

ΚΩΝΣΤΑΝΤΙΝΟΥ Δ. ΧΑΤΖΗ

Επιβλέπων: Δημήτριος Ασκούνης.

Καθηγητής Ε.Μ.Π.

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ΚΩΝΣΤΑΝΤΙΝΟΣ ΧΑΤΖΗΣ

Διπλωματούχος Ηλεκτρολόγος Μηχανικός και Μηχανικός Υπολογιστών Ε.Μ.Π.

Ευχαριστίες

Περίληψη

Οι σύγχρονες τεχνολογικές εξελίξεις, η ραγδαία ανάπτυξη των φορητών συσκευών, των κοινωνικών δικτύων και του Internet of Things (IoT, Internet των Πραγμάτων), έχουν ως αποτέλεσμα τη συγκέντρωση τεράστιου όγκου σύνθετων, δομημένων και μη δομημένων δεδομένων, γνωστών ως Δεδομένων Μεγάλης Κλίμακας (Big Data). Τα δεδομένα αυτά μπορούν να αποτελέσουν κινητήρια δύναμη για την οικονομική ανάπτυξη, την ανταγωνιστικότητα, την καινοτομία, τη δημιουργία θέσεων απασχόλησης και την κοινωνική πρόοδο γενικότερα. Στην παρούσα διπλωματική εργασία γίνεται διερεύνηση των προοπτικών αξιοποίησης των Δεδομένων Μεγάλης Κλίμακας από το δημόσιο τομέα, με στόχο τη βελτίωση της αποτελεσματικότητας και την τεκμηρίωση της διαδικασίας χάραξης πολιτικής.

Αρχικά αναλύονται η φύση, τα χαρακτηριστικά, τα πεδία εφαρμογής και η αξία των Δεδομένων Μεγάλης Κλίμακας. Ακολουθούν η ανάλυση του κύκλου χάραξης πολιτικής και η ανάλυση των κριτηρίων: Κλίμακα Τεχνολογικής Ετοιμότητας (Technology Readiness Level - TRL), Ευκολία Χρήσης (Ease of Use), Ελεύθερη Άδεια Χρήσης (Open License Availability), Κόστος Παραμετροποίησης/Υλοποίησης (Customization/Implementation Cost), Ετοιμότητα Χρήσης/Ανάλυσης Δεδομένων Μεγάλης Κλίμακας (Big Data Readiness) και Ανάλυση SWOT, βάσει των οποίων δημιουργήθηκαν οι πίνακες του Παραρτήματος.

Τέλος, αναλύονται τα αποτελέσματα των πινάκων αξιολόγησης και διατυπώνονται τα συμπεράσματα, οι προοπτικές και οι προκλήσεις της χρήσης των Δεδομένων Μεγάλης Κλίμακας στον κύκλο χάραξης πολιτικής.

Λέξεις Κλειδιά: Δεδομένα Μεγάλης Κλίμακας, Κύκλος Χάραξης Πολιτικής, Κλίμακα Τεχνολογικής Ετοιμότητας, Ανάλυση SWOT

Abstract

Data are being produced globally in greater quantities and by more sources than ever before. These enormous volumes of digital data, combined with advances in data analysis, have attracted much interest from industry and research, under the name of Big Data. The reach and applicability of Big Data is of great value and seem limitless. New tools are created to turn raw data into information, and information into visual representations.

This diploma thesis focuses on the potential use of Big Data Analytics in policy making and the different ways Big Data can be leveraged to improve the efficiency and effectiveness of government.

Big Data are reviewed in accordance to the policy cycle, followed by evaluation reports of Analytics tools based on the following criteria: Technology Readiness Level (TRL), Ease of Use, Open License Availability, Customization/Implementation Cost, Data Readiness and SWOT analysis. The results from the evaluation reports have been analysed and suggest high applicability on the public sector and policy making processes.

Keywords: Big Data, TRL, Big Data Readiness, SWOT analysis, Policy Cycle, Public sector

Πίνακας Περιεχομένων

1 Εισαγωγή

1.1 Σκοπός της διπλωματικής

Οι σύγχρονες τεχνολογικές εξελίξεις, η ραγδαία ανάπτυξη των φορητών συσκευών, των κοινωνικών δικτύων και του Internet of Things (IoT, Internet των Πραγμάτων), έχουν ως αποτέλεσμα τη συγκέντρωση τεράστιου όγκου σύνθετων, δομημένων και μη δομημένων δεδομένων. Τα δεδομένα αυτά αναφέρονται ως Δεδομένα Μεγάλης Κλίμακας (Big Data, βλ. παράγραφο 2.1) και υπάρχουν πλέον σε όλους τους τομείς, σε κάθε οικονομία, κάθε οργανισμό και κάθε χρήση της ψηφιακής τεχνολογίας (π.χ. αισθητήρες που χρησιμοποιούνται για τη συγκέντρωση πληροφοριών κατά τη διαδικασία παραγωγής, δημοσιεύσεις σε κοινωνικά δίκτυα, ψηφιακές φωτογραφίες και βίντεο, online συναλλαγές και σήματα GPS κινητού τηλεφώνου). Σύμφωνα με την IBM, το 90% των δεδομένων στον κόσμο σήμερα δημιουργήθηκε τα τελευταία δύο χρόνια [1].

Παρά τις διάχυτες ανησυχίες ως προς τη διαχείριση του κύκλου ζωής των δεδομένων (data life cycle), την προστασία προσωπικών δεδομένων, αλλά και ως προς την ασφάλεια και την αναπαράστασή τους, η χρήση σύγχρονων τεχνολογιών για τη συγκέντρωση, αποθήκευση και ανάλυση των δεδομένων αυτών είναι απαραίτητη για τη βελτιστοποίηση διαδικασιών σε πολλούς τομείς (π.χ. στη βιομηχανική παραγωγή, τις μεταφορές, την υγεία κ.ά.) αλλά και για την πρόβλεψη πιθανών προκλήσεων. Σήμερα, τα ψηφιακά δεδομένα αποτελούν ουσιαστικό πόρο για την οικονομική ανάπτυξη, την ανταγωνιστικότητα, την καινοτομία, τη δημιουργία θέσεων απασχόλησης και την κοινωνική πρόοδο γενικότερα. Ενώ ο ιδιωτικός τομέας προχωρά στην αξιοποίηση των δεδομένων αυτών, ο δημόσιος τομέας φαίνεται να παραμένει πίσω [2].

Σκοπός της παρούσας διπλωματικής εργασίας είναι η διερεύνηση των προοπτικών αξιοποίησης των Δεδομένων Μεγάλης Κλίμακας (Big Data) από το δημόσιο τομέα, με στόχο τη βελτίωση της αποτελεσματικότητας και την τεκμηρίωση της διαδικασίας χάραξης πολιτικής.

2 Δεδομένα Μεγάλης Κλίμακας (Big Data)

2.1 Ορισμός

Ο όρος Δεδομένα Μεγάλης Κλίμακας (Big Data) αναφέρεται σε σύνολα σύνθετων, δομημένων και μη δομημένων δεδομένων μεγάλου όγκου, η αποθήκευση, ανάκτηση, επεξεργασία και ανάλυση των οποίων απαιτούν τη χρήση νέων τεχνολογιών και έχουν ως αποτέλεσμα την εξόρυξη πληροφορίας και τη χρήση αυτής στη βελτιστοποίηση διαδικασιών σε διάφορους τομείς (π.χ στη βιομηχανική παραγωγή, τις μεταφορές, την υγεία κ.ά.), πρόβλεψη πιθανών προκλήσεων και διευκόλυνση της λήψης αποφάσεων[3].

Εικόνα2.1 Ημερήσια και ανά λεπτό παραγωγή δεδομένων.[1]

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[1] Πηγή: Forbes 2018 (https://www.forbes.com/sites/bernardmarr/2018/05/21/how-much-data-do-we-create-every-day-the-mind-blowing-stats-everyone-should-read/#4fc074d560ba)

2.2 Χαρακτηριστικά

Τα Δεδομένα Μεγάλης Κλίμακας χαρακτηρίζονται από τον Ογκο, τη Ταχύτητα, τη Ποικιλομορφία και την Αξιοπιστία [3] (Εικόνα 2.2):

Εικόνα 2.2 Χαρακτηριστικά Δεδομένων Μεγάλης Κλίμακας

Όγκος (Volume): Αφορά τον όγκο των δεδομένων προς διαχείριση και ανάλυση, ο οποίος σήμερα κυμαίνεται σε επίπεδα petabytes, ενώ προβλέπεται ότι τα επόμενα χρόνια θα αυξηθεί σε zettabytes (ZB) [4]. Αυτό οφείλεται κυρίως στην αύξηση της χρήσης κινητών συσκευών και κοινωνικών δικτύων.

Ταχύτητα (Velocity): Αναφέρεται στον ταχύτατο ρυθμό με τον οποίο εισέρχονται νέα δεδομένα και ανανεώνονται τα ήδη υπάρχοντα, αλλά και στο χρόνο που απαιτείται για την επεξεργασία και ανάλυσή τους. Χαρακτηριστικό των Δεδομένων Μεγάλης Κλίμακας είναι η γρήγορη ταχύτητα παραγωγής μεγάλου όγκου πληροφορίας σε πραγματικό χρόνο, γεγονός που δημιουργεί προκλήσεις στην ανάλυση δεδομένων με χρήση παραδοσιακών μεθόδων, αφενός γιατί τα μεγέθη τους είναι πολύ μεγάλα και αφετέρου γιατί μεταβάλλονται διαρκώς. Ανάλογα με τη φύση των δεδομένων (κειμένου, ήχου, εικόνας κ.λπ.), οι τυπικές απαιτήσεις επεξεργασίας κυμαίνονται από kilobytes/δευτερόλεπτο έως terabytes/δευτερόλεπτο.

Ποικιλομορφία (Variety): Αναφέρεται στην ετερογενή φύση των δεδομένων προς επεξεργασία, καθώς συλλέγονται από διάφορες πηγές και δεν εμπίπτουν στην ίδια κατηγοριοποίηση (π.χ. κείμενα, πληροφορία από αισθητήρες, ηλεκτρονικά μηνύματα, ήχος, βίντεο, ροές κλικ κ.λπ). Η ποικιλία αυτή

απαιτεί νέες συνδυαστικές μεθόδους επεξεργασίας, καθώς τα παραδοσιακά μοντέλα ανάλυσης είναι πλέον παρωχημένα.

Αξιοπιστία (Veracity): Αναφέρεται στην ποιότητα των δεδομένων. Η εδραίωση της εμπιστοσύνης στην ποιότητα των δεδομένων αποτελεί τεράστια πρόκληση, καθώς η ποικιλία και ο αριθμός των πηγών παραγωγής και συλλογής δεδομένων αυξάνονται συνεχώς και προκύπτουν έτσι ζητήματα προέλευσης, ακρίβειας και πληρότητας των δεδομένων.

2.3   Αξία Πληροφορίας

Τα ψηφιακά δεδομένα αποτελούν ουσιαστικό πόρο για την οικονομική ανάπτυξη, την ανταγωνιστικότητα, την καινοτομία, τη δημιουργία θέσεων απασχόλησης και την κοινωνική πρόοδο γενικότερα. [5],[6],[7]

Εικόνα 2.3 Αξία της οικονομίας δεδομένων στην ΕΕ[2]

Στην Ευρωπαϊκή Ένωση (ΕΕ), ο δημόσιος τομέας διαχειρίζεται τεράστιο όγκο δεδομένων, γνωστών και ως Πληροφοριών για τον Δημόσιο Τομέα (PSI), τα οποία, ανάλογα με τα εθνικά καθεστώτα

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[2] Πηγή: https://ec.europa.eu/digital-single-market/en/news/final-results-european-data-market-study-measuring-size-and-trends-eu-data-economy

πρόσβασης, μπορεί να είναι ανοιχτά προς επεξεργασία. Η επαναχρησιμοποίηση αυτών των δεδομένων μπορεί να συμβάλει στην ανάπτυξη της ευρωπαϊκής οικονομίας, της Τεχνητής Νοημοσύνης, ακόμα και στην καταπολέμηση κοινωνικών προκλήσεων.

Η αξία της οικονομίας δεδομένων της Ευρωπαϊκής Ένωσης ήταν μεγαλύτερη από 285 δισ. ευρώ το 2015, αντιπροσωπεύοντας πάνω από το 1,94% του ΑΕΠ της ΕΕ [8]. Λόγω ετήσιου ρυθμού αύξησης 5,03%, η αξία αυτή ανήλθε το 2016 σε 300 δισ. ευρώ, που αντιπροσωπεύουν το 1,99% του ΑΕΠ του ίδιου έτους. Με τη θέσπιση ευνοϊκών πολιτικών και νομοθετικών προϋποθέσεων, η αξία της ευρωπαϊκής οικονομίας δεδομένων μπορεί να αυξηθεί σε 739 δισ. ευρώ έως το 2020, αντιπροσωπεύοντας το 4% του συνολικού ΑΕΠ της ΕΕ [8].

2.4 Πεδία εφαρμογής Δεδομένων Μεγάλης Κλίμακας

Η χρήση ανάλυσης των Δεδομένων Μεγάλης Κλίμακας στο δημόσιο τομέα έχει τα παρακάτω πεδία εφαρμογής, όπως απεικονίζονται στην παρακάτω εικόνα (Εικόνα 2.4) [9]:

Εικόνα 2.4 Πεδία εφαρμογής Δεδομένων Μεγάλης Κλίμακας

Τα πεδία εφαρμογής των Δεδομένων Μεγάλης Κλίμακας αναλύονται παρακάτω:

- **Αποτελεσματικότητα και διοικητική μεταρρύθμιση**: αφορά τη βελτιστοποίηση των διοικητικών διαδικασιών μέσω της προετοιμασίας των πληροφοριών και της αυτοματοποίησης των καθηκόντων.

- **Ασφάλεια και καταπολέμηση του εγκλήματος:** έχει να κάνει με το σχεδιασμό αποστολών των πυροσβεστικών σωμάτων, μονάδων ασθενοφόρων και αστυνομίας, την καταπολέμηση της τρομοκρατίας, και την πρόληψη της απάτης.

- **Υποδομές:** αναφέρονται στην υποστήριξη του συστήματος υγείας, την ανίχνευση επιδημιών, τον έλεγχος των δημόσιων και ιδιωτικών μεταφορών, την κατανάλωση ενέργειας, την εκπαίδευση.

- **Οικονομία και εργασία:** έχει να κάνει με τη βελτιστοποίηση διαχείρισης της αγοράς εργασίας, τη μέτρηση επιδόσεων της χρηματοδότησης της έρευνας, την εποπτεία της χρηματοπιστωτικής αγοράς, τον έλεγχος των τροφίμων και τον έλεγχο της πανδημικής νόσου.

- **Εκσυγχρονισμός της νομοθεσίας:** αφορά στην ανάλυση σεναρίων, την ανάλυση των τάσεων, τη σύνθετη εκτίμηση επιπτώσεων σε πραγματικό χρόνο, τις νέες μορφές ηλεκτρονικής συμμετοχής.

- **Υπηρεσίες πολιτών και επιχειρήσεων:** έχει να κάνει με τη χρήση νέων τεχνολογιών για τη βελτίωση της ποιότητας και του αριθμού των υπηρεσιών που παρέχονται από τη δημόσια διοίκηση, τις νέες και βελτιωμένες υπηρεσίες μέσω διασύνδεσης δεδομένων και την αυτοματοποίησης διαδικασιών.

3 Δεδομένα Μεγάλης Κλίμακας και κύκλος χάραξης πολιτικής

Ο κύκλος χάραξης πολιτικής επηρεάζεται όλο και περισσότερο από την έρευνα και τη συλλογή πληροφοριών από στοιχεία των κυβερνητικών υπηρεσιών[10],[11]. Παρά τον αυξανόμενο όγκο δεδομένων που συλλέγονται στον ιδιωτικό τομέα από εταιρίες, όπως για παράδειγμα Google LLC, Facebook Inc. κ.ά., τα ψηφιακά δεδομένα του δημόσιου τομέα εξακολουθούν να είναι μεγαλύτερα σε όγκο και αυξάνονται με ταχύτερο ρυθμό από αυτά του ιδιωτικού.[12]

Οι κυβερνήσεις ενεργούν μέσω της δημόσιας διοίκησης. Η δημόσια διοίκηση είναι ενεργός βραχίονας της κυβέρνησης, και καθοδηγείται από την υφιστάμενη δομή διακυβέρνησης - πολιτικής, π.χ. ο τρόπος με τον οποίο λαμβάνονται οι αποφάσεις, τα προβλήματα στα οποία δίνεται προτεραιότητα και ο βαθμός συμμετοχής της κοινωνίας των πολιτών [13]. Η πιθανή αλλαγή της δομής αυτής μέσω των σύγχρονων Τεχνολογιών Πληροφορίας και Επικοινωνίας (ΤΠΕ-ICT) και της Ανάλυσης Δεδομένων Μεγάλης Κλίμακας (BDA) είναι από τις σημαντικότερες προκλήσεις που αντιμετωπίζει ο δημόσιος τομέας [14],[15]. Οι αλλαγές που προκαλούνται από την τεχνολογική πρόοδο έχουν τη δυναμική να μετατραπούν σε νέους τρόπους διακυβέρνησης.

Η ανάλυση των Δεδομένων Μεγάλης Κλίμακας υποστηρίζει, μεταξύ άλλων, συστήματα έγκαιρης προειδοποίησης, ανάλυσης συναισθημάτων στα κοινωνικά δίκτυα και λήψης αποφάσεων σε πραγματικό χρόνο, τα οποία παίζουν σημαντικό ρόλο στον κύκλο πολιτικής. Η χρήση των Δεδομένων Μεγάλης Κλίμακας παρέχει επίσης τη δυνατότητα γρήγορης αντίδρασης, προσφέροντας έτσι στους υπεύθυνους χάραξης πολιτικής, στους δημόσιους υπαλλήλους αλλά και στους πολίτες τη δυνατότητα γρήγορης ενημέρωσης και συλλογικής δράσης, η οποία βασίζεται σε συλλογικές πληροφορίες που διανέμονται εκτός των επίσημων καναλιών [16],[17].

3.1 Στάδια κύκλου χάραξης πολιτικής

Εικόνα 3.1 Στάδια χάραξης κύκλου πολιτικής

Ο κύκλος πολιτικής αποτελείται από έξι στάδια όπως περιγράφονται στη συνέχεια [18]. Το πρώτο στάδιο είναι ο καθορισμός της ατζέντας, όπου εντοπίζονται τα προβλήματα και διατυπώνεται η ανάγκη για δράση. Ακολουθεί το επόμενο στάδιο, ο δημόσιος διάλογος, που έχει στόχο τον εντοπισμό των ενδεδειγμένων τρόπων αντιμετώπισης των εν λόγω προβλημάτων. Στη συνέχεια, ως αποτέλεσμα του δημόσιου διαλόγου, διαμορφώνονται οι πραγματικές πολιτικές οι οποίες διατυπώνονται σε νομοθετική και εκτελεστική γλώσσα (διαμόρφωση πολιτικής) και ακολουθούν η πραγματική υιοθέτηση της πολιτικής και η παροχή των απαραίτητων (δημοσιονομικών) μέσων. Μόλις ολοκληρωθεί το στάδιο της εφαρμογής, πραγματοποιείται η αξιολόγηση των αποτελεσμάτων, προκειμένου να διαπιστωθεί αν η εφαρμογή ήταν επιτυχημένη. Τέλος, ακολουθεί μια μακροπρόθεσμη αξιολόγηση, η οποία εξετάζει ολόκληρη τη διαδικασία από το πρώτο στάδιο καθορισμού της ατζέντας.

3.2 Δεδομένα Μεγάλης Κλίμακας και αξιοποίησή τους στον κύκλο ζωής πολιτικής

Όπως αναφέρθηκε παραπάνω, ο κύκλος χάραξης πολιτικής αποτελείται από τα στάδια: Καθορισμός Ατζέντας, Δημόσιος Διάλογος, Διαμόρφωση και Υιοθέτηση Πολιτικής, Παροχή Μέσων, Εφαρμογή Πολιτικής και τέλος Αξιολόγηση. Παρακάτω αναλύονται τα στάδια αυτά καθώς και η αξιοποίηση των Δεδομένων Μεγάλης Κλίμακας σε καθένα από αυτά.

Καθορισμός ατζέντας

Όσον αφορά τον καθορισμό της ατζέντας, βασικό ζήτημα είναι ο προσδιορισμός των θεμάτων που θα απασχολήσουν τους υπευθύνους χάραξης πολιτικής. Καίριο ρόλο παίζουν τα ΜΜΕ και τα μέσα κοινωνικής δικτύωσης, καθώς φέρνουν στην επιφάνεια θέματα που απασχολούν τους πολίτες και απαιτούν λύση [18]. Η χρήση της ανάλυσης Δεδομένων Μεγάλης Κλίμακας στη διαδικασία αυτή παρέχει τη δυνατότητα συλλογής δεδομένων από κοινωνικά δίκτυα, τα οποία έχουν υψηλό βαθμό συμμετοχής σε θέματα που απασχολούν τους πολίτες, βοηθά στην αποτύπωση του κοινού αισθήματος για συγκεκριμένα θέματα και διευκολύνει την ενεργή συμβολή των πολιτών μέσω διαδικασιών ηλεκτρονικής συμμετοχής.

Δημόσιος διάλογος

Το στάδιο αυτό στοχεύει στον εντοπισμό του σωστού τρόπου αντιμετώπισης του προβλήματος που καθορίστηκε στην ατζέντα. Βασική πρόκληση στο στάδιο αυτό αποτελεί η αξιοποίηση των μη δομημένων δεδομένων, όπως για παράδειγμα κείμενο από σχόλια σε κοινωνικά δίκτυα, άρθρα σε ιστοσελίδες κ.λπ. Η φύση των δεδομένων αυτών κάνει απαραίτητη τη χρήση αυτοματοποιημένων μεθόδων, εργαλείων ανάλυσης κειμένου, προκειμένου να ενσωματωθεί η πληροφορία αυτή στη χάραξη πολιτικής. Η ανάλυση του κοινού αισθήματος θα συμβάλει στην ενημέρωση των υπευθύνων χάραξης πολιτικής σχετικά με την τρέχουσα τάση της δημόσιας συζήτησης καθώς και τις αλλαγές στην κοινή γνώμη, υπό το πρίσμα των συζητήσεων και των προτεινόμενων αλλαγών[19].

Διαμόρφωση και υιοθέτηση πολιτικής

Διαμόρφωση μιας πολιτικής είναι η περιγραφή των βημάτων που αναμένεται να πραγματοποιηθούν κατά τη φάση υλοποίησης. Η ανάλυση των Δεδομένων Μεγάλης Κλίμακας μπορεί να παίξει σημαντικό ρόλο στην αξιολόγηση των βημάτων αυτών. Στη φάση διαμόρφωσης πολιτικής, τα έγγραφα χάραξης πολιτικής εξετάζονται προσεκτικά από τις κυβερνήσεις προκειμένου να υιοθετηθούν και να διαμορφωθούν πραγματικές πολιτικές, λαμβάνοντας υπόψη την άποψη των πολιτών. Η αξιοπιστία και η νομιμότητα των πολιτικών αυτών είναι απαραίτητες για την αποδοχή της πολιτικής προς εφαρμογή. Θα είναι χρήσιμη λοιπόν η χρήση εργαλείων συλλογής δεδομένων για να ερευνηθεί η να προβλεφθεί η αποδοχή συγκεκριμένων πολιτικών μεταξύ διαφορετικών κοινωνικών ομάδων.

Παροχή μέσων

Οι αποφάσεις για τον αποτελεσματικότερο τρόπο παροχής του απαιτούμενου προσωπικού και οικονομικών μέσων για την εφαρμογή νέων πολιτικών μπορούν να βελτιωθούν, εάν τα παλαιότερα δεδομένα μπορούν να αναλυθούν λεπτομερώς. Οι δημοσιονομικές διαδικασίες παρέχουν δεδομένα, η ανάλυση των οποίων μπορεί να επιτρέψει την ανίχνευση προτύπων, τα οποία στη συνέχεια μπορούν να χρησιμοποιηθούν για το σχεδιασμό αποτελεσματικότερων τρόπων καθορισμού του προϋπολογισμού για μια πολιτική. Υπάρχουν ήδη κάποιες εμπειρικές ενδείξεις που συνδέουν τη χρήση ανάλυσης Δεδομένων Μεγάλης Κλίμακας στον προϋπολογισμό με την αύξηση της αποδοτικότητας και τη μείωση κόστους [20],[21]. Η διαθεσιμότητα μεγαλύτερου όγκου δεδομένων διευκολύνει τη δημιουργία πλαισίων αξιολόγησης για τη βέλτιστη αξιοποίηση πόρων. Τέλος, η ανάλυση Δεδομένων Μεγάλης Κλίμακας μπορεί επίσης να διαδραματίσει παραγωγικό ρόλο στη διαδικασία σύναψης συμβάσεων.

Εφαρμογή πολιτικής

Με την εφαρμογή νέων πολιτικών παράγονται σχεδόν αμέσως νέα δεδομένα, τα οποία στη συνέχεια μπορούν να χρησιμοποιηθούν στην αξιολόγηση της αποτελεσματικότητας των πολιτικών αυτών και στην ενίσχυση των μελλοντικών διαδικασιών εφαρμογής, προσδιορίζοντας προκλήσεις που παρουσιάστηκαν από προηγούμενες διαδικασίες χάραξης πολιτικής.

Η παραγωγή δεδομένων σχετικά με την εφαρμογή πολιτικών σε πραγματικό χρόνο κατά τη διάρκεια της υλοποίησης, επιτρέπει μια άνευ προηγουμένου ευελιξία στη μετατροπή των ιδεών πολιτικής σε πραγματικά εκτελέσιμες πολιτικές. Για παράδειγμα, ένας νέος αναδιανεμητικός κώδικας φόρου θα μπορούσε να δοκιμαστεί σχεδόν σε πραγματικό χρόνο ως προς το αν έχει το επιθυμητό αποτέλεσμα ή θα είναι απαραίτητη η τροποποίησή του.

Η ανάλυση Δεδομένων Μεγάλης Κλίμακας παρέχει τη δυνατότητα εντοπισμού προβληματικών ζωνών, κάτι που διευκολύνει την εφαρμογή διαφορετικών επιπέδων πολιτικής ανάλογα με τις απαιτήσεις κάθε ζώνης. Για παράδειγμα, η αύξηση της αστυνόμευσης μπορεί να επικεντρωθεί με μεγαλύτερη ακρίβεια στις προβληματικές περιοχές, μειώνοντας έτσι την εμφάνιση του εγκλήματος στο σημείο της προέλευσής του. Βελτιστοποιεί επίσης την ακρίβεια ορισμένων πηγών πληροφορίας όπως π.χ. τα δεδομένα απογραφής, τα οποία συχνά διατρέχουν τον κίνδυνο να είναι παρωχημένα τη στιγμή που χρησιμοποιούνται για τη διαδικασία διαμόρφωσης και εφαρμογής νέων πολιτικών. Ωστόσο, μέσω του συνδυασμού διαφόρων βάσεων δεδομένων, τα δεδομένα απογραφής θα μπορούσαν να παράγονται

σχεδόν σε καθημερινή βάση αντί να ενημερώνονται μόνο μια ή δύο φορές ανά δεκαετία. Τα δημογραφικά στοιχεία, τα ποσοστά ανεργίας ή τα πρότυπα μετανάστευσης, μπορούν να παρατηρηθούν σε πραγματικό χρόνο, επιτρέποντας μια πολύ ταχύτερη αξιολόγηση του κατά πόσον η εφαρμογή μιας συγκεκριμένης πολιτικής ήταν επιτυχής.

Αξιολόγηση στον κύκλο πολιτικής

Η αξιολόγηση είναι κατά παράδοση το τελικό στάδιο μετά την εφαρμογή πολιτικής. Ωστόσο, η χρήση ανάλυσης Δεδομένων Μεγάλης Κλίμακας επιτρέπει την άμεση επεξεργασία των δεδομένων που προκύπτουν από κάθε στάδιο του κύκλου πολιτικής, με αποτέλεσμα την ενίσχυση της διαφάνειας, της αποτελεσματικότητας και της ευελιξίας.

4   Ανάλυση Διαδικασίας Αξιολόγησης

4.1   Εφαρμογές προς αξιολόγηση

Στην ενότητα αυτή γίνεται ονομαστική αναφορά των εργαλείων διαχείρισης Δεδομένων Μεγάλης Κλίμακας, τα οποία αξιολογήθηκαν, και είναι χωρισμένα στις εξής κατηγορίες: Εφαρμογές (Applications), Βάσεις Δεδομένων /Πηγές Δεδομένων (Databases/Datasets), Οδηγούς (Guides), Πλαίσια/Μεθόδους/Μοντέλα (Frameworks/Methods/Models), Πλατφόρμες/Πύλες (Platforms/Portals), Λογισμικό/Μηχανές (Software/Engines), Εργαλεία (Tools), Περιπτώσεις Εφαρμογής (Use Cases), Βέλτιστες Πρακτικές (Best Practices), Λεξιλόγια (Vocabularies).

Applications: Bechtle solutions, DCAT-AP, ENAP, Wetter.com, Buienalarm, They say sentiment analysis API (Preceive), Google Fusion Tables, Opinion Crawl, Cool Farm, Tool Water, Agrivi farm management, OPEN ARTFISH, FishstatJ, Workday in figures, Diabetis Plus, Runtastic, The OO Software, ALERTS

Databases/Data sources: ESPON Database for policy makers, European Data Portal, The CIARD Routemap, RASFF Database, EU Open Data Portal, eu.us.opendata

Guides: Open policy making toolkit

Frameworks/Methods/Models: Digital Policy Model Canvas, GLEAM, Economic Simulation Library, Energy Big Data: A Survey, Modernization Defence Intelligence, Promises and Challenges of Big Data Computing in Health Sciences, EDA, Fraunhofer E-Health, InnOPlan, BehavePlus, Edge Intelligence EI, The public safety assessment, €CONOMIA - The Monetary Policy Game, Thousand Visions, LEED, SPLASH, Business Process Re-engineering (BPR)

Platforms and portals: EU Open Data Portal, EtherSport: Blockchain Sports Prediction Platform, Creativechain, Europeana, PETER SERVICE, Virtuose DE, MASAR, UrbanSim, KNIME Analytics Platform, RapidMiner, Pentaho, SAHARA Smart analysis, IBM Watson, Employment Ontario Geo Hub, GENIX, SMART Energy Hub, Watson Super Computer Project

Software and engines: NodeXL, LiquidFeedback, APACHE Spark, Gephi, Solver BI360, DataMelt, Weka, OpenText, Trackur

Standards: Document, Discover and Interoperate, Blockcerts, Smart City Reference Architecture, FoodEx2, ISO, ISO 27001

Tools: Risk Assessment and Horizon Scanning (RAHS), Meieraha, The European Data Market Monitoring Tool, Correctional Offender Management Profiling for Alternative Sanctions, OpenRefine, Datawrapper, Agora Voting, D-CENT, Orange, BudgIt, Qlik, Tableau Public, Semantria, Infogram, 3D City Model, EVOKE, Inflation Island

Use cases: Nowcasting for economic policy and beyond, Using learning analytics systems for educational policies, Text and opinion mining for policy making, Smart Fire Department, Smart Construction Administration, Lisbon City Hall - Participatory Budgeting, Madrid Participa, Maryland Budget Game, Modelling the early life-course (MELC), OpenGov.gr, Opinion Space, Energie Atlas, 2050 Pathways Web Tool, A systematic quantitative backcasting on low-carbon society policy in case of Kyoto city, African Highland Farmer – the Game, Crowdsourcing Through Social Media-The Icelandic Constitution Case

4.2   Κριτήρια αξιολόγησης

Η αξιολόγηση των εργαλείων βασίστηκε στα κριτήρια που αναλύονται παρακάτω:

- Κλίμακα Τεχνολογικής Ετοιμότητας (Technology Readiness Level - TRL)
- Ευκολία Χρήσης (Ease of Use)
- Ελεύθερη Άδεια Χρήσης (Open License Availability)
- Κόστος Παραμετροποίησης/Υλοποίησης (Customization/Implementation Cost)
- Ετοιμότητα Χρήσης/Ανάλυσης Δεδομένων Μεγάλης Κλίμακας (Big Data Readiness)

καθώς και σε ανάλυση SWOT, η οποία αναλύεται στο επόμενο κεφάλαιο.

Τα αποτελέσματα αποτυπώθηκαν σε πίνακες (βλ. παράρτημα Πινάκων Αξιολόγησης)

4.2.1   Κλίμακα Τεχνολογικής Ετοιμότητας (Technology Readiness Level - TRL)

Η Κλίμακα Τεχνολογικής Ετοιμότητας (Technology Readiness Level -TRL) αναπτύχθηκε τη δεκαετία του 1970 από τη NASA, για την αποτελεσματικότερη αξιολόγηση και επικοινωνία σχετικά με το επίπεδο ωριμότητας των νέων τεχνολογιών. Η Ευρωπαϊκή Επιτροπή πρότεινε την εφαρμογή της κλίμακας αυτής ως εργαλείου λήψης αποφάσεων σχετικά με τις επενδύσεις προγραμμάτων Έρευνας και Ανάπτυξης χρηματοδοτούμενων από την ΕΕ και υιοθετήθηκε το 2014 στο πρόγραμμα Horizon 2020 [22] [23]

TRL 1. Παρατήρηση βασικών αρχών: Περιλαμβάνει την τεχνολογική έρευνα και αφορά την παρατήρηση βασικών αρχών και την πρώτη διατύπωση της ανάγκης που καλούμαστε να καλύψουμε. Αποτελεί το χαμηλότερο επίπεδο τεχνολογικής ετοιμότητας. Η επιστημονική έρευνα αρχίζει να μεταφράζεται σε εφαρμοσμένη Έρευνα και Ανάπτυξη.

TRL 2. Σύλληψη τεχνολογίας: Το δεύτερο στάδιο επικεντρώνεται στην έρευνα προκειμένου να αποδειχθεί η σκοπιμότητα ανάπτυξης της τεχνολογίας.

TRL 3. Πειραματική απόδειξη της ιδέας: Η τεχνολογία αρχίζει να αναπτύσσεται σε εργαστηριακό περιβάλλον.

TRL 4. Επικύρωση λειτουργίας της τεχνολογίας σε εργαστηριακό περιβάλλον: Περιλαμβάνει αναλυτικές εργαστηριακές μελέτες για την επικύρωση της τεχνολογίας.

TRL 5. Επικύρωση λειτουργίας τεχνολογίας σε περιβάλλον προσομοίωσης.

TRL 6. Επίδειξη λειτουργίας της τεχνολογίας σε σχετικό περιβάλλον.

TRL 7. Επίδειξη πρωτοτύπου συστήματος σε επιχειρησιακό περιβάλλον

TRL 8. Πλήρες και εξειδικευμένο σύστημα σε λειτουργία

TRL 9. Πραγματικό σύστημα εφαρμοσμένο σε επιχειρησιακό περιβάλλον

4.2.2 Ευκολία Χρήσης (Ease of Use)

Αναφέρεται στο βαθμό ευκολίας της χρήσης ενός λογισμικού, μιας εφαρμογής για την επίτευξη ποσοτικοποιημένων στόχων με αποτελεσματικότητα και ικανοποίηση του χρήστη.

4.2.3 Ελεύθερη Άδεια Χρήσης(Open License Availability)

Αναφέρεται στο κατά πόσον υπάρχει η δυνατότητα ο χρήστης να εξετάσει και να αξιοποιήσει τη γνώση και τις δυνατότητες που προσφέρει ο παρεχόμενος πηγαίος κώδικας.

4.2.4 Κόστος Παραμετροποίησης/Υλοποίησης (Customization/Implementation Cost)

Αναφέρεται στο κόστος παραμετροποίησης και υλοποίησης μιας τεχνολογίας.

4.2.5 Ετοιμότητα Χρήσης/Ανάλυσης Δεδομένων Μεγάλης Κλίμακας (Big Data Readiness)

Μετρά τη Δυνατότητα χρήσης του εργαλείου διαχείρισης (Feasibility), τη Σκοπιμότητα χρήσης της (Reasonability), την αξία εφαρμογής (Value), τη διαδικασία ενσωμάτωσης στο ήδη υπάρχον περιβάλλον (Integrability) και την ευελιξία χρήσης του (Scalability) [24][25][26][27]

Δυνατότητα χρήσης (Feasibility): Λαμβάνει υπόψιν τη κλίμακα TRL και παραδείγματα εφαρμογής της εν λόγω τεχνολογίας

0: Σύλληψη ιδέας. Η τεχνολογία βρίσκεται στο χαμηλότερο επίπεδο τεχνολογικής ετοιμότητας.

1: Η τεχνολογία βρίσκεται στο στάδιο διαμόρφωσης

2: Η τεχνολογία βρίσκεται σε πειραματικό στάδιο.

3: Η τεχνολογία είναι έτοιμη για εφαρμογή στο περιβάλλον του οργανισμού.

4: Υπάρχουν στοιχεία τα οποία πιστοποιούν τη χρήση της τεχνολογίας στο περιβάλλον του οργανισμού

Σκοπιμότητα (Reasonability):

0: Δεν απαιτείται χρήση της εν λόγω τεχνολογίας, καθώς οι ανάγκες του οργανισμού καλύπτονται πλήρως.

1: Η χρήση της εν λόγω τεχνολογίας ενδέχεται να βελτιστοποιήσει τη λειτουργία του οργανισμού, καθώς δεν είναι σαφές αν ικανοποιούνται οι ανάγκες του.

2: Η εφαρμογή της εν λόγω τεχνολογίας θα βοηθήσει στην ικανοποίηση των μακροπρόθεσμων αναγκών (π.χ. εργαλεία πρόβλεψης προκλήσεων στον τομέα υγείας), παρόλο που οι βραχυπρόθεσμες και μεσοπρόθεσμες ανάγκες του οργανισμού καλύπτονται ήδη.

3: Η χρήση της εν λόγω τεχνολογίας συνδέεται με τη βελτιστοποίηση της απόδοσης του οργανισμού, μεσοπρόθεσμα και μακροπρόθεσμα.

4: Η χρήση της τεχνολογίας αυτής είναι απαραίτητη για τη σωστή λειτουργία του οργανισμού και την βελτίωση της ετοιμότητας του οργανισμού για τη κάλυψη μελλοντικών προκλήσεων

Αξία εφαρμογής (Value): Αξιολογεί την ποσοτικοποιήσημη (π.χ. μείωση λειτουργικού κόστους) και μη ποσοτικοποιήσιμη αξία (π.χ. αξιοπιστία, βελτίωση φήμης) που θα προσφέρει η χρήση της εν λόγω τεχνολογίας στον οργανισμό.

0: Η χρήση της εν λόγω τεχνολογίας δεν συνδέεται με ποσοτικοποιήσιμη ή μη αξία στον οργανισμό.

1: Είναι άγνωστο αν η χρήση της εν λόγω τεχνολογίας θα φέρει κάποια μορφή αξίας στον οργανισμό..

2: Υπάρχουν ενδείξεις μικρής ποσοτικοποιημένης ή μη αξίας η οποία προκύπτει από τη χρήση της εν λόγω τεχνολογίας βραχυπρόθεσμα

3:Η χρήση της εν λόγω τεχνολογίας θα φέρει κάποια μορφή αξίας βραχυπρόθεσμα (μείωση κόστους λειτουργίας, μείωση κατανάλωσης ενέργειας, βελτίωση κοινής γνώμης).

4: Η χρήση της εν λόγω τεχνολογίας αναμένεται να φέρει υψηλή ποσοτικοποιήσιμη ή μη αξία στον οργανισμό μακροπρόθεσμα.

Ενσωμάτωση (Integrability): Λαμβάνει υπόψη την Ευκολία Χρήσης της τεχνολογίας και τις απαραίτητες προϋποθέσεις για την εφαρμογή της.

0: Σημαντικά εμπόδια στην ενσωμάτωση της εν λόγω τεχνολογίας στο περιβάλλον του οργανισμού.

1: Απαιτείται προθυμία του οργανισμού για καθορισμό τρόπων ενσωμάτωσης της τεχνολογίας.

2: Η ενσωμάτωση και εφαρμογή της τεχνολογίας είναι εφικτές με κάποιους περιορισμούς.

3: Υπάρχουν σαφείς διαδικασίες για τη μετεγκατάσταση ή την ενσωμάτωση νέων τεχνολογιών, ωστόσο απαιτούν ειδικούς πόρους και ενέργειες από τον οργανισμό.

4: Δεν υπάρχουν περιορισμοί ή εμπόδια για την πλήρη ενσωμάτωση της τεχνολογίας στο περιβάλλον του οργανισμού.

Δυνατότητα επέκτασης (Scalability): Αξιολογεί τη δυνατότητα προσαρμογής και συντήρησης της τεχνολογίας λαμβάνοντας υπόψη και την Ελεύθερη Άδεια Χρήσης.

0: Συνεχή έξοδα διαχείρισης και συντήρησης χωρίς τη δυνατότητα παραμετροποίησης. Δυσκολία μακροπρόθεσμης χρήσης.

1: Συνεχή έξοδα διαχείρισης, συντήρησης και παραμετροποίησης υπό περιορισμούς.

2: Χρηματοδότηση σε ετήσια βάση για τη συντήρηση, διαχείριση και παραμετροποίηση της τεχνολογίας χωρίς περιορισμούς.

3: Δυνατότητα παραμετροποίησης χωρίς περιορισμούς και με μικρή χρηματοδότηση

4: Παραμετροποίηση χωρίς περιορισμούς. Διευκολύνει μακροπρόθεσμη χρήση.

Σύνολο: Προκύπτει από τον μέσο όρο των υπολοίπων.

4.3 Πίνακας αξιολόγησης

Μη συμπληρωμένος Πίνακας αξιολόγησης

<table>
<tr><td colspan="7" align="center">Ονομασία τεχνολογίας</td></tr>
<tr><td>Περιγραφή & Link</td><td colspan="6"></td></tr>
<tr><td>Είδος τεχνολογίας</td><td colspan="6"></td></tr>
<tr><td>Τομέας από τον οποίο προέρχεται η εν λόγω τεχνολογία</td><td colspan="6"></td></tr>
<tr><td>Στάδιο χάραξης πολιτικής</td><td colspan="6"></td></tr>
<tr><td>Τομέας εφαρμογής της πολιτικής</td><td colspan="6"></td></tr>
<tr><td>Κλίμακα τεχνολογικής ετοιμότητας</td><td colspan="2">1-9</td><td colspan="3">Κόστος Παραμετροποίησης/ Υλοποίησης</td><td>Χαμηλό/Υψηλό</td></tr>
<tr><td>Ευκολία χρήσης</td><td colspan="2">Χαμηλό/Υψηλό</td><td colspan="3">Ελεύθερη Άδεια Χρήσης</td><td>Ναι /Όχι</td></tr>
<tr><td rowspan="2">Ετοιμότητα Χρήσης Ανάλυσης Δεδομένων Μεγάλης Κλίμακας</td><td>Δυνατότητα χρήσης</td><td>Σκοπιμότητα</td><td>Αναμενόμενη Αξία εφαρμογής</td><td>Ενσωμάτωση</td><td>Δυνατότητα επέκτασης</td><td><i>Σύνολο</i></td></tr>
<tr><td>0-4</td><td>0-4</td><td>0-4</td><td>0-4</td><td>0-4</td><td>0-4</td></tr>
<tr><td rowspan="2">SWOT</td><td colspan="3"><u>Ισχυρά σημεία</u></td><td colspan="3"><u>Αδύναμα σημεία</u></td></tr>
<tr><td colspan="3"><u>Ευκαιρίες</u></td><td colspan="3"><u>Απειλές</u></td></tr>
<tr><td colspan="7" align="center">Καταγραφή Αναγκών και Τάσεων</td></tr>
<tr><td>Αντιμετώπιση Τάσεων</td><td colspan="3"></td><td colspan="3"></td></tr>
<tr><td>Κάλυψη Αναγκών</td><td colspan="3"></td><td colspan="3"></td></tr>
</table>

Μη συμπληρωμένος **Πίνακας αξιολόγησης στα Αγγλικά**

<table>
<tr><td colspan="7" align="center">**Application Name**</td></tr>
<tr><td>**Description (& Link)**</td><td colspan="6"></td></tr>
<tr><td>**Type**</td><td colspan="6"></td></tr>
<tr><td>**Origin**</td><td colspan="6"></td></tr>
<tr><td>**Policy Cycle Stage (s)**</td><td colspan="6"></td></tr>
<tr><td>**Policy Domain (s)**</td><td colspan="6"></td></tr>
<tr><td>**TRL**</td><td>1-9</td><td colspan="4">**Implementation /Customisation Cost**</td><td>Low/High</td></tr>
<tr><td>**Ease of use**</td><td>Low/High</td><td colspan="4">**Open License Availability**</td><td>Yes/No</td></tr>
<tr><td>**Big Data Readiness**</td><td>Feasibility</td><td>Reasonability</td><td>Value</td><td>Integrability</td><td>Scalability</td><td>**Total Score**</td></tr>
<tr><td></td><td>0-4</td><td>0-4</td><td>0-4</td><td>0-4</td><td>0-4</td><td>0-4</td></tr>
<tr><td rowspan="2">**SWOT**</td><td colspan="3">Strengths</td><td colspan="3">Weaknesses</td></tr>
<tr><td colspan="3">Opportunities</td><td colspan="3">Threats</td></tr>
<tr><td colspan="7" align="center">Mapping to Needs and Trends</td></tr>
<tr><td>**Addresses (Trend)**</td><td colspan="6"></td></tr>
<tr><td>**Serves (Need)**</td><td colspan="6"></td></tr>
</table>

Μη συμπληρωμένος **Πίνακας αξιολόγησης στα Αγγλικά**

4.4 Παραδείγματα Πινάκων Αξιολόγησης από το Παράρτημα

Παρουσιάζονται παραδείγματα συμπληρωμένων πινάκων αξιολόγησης του Παραρτήματος (η ανάλυση SWOT περιγράφεται στο κεφάλαιο 5 και παρουσιάζονται παραδείγματα Πινάκων)

Applications

World in figures						
Description (& Link)	Provides access to over 100 country ranking indices (https://worldinfigures.com/#close).					
Type	Web application					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Economy & Finance					
TRL	7		**Implementation /Customisation Cost**			Low
Ease of use	Low		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	4	4	3	3	**3.4**
SWOT **(Παρουσιάζεται στη παράγραφο 5.3)**	Strengths			Weaknesses		
	Opportunities			Threats		
Mapping to Needs and Trends						
Addresses (Trend)	Open Data					
Serves (Need)	Ensure availability of (real-time) information and knowledge					

Diabetis Plus						
Description (& Link)	An application which is capable of an analysing of your blood sugar level (http://www.diabetesplus.info/de/).					
Type	Application					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Health					
TRL	9	**Implementation /Customisation Cost**				High
Ease of use	High	**Open License Availability**				No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	3	**3.8**
SWOT **(Παρουσιάζεται στη παράγραφο 5.3)**	Strengths			Weaknesses		
	Opportunities			Threats		
Mapping to Needs and Trends						
Addresses (Trend)	Next Generation of BI and Data Analytics platforms					
Serves (Need)	Ensure availability of (real-time) information and knowledge					

The OO Software						
Description (& Link)	Official Service partner for Microsoft and NATO. The main aim is that the customer should be able to concentrate on the important things, without having to waste time on or worry about maintaining their systems. That has led to the development of numerous tools that offer immeasurable help with performance optimization, data security, data imaging and with the recovery lost data. (https://blog.oo-software.com/en/about)					
Type	Application					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	Foreign Affairs and Defence					
TRL	8		**Implementation /Customisation Cost**			High
Ease of use	Low		**Open License Availability**			No
Big Data Readiness						
	4	4	4	2	2	3.2
SWOT **(Παρουσιάζεται στη παράγραφο 5.3)**	Strengths			Weaknesses		
	Opportunities			Threats		
Mapping to Needs and Trends						
Addresses (Trend)	Smart surveillance systems					
Serves (Need)	Comprehensive knowledge and information management					

Databases/ Data sources

<table>
<tr><td colspan="7" align="center">ESPON Database for policy makers</td></tr>
<tr>
<td>Description (& Link)</td>
<td colspan="6">Database providing comparable indicators covering all regions of Europe. The ESPON 2013 Database provides fundamental regional information provided by ESPON projects and EUROSTAT. This information can be used to support territorial development analysis at different geographical levels. The Database supports better understanding of past and future trends in different types of European territories and makes possible to benchmark your region and city in the European context. Ultimately, it aims at contributing to a better understanding of the potentials and development perspectives of regions in the European context and globalised world. It provides access to regional, local, urban, neighbourhood, world, grid and historical data. Most of the datasets and information produced are public available and freely accessible. Users can focus their search using the categories "Theme", "Policy", "Project" and "Keyword" (http://database.espon.eu/db2/).</td>
</tr>
<tr>
<td>Type</td>
<td colspan="6">Database</td>
</tr>
<tr>
<td>Origin</td>
<td colspan="6">Public Sector</td>
</tr>
<tr>
<td>Policy Cycle Stage (s)</td>
<td colspan="6">Policy Design and Analysis</td>
</tr>
<tr>
<td>Policy Domain (s)</td>
<td colspan="6">All</td>
</tr>
<tr>
<td>TRL</td>
<td colspan="3">7</td>
<td colspan="2">Implementation /Customisation Cost</td>
<td>Low</td>
</tr>
<tr>
<td>Ease of use</td>
<td colspan="3">Low</td>
<td colspan="2">Open License Availability</td>
<td>Yes</td>
</tr>
<tr>
<td>Big Data Readiness</td>
<td>Feasibility</td>
<td>Reasonability</td>
<td>Value</td>
<td>Integrability</td>
<td>Scalability</td>
<td>Total Score</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3.8</td>
</tr>
<tr>
<td rowspan="2">SWOT

(Παρουσιάζεται στη παράγραφο 5.3)</td>
<td colspan="3"><u>Strengths</u></td>
<td colspan="3"><u>Weaknesses</u></td>
</tr>
<tr>
<td colspan="3"><u>Opportunities</u></td>
<td colspan="3"><u>Threats</u></td>
</tr>
</table>

	39	

Mapping to Needs and Trends	
Addresses (Trend)	Open Data
Serves (Need)	Improve and strengthen Europeanisation Ensure availability of (real-time) information and knowledge

Frameworks/Methods/Models

<table>
<tr><td colspan="7" align="center">**GLEAM**</td></tr>
<tr>
<td>**Description (& Link)**</td>
<td colspan="6">GLEAM, the global epidemic and mobility model, combines real-world data on populations and human mobility with elaborate stochastic models of disease transmission to deliver analytic and forecasting power to address the challenges faced in developing intervention strategies that minimise the impact of potentially devastating epidemics (http://www.gleamviz.org/).</td>
</tr>
<tr>
<td>**Type**</td>
<td colspan="6">Model</td>
</tr>
<tr>
<td>**Origin**</td>
<td colspan="6">Research domain</td>
</tr>
<tr>
<td>**Policy Cycle Stage (s)**</td>
<td colspan="6">Policy Design and Analysis</td>
</tr>
<tr>
<td>**Policy Domain (s)**</td>
<td colspan="6">Health</td>
</tr>
<tr>
<td>**TRL**</td>
<td colspan="3">5</td>
<td colspan="2">**Implementation /Customisation Cost**</td>
<td>Low</td>
</tr>
<tr>
<td>**Ease of use**</td>
<td colspan="3">Low</td>
<td colspan="2">**Open License Availability**</td>
<td>Yes</td>
</tr>
<tr>
<td>**Big Data Readiness**</td>
<td>Feasibility</td>
<td>Reasonability</td>
<td>Value</td>
<td>Integrability</td>
<td>Scalability</td>
<td>**Total Score**</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>**3.4**</td>
</tr>
<tr>
<td rowspan="2">**SWOT**

(Παρουσιάζεται στη παράγραφο 5.3)</td>
<td colspan="3">Strengths</td>
<td colspan="3">Weaknesses</td>
</tr>
<tr>
<td colspan="3">Opportunities</td>
<td colspan="3">Threats</td>
</tr>
<tr>
<td colspan="7" align="center">Mapping to Needs and Trends</td>
</tr>
<tr>
<td>**Addresses (Trend)**</td>
<td colspan="6">Next Generation of BI and Data Analytics platforms</td>
</tr>
<tr>
<td>**Serves (Need)**</td>
<td colspan="6">Ensure availability of (real-time) information and knowledge

Forward-looking strategic planning for the use of data and technologies as well as for practical implementation</td>
</tr>
</table>

Tools

EVOKE					
Description (& Link)	The goal of the social network game is to help empower people all over the world to come up with creative solutions to our most urgent social problems (http://www.urgentevoke.com/).				
Type	Tool (Serious Game)				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Institutional Questions / Internal Affairs				
TRL	9	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	3	3	3	3	**3.2**
SWOT **(Παρουσιάζεται στη παράγραφο 5.3)**	Strengths		Weaknesses		
	Opportunities		Threats		
Mapping to Needs and Trends					
Addresses (Trend)	Socio-Technical Systems				
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making				

Platforms/Portals

Europeana						
Description (& Link)	Europeana works with thousands of European archives, libraries and museums to share cultural heritage for enjoyment, education and research. Europeana Collections provides access to over 50 million digitised items - books, music, artworks and more - with sophisticated search and filter tools to help you find what you're looking for. The dedicated thematic collections on art, fashion, music, photography and World War I contain galleries, blogs and exhibitions to inform and inspire (https://www.europeana.eu/portal/en).					
Type	Portal					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	*Education, Youth,* Culture *& Sport*					
TRL	8		**Implementation /Customisation Cost**			Low
Ease of use	High		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	3	2	3	2	**2.6**
SWOT **(Παρουσιάζεται στη παράγραφο 5.3)**	Strengths			Weaknesses		
	Opportunities			Threats		
Mapping to Needs and Trends						
Addresses (Trend)	Open Data					
Serves (Need)	Cross-linked information exchange Ensure availability of (real-time) information and knowledge					

OPEN ARTFISH						
Description (& Link)	The toolkit comprises a generic database (OPEN ARTFISH) and a mobile phone application. The toolkit's primary objective is to facilitate the implementation of cost-effective and sustainable routine data collection, storage and analysis of data, using the appropriate statistical procedure (http://www.fao.org/3/a-i7680e.pdf).					
Type	Application					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	Agriculture, Fisheries, Forestry and Foods					
TRL	6	**Implementation /Customisation Cost**				Low
Ease of use	Low	**Open License Availability**				Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	2	4	3	4	4	**3.4**
SWOT	Strengths			Weaknesses		
	Opportunities			Threats		
Mapping to Needs and Trends						
Addresses (Trend)	Big Data					
Serves (Need)	Cope with the production of huge volumes of data Comprehensive knowledge and information management					

5   Ανάλυση SWOT
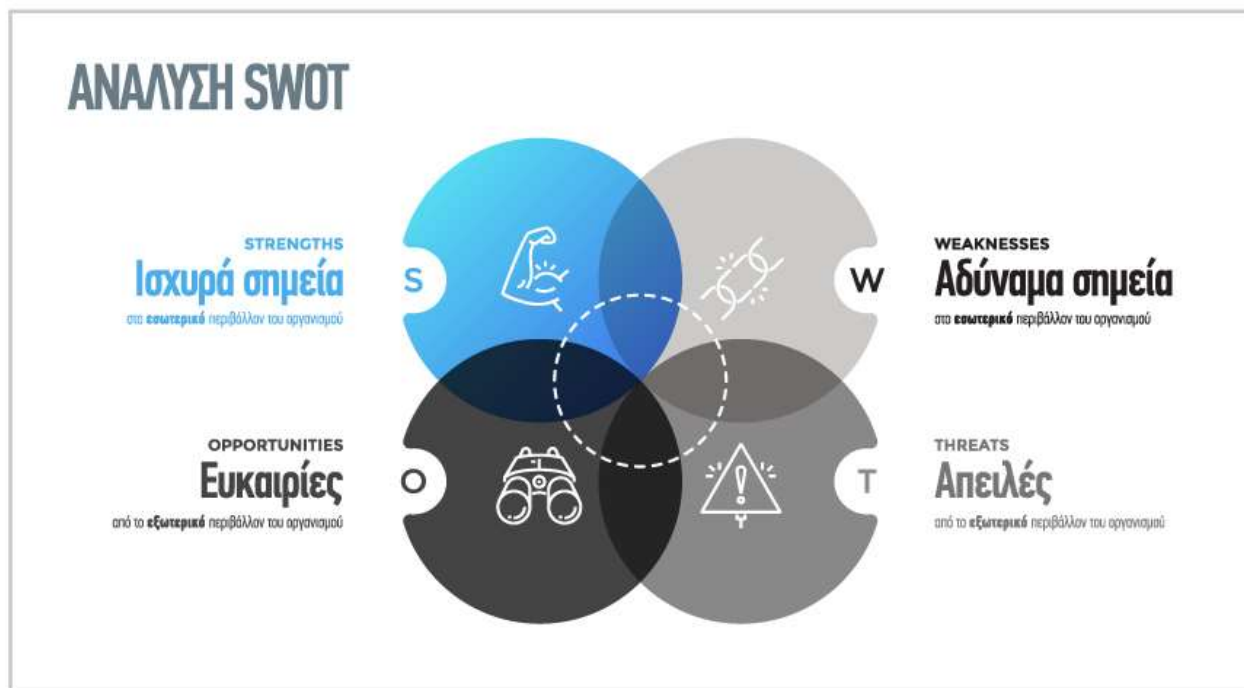
Εικόνα 5 Ανάλυση SWOT

Η ανάλυση SWOT αξιολογεί τα τρέχοντα Πλεονεκτήματα και Αδυναμίες (Strengths, Weaknesses), στο εσωτερικό περιβάλλον ενός οργανισμού και τις Ευκαιρίες και Απειλές (Opportunities, Threats) που μπορεί να προκύψουν από το εξωτερικό περιβάλλον. Η εσωτερική ανάλυση χρησιμοποιείται για τον εντοπισμό πόρων, δυνατοτήτων, βασικών ικανοτήτων και ανταγωνιστικών πλεονεκτημάτων που είναι εγγενείς στον οργανισμό. Η εξωτερική ανάλυση προσδιορίζει τις ευκαιρίες και τις απειλές της αγοράς εξετάζοντας τους πόρους των ανταγωνιστών, το περιβάλλον της αγοράς στο συγκεκριμένο τομέα και το γενικότερο περιβάλλον. Στόχος της ανάλυσης αυτής είναι η αξιοποίηση τις γνώσης που έχει ένας οργανισμός για το εσωτερικό και εξωτερικό του περιβάλλον στη διαμόρφωση της στρατηγικής του [27].

5.1   Ανάλυση Ισχυρών και Αδύναμων Σημείων στο εσωτερικό περιβάλλον του οργανισμού (Strengths, Weaknesses)

Η εσωτερική ανάλυση του οργανισμού είναι κρίσιμη για τον εντοπισμό του ανταγωνιστικού πλεονεκτήματος. Προσδιορίζει τους πόρους που πρέπει να αναπτυχθούν και να διατηρηθούν

προκειμένου ο οργανισμός να παραμείνει ανταγωνιστικός. Ισχυρά σημεία αποτελούν: τα πλεονεκτήματα έναντι του ανταγωνισμού, η φήμη στην αγορά, η αποτελεσματικότητα, το μερίδιο αγοράς, η εταιρική υπευθυνότητα, οι πατέντες, η καινοτομία, το δυνατό marketing κ.α. Αδύναμα σημεία αποτελούν: ο ανταγωνισμός, οι τομείς προς βελτίωση, η κακή οικονομική κατάσταση, η έλλειψη πόρων, η αρνητική φήμη κ.ά.

5.2 Ανάλυση Ευκαιριών και Απειλών από το εξωτερικό περιβάλλον του οργανισμού (Opportunities, Threats)

Στόχοι της ανάλυσης του εξωτερικού περιβάλλοντος του οργανισμού είναι η αναγνώριση σημαντικών εξελίξεων και η πρόβλεψη μελλοντικών επιπτώσεων. Το εξωτερικό περιβάλλον αποτελείται από μεταβλητές που είναι πέρα από τον έλεγχο ενός οργανισμού, απαιτούν ωστόσο ανάλυση για τον επαναπροσδιορισμό της εταιρικής στρατηγικής ώστε να ανταποκρίνεται στις νέες απαιτήσεις της αγοράς. Ευκαιρίες αποτελούν: η αναπτυσσόμενη αγορά, οι συνεργασίες, οι ευνοϊκές αλλαγές στη νομοθεσία, οι νέες αγορές κ.α. Απειλές αποτελούν: ο νέος ανταγωνισμός, οι μη ευνοϊκές αλλαγές στη νομοθεσία, η αύξηση της φορολογίας, οι περιβαλλοντικές καταστροφές, το υψηλό κόστος, κ.ά.

5.3 Παραδείγματα Ανάλυσης SWOT

Στην ενότητα αυτή παρουσιάζονται παραδείγματα ανάλυσης SWOT από τους πίνακες Παραρτήματος.

Diabetis Plus						
Description (& Link)	An application which is capable of an analysing of your blood sugar level (http://www.diabetesplus.info/de/).					
Type	Application					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Health					
TRL	9		Implementation /Customisation Cost			High
Ease of use	High		Open License Availability			No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	3	3.8
SWOT	Strengths • Easy to use • Keeps track of your blood sugar and insulin levels, physical activity, food intake by creating a journal entry with those values. • Export your results easily in pdf. • Innovative			Weaknesses • High implementation/ customisation cost • Available in German only • No open license availability. • Option to remove one entire entry but there's no remove option for individual values such as blood sugar level, insulin level, food intake etc.		

	Opportunities • Availability in other languages • Ability to remove individual values in journal entry.	Threats • Competition. • High implementation/ customisation cost
Mapping to Needs and Trends		
Addresses (Trend)	Next Generation of BI and Data Analytics platforms	
Serves (Need)	Ensure availability of (real-time) information and knowledge	

World in figures						
Description (& Link)	Provides access to over 100 country ranking indices (https://worldinfigures.com/#close).					
Type	Web application					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Economy & Finance					
TRL	7		Implementation /Customisation Cost			Low
Ease of use	Low		Open License Availability			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	3	4	4	3	3	3.4
SWOT	Strengths • User-friendly interface • Over 100 countries ranking on different sectors such as economy, agriculture, arts, Nobel prize-winners etc		Weaknesses • No up-to-date results: The research for this edition of The Economist World in Figures was carried out in 2016 using the latest available sources that present data on an internationally comparable basis. • The extent and quality of the statistics available that varies from country to country. • Energy consumption data are not always reliable, particularly for the major oil producing countries • Doesn't provide the exact algorithm the results are based on.				

	Opportunities	Threats
	• Make reliable data comparisons between countries • Provide updated real time data.	• Data quality: figures from individual countries may differ from standard international statistical definitions • Technical difficulties
Mapping to Needs and Trends		
Addresses (Trend)	Open Data	
Serves (Need)	Ensure availability of (real-time) information and knowledge	

Google Fusion Tables			
Description (& Link)	Google Fusion tables is a web application for data analysis, large data-set visualisation, and mapping. It allows users to easily create data visuals and publish them online instantly with provided subsets and an easy format similar to online files. It further supports the ability to work through larger data sets including filtering, sorting, summarising them in collaboration with other users online. It enables users to share and combine multiple tables between users and publicly available data and merge them into one. The application is still experimental and its API has released V2 (https://support.google.com/fusiontables/answer/2571232).		
Type	Web Application		
Origin	Private Sector		
Policy Cycle Stage (s)	Policy Design and Analysis		
Policy Domain (s)	All		
TRL	3	Implementation /Customisation Cost	Low
Ease of use	Low	Open License Availability	Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	1	2	2	1	4	2

SWOT	Strengths	Weaknesses
	Provides the ability to: • Find public data • Import your own data • Export your data as CSV or KML. • Visualize your data instantly • Publish your visualization on other web properties • Host your data online and stay in control	• Experimental app • Low ease of use
	Opportunities	Threats
	• High demand on data analysis apps • User friendly interface	• Experimental app • Low ease of use and TRL

Mapping to Needs and Trends	
Addresses (Trend)	Big Data
Serves (Need)	Cross-linked information exchange

EVOKE					
Description (& Link)	The goal of the social network game is to help empower people all over the world to come up with creative solutions to our most urgent social problems (http://www.urgentevoke.com/).				
Type	Tool (Serious Game)				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Institutional Questions / Internal Affairs				
TRL	9	Implementation /Customisation Cost			Low
Ease of use	High	Open License Availability			Yes
Big Data Readiness	Feasibility	Reasonabiliy	Value	Integrability	Scalabiliy	Total Score
	4	3	3	3	3	3.2
SWOT	Strengths • Ability to innovate and experiment to creatively solve problems and reach goals. • Mobile & low-bandwidth version available • Award-winning • Multi-player online educational game, which uses storytelling, game mechanics, and social networks, • Has been played in three languages by student groups in over 100 countries over the past seven years. • Better learning experience • Instant feedback. Since gamification provides metrics it can be easily seen, as trainer, how a participant is progressing. • Learning experience is personalized; the learners could		Weaknesses • Applies only to young people and people familiar with technology • Internet connection needed.			

	evolve in their own rhythm, in a safe way. Gratification system provides an effective, informal learning environment that helps learners practice real life situations and challenges.	
	Opportunities • Preparing young people to become social innovators who create solutions that address global 'grand challenges' (e.g., displacement, hunger, poverty, water scarcity). • Large-scale Alternate Reality Games can reach and impact far more individuals than a typical classroom intervention. The ability to tap into the masses makes ARGs ideal for content areas related to large-scale social phenomena such as globalization, economics, environmental science, social media, and social innovation • Support young people in developing an understanding of complex challenges and acquiring 21st century skills (e.g. creativity, collaboration, critical reflection), socio-emotional skills (e.g. curiosity, empathy, generosity), and gain the confidence to experiment, collaborate, and create innovative solutions.	**Threats** • For performance and security reasons, modern browsers either discourage the use of, or block completely, the Flash Player plug-in. You need to give explicit permission to your browser to run it • Applies only to young people and people familiar with technology • Simplification and limitation of the game elements employed: Some designers believe that limiting its perspective to the use of points, badges and leader boards is the main problem of gamification. • One-size fits all: The spreading of third-part services on the one hand has promoted the adoption of gamification, on the other hand has highlighted the problem of the one size-fits-all approach currently applied to many gamification interventions. This design technique is mainly actualized as a cut and paste

		methodology, lacking originality not only for the scarce variety of the elements commonly employed, but also for a perspective that is inclined to consider different contexts and different users in the same way.
	• Push of Videogame Industry: The success of gamification is also driven by the recent growth in the gaming industry and the mass appeal that videogames have in the entertainment arena. - Increasing interest of the academic world: Gamification is receiving an increasing attention by the academic world. Researches aimed at investigating the effects of game elements on users are more and more • Inclusion of new game elements: game designers have a huge quantity of components at their disposal, almost unexplored in the gamification practices	• Side effects: many researches highlighted that different forms of extrinsic rewards could determine in specific contexts, a detrimental effect on the users' intrinsic motivation

Mapping to Needs and Trends	
Addresses (Trend)	Socio-Technical Systems
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making

Promises and Challenges of Big Data Computing in Health Sciences	
Description (& Link)	An impressive study concerning Big Data and how to transfer the concept to the Health Science: The concept of Big Data is causing a world-wide buzz. Its successful applications in business, sciences and healthcare have radically changed their traditional practices. The demand for Big Data analysis is increasing day by day. More than 200 colleges provide degrees with Data Science

Type	Model
Origin	Public Sector
Policy Cycle Stage (s)	Policy Design and Analysis
Policy Domain (s)	Health

TRL	n/a	Implementation /Customisation Cost			n/a
Ease of use	High	Open License Availability			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	3	4	4	4	4	3.8

SWOT	Strengths	Weaknesses
	- Making fundamental changes in care delivery and discovery of treatments, - Reducing health care costs, - Reducing number of hospital re-admissions, - Targeted interventions for reducing emergency department (ED) visits, - Triage of patients in ED, - Preventing adverse drug effects	- More data needed: Identifying a cohort in the MIMIC (Medical Information Mart for Intensive Care) for answering a specific clinical question, it often results in a very small set of cases (small cohort) that makes it almost impossible to answer the question with a strong statistical confidence. - Data do not fully capture temporal and process information: In most cases, clinical data are captured in various systems, even within an organization, each with a somewhat different intent and often not well integrated.

	Opportunities	Threats
	• The volume of data being captured from biological experiments and routine health care procedures is growing at an unprecedented pace. This data trove has brought new promises for discovery in health care research and breakthrough treatments as well as new challenges in technology, management, and dissemination of knowledge • Building specific systems in addressing the need for analysis of different types of data, e.g., integrated electronic health record (EHR), genomics-EHR, genomics-connectomes, insurance claims data, etc.	• Data ownership, Access, Shareability, Proprietary rights: Accessibility to patient data for scientific research and sharing of the scientific work as digital objects for validation and reproducibility is another challenging domain due to patient privacy concerns, technological issues such as interoperability, and data ownership confusion. • Translation: Many machine learning algorithms work as a "black box" with no provision of good interpretations and clinical context of the outcomes, even though they often perform with reasonable accuracy. • The lack of incentive for organizations to take initiative to address the technological challenges
Mapping to Needs and Trends	
Addresses (Trend)	Big Data	
Serves (Need)	Standardisation of data management Coherent use of digital technology across policy areas	

Best Practice

<table>
<tr><td colspan="6" align="center">Troubled family program</td></tr>
<tr>
<td>Description (& Link)</td>
<td colspan="5">The English government is committed to working with local authorities and their partners to help 120,000 troubled families in England turn their lives around by 2015. The family monitoring data was collected by Ecorys as part of the national evaluation of the programme. Please read the Ecorys interim report on family monitoring data for more detail and additional results.

(https://www.gov.uk/government/news/troubled-families-programme-turning-117000-lives-around)</td>
</tr>
<tr>
<td>Type</td>
<td colspan="5">Best Practice</td>
</tr>
<tr>
<td>Origin</td>
<td colspan="5">Public Sector</td>
</tr>
<tr>
<td>Policy Cycle Stage (s)</td>
<td colspan="5">Policy Implementation</td>
</tr>
<tr>
<td>Policy Domain (s)</td>
<td colspan="5">Employment & Social Security</td>
</tr>
<tr>
<td>TRL</td>
<td>n/a</td>
<td colspan="3">Implementation /Customisation Cost</td>
<td>n/a</td>
</tr>
<tr>
<td>Ease of use</td>
<td>High</td>
<td colspan="3">Open License Availability</td>
<td>n/a</td>
</tr>
<tr>
<td>Big Data Readiness</td>
<td>Feasibility</td>
<td>Reasonability</td>
<td>Value</td>
<td>Integrability</td>
<td>Scalability</td>
<td>Total Score</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2.8</td>
</tr>
<tr>
<td>SWOT</td>
<td colspan="3">
<u>Strengths</u>

- Succeeded in reaching almost all of the hardest to help homes in the country,
- Working with 99% of households in England identified as having multiple problems, including high levels of truancy, youth crime, anti-social behaviour and worklessness,
- Councils had met payment-by-results criteria for turning around the lives of more than 69,000 families,
</td>
<td colspan="3">
<u>Weaknesses</u>

- Wide variations in local practice: need for more standardised training, quality assurance,
- Mixed evidence regarding the extent to which scaling-up had been achieved without sacrificing some level of quality of family intervention practice,
- Payment-by-Results (PbR) progress data counts the number of positive outcomes observed for families on the Programme (i.e. gross rather than net outcomes). It doesn't estimate how many net
</td>
</tr>
</table>

	• Levels of youth crime and anti-social behaviour have been significantly reduced across the family	positive outcomes there are over and above any positive outcomes that would have occurred in the absence of the programme (i,e deadweight or counterfactual outcomes)
	Opportunities • Help bring security and opportunity to families and communities, • Getting children back into school • cutting youth crime and anti-social behaviour across the whole family • getting adults into work, • reducing the costs to the taxpayer of tackling their problems.	Threats • Questionable whether deep and sustained improvements were achieved to partnership working at a local level, beyond individual examples of good practice, • the requirement to work with greater numbers of families on reduced funding poses a risk of 'diluting' the intervention, • lack of evidence that it has had an impact on the outcomes that it seeks to affect for families: PbR progress data counts the number of positive outcomes observed for families on the Programme (i.e. gross rather than net outcomes). It doesn't estimate how many net positive outcomes there are over and above any positive outcomes that would have occurred in the absence of the programme.
Mapping to Needs and Trends		
Addresses (Trend)	Evidence-based policy	
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

African Highland Farmer – the Game		
Description (& Link)	Creating awareness among decision makers on land degradation and sustainable land management. (https://ypard.net/sites/ypard.net/files/Machteld.%20A.%20Schoolenberg.pdf)	
Type	Use Case	
Origin	Public Sector	
Policy Cycle Stage (s)	Agenda Setting	
Policy Domain (s)	Environment & Energy	

<table>
<tr><td>TRL</td><td>n/a</td><td>Implementation /Customisation Cost</td><td>n/a</td><td></td><td></td></tr>
<tr><td>Ease of use</td><td>High</td><td>Open License Availability</td><td>n/a</td><td></td><td></td></tr>
<tr><td>Big Data Readiness</td><td>Feasibility</td><td>Reasonability</td><td>Value</td><td>Integrability</td><td>Scalability</td><td>Total Score</td></tr>
<tr><td></td><td>3</td><td>2</td><td>3</td><td>3</td><td>3</td><td>2.8</td></tr>
</table>

SWOT	Strengths	Weaknesses
	- Make policy makers aware of the problems - To gather input data for the game, a farming system analysis was done in order to understand the choices a farmer faces regarding his land management, providing: - Insight into farmers' choices in land management - Insight in the critical decision moments that farmers face for socio-economic issues and physical phenomena - Insight in the coping strategies and investment	- Many soil conservation techniques have been introduced in the area, the acceptation and wide implementation of these techniques by local communities is limited and land degradation (LD) is increasingly destructive regarding agricultural production - Part of the communication gap between the scientific studies and policy makers comes from the working schedule of these policy makers that leaves little room studying research reports

		behaviour of farmers at critical decision moments	
		o Translation of results into rules and input data for the game	
	Opportunities		Threats
	• The degradation of arable land has been an increasing problem on smallholder farmer communities		• Lacks communication between these scientific studies and policy makers, especially on district level
	• A lot of research on LD and sustainable land management (SLM) has been done, trying to involve institutes and NGOs to improve the situation in the area.		• Simplification and limitation of the game elements employed
	• Using innovative communication tools [among which a computer game] in a policy maker workshop to bridge this communication gap between the scientific studies and policy makers		
	• Both statistical research and literature reviews have shown over the last decades that gaming has significant learning potential and increases the efficiency in instruction time		
Mapping to Needs and Trends			
Addresses (Trend)	Evidence-based policy		
Serves (Need)	Ensure availability of (real-time) information and knowledge Development of domain specific target and indicator systems		

Cool Farm Tool Water						
Description (& Link)	Cool Farm Tool water metrics enable farmers quickly and easily account for their crops' water needs and gain insight into better practice (https://coolfarmtool.org/coolfarmtool/water/).					
Type	Web Application					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	Agriculture, Fisheries, Forestry and Foods					
TRL	8		**Implementation /Customisation Cost**			Low
Ease of use	Low		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • Enables farmers to quickly and easily account for their crops' water needs and gain insight into better practice. • Minimal data entry maximum output (the tool combines just a few additional user inputs with global data sets for crop, soil and climate data, to provide crop water estimates). • Efficient water use			Weaknesses • Not providing calculations to inform water catchment policies		
	Opportunities • Ability to compare crop water footprints to water scarcity/availability in the region. • Include more crops and more management options to consider. • Provide calculations to inform water catchment policies. • Add-ons			Threats • Competition • Ownership issues of the public and government generated data • Weather conditions		

Mapping to Needs and Trends	
Addresses (Trend)	Smart surveillance systems
Serves (Need)	Ensure availability of (real-time) information and knowledge Process and resource optimisation

	OPEN ARTFISH					
Description (& Link)	The toolkit comprises a generic database (OPEN ARTFISH) and a mobile phone application. The toolkit's primary objective is to facilitate the implementation of cost-effective and sustainable routine data collection, storage and analysis of data, using the appropriate statistical procedure (http://www.fao.org/3/a-i7680e.pdf).					
Type	Application					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	Agriculture, Fisheries, Forestry and Foods					
TRL	6		Implementation /Customisation Cost			Low
Ease of use	Low		Open License Availability			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	2	4	4	3	3	**3.2**
SWOT	Strengths • Putting information within reach and supporting the transition to sustainable agriculture • Strengthening political will and sharing policy expertise. • Bolstering public-private collaboration to improve smallholder agriculture. • Bringing knowledge to the field • Supporting countries prevent and mitigate risks and crisis			Weaknesses • Low TRL • Low ease of use		
	Opportunities • Achieve food security for all and make sure that people have regular			Threats • High rates of food insecurity due to population growth		

	access to enough high-quality food to lead active, healthy lives • Some of the world's highest rates of population growth are predicted to occur in areas that are highly dependent on the agriculture sector (crops, livestock, forestry and fisheries) and have high rates of food insecurity • Reducing rural poverty	• Climate change • Natural disasters
Mapping to Needs and Trends		
Addresses (Trend)	Big Data	
Serves (Need)	Cope with the production of huge volumes of data Comprehensive knowledge and information management	

6 Αποτελέσματα Ανάλυσης Πινάκων Παραρτήματος

Στο κεφαλαίο αυτό θα παρουσιαστούν τα αποτελέσματα από την ανάλυση των πινάκων αξιολόγησης του Παραρτήματος, ανά κατηγορία: Applications, Databases/Data sources, Frameworks/Methods/Models, Platforms/Portals, Software/Engines και Tools. Τέλος παρουσιάζεται η ετοιμότητα των εργαλείων διαχείρισης σε σχέση με το στάδιο κύκλου πολιτικής στο οποίο μπορούν να αξιοποιηθούν.

6.1 Αποτελέσματα αξιολόγησης ανά κατηγορία

Αποτελέσματα ανά κατηγορία: Για κάθε κατηγορία εργαλείων που αξιολογήθηκαν φαίνονται τα ποσοστά κατανομής τους βάσει:

- της Κλίμακας Τεχνολογικής Ετοιμότητας (TRL)
- της Ετοιμότητας Χρήσης/Ανάλυσης Δεδομένων Μεγάλης Κλίμακας
- της Ευκολίας Χρήσης, και
- της Ελεύθερης Άδειας Χρήσης.

6.1.1 Εφαρμογές (Applications)

Οι εφαρμογές κατανεμήθηκαν στην Κλίμακα Τεχνολογικής Ετοιμότητας (TRL) με δείκτες από 3 έως 9 σε ποσοστά που φαίνονται στο σχετικό διάγραμμα.

Στην Ετοιμότητα Χρήσης/Ανάλυσης Δεδομένων Μεγάλης Κλίμακας, οι περισσότερες εφαρμογές συγκέντρωσαν βαθμολογία από 2 έως 4, σε ποσοστά τα οποία φαίνονται στο σχετικό διάγραμμα.

Οι εφαρμογές εμφανίζουν υψηλή Ευκολία Χρήσης (56%).

Τέλος, οι εφαρμογές που αξιολογήθηκαν διαθέτουν Ελεύθερη Άδεια Χρήσης σε ποσοστό 78%, όπως φαίνεται παρακάτω.
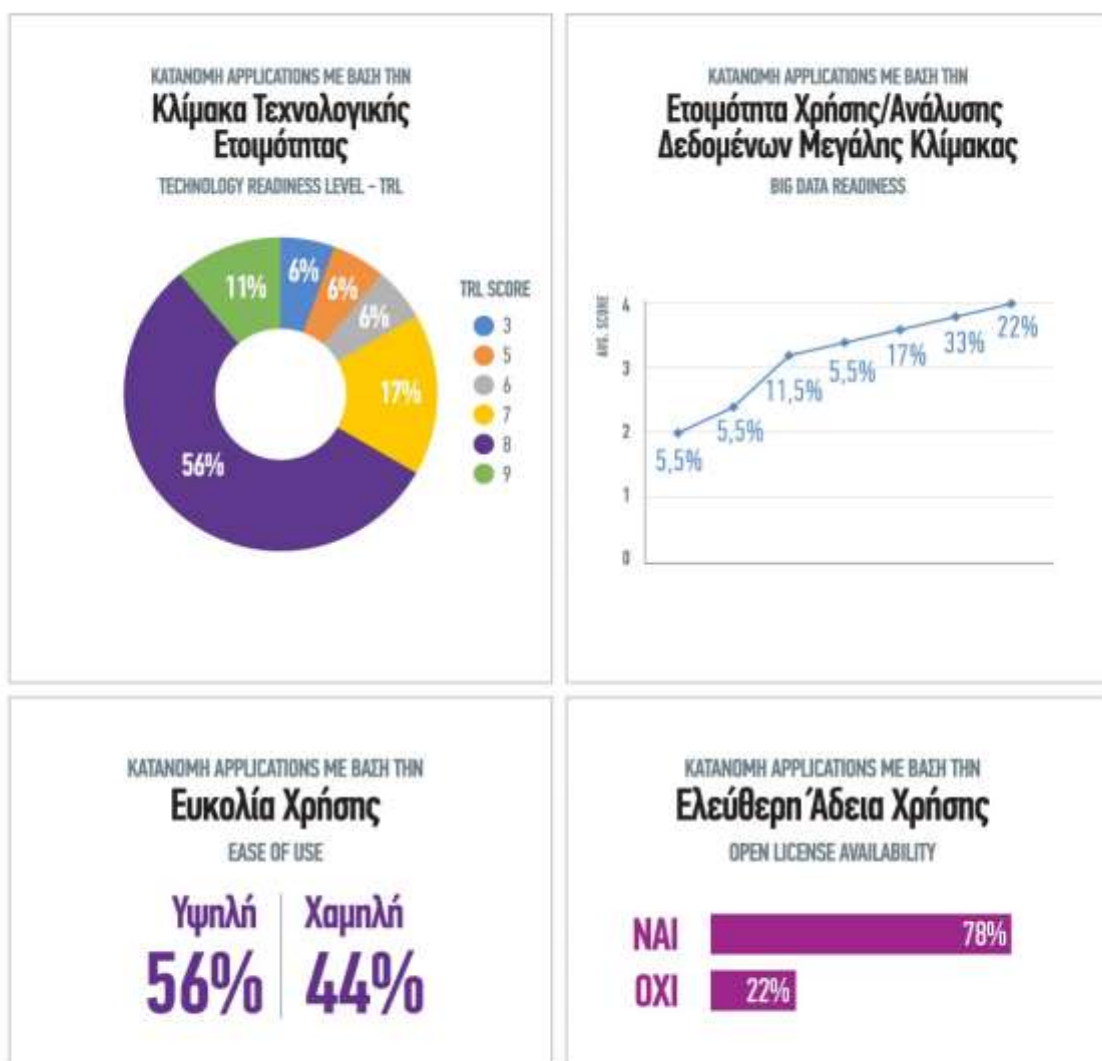
6.1.2 Βάσεις Δεδομένων /Πηγές Δεδομένων (Databases/Datasets)

Οι Βάσεις Δεδομένων οι οποίες αξιολογήθηκαν, κατανεμήθηκαν στην Κλίμακα Τεχνολογικής Ετοιμότητας (TRL) με δείκτες 7 και 8, σε ποσοστό 25% και 75% αντίστοιχα.

Στην Ετοιμότητα Χρήσης/Ανάλυσης Δεδομένων συγκέντρωσαν μέσο όρο πάνω από 3 (αξιολογήθηκε μικρός αριθμός).

Στην Ευκολία Χρήσης και την Ελεύθερη Άδεια Χρήσης, τα ποσοστά είναι 50%-50%, όπως φαίνεται στα σχετικά διαγράμματα (αξιολογήθηκε μικρός αριθμός).
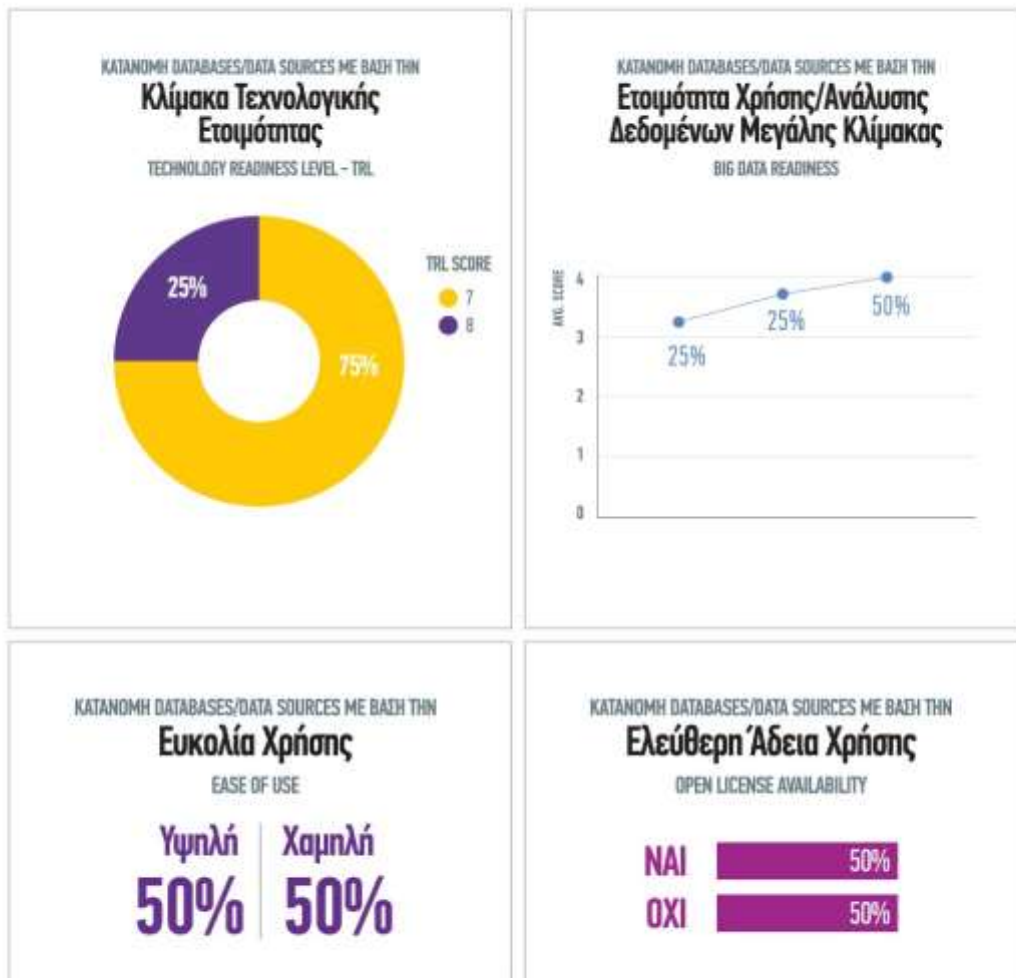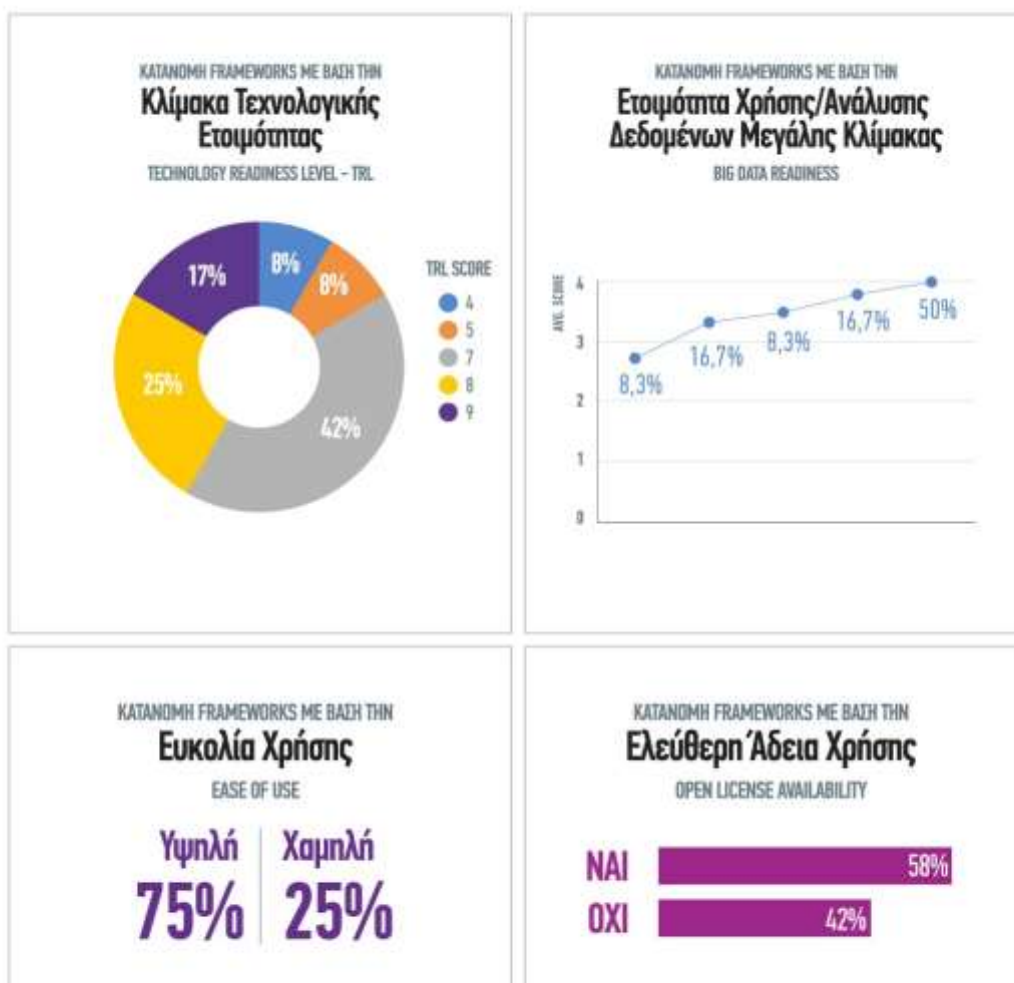
6.1.3 Πλαίσια/Μεθόδους/Μοντέλα (Frameworks/Methods/Models)

Στην κατηγορία αυτή, τα εργαλεία που αξιολογήθηκαν κατανεμήθηκαν στην Κλίμακα Τεχνολογικής Ετοιμότητας (TRL) με δείκτες από 4 έως 9.

Στην Ετοιμότητα Χρήσης/Ανάλυσης Δεδομένων Μεγάλης Κλίμακας, βλέπουμε ότι τα εργαλεία που αξιολογήθηκαν συγκέντρωσαν βαθμολογία μεταξύ 2,8 και 4, σε ποσοστά τα οποία φαίνονται στο διάγραμμα.

Στη συγκεκριμένη κατηγορία εμφανίζεται υψηλή Ευκολία Χρήσης (75%).

Η πλειονότητα των εφαρμογών που αξιολογήθηκαν διαθέτει Ελεύθερη Άδεια Χρήσης, σε ποσοστό 58%, όπως φαίνεται στο σχετικό διάγραμμα.
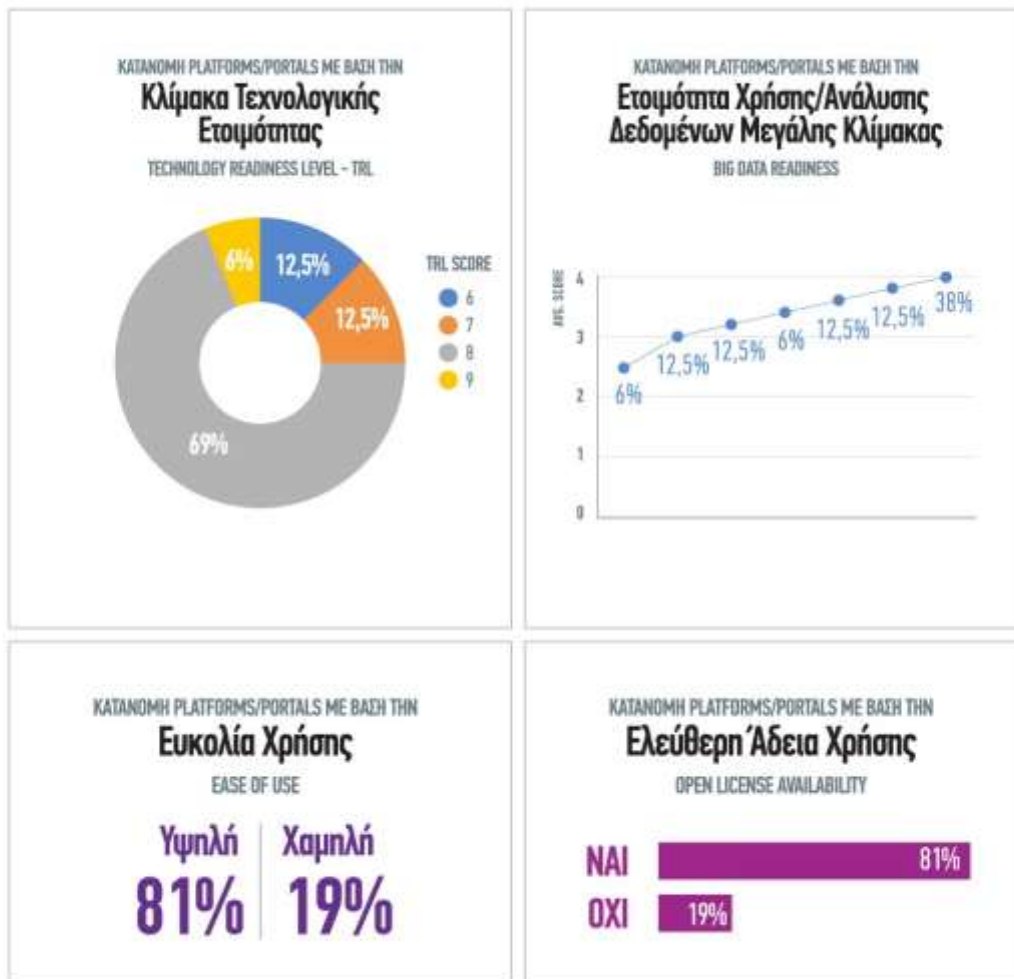
6.1.4 Πλατφόρμες/Πύλες (Platforms/Portals)

Στην κατηγορία αυτή, τα εργαλεία που αξιολογήθηκαν κατανεμήθηκαν στην Κλίμακα Τεχνολογικής Ετοιμότητας (TRL) με δείκτες από 6 έως 9.

Στην Ετοιμότητα Χρήσης/Ανάλυσης Δεδομένων Μεγάλης Κλίμακας, τα εργαλεία που αξιολογήθηκαν συγκέντρωσαν βαθμολογία από 2,6 έως 4.

Τα εργαλεία που αξιολογήθηκαν εμφανίζουν υψηλή Ευκολία Χρήσης, σε ποσοστό 81%, όπως φαίνεται στο σχετικό διάγραμμα.

Τέλος, οι Πλατφόρμες/Πύλες διαθέτουν υψηλή Ελεύθερη Άδεια Χρήσης, σε ποσοστό 81%.
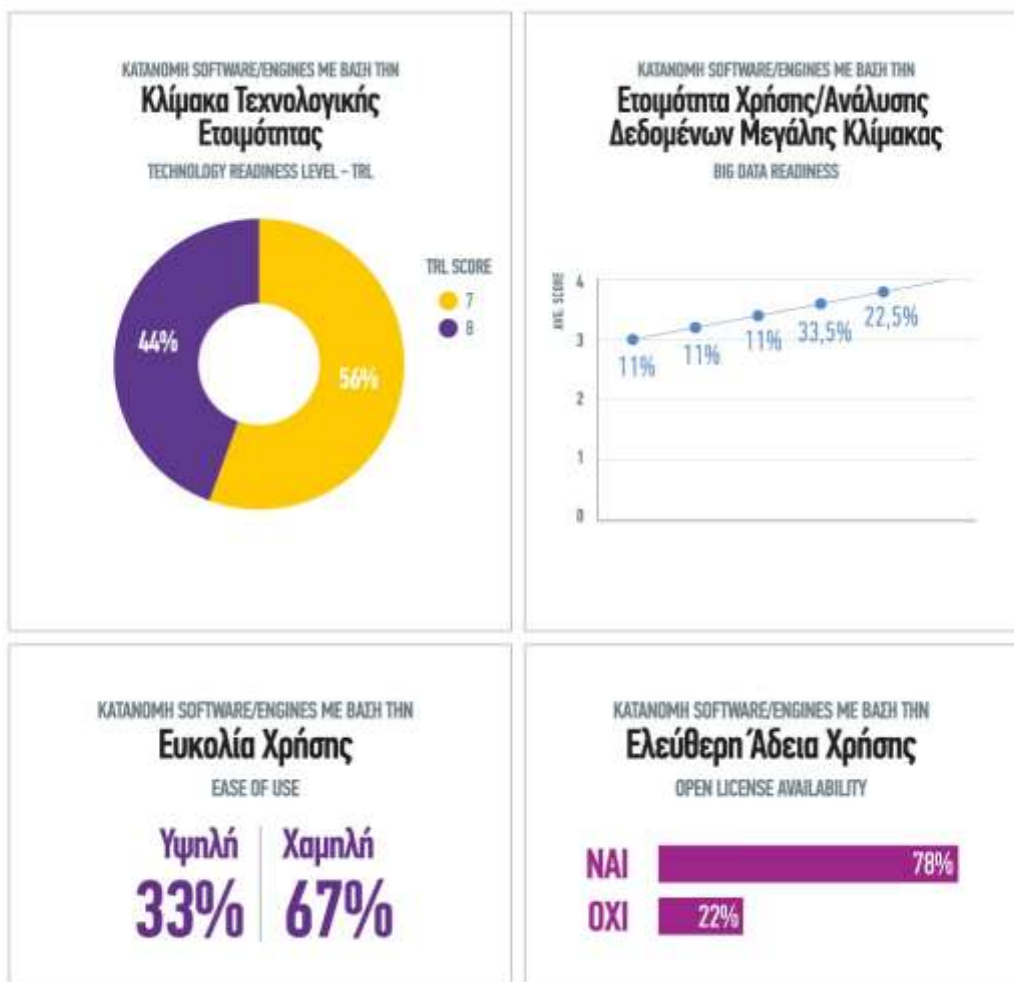
6.1.5 Λογισμικό/Μηχανές (Software/Engines)

Στην κατηγορία αυτή, τα εργαλεία που αξιολογήθηκαν κατανεμήθηκαν στην Κλίμακα Τεχνολογικής Ετοιμότητας (TRL) με δείκτες 7 και 8, σε ποσοστά 56% και 44% αντίστοιχα, όπως φαίνεται στο σχετικό διάγραμμα.

Στην Ετοιμότητα Χρήσης/Ανάλυσης Δεδομένων Μεγάλης Κλίμακας, βλέπουμε ότι τα εργαλεία που αξιολογήθηκαν συγκέντρωσαν σύνολο 3 και 4.

Επίσης εμφανίζουν χαμηλό ποσοστό Ευκολίας Χρήσης (33%), αντίθετα με όλες τις υπόλοιπες κατηγορίες εργαλείων που εξετάστηκαν.

Οι εφαρμογές οι οποίες αξιολογήθηκαν διαθέτουν Ελεύθερη Άδεια Χρήσης σε ποσοστό 78%, όπως φαίνεται στο σχετικό διάγραμμα.

6.1.6 Εργαλεία (Tools)

Στην κατηγορία αυτή, τα εργαλεία που αξιολογήθηκαν κατανεμήθηκαν στην Κλίμακα Τεχνολογικής Ετοιμότητας (TRL) με δείκτες από 6 έως 9.

Στην Ετοιμότητα Χρήσης/Ανάλυσης Δεδομένων Μεγάλης Κλίμακας, βλέπουμε ότι τα εργαλεία που αξιολογήθηκαν συγκέντρωσαν βαθμολογία από 2,8 έως 4.

Τα Εργαλεία εμφανίζουν υψηλή Ευκολία Χρήσης, σε ποσοστό 76%, όπως φαίνεται στο σχετικό διάγραμμα.

Τέλος, διαθέτουν Ελεύθερη Άδεια Χρήσης σε ποσοστό 82%.
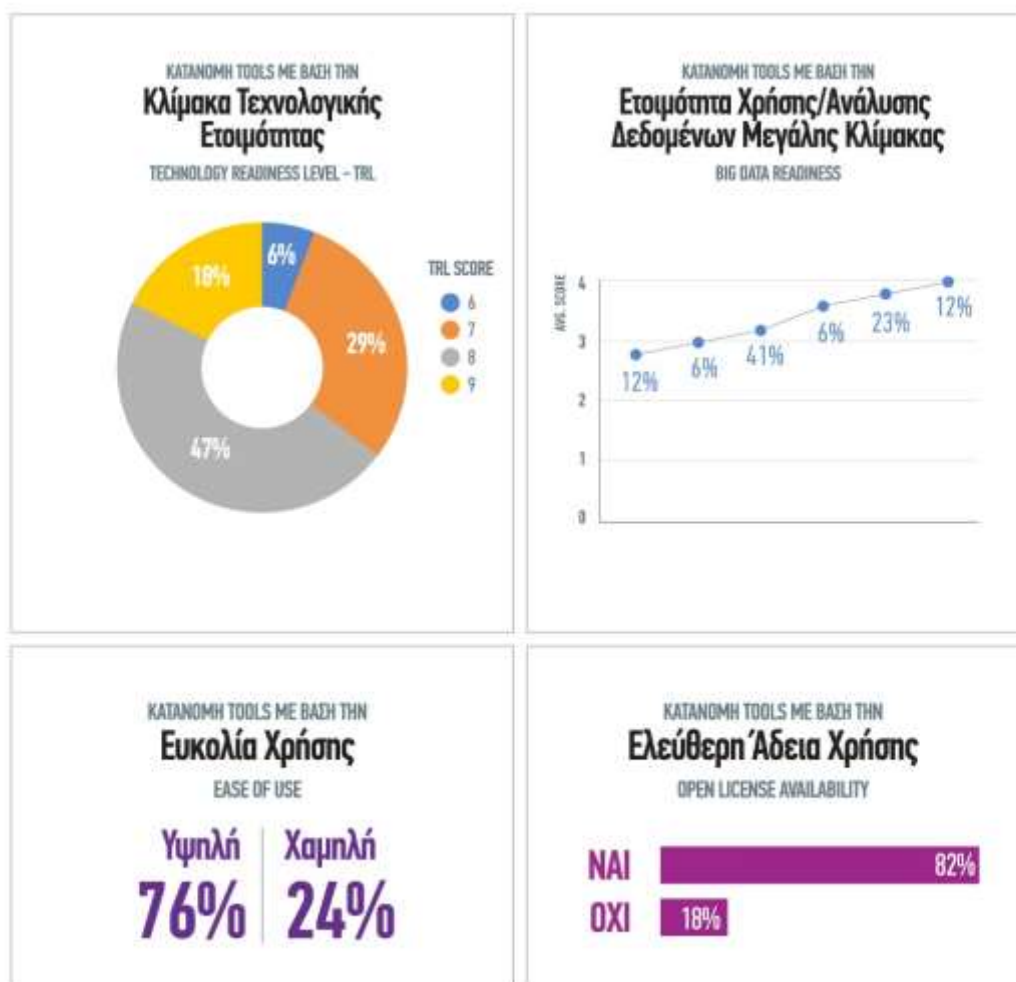
6.2 Αποτελέσματα στον Κύκλο Πολιτικής

Στην ενότητα αυτή παρουσιάζονται τα αποτελέσματα κατανομής των συνολικών εργαλείων που αξιολογήθηκαν ανά στάδιο του κύκλου πολιτικής όπου μπορούν να αξιοποιηθούν ή αξιοποιούνται ήδη

και τα ποσοστά τους με βάση την Κλίμακα Τεχνολογικής Ετοιμότητας ανά χρήση στον κύκλο πολιτικής.

Όπως βλέπουμε παρακάτω, το 2% αξιοποιείται στον Καθορισμό Ατζέντας, το 66% για το Σχεδιασμό και Ανάλυση Πολιτικής, το 22% στην Εφαρμογή της και το 10% στην Αξιολόγηση και Επίβλεψή της.

Στη συνέχεια παρουσιάζονται τα ποσοστά κατανομής του συνόλου των εργαλείων που αξιολογήθηκαν με βάση την Κλίμακα Τεχνολογικής Ετοιμότητας ανά στάδιο του Κύκλου Πολιτικής στο οποίο μπορούν να αξιοποιηθούν ή αξιοποιούνται ήδη.
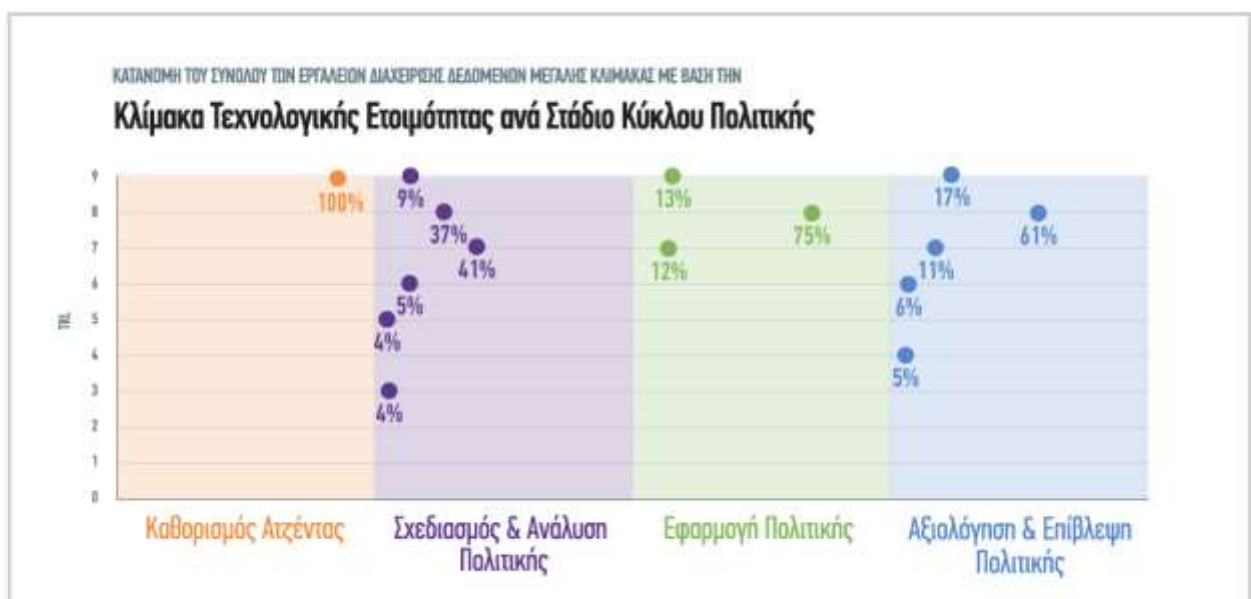
7 Συμπεράσματα

Μεγάλο μέρος της διπλωματικής αυτής εργασίας ήταν η δημιουργία πινάκων αξιολόγησης 144 εργαλείων διαχείρισης Δεδομένων Μεγάλης Κλίμακας (βλ. Παράρτημα) με βάση τα κριτήρια: Κλίμακα Τεχνολογικής Ετοιμότητας, Ετοιμότητα Χρήσης/Ανάλυσης Δεδομένων Μεγάλης Κλίμακας, Ευκολία Χρήσης, Ελεύθερη Άδεια Χρήσης, Κόστος Παραμετροποίησης/Υλοποίησης και Ανάλυση SWOT. Στις ενότητες 7.1 και 7.2 παρουσιάζονται τα συμπεράσματα όπως προέκυψαν από τα κριτήρια αξιολόγησης και την ανάλυση SWOT αντίστοιχα.

7.1 Συμπεράσματα από την ανάλυση πινάκων αξιολόγησης του Παραρτήματος

Σύνολο Εφαρμογών

Από την ανάλυση των αποτελεσμάτων των πινάκων αξιολόγησης των 144 εργαλείων διαχείρισης Δεδομένων Μεγάλης Κλίμακας, τα παρακάτω ξεχώρισαν λόγω μεγαλύτερης Τεχνολογικής Ετοιμότητας και Ευκολίας Χρήσης: Bechtle solutions,Wetter.com, Buienalarm, Opinion Crawl, Agrivi farm management, Workday, Diabetis Plus, Runtastic Applications, European Data Portal, The public safety assessment, €CONOMIA - The Monetary Policy Game, Thousand Visions, EU Open Data Portal, EtherSport: Blockchain Sports Prediction Platform, PETER SERVICE, MASAR, IBM Watson, Employment Ontario Geo Hub, Trackur, Meieraha, Datawrapper, 3D City Model, Interoperability Centre.

Ανά κατηγορία εργαλείων

Σύμφωνα με τα αποτελέσματα της αξιολόγησης ανά κατηγορία (παράγραφος 6.1), με βάση την Κλίμακα Τεχνολογικής Ετοιμότητας αλλά και την Ετοιμότητα Χρήσης/Ανάλυσης Δεδομένων Μεγάλης Κλίμακας, διαπιστώνεται ότι στην πλειονότητά τους τα εργαλεία που αξιολογήθηκαν στις κατηγορίες Εφαρμογές (Applications), Πλατφόρμες/Πύλες (Platforms/Portals) και Εργαλεία (Tools), είναι τεχνολογικά έτοιμα για χρήση και αξιοποιούνται ήδη σε επιχειρησιακό περιβάλλον, με το 67% των Εφαρμογών (Applications), το 75% στις Πλατφόρμες/Πύλες (Platforms/Portals) και το 65% στα Εργαλεία (Tools) να έχουν δείκτη Κλίμακας Τεχνολογικής Ετοιμότητας μεγαλύτερο του 7 και σύνολο δείκτη Ετοιμότητας Χρήσης/Ανάλυσης Δεδομένων Μεγάλης Κλίμακας, μεγαλύτερο του 3,5, σε ποσοστά, 89%, 81,5% και 82% αντίστοιχα.

Τα εργαλεία διαχείρισης τα οποία ανήκουν στις κατηγορίες Βάσεις Δεδομένων /Πηγές Δεδομένων (Databases/Datasets), Λογισμικό/Μηχανές (Software/Engines) και Πλαίσια/Μέθοδοι/Μοντέλα (Frameworks/Methods/Models) φαίνεται από την αξιολόγηση ότι στην πλειονότητά τους έχουν χαμηλότερο επίπεδο τεχνολογικής ετοιμότητας.

Από τις **Εφαρμογές (Applications),** που αξιολογήθηκαν, οι Bechtle solutions, DCAT-AP, ENAPWetter.com, Buienalarm, Opinion Crawl και Workday, διαπιστώνεται ότι σε σχέση με τις υπόλοιπες, είναι τεχνολογικά σε προχωρημένο επίπεδο, η εφαρμογή τους είναι εύκολη και η χρήση τους στο περιβάλλον του οργανισμού θα προσφέρει ποσοτικοποιήσιμη η μη αξία.

Στην κατηγορία **Βάσεις Δεδομένων/Πηγές Δεδομένων (Databases/Datasets)**, αξιολογήθηκε μικρός αριθμός εργαλείων, ωστόσο ξεχώρισε το European Data Portal, καθώς διαθέτει προχωρημένη τεχνολογική ετοιμότητα και ευκολία χρήσης.

Στα **Πλαίσια/Μεθόδους/Μοντέλα (Frameworks/Methods/Models)**, ξεχώρισαν τα Promises and Challenges of Big Data Computing in Health Sciences, The public safety assessment, €CONOMIA - The Monetary Policy Game, Thousand Visions , LEED και Energy Big Data: A Survey, καθώς παρουσιάζουν μεγαλύτερη τεχνολογική ετοιμότητα σε σχέση με τα υπόλοιπα εργαλεία της κατηγορίας αυτής.

Από την κατηγορία **Πλατφόρμες/Πύλες (Platforms/Portals)**, ξεχώρισαν τα EU Open Data Portal, EtherSport: Blockchain Sports Prediction Platform, Creativechain, PETER SERVICE, MASAR, UrbanSim, IBM Watson, Employment Ontario Geo Hub, καθώς διαθέτουν μεγαλύτερη τεχνολογική ωριμότητα και ετοιμότητα διαχείρησης/ανάλυσης δεδομένων από τις υπόλοιπες πλατφόρμες/ πύλες αλλα και Ελεύθερη Αδεια Χρήσης.

Οι **Βέλτιστες Πρακτικές (Best Practices)** στην πλειονότητά τους παρουσίασαν θετικά αποτελέσματα από την εφαρμογή τους, με εξαίρεση το Troubled family program, από την αξιολόγηση του οποίου πιθανολογείται ότι υπήρξαν λάθη στην εφαρμογή του και στην ανάλυση των αποτελεσμάτων που προέκυψαν από αυτή.

Από την κατηγορία των **Εργαλείων (Tools)** ξεχώρισαν τα Meieraha, 3D City Model, Qlik, καθώς διαθέτουν μεγαλύτερη τεχνολογική ετοιμότητα και ευκολία χρήσης.

Τέλος, από τις **Περιπτώσεις Εφαρμογής (Use Cases)** ξεχώρισαν, λόγω της επιτυχούς χρήσης των εργαλείων ανάλυσης Δεδομένων Μεγάλης Κλίμακας και της υψηλής απόδοσής τους, τα παρακάτω: Google ECO Projects, Big data analytics: The case of the social security administration, Qlik, e- Social Security Interoperability Platform, Interoperability Centre, Smart Construction Administration, Madrid Participa, Maryland Budget Game, OpenGov.gr, Opinion Space, Crowdsourcing Through Social Media-The Icelandic Constitution Case, DEMOS Plan, Watson Super Computer Project.

Χρήση στον Κύκλο Πολιτικής

Όσον αφορά τη χρήση στον κύκλο πολιτικής, το μεγαλύτερο ποσοστό των εργαλείων διαχείρισης Δεδομένων Μεγάλης Κλίμακας τα οποία αξιολογήθηκαν, μπορούν να αξιοποιηθούν στο στάδιο Σχεδιασμού και Ανάλυσης της Πολιτικής , σε ποσοστό 66%, ενώ στα υπόλοιπα στάδια το ποσοστό αυτό είναι πολύ χαμηλότερο (το 22% στην Εφαρμογή Πολιτικής, το 10% στην Επίβλεψη και Αξιολόγηση της Πολιτικής και μόλις το 2% στον Καθορισμό της Ατζέντας.)

Στο στάδιο Καθορισμού της Ατζέντας του κύκλου πολιτικής ξεχώρισαν, λόγω της Τεχνολογικής Ετοιμότητάς τους, η χρήση των: Meieraha και Interoperability Centre, τα οποία θα βοηθήσουν στην καλύτερη αποτύπωση και επιλογή προκλήσεων που απαιτούν λύση. Στο στάδιο Σχεδιασμού και Ανάλυσης της Πολιτικής ξεχώρισε η χρήση των: Wetter.com, Buienalarm, Opinion Crawl, Diabetis Plus, Runtastic Applications, Thousand Visions, EU Open Data Portal, MASAR, IBM Watson, Employment Ontario Geo Hub, Trackur, Datawrapper. Τα εργαλεία αυτά θα βοηθήσουν στην αποτύπωση των βημάτων που αναμένεται να πραγματοποιηθούν κατά τη φάση υλοποίησης μιας πολιτικής.

Στο στάδιο Εφαρμογής της Πολιτικής ξεχώρισαν, λόγω της Τεχνολογικής Ετοιμότητας και της Ευκολίας Χρήσης τους, τα: Agrivi farm management, Workday, The public safety assessment, €CONOMIA - The Monetary Policy Game, EtherSport: Blockchain Sports Prediction Platform, PETER SERVICE. Τα εργαλεία αυτά θα βοηθήσουν στη συγκέντρωση δεδομένων κατά τη φάση εφαρμογής μιας πολιτικής, που αργότερα θα αξιοποιηθούν στην αξιολόγηση της αποτελεσματικότητάς της. Τέλος, στην Αξιολόγηση του Κύκλου Πολιτικής ξεχώρισε η χρήση των: Bechtel solutions, European Data Portal και 3D City Model. Τα εργαλεία αυτά κάνουν εφικτή την αξιολόγηση κάθε φάσης του κύκλου πολιτικής.

7.2   Συμπεράσματα που προκύπτουν από την Ανάλυση SWOT

Η εφαρμογή των εργαλείων διαχείρισης Δεδομένων Μεγάλης Κλίμακας που αξιολογήθηκαν στον Κύκλο Χάραξης Πολιτικής παρουσιάζει τα εξής:

Ισχυρά σημεία

Τα εργαλεία διαχείρισης Δεδομένων Μεγάλης Κλίμακας που αξιολογήθηκαν προσφέρουν αξιόπιστη πληροφορία σε υψηλή ταχύτητα, δεδομένου ότι με τη χρήση εργαλείων Business Intelligence, η συσχέτιση δεδομένων γίνεται αυτόματα με αλγόριθμους μηχανικής μάθησης (machine learning algorithms), τα δεδομένα παρατηρούνται στο σύνολο τους και τα αποτελέσματα της ανάλυσής τους

είναι άμεσα διαθέσιμα. Παρέχουν έτσι τη δυνατότητα ταχύτερης δράσης προσαρμοσμένης στις νέες συνθήκες, γεγονός που αποτελεί πλεονέκτημα στη χρήση τους στον κύκλο χάραξης πολιτικής.

Προσφέρουν στον οργανισμό τη δυνατότητα να βελτιστοποιήσει τις λειτουργικές του διαδικασίες, να προβλέψει προκλήσεις και τάσεις, αυξάνοντας έτσι την ετοιμότητά του.

Επιτρέπουν την αξιολόγηση σε κάθε στάδιο του κύκλου πολιτικής, δίνοντας έτσι τη δυνατότητα εντοπισμού εναλλακτικών πολιτικών που προκύπτουν από σενάρια αλλά και την αλλαγή πολιτικής σε προηγούμενα στάδια, βελτιώνοντας έτσι την αποτελεσματικότητα της πολιτικής.

Διαθέτουν Άδεια Ελεύθερης Χρήσης πράγμα το οποίο βοηθά στην ενσωμάτωσή τους και την παραμετροποίησή τους στο περιβάλλον του οργανισμού.

Προοπτικές/Ευκαιρίες

Με τη χρήση των εργαλείων Δεδομένων Μεγάλης Κλίμακας στον κύκλο χάραξης πολιτικής, μια κυβέρνηση μπορεί να λάβει γρήγορες και εύστοχες αποφάσεις, μειώνοντας έτσι το χρονοδιάγραμμα που παραδοσιακά απαιτείται για τη δημιουργία, την αξιολόγηση και την εφαρμογή μιας πολιτικής.

Η κυβέρνηση, μέσω προηγμένων αναλύσεων Δεδομένων Μεγάλης Κλίμακας, μπορεί ταχύτερα να αξιολογήσει πληροφορίες που σχετίζονται με την καθημερινότητα των πολιτών και τις ανάγκες τους, και να αξιοποιήσει τα συμπεράσματα για να διαμορφώσει πολιτικές που ανταποκρίνονται στις ανάγκες της κοινωνίας.

Όσον αφορά την οικονομία, η ανάπτυξη των επιχειρήσεων εξαρτάται ευρέως από τις πολιτικές που εφαρμόζει η εκάστοτε κυβέρνηση. Για τη χάραξη αυτών των πολιτικών, η κυβέρνηση απαιτεί αντίστοιχα μεγάλο όγκο πληροφοριών από κάθε τομέα της αγοράς, κάτι το οποίο είναι εφικτό με τη χρήση ανάλυσης Δεδομένων Μεγάλης Κλίμακας. Η ανάλυση αυτή μπορεί να βελτιώσει τις επιχειρηματικές πολιτικές και να επιτρέψει στην κυβέρνηση να ενισχύσει την οικονομία γρήγορα και με βιώσιμο τρόπο.

Προκλήσεις/Απειλές

Προστασία Προσωπικών Δεδομένων: Η προστασία των προσωπικών δεδομένων είναι απαραίτητη, καθώς η ισορροπία μεταξύ της πιθανής αξίας που προκύπτει από τη χρήση/ανάλυση Δεδομένων Μεγάλης Κλίμακας και του ενδεχόμενου απειλής της ιδιωτικότητας και άλλων αξιών είναι εύθραυστη. Η συγκέντρωση της πληροφορίας για τη ζωή, τις απόψεις και τις συναλλαγές των πολιτών, είναι μεγάλη και καθιστά εύκολη την πρόβλεψη συμπεριφορών και την αναγνώριση τάσεων της κοινωνίας με μεγάλη ακρίβεια. Αυτό δημιουργεί ερωτήματα ως προς τον τρόπο με τον οποίο μπορεί να διασφαλιστεί η σωστή χρήση της πληροφορίας αυτής, αλλά και να προστατευτεί η ιδιωτικότητα. Τα Δεδομένα Μεγάλης Κλίμακας έχουν πολλές προοπτικές, ωστόσο υπό συγκεκριμένες συνθήκες μπορεί να αποτελέσουν απειλή για την ελευθερία του πολίτη και τη δημοκρατία.

Για την καλύτερη δυνατή αξιοποίηση των Δεδομένων Μεγάλης Κλίμακας, απαιτείται η ελεύθερη μεταφορά δεδομένων μεταξύ των τμημάτων του οργανισμού, κάτι που αποτελεί πρόκληση, λόγω της ποικιλομορφίας των δεδομένων, της διαφοράς λογισμικού και εξοπλισμού που χρησιμοποιείται στα διάφορα τμήματα του οργανισμού, των διαφορετικών μορφών αποθήκευσης δεδομένων, των υπαρχόντων κανονισμών και της έλλειψης διαδικασιών τυποποίησης (standardization processes).

Τέλος, βασικές προκλήσεις για τη χρήση των εργαλείων που αξιολογήθηκαν αποτελούν ο σκεπτικισμός των πολιτών, η ορθότητα και ποιότητα των δεδομένων και το ενδεχόμενο αποκλεισμού ορισμένων ομάδων (πολιτών μη εξοικειωμένων με την τεχνολογία).

Ανακεφαλαίωση

Σκοπός της παρούσας διπλωματικής εργασίας ήταν η διερεύνηση των προοπτικών αξιοποίησης των Δεδομένων Μεγάλης Κλίμακας (Big Data) από το δημόσιο τομέα, με στόχο τη βελτίωση της αποτελεσματικότητας και την τεκμηρίωση της διαδικασίας χάραξης πολιτικής. Για το σκοπό αυτό διερευνήθηκαν σε βάθος 144 εργαλεία διαχείρισης Δεδομένων Μεγάλης Κλίμακας και εξήχθησαν χρήσιμα συμπεράσματα σχετικά με την ετοιμότητά τους για επωφελή χρήση στο δημόσιο τομέα. Κατέστη έτσι σαφές ότι η καλύτερη οργάνωση και αξιοποίηση ήδη ανεπτυγμένων εργαλείων στο δημόσιο τομέα, μέσω της διαλειτουργικότητας, προσφέρει σημαντικό πεδίο περαιτέρω έρευνας και ανάλυσης.

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Παράρτημα: Πίνακες Αξιολόγησης

I.1 Applications

<table>
<tr><td colspan="7" align="center">Bechtle solutions</td></tr>
<tr>
<td>Description (& Link)</td>
<td colspan="6">With its own locations in 14 European countries and with partnerships on all continents, the development of international IT solutions is part of Bechtle's day-to-day business. This includes leading customers safely through the complex challenges of European and global procurement and providing the right IT solution with great flexibility. Official partner for NATO Cyber Defence (https://www.bechtle.com/it-services/managed-services/managed-network-and-security).</td>
</tr>
<tr>
<td>Type</td>
<td colspan="6">Application/ Use Case</td>
</tr>
<tr>
<td>Origin</td>
<td colspan="6">Private Sector</td>
</tr>
<tr>
<td>Policy Cycle Stage (s)</td>
<td colspan="6">Policy Monitoring and Evaluation</td>
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<tr>
<td>Policy Domain (s)</td>
<td colspan="6">Foreign Issues and Defence</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td colspan="4">Implementation /Customisation Cost</td>
<td>Low</td>
</tr>
<tr>
<td>Ease of use</td>
<td>High</td>
<td colspan="4">Open License Availability</td>
<td>Yes</td>
</tr>
<tr>
<td>Big Data Readiness</td>
<td>Feasibility</td>
<td>Reasonability</td>
<td>Value</td>
<td>Integrability</td>
<td>Scalability</td>
<td>Total Score</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3.8</td>
</tr>
<tr>
<td>SWOT</td>
<td colspan="3">

Strengths

- One of the largest providers of IT products, solutions and managed services in Germany, Austria and Switzerland.
- E-commerce subsidiaries in 14 countries
- Leading value-added reseller in Europe: More than 75,000 customers from various industries and the public sector rely its vendor-independent offering spanning the entire IT lifecycle.
- Diversified business.
- Sustainable business model
- Decentralised organisation
- Financial stability
- Strong corporate culture
- Motivated staff
- Extensive experience and expertise in future-proof IT architecture,
- Strong competency in acquisitions
- Integration of products and services

</td>
<td colspan="3">

Weaknesses

- Increasing pace of technological change and higher level of technical sophistication needed.
- Data security
- Integration with Existing Applications

</td>
</tr>
</table>

	• Quickly and flexibly respond to evolving business requirements. • Ability to adapt to new technologies. • Future-driven IT architectures	
	Opportunities • Increasing demand of cloud based services: mobile traffic, the Internet of Things (IoT), streaming services and other future-driven technologies all generate enormous amounts of data. Having recognised the new reality, numerous companies have already transitioned to the cloud. • Hybrid and private clouds • Developing international IT solutions	Threats • Increasing pace of technological change and higher level of technical sophistication • Increasing competition • Threats posed by malware, • Cyber attacks • Organizations are hesitant to let sensitive business data leave their own data centres

Mapping to Needs and Trends	
Addresses (Trend)	Next Generation of BI and Data Analytics platforms
Serves (Need)	Deeper understanding of IT potential and IT processes

DCAT Application Profile for Data Portals in Europe (DCAT-AP)						
Description (& Link)	DCAT-AP enables the exchange of dataset descriptions between portals, thus increasing the access to and reusability of datasets (https://ec.europa.eu/isa2/sites/isa/files/leaflet_dcat-ap_lr_v13.pdf).					
Type	Application/ Use Case					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Monitoring and Evaluation					
Policy Domain (s)	Foreign Issues and Defence					
TRL	8		**Implementation /Customisation Cost**			Low
Ease of use	High		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	3	4	4	3	3	**3.6**
SWOT	Strengths • Solutions are open source and available free of charge to any interested public administration in Europe. • Data catalogues can describe their dataset collections using a standardised description, while keeping their own system for documenting and storing them. • Content aggregators, such as the European Data Portal, can easily aggregate such descriptions into a single point of access. • Data consumers can more easily search and find datasets by using the same parameters on different portals thanks to a harmonised vocabulary.			Weaknesses • Focus mainly on public administration in Europe • Integration with existing applications		
	Opportunities • User-centric design • Increasing number of data portals • Magnitude of available datasets			Threats • Competition • Data privacy		
Mapping to Needs and Trends						
Addresses (Trend)	Next Generation of BI and Data Analytics platforms					
Serves (Need)	Deeper understanding of IT potential and IT processes					

ENAP					
Description (& Link)	ENAP Holding acknowledges Sustainable Development as one of the four cornerstones of its Strategic Plan and channels its value proposition to becoming a company integrated with the community and environmentally accountable. Within the framework of the impact assessment, it is necessary to examine whether the effects of a project correspond to sustainable development in accordance with the German legislation. The central reference point for the audit is the German Sustainability Strategy with its goals and management rules (https ://www.enap.bund.de/intro).				
Type	Application				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Monitoring and Evaluation				
Policy Domain (s)	Environment & Energy				
TRL	8	**Implementation /Customisation Cost**		Low	
Ease of use	High	**Open License Availability**		Yes	

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	3	3	**3.6**

SWOT	Strengths	Weaknesses

	• Has established a Policy of Corporate Sustainability
	 • The policy establishes the framework for the management of Sustainable Development, based on international standards and certification protocols.
	 • Ensures:
	    o Compliance with legislation
	    o Ethical behaviour
	    o Shared creation of value
	    o Occupational health and safety
	    o Contribution to society
	    o Involvement in the development of the community
	    o Customer's satisfaction
	    o Fair operational and labour practices
	    o Respect to human rights and safe
	    o Socially and environmentally responsible operations, consistent with a preventive and eco-efficiency approach.
		• Demand for computing continues to skyrocket, with millions more people coming online every month, and data centre capacity continues to expand to meet this need
		 • State deregulation

	Opportunities	Threats
	- Sustainable development - Create awareness and organize the companies in managing their business in a socially responsible manner, supporting their leaders and collaborators to implement the logic of Sustainable Development into their strategy. - Strengthen inter-relationships with the stakeholders in the areas where it operates under shared guidelines, previously defined and known by everyone involved.	- Challenges posed by climate change - Population growth - Humanity is consuming natural resources at an astonishing rate. During the 20th century, global raw material use rose at about twice the rate of population growth. - State deregulation

Mapping to Needs and Trends	
Addresses (Trend)	Performance measurement
Serves (Need)	Development of domain specific target and indicator systems

Wetter.com					
Description (& Link)	Wetter.com is an App, which collects and shows weather information globally. It's a classic example of the use of Big Data in our society (https://www.wetter.com/).				
Type	Application				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Environment & Energy				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	24x7 provider of weather forecasts, warnings, hazards etc. - Available mobile apps - Up-to-date weather alerts, precipitation radar, bioweather, thematic weather maps, satellite imagery, HD live webcams, unique weather-related services, daily newly produced weather videos and the 24-hour "wetter.com TV" - Number one online weather portal in Germany, Switzerland and Austria.	Site-app traffic is not consistent, because as long as weather is normal people simply seem to ignore weather.
	Opportunities	Threats
	- Social media presence - User-friendly interface.	High competition. There are lots of global weather forecasting sites-apps.

Mapping to Needs and Trends	
Addresses (Trend)	Predictive Analytics
Serves (Need)	Ensure availability of (real-time) information and knowledge

Buienalarm					
Description (& Link)	An App, which collects data and shows weather related information (e.g. duration of rain showers) but also predicts the weather in the Netherlands (http://www.buienalarm.be).				
Type	Application				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Environment & Energy				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	4	4	4	4	**3.8**
SWOT	Strengths • Easy to use • User-friendly interface • Provides weather related information (e.g. duration of rain showers) • Predicts the weather		Weaknesses • Web site-apps' traffic is not consistent, because as long as weather is normal, people simply seem to ignore weather. •		
	Opportunities • Include articles or info related to weather such as travel tips, in order to attract more hits.		Threats • High competition. There are lots of global weather forecasting sites-apps.		
Mapping to Needs and Trends					
Addresses (Trend)	Predictive Analytics				
Serves (Need)	Ensure availability of (real-time) information and knowledge				

They say sentiment analysis API (Preceive)						
Description (& Link)	The analysis is powered by a hybrid Natural Language Processing (NLP) engine that runs highly sophisticated linguistic algorithms and Machine Learning classifiers. The engine is wrapped in a platform-agnostic REST API service that enables your software applications, workflows, and services to receive rich TheySay JSON metadata with minimal integration work (http ://www.theysay.io/product/preceive/).					
Type	Application					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	All					
TRL	5		**Implementation /Customisation Cost**			Low
Ease of use	Low		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	2	2	3	1	4	**2.4**

SWOT	Strengths	Weaknesses
	• Helps businesses make sense of human signals in ever-increasing data • Provides the ability to extract sensitive human signals from masses of raw, cold text data – creating real value, clarity, and time-critical intelligence for shaping a business.	• Low TRL • Low ease of use • Ownership of Data • Focus mainly on large enterprises
	Opportunities	Threats
	• Shortcomings of existing approaches to computational sentiment and emotion analysis	• Low ease of use and TRL • Rest API security risks • Data • Ownership of Data

Mapping to Needs and Trends	
Addresses (Trend)	Machine Learning
Serves (Need)	Process and resource optimization

Google Fusion Tables					
Description (& Link)	Google Fusion tables is a web application for data analysis, large data-set visualisation, and mapping. It allows users to easily create data visuals and publish them online instantly with provided subsets and an easy format similar to online files. It further supports the ability to work through larger data sets including filtering, sorting, summarising them in collaboration with other users online. It enables users to share and combine multiple tables between users and publicly available data and merge them into one. The application is still experimental and its API has released V2 (https://support.google.com/fusiontables/answer/2571232).				
Type	Web Application				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	All				
TRL	3	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	1	2	2	1	4	**2**

SWOT	Strengths Provides the ability to: • Find public data • Import your own data • Export your data as CSV or KML. • Visualize your data instantly • Publish your visualization on other web properties • Host your data online and stay in control	Weaknesses • Experimental app • Low ease of use
	Opportunities • High demand on data analysis apps • User friendly interface	Threats • Experimental app • Low ease of use and TRL

Mapping to Needs and Trends	
Addresses (Trend)	Big Data
Serves (Need)	Cross-linked information exchange

Opinion Crawl		
Description (& Link)	Opinion Crawl is an online sentiment analysis for current events, companies, products, and people. Opinion Crawl allows visitors assess Web sentiment on a topic – a person, an event, a company or a product. The user can enter a topic and get an ad-hoc sentiment assessment of it. For each topic, the user gets a pie chart showing current real-time sentiment, a list of the latest news headlines, a few thumbnail images, and a tag cloud of key semantic concepts that the public associates with the subject. The concepts allow to see what issues or events drive the sentiment in a positive or negative way. For more in-depth assessment, the web crawlers would find the latest published content on many popular subjects and current public issues and calculate sentiment for them on ongoing basis. Then the blog posts would show the trend of sentiment over time, as well as the Positive-to-Negative ratio (http://opinioncrawl.net/, www.opinioncrawl.com/).	
Type	Online Application	
Origin	Private Sector	
Policy Cycle Stage (s)	Policy Design and Analysis	
Policy Domain (s)	All	
TRL	8	**Implementation /Customisation Cost** Low
Ease of use	High	**Open License Availability** Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	3	4	4	4	4	**3.8**

SWOT	Strengths	Weaknesses
	• Many years of experience on use of proprietary techniques of text mining, semantic analysis, and sentiment analysis. • The user will find the latest published content on many popular subjects and current public issues and calculate sentiment for them on ongoing basis	• Poorly designed website interface • Errors on http://opinioncrawl.net site
	Opportunities	Threats
	• Provide real time sentiment analysis • Ability to share-save results of analysis.	• Poorly designed website interface • Errors on the search • Data privacy

Mapping to Needs and Trends	
Addresses (Trend)	Next Generation of BI and Data Analytics platforms
Serves (Need)	Ensure availability of (real-time) information and knowledge

Cool Farm Tool Water					
Description (& Link)	Cool Farm Tool water metrics enable farmers quickly and easily account for their crops' water needs and gain insight into better practice (https://coolfarmtool.org/coolfarmtool/water/).				
Type	Web Application				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Agriculture, Fisheries, Forestry and Foods				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**20**

SWOT	Strengths	Weaknesses
	• Enables farmers to quickly and easily account for their crops' water needs and gain insight into better practice. • Minimal data entry maximum output (the tool combines just a few additional user inputs with global data sets for crop, soil and climate data, to provide crop water estimates). • Efficient water use	• Not providing calculations to inform water catchment policies
	Opportunities	Threats
	• Ability to compare crop water footprints to water scarcity/availability in the region. • Include more crops and more management options to consider. • Provide calculations to inform water catchment policies. • Add-ons	• Competition • Ownership issues of the public and government generated data • Weather conditions

Mapping to Needs and Trends	
Addresses (Trend)	Smart surveillance systems
Serves (Need)	Ensure availability of (real-time) information and knowledge Process and resource optimisation

Agrivi farm management						
Description (& Link)	Helps farmers plan, monitor and analyse all activities on their farm easily (http://www.agrivi.com/en/farm-management). Based on best-practice production processes for more than 60 crops, Agrivi app guides farmers to improve their production and increase productivity.					
Type	Web Application					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	Agriculture, Fisheries, Forestry and Foods					
TRL	8		**Implementation /Customisation Cost**			High
Ease of use	High		**Open License Availability**			No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	3	**3.8**
SWOT	Strengths • Its features include project-oriented farm management with a simple and fast way of planning, monitoring and tracking all farm activities and inputs usage • Advance sales and expense tracking ensures taking control over farm finances, inventory management with low inventory alarms removes delays in production caused by lack of inputs • Weather monitoring with detailed 7-day weather forecast and 3-year weather history for each field • Smart disease risk detection alarms. • Received the title of the World's Best Startup in 2014 by winning 1st prize in the World Startup Competition held in Seoul, Korea, in November that year • High TRL			Weaknesses • Lack of awareness regarding suitable agricultural methods among the farmers • High implementation/ customization cost • No open license availability		
	Opportunities • Integrated automated robotics, e.g. computer controlled stand-alone systems that milk the dairy cattle without human labour			Threats • Climate change is putting pressure on the resources we all depend on, increasing risks associated with natural, but also insect pest and disease which threaten 20-40% of all yield worldwide		

		• World population growth. By 2050 global food production will need to increase by over 60% if we are to feed the entire population
	94	
Mapping to Needs and Trends		
Addresses (Trend)	Smart Work Smart surveillance systems	
Serves (Need)	Process and resource optimisation	

OPEN ARTFISH					
Description (& Link)	The toolkit comprises a generic database (OPEN ARTFISH) and a mobile phone application. The toolkit's primary objective is to facilitate the implementation of cost-effective and sustainable routine data collection, storage and analysis of data, using the appropriate statistical procedure (http://www.fao.org/3/a-i7680e.pdf).				
Type	Application				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Agriculture, Fisheries, Forestry and Foods				
TRL	6	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	2	4	4	2	2	**3**

SWOT	Strengths • Putting information within reach and supporting the transition to sustainable agriculture • Strengthening political will and sharing policy expertise. • Bolstering public-private collaboration to improve smallholder agriculture. • Bringing knowledge to the field • Supporting countries prevent and mitigate risks and crisis	Weaknesses • Low TRL • Low ease of use
	Opportunities • Achieve food security for all and make sure that people have regular access to enough high-quality food to lead active, healthy lives • Some of the world's highest rates of population growth are predicted to occur in areas that are highly dependent on the agriculture sector (crops, livestock, forestry and fisheries) and have high rates of food insecurity • Reducing rural poverty	Threats • High rates of food insecurity due to population growth • Climate change • Natural disasters

Mapping to Needs and Trends	
Addresses (Trend)	Big Data

Serves (Need)	Cope with the production of huge volumes of data
	Comprehensive knowledge and information management

FishstatJ					
Description (& Link)	FishStatJ is a Java-based desktop application which provides users with access to a variety of fishery statistical datasets. It consists of a main application and several workspaces that include the datasets. FishStatJ key features are: (1) statistical datasets browsing, data mining, charting and reporting; (2) filtering, grouping and aggregation through hierarchical dimensions (https://data-bioeconomy.jrc.ec.europa.eu/dataset/beofao-fao-fishery_global_capture_production/resource/17ae4f93-07ff-40fb-a1e1-44c3992fb4bf).				
Type	Web application				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Monitoring and Evaluation				
Policy Domain (s)	Agriculture, Fisheries, Forestry and Foods				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	3	4	**3.8**

SWOT	Strengths • Statistical datasets browsing • Data mining, charting and reporting • Filtering, grouping and aggregation through hierarchical dimensions	Weaknesses • Low ease of use • Poorly designed interface.
	Opportunities • Some of the world's highest rates of population growth are predicted to occur in areas that are highly dependent on the agriculture sector and have high rates of food insecurity • Reducing rural poverty • Integration with other apps	Threats • Climate change • Natural disasters
Mapping to Needs and Trends		
Addresses (Trend)	Big Data	
Serves (Need)	Cope with the production of huge volumes of data	

Workday					
Description (& Link)	Workday provides enterprise cloud applications for financial management, human capital management (HCM), payroll, student systems, and analytics (https://www.workday.com/en-us/industries/government.html#?q).				
Type	Web application				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Economy and Finance, Employment & Social Security				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	• Global presence • Better decision-making with real-time analytics • Continuous innovation and adoption • Reduces errors • Rapid deployment and faster time to value • Increase productivity and user adoption with an intuitive mobile and desktop interface • More time to focus on strategic initiatives • Standardize on industry best practices with more than 300 proven business processes • Easily configure the system for specific business needs	• Integration with existing apps-technologies.
	Opportunities	Threats
	• Outdated technologies on the public sector • Hybrid and private clouds • Increasing pace of technological change and higher level of technical sophistication.	• DDoS and cyber-attacks • Unknown Data Locations. • Ownership of Data. • Integration with Existing Applications • Increasing pace of technological change and higher level of technical sophistication.

Mapping to Needs and Trends	
Addresses (Trend)	Cloud Computing
Serves (Need)	Ensure availability of (real-time) information and knowledge

World in figures					
Description (& Link)	Provides access to over 100 country ranking indices (https://worldinfigures.com/#close).				
Type	Web application				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Economy & Finance				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	4	4	3	3	**3.4**

SWOT	Strengths	Weaknesses
	- Easy to use - User-friendly interface - Over 100 countries ranking on different sectors such as economy, agriculture, arts, Nobel prize-winners etc	- No up-to-date results: The research for this edition of The Economist World in Figures was carried out in 2016 using the latest available sources that present data on an internationally comparable basis. - The extent and quality of the statistics available that varies from country to country. - Energy consumption data are not always reliable, particularly for the major oil producing countries - Doesn't provide the exact algorithm the results are based on.
	Opportunities	Threats
	- Make reliable data comparisons between countries - Provide updated real time data.	- Data quality: figures from individual countries may differ from standard international statistical definitions - Technical difficulties

Mapping to Needs and Trends	
Addresses (Trend)	Open Data
Serves (Need)	Ensure availability of (real-time) information and knowledge

Diabetis Plus						
Description (& Link)	An application which is capable of an analysing of your blood sugar level (http://www.diabetesplus.info/de/).					
Type	Application					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Health					
TRL	9		**Implementation /Customisation Cost**			High
Ease of use	High		**Open License Availability**			No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	3	**3.8**
SWOT	Strengths • Easy to use • Keeps track of your blood sugar and insulin levels, physical activity, food intake by creating a journal entry with those values. • Export your results easily in pdf.			Weaknesses • High implementation/ customisation cost • Available in German only • No open license availability. • Ability to remove one entry and no individual values such as blood sugar level, insulin level, food intake etc.		
	Opportunities • Availability in other languages • Ability to remove individual values in journal entry.			Threats • Competition. • High implementation/ customisation cost		
Mapping to Needs and Trends						
Addresses (Trend)	Next Generation of BI and Data Analytics platforms					
Serves (Need)	Ensure availability of (real-time) information and knowledge					

Runtastic Applications					
Description (& Link)	Runtastic offers a vast amount of diagnostic health tools and apps for the smart phone communities (https://www.runtastic.com/de/apps).				
Type	Application				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Health				
TRL	9	**Implementation /Customisation Cost**			High
Ease of use	High	**Open License Availability**			No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	3	**3.8**

SWOT	Strengths	Weaknesses
	- More than 245 million downloads and 130+ million registered users on Runtastic.com, - Runtastic's mobile applications sync directly with proprietary hardware to track distance, speed, pace, duration, heart rate, calorie consumption and route travelled (via maps) when running, biking or engaging in other exercise activities. - The results can be viewed directly within the app, via Runtastic GPS devices or on Runtastic.com, where users can view their online training log, get detailed data analysis and compare with others. - User-friendly interface - Combines fitness with mobile applications, social networking and elements of gamification - Fitness advice, training programs, customisation	- No open license availability - Market remains highly unorganized and fragmented
	Opportunities	Threats
	- Hardware (including wearable devices) - Online training - Partnerships with gyms, gym equipment companies	Competition
	Mapping to Needs and Trends	

Addresses (Trend)	Next Generation of BI and Data Analytics platforms
Serves (Need)	Ensure availability of (real-time) information and knowledge

The OO Software					
Description (& Link)	Official Service partner for Microsoft and NATO.The main aim is that the customer should be able to concentrate on the important things, without having to waste time on or worry about maintaining their systems. That has led to the development of numerous tools that offer immeasurable help with performance optimization, data security, data imaging and with the recovery lost data. (https://blog.oo-software.com/en/about)				
Type	Application				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Foreign Affairs and Defence				
TRL	8	**Implementation /Customisation Cost**			High
Ease of use	Low	**Open License Availability**			No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	2	2	**3.2**

SWOT	Strengths	Weaknesses
	- Leading manufacturer of system tools - Microsoft Gold Partner (the highest partner level) - One of the very few companies worldwide who can license their products with Microsoft-based technology - O&O is one of the few European software manufacturers that has Master Agreements with the Bundesrepublik of Germany and NATO for delivery of its software. - Provides tools that offer help with performance optimization, data security, data imaging and with the recovery lost data.	- Low ease of use - Implementation/customisation cost - Focus mainly on large enterprises
	Opportunities	Threats
	- High demand on performance optimization, data security, data imaging and lost data recovery tools. - Cloud-based services	- Data privacy - Increasing pace of technological change and higher level of technical sophistication - Increasing competition - Threats posed by malware

Mapping to Needs and Trends	
Addresses (Trend)	Smart surveillance systems
Serves (Need)	Comprehensive knowledge and information management

ALERTS (Automated Land change Evaluation, Reporting, and Tracking System)						
Description (& Link)	ALERTS (beta), the Automated Land change Evaluation, Reporting and Tracking System, beta edition, is a web-based prototype application for near real-time global land use and land cover change detection (http://planetaryskin.org/rd-programs/resource-nexus/global-land-change-detection).					
Type	Application					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Environment & Energy, Urban Planning & Transport					
TRL	7	**Implementation /Customisation Cost**				Low
Ease of use	Low	**Open License Availability**				Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	3	2	2	**3.2**
SWOT	Strengths • Offers near real time land use data and cover change detection • Land change evaluation		Weaknesses • Beta version • Poorly designed interface • Low ease of use			
	Opportunities • High need for land data reporting tools. • App efficiency • Environmental awareness		Threats • Competition • Climate change			
Mapping to Needs and Trends						
Addresses (Trend)	Smart City / Smart Government					
Serves (Need)	Ensure availability of (real-time) information and knowledge					

I.2 Databases / Data sources

ESPON Database for policy makers					
Description (& Link)	Database providing comparable indicators covering all regions of Europe. The ESPON 2013 Database provides fundamental regional information provided by ESPON projects and EUROSTAT. This information can be used to support territorial development analysis at different geographical levels. The Database supports better understanding of past and future trends in different types of European territories and makes possible to benchmark your region and city in the European context. Ultimately, it aims at contributing to a better understanding of the potentials and development perspectives of regions in the European context and globalised world. It provides access to regional, local, urban, neighborhood, world, grid and historical data. Most of the datasets and information produced are public available and freely accessible. Users can focus their search using the categories "Theme", "Policy", "Project" and "Keyword" (http://database.espon.eu/db2/).				
Type	Database				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	All				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	3	4	3	3	**3.6**
SWOT	**Strengths** • Provides access to regional, local, urban, neighbourhood, world, grid and historical data. • Supplies different users (researchers, policy makers and stakeholders at regional and local level) with data, indicators and tools that can be used for European territorial development and cohesion policy formulation, application and monitoring at different geographical levels. • Offers better understanding of past and future trends in different types of European territories • Makes possible to benchmark your region and city in the European context		**Weaknesses** • Low ease of use • Focus mainly on public administration in Europe • Poorly designed interface • Not updated material-reports. • The extent and quality of the data available varies from country to country.		

	Opportunities	Threats
	• Better understanding territorial structures, the current situation and past and future trends of different types of European territories in relation with various geographical contexts (from local to global) and within a large variety of themes. • Provide updated real time data.	• Competition • Data quality: figures from individual countries may differ from standard international statistical definitions
Mapping to Needs and Trends		
Addresses (Trend)	Open Data	
Serves (Need)	Improve and strengthen Europeanisation Ensure availability of (real-time) information and knowledge	

European Data Portal					
Description (& Link)	The European Data Portal harvests the metadata of Public Sector Information available on public data portals across European countries. Information regarding the provision of data and the benefits of re-using data is also included (https://www.europeandataportal.eu/).				
Type	Portal/Database				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Monitoring and Evaluation				
Policy Domain (s)	All				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	3	**3.8**
SWOT	Strengths • Improves the quality of the metadata and data available throughout Europe. • Gives an insight into understanding Open Data from the perspective of a data provider. • Instructions are offered for those who wish their data portal to be harvested by the European Data Portal.		Weaknesses • Focused mainly on public administration in Europe • No open license availability.		
	Opportunities • Improving the quality of the metadata and data available throughout Europe: figures from individual countries may differ from standard international statistical definitions		Threats • Competition • Data ownership: Different licences, or absence of licence may occur and re-uses are invited to check with the owners/publishers of the data what terms and conditions apply to the re-use of the data.		
Mapping to Needs and Trends					
Addresses (Trend)	Open Data				
Serves (Need)	Ensure availability of (real-time) information and knowledge Comprehensive knowledge and information management				

The CIARD Routemap to Information Nodes and Gateways (RING)					
Description (& Link)	The RING is a global directory of datasets and data services for the agri-food sector. It is the principal tool created through the CIARD initiative to allow information providers to register their services and datasets in various categories and so facilitate the discovery of sources of agriculture-related information across the world (http://ring.ciard.net/about-ring).				
Type	Database				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Agriculture, Fisheries, Forestry and Foods				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	3	2	**3.2**
SWOT	**Strengths** • Is a global directory of datasets and data services for the agri-food sector • Allows data providers to publicize their services and datasets by registering them. • Provides technical metadata on information sources that enable providers of integrated services to discover, access and re-use the data. • Provides a map of accessible information sources with instructions on how they can be used effectively. • Provides a dataset sharing platform for the agri-food sector. • Federates metadata from existing sources whenever possible and alternatively allow for manual submission and curation. • Provides examples of services that show good practices on implementing "interoperability". • Clarifies the level and mode of interoperability of information sources. • The metadata about the datasets registered in the RING can be re-used by other systems and in other		**Weaknesses** • Ownership issues of the generated data • Low ease of use • No open license availability. • Poorly designed interface		

	works provided that the CIARD RING is acknowledged as the source.	
	Opportunities • Provide an infrastructure to improve the accessibility of the outputs of agricultural research and of information relevant to ARD management.	Threats • Competition • Data ownership: metadata that have been imported from other catalogues should contain licensing information for the actual content of the datasets and the related methods of access (download, special protocol, queries...). Relying on the source catalogue for this metadata.
Mapping to Needs and Trends		
Addresses (Trend)	Open Data	
Serves (Need)	Ensure availability of (real-time) information and knowledge	

RASFF Database					
Description (& Link)	The RASFF (Rapid Alert System for Food and Feed) portal features an interactive searchable online database. It gives public access to summary information about the most recently transmitted RASFF notifications as well as the ability to search for information on any notification issued in the past (https://webgate.ec.europa.eu/rasff-window/portal/).				
Type	Database				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Agriculture, Fisheries, Forestry and Foods				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	• Enables information to be shared efficiently between its members (EU-28 national food safety authorities, Commission, EFSA, ESA, Norway, Liechtenstein, Iceland and Switzerland) • Provides a round-the-clock service to ensure that urgent notifications are sent, received and responded to collectively and efficiently.	• Refers only to members of the EU
	Opportunities	Threats
	• Food safety standards	• Needs to strike a balance between openness and protection of information that could lead to disproportionate economic damage • Food distribution • Food importation-exportation • Population growth

Mapping to Needs and Trends	
Addresses (Trend)	Open Data
Serves (Need)	Ensure availability of (real-time) information and knowledge

EU Open Data Portal					
Description (& Link)	Employment and working conditions (https://data.europa.eu).				
Type	Data Source				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Employment & Social Security				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Is the single point of access to open data produced by EU institutions and bodies. - All the data you can find via this catalogue are free to use and reuse for commercial or non-commercial purposes. - More intensive usage of stored data of public authorities - Opening and connecting of data - Diversity of opinion and interests - Confidence-building measures - Input for economic development	- Provides data only for EU members - Danger to current business models - Cultural shift of the public administration - Uncertainty of existing copyright laws - Long standardization processes - Digital divide
	Opportunities	Threats
	- Strengthening of society by a cautious opening of the state - Re-use and recovery of data - Transparency, participation, collaboration. - External impulses of innovation. - Usage of collective intelligence - Data Visualisation - Free use of data - Single point of access to open data produced by institutions and bodies.	- Increases vulnerability to criticism - Missing Interpretive Predominance-Misinterpretation - Populist mobilization of masses - Attendance for a wide openness - Ignorance of criticism and open platform - Balance between openness and protection of information.

Mapping to Needs and Trends	
Addresses (Trend)	Open Data
Serves (Need)	Ensure availability of (real-time) information and knowledge Include scientific knowledge and expertise

eu.us.opendata					
Description (& Link)	The United States Department of Commerce and the Bureau of Economic Analysis in partnership with the European Commission's DG CONNECT and Eurostat have established a Transatlantic Open Data Partnership focused on economic data. The eu.us.opendata R library is the direct result of this collaborative effort, enabling easy access to comparable datasets from the Eurostat API and BEA API. Built following a Linked Open Data design, the R library taps into the Bureau of Economic Analysis' API and the Eurostat API to make comparable data accessible. In only a few lines of code, a data analyst can obtain economic data (https://www.bea.gov/developers/r-index.htm).				
Type	Data source (Methodological)				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Economy & Finance				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Allows users to "mix and match" regional macroeconomic data about the United States and the European Union. - The R library uses Linked Open Data to establish relationships between comparable EU and US economic indicators. - The library therefore makes it easier for data scientists and researchers to make comparisons of the EU and US economies. - Offers integrated access to key indicators on the EU and US economies; on GDP, population, employment, and disposable income, by industry and region. - More intensive usage of stored data - Opening and connecting of data - Diversity of opinion and interests - Input for economic development	- Provides data only for EU members and US - Uncertainty of existing copyright laws - Long standardization processes

	Opportunities	Threats
	<u>Opportunities</u> • Strengthening of economy. • Re-use and recovery of data • Transparency, participation, collaboration. • External impulses of innovation. • Usage of collective intelligence • Data Visualisation	<u>Threats</u> • Data quality • Balance between openness and protection of information.
Mapping to Needs and Trends		
Addresses (Trend)	Open Data	
Serves (Need)	Include scientific knowledge and expertise	

Open policy making toolkit					
Description (& Link)	Manual that includes information about Open Policy Making as well as the tools and techniques policy makers can use to create more open and user led policy (http://database.espon.eu/db2/).				
Type	Manual/Guide				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	All				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	3	4	**3.8**

SWOT	Strengths	Weaknesses
	- Political Willingness - Institutional Capacity - Existing policies - Includes information about Open Policy Making as well as the tools and techniques policy makers can use to create more open and user led policy. - Supplies different users (researchers, policy makers and stakeholders at regional and local level) with data, indicators and tools that can be used for European territorial development and cohesion policy formulation , application and monitoring at different geographical levels.	- Low ease of use - Long standardization processes - Improper Implementation of Policies - Delays in approval of Policies - Lack of Research based policies
	Opportunities	Threats
	- Information about Open Policy Making as well as the tools and techniques policy makers can use to create more open and user led policy - Availability of successful models at national and International level - Indigenous Knowledge & Practices - External Support	- Low ease of use - Poorly designed interface - Health-related issues - Environmental degradation - Degradation of natural resources - Socio-economic imbalance - Failure of Projects
Mapping to Needs and Trends		

Addresses (Trend)	Open Data
Serves (Need)	Ensure availability of (real-time) information and knowledge
	Comprehensive knowledge and information management

I.4 Frameworks / Methods / Models

Digital Policy Model Canvas						
Description (& Link)	A tool to guide policy makers to derive specific policies and regulatory mechanisms in an agile and iterative manner – integrating both design thinking and evidence - based policy making. This notion of a canvas is borrowed from the business world. The canvas approach helps translate broad insights and understandings to the needs of a particular country. It also helps define the key issues at stake as well as metrics to evaluate success and suggest avenues for possible iteration and improvement. Overall, such an approach provides an element of rigor in methodology that can help guide policymakers through the often confusing and contradictory universe of digital policymaking. It offers structure with flexibility, and a broad approach informed by global lessons with the ability to focus on a specific region (http://thegovlab.org/introducing-the-digital-policy-model-canvas/).					
Type	Method					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	All					
TRL	n/a	**Implementation /Customisation Cost**				n/a
Ease of use	Low	**Open License Availability**				n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	3	4	**3.4**
SWOT	Strengths • Political Willingness • Institutional Capacity • Existing Policies • Help leaders in designing digital policies that maximize the forthcoming opportunities and effectively meet the challenges. • Includes a number of specific recommendations, aimed at different challenges and adaptable to different circumstances and geographies.		Weaknesses • Low ease of use • Transparency Accountability • Monitoring and Evaluation • Poor Planning Poor Governance and administration • Lack of Political Commitment • Insufficient Infrastructure • Lack of data • Lack of implementation of existing policies			

	Opportunities	Threats
	• Need for a lean approach to policymaking that incorporates agility and iteration • Multiplicity of settings, contexts and circumstances in which policymaking takes place, and particularly the regional, national and transnational nature of contemporary policymaking. • Adapting to digital change and innovation that continue to throw up both unprecedented challenges and new opportunities for policymakers	• Fast-moving and multi-stranded nature of the challenges • Adapting to digital change and innovation that continue to throw up both unprecedented challenges and new opportunities for policymakers
Mapping to Needs and Trends		
Addresses (Trend)	Performance Measurement	
Serves (Need)	Comprehensive knowledge and information management Coherent use of digital technology across policy areas	

GLEAM					
Description (& Link)	GLEAM, the global epidemic and mobility model, combines real-world data on populations and human mobility with elaborate stochastic models of disease transmission to deliver analytic and forecasting power to address the challenges faced in developing intervention strategies that minimise the impact of potentially devastating epidemics (http://www.gleamviz.org/).				
Type	Model				
Origin	Research domain				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Health				
TRL	5	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	2	4	4	3	4	**3.4**

SWOT	Strengths	Weaknesses
	- Supports policy-making and emergency planning by developing epidemic models and scenario analysis able to gauge the actual threat of highly pathogenic diseases. - Allows the modelling of containment and mitigation strategies providing quantitative projections that better informs the analysis of their likely impact. - Delivers forecasts for the spreading pattern of infectious diseases epidemics. - Provides a suite of computational tools to help modelling the spread of a disease, understanding observed epidemic patterns, studying the effectiveness of different intervention strategies. The tools are available to researchers, health-care professionals and policy makers.	- Low ease of use - Low TRL - While the model is undoubtedly the best solution for diseases spread through transportation (and specifically airlines), it might be too sophisticated when dealing with more restricted areas of application.

	Opportunities	Threats
	• Effectively limit the social and economic damage caused by infectious diseases • Deliver forecasts for the spreading pattern of infectious diseases epidemics by combining real-world data covering the distribution of the world-wide population, their daily interactions and journeys, and the spatial structure and volumes of national and international air traffic. • GLEAM project team should search for collaborations with public administrations and / or NGOs, in order to achieve great results in terms of public health and relative application.	• Globalization: In a globalized world, we cannot ignore the international spread of disease. International travel will bring diseases in, and spread infections to far flung community • Misinterpretation • Populist mobilization of masses
Mapping to Needs and Trends	
Addresses (Trend)	Next Generation of BI and Data Analytics platforms	
Serves (Need)	Ensure availability of (real-time) information and knowledge Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

Economic Simulation Library					
Description (& Link)	Economic Simulation Library is a community driven, open-source project to develop a user-friendly modelling library for building agent-based models of economic systems (https://economicsl.github.io/overview/).				
Type	Model				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Economy & Finance				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	• Java library which acts as a starting point for a variety of economic models • User-friendly software library for building agent-based models (ABMs) of economic systems • Open licence availability	• Interactions with mainstream community • Policy Implications • Empirical validation
	Opportunities	Threats
	• Develop a user-friendly software library for building agent-based models (ABMs) of economic systems. • Build a Java library which acts as a starting point for a variety of economic models • Save agent-based modelers time by implementing several dynamics which are shared across a variety of economic ABMs. • There are many agent-based economic models require a few common components	• Interactions with mainstream community • Policy Implications • Empirical validation

Mapping to Needs and Trends	
Addresses (Trend)	Open Data
Serves (Need)	Ensure availability of (real-time) information and knowledge
	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation

Energy Big Data: A Survey						
Description (& Link)	IEEE Model for planning Big Data Energy Applications through a Smart Grid (including Use Case Scenarios), (https://folk.uio.no/yanzhang/IEEEAccessAug2016.pdf).					
Type	Model (methodological)					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Environment & Energy					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • Provides a community of professionals in industry, academia, and government working to solve the challenges associated with Big Data • Recognition of useful versus irrelevant data • Collection of distributed data • Accuracy, completeness, and timeliness of data • Efficient storage and transfer • Privacy and security of data • Fault tolerance • Scalability and economic impact of implementation • Intelligent analysis • Insightful and flexible presentation			Weaknesses • The volume of energy big data is increasing at an exponential speed. At the same time, difficulties also arise up in data storage, mining, querying, processing, etc. Therefore, cryptography technologies, fuzzy data computing, qualified data processing are all essential for big data applied better in smart grid.		
	Opportunities • The volume of energy big data is increasing at an exponential speed. At the same time, difficulties also arise up in data storage, mining, querying, processing, etc. Therefore, cryptography technologies, fuzzy data computing, qualified data processing are all essential for big data applied better in smart grid.			Threats • Data privacy • Integrity: Preventing unauthorised persons or systems modifying information • Authentication: verify participator's identity and map this identity to the existing authentication table in power network. • Third party protection: a third-party must be listed in the authentication table in power network		

Mapping to Needs and Trends		
Addresses (Trend)	Smart Work	
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

Modernization Defence Intelligence						
Description (& Link)	(https://www.ncsi.com/diaid/2013/presentations/johnston.pdf).					
Type	Model					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Foreign Affairs and Defence					
TRL	7		**Implementation /Customisation Cost**			Low
Ease of use	High		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Integration: speed of discovery, Eliminate stovepipes, Tactical - National data - Efficiency: Cloud based Data Sharing. - Quality: Depth, Focus on analysis. - Object Based Production: new way of organising the data - Activity based intelligence: focus on discovery and association of unknown activities - Big data/ Social media strategies to extract data	- Large Unstructured Data Sets - Volume and velocity of data
	Opportunities	Threats
	- Object Based Production: new way of organising the data - Activity based intelligence - Big data/ Social media strategies to extract data - Greater integration	- Large Unstructured Data Sets - Volume and velocity of data - Rapid acceleration of data growth - Increased data volumes pushed into the network - Growing variation in types of data assets for analysis - Alternative and unsynchronized methods for facilitating data delivery - Rising demand for real-time integration of analytical result

Mapping to Needs and Trends	
Addresses (Trend)	Big Data
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation

Promises and Challenges of Big Data Computing in Health Sciences					
Description (& Link)	An impressive study concerning Big Data and how to transfer the concept to the Health Science: The concept of Big Data is causing a world-wide buzz. Its successful applications in business, sciences and healthcare have radically changed their traditional practices. The demand for Big Data analysis is increasing day by day. More than 200 colleges provide degrees with Data Science (https://ac.els-cdn.com/S2214579615000118/1-s2.0-S2214579615000118-main.pdf?_tid=spdf-bd074572-4c1a-4af0-a386-e65fda559b3f&acdnat=1519839451_fc079f2f8b3cf146f047c5eb90a77ef7).				
Type	Model				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Health				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	3	4	4	4	4	**3.8**

SWOT	Strengths	Weaknesses
	- Making fundamental changes in care delivery and discovery of treatments such - Reducing health care costs, - Reducing number of hospital re-admissions, - Targeted interventions for reducing emergency department (ED) visits, - Triage of patients in ED, - Preventing adverse drug effects	- More data needed: Identifying a cohort in the MIMIC (Medical Information Mart for Intensive Care) for answering a specific clinical question, it often results in a very small set of cases (small cohort) that makes it almost impossible to answer the question with a strong statistical confidence. - Data do not fully capture temporal and process information: In most cases, clinical data are captured in various systems, even within an organization, each with a somewhat different intent and often not well integrated.

Opportunities	-Threats
• The volume of data being captured from biological experiments and routine health care procedures is growing at an unprecedented pace. This data trove has brought new promises for discovery in health care research and breakthrough treatments as well as new challenges in technology, management, and dissemination of knowledge • Building specific systems in addressing the need for analysis of different types of data, e.g., integrated electronic health record (EHR), genomics-EHR, genomics-connectomes, insurance claims data, etc.	• Data ownership, Access, Shareability, Proprietary rights: Accessibility to patient data for scientific research and sharing of the scientific work as digital objects for validation and reproducibility is another challenging domain due to patient privacy concerns, technological issues such as interoperability, and data ownership confusion. • Translation: Many machine learning algorithms work as a "black box" with no provision of good interpretations and clinical context of the outcomes, even though they often perform with reasonable accuracy. • Incentive: the lack of incentive for organizations to take initiative to address the technological challenges

Mapping to Needs and Trends	
Addresses (Trend)	Big Data
Serves (Need)	Standardisation of data management Coherent use of digital technology across policy areas

EDA					
Description (& Link)	EDA, the European Defence Analytics System, is a Modelling and Simulation Project for the WIP European defence strategy. It's a supranational solution for the EU members to intensify the military cooperation among the EU Member states (https://www.eda.europa.eu/webzine/issue14/cover-story/big-data-analytics-for-defence).				
Type	Model				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Foreign Affairs and Defence				
TRL	8	**Implementation /Customisation Cost**			High
Ease of use	Low	**Open License Availability**			No

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	3	4	**3.8**

SWOT	Strengths	Weaknesses
	<u>Strengths</u> • Programme Preparation: development of future operating concepts and capability management activities. • Operational Analysis: analytical techniques used to inform defence decision making • System Development: acquisition, development and fielding of new or enhanced military capabilities • Training: development of in-service doctrine, analysis to identify training gaps, retention issues, alternative training methods, and Live, Virtual or Constructive military training: • Support to Operations: decision making support to the planning and conduct of operational activities.	<u>Weaknesses</u> • Low ease of use • High implementation/ customisation cost • The technologies in question must be mature enough to be included in defence platforms and systems.
	<u>Opportunities</u> • Internet of Things • Autonomous systems (drones etc) • Additive Manufacturing (AM), known as 3D-printing, has been identified by the European Commission as one of the key enabling technologies to improve European industrial competitiveness given its ability	<u>Threats</u> • Cyber-attack: a constant battle which constrains the pace of change • Political, cultural, sociological and regulatory issues as well as their potential ethical and legal implications • Safety constraints need to be considered (autonomous systems)

	for rapid, delocalised and flexible manufacturing. • Understanding the impact on Modelling & Simulation across the full breadth of its use in the life cycle of future military systems. • Exploring the Big Data domain to understand how its tools and techniques could best be applied to Modelling & Simulation (M&S) activities in the Defence environment • Investment in innovative hardware and software architectures (such as open-standard Hadoop Distributed File System and associated application MapReduce). • Enhancing military capabilities	• Volume and velocity of data • Rapid acceleration of data growth • Increased data volumes pushed into the network • Growing variation in types of data assets for analysis • Alternative and unsynchronized methods for facilitating data delivery • Rising demand for real-time integration of analytical result.
Mapping to Needs and Trends		
Addresses (Trend)	Next Generation of BI and Data Analytics platforms	
Serves (Need)	Process and resource optimisation	

Fraunhofer E-Health					
Description (& Link)	A Complete Consultant Solution by Fraunhofer SIT, to create your own Health Infrastructure from scratch. (https://www.sit.fraunhofer.de/de/angebote/projekte/ehealth/)				
Type	Framework				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Health				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • Improves the quality and efficiency of medical services • Involvement in the most important pilot projects preceding the introduction of the German Ministry of Health's electronic health card (bIT4health, solution architecture for electronic health card applications) and self-management program (protego.net planning project). • Technical advice for card manufacturers, card publishers, application developers, and end users of the electronic health card and the health professional card • Consulting on smart card technologies and cryptographic protocols • Specification of card interfaces and applications • Development support based on the specifications used in the telematics infrastructure • Development and evaluation of, and consulting for, eHealth applications and secure online services • Development and evaluation of security and data protection concepts • Consulting, feasibility studies and requirements analyses linked to the integration of security technologies		Weaknesses • Data security • Lack of system Integration: Clinical, administrative, and financial systems are not linked, and as a result, many healthcare institutions are not yet maximizing their IT potential • Slow IT Adoption: Traditionally, healthcare has been slow to adopt IT and has lagged significantly behind other industries in the use of IT.			

	• Security tests of products, components, and services (optionally with the Fraunhofer security certificate) • Solutions for long-time archival of digitally signed documents that preserve their evidentiary force (ArchiSoft) as well as browser based applications for electronic signatures	
	Opportunities • Development of secure software • Security and data protection. • Security evaluation and verification • Security Integration and advancement • Security management • Improvement in reporting and data presentation capabilities • Improvement in quality of healthcare services • Effective and efficient resources utilization procedures • Improvement in patients trust and satisfaction • Encouragement in proactive healthcare practices • Public awareness and community support programs • Training programs and facilities • Unification and integration of Public and Private sector health records • Improved support for knowledge management and decision making • Productive, efficient and effective healthcare management • Better human resource management • Costing and budget analysis for enhanced funds utilization • Sufficient allocation of resources for supporting IT infrastructure • Internet availability and enhanced bandwidth	Threats • Economic and medical challenges • Data protection • Cyber-attack • Data quality • Rapid changes in technology and IT systems • Unreliable and unrealistic system and reporting requirements
Mapping to Needs and Trends		
Addresses (Trend)	Smart Work	

Serves (Need)	Strengthen citizens' trust in public administration
	Continuous Evaluation of Policies

InnOPlan					
Description (& Link)	A huge improvement through the system of interactive surgery thanks to the Innoplan Project (https://www.scads.de/de/projekt/kooperationen/307-innoplan).				
Type	Model				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Health				
TRL	4		**Implementation /Customisation Cost**		High
Ease of use	Low		**Open License Availability**		No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	1	3	4	2	3	**2.6**

SWOT	Strengths	Weaknesses
	• This framework allows scalable processing of large medical device data in real-time as well as for getting insights in live and historic data by big data analytics. • Provides efficient surgical processes by smart data services • Develops a data-driven way to link and optimize processes and tasks in the operating room area • Integrate data of medical devices, because they allow to get real-time insights into running processes and tasks. • Development of a Smart Data Platform, which connects all related data sources and additionally provides solutions for accessing raw data as well as analysed information	• In the operating room many tasks are not supported with information technology • Low TRL • High implementation/ customisation cost • Low ease of use
	Opportunities	Threats
	• Improvement on monitoring and management of the operating room • Automatization of some surgical tasks • In the whole healthcare area, there is an increasing cost pressure and every gain in efficiency has to be utilized • Development of a data-driven way to link and optimize processes and tasks in the operating room area	• The integration on an information or communication level is quite poor. • In the operating room, many tasks are not supported with information technology • Economic and medical challenges • The efficient and intelligent handling of large, often distributed and heterogeneous

• Many tasks are not supported with information technology	data sets increasingly determines the scientific and economic competitiveness.
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Mapping to Needs and Trends	
Addresses (Trend)	Big Data
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation

BehavePlus					
Description (& Link)	The BehavePlus fire modelling system is a Windows® based computer program that can be used for any fire management application that involves modelling fire behaviour and some fire effects. The system is composed of a collection of mathematical models that describe fire behaviour and the fire environment. The program simulates rate of fire spread, spotting distance, scorch height, tree mortality, fuel moisture, wind adjustment factor, as well as other variables; so, it is used to predict fire behaviour in multiple situations (https://www.firelab.org/project/behaveplus).				
Type	Model				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Agriculture, Fisheries, Forestry and Foods				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			No

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	3	3	**3.6**

SWOT	Strengths	Weaknesses
	• Uses specified fuel and moisture conditions to simulate surface and crown fire rate of fire spread and intensity, probability of ignition, fire size, spotting distance, and tree mortality. • Predicting the behaviour of an ongoing fire. • Planning fire treatments. • Assessing fuel hazard. • Understanding fire behaviour.	• No open licence availability • Successful application of Behave Plus depends upon a knowledgeable user. To effectively use Behave Plus in fire modelling, you must have enough fire and fuel experience and fire behaviour training to recognize whether your input values are reasonable and make appropriate adjustments.
	Opportunities	Threats
	• Climate change: intense heat waves that sweep over Europe, roaring temperatures and weeks of drought are triggering deadly fires across the region making the understanding of fire behaviour vital for decision making and safety.	• Climate change: intense heat waves that sweeping over Europe, roaring temperatures and weeks of drought are triggering deadly fires across the region.

Mapping to Needs and Trends	
Addresses (Trend)	Predictive Analytics
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation

	Cross-linked information exchange

Edge Intelligence EI					
Description (& Link)	A Whitepaper from Fraunhofer FOKUS and several cooperation partners developed an ingenious future technology, for Improvement of the 5G Net-Infrastructure through networks which are capable to learn. Thanks to this it will be possible soon to provide a 5G Network without any latencies. In conclusion it means, that the cloud system will be obsolete for big companies faster or sooner. The Article explains the technology behind it and the possibilities (https://www.fokus.fraunhofer.de/de/fokus/news/edge-intelligence_10-2017).				
Type	Model				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Environment & Energy				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • Taking decisions more quickly and efficiently by placing machine learning (ML) algorithms on the edge devices and reducing the frequency of contact with cloud servers, thus steadily reducing the effect of the roundtrip delay on decision-making; • Reaching decisions according to local identity management and access control policies specific to the running applications, securing the data close to its source and following local regulations • Lowering communication costs by reducing communication over public wide area networks, using caching or local algorithms to pre-process the data so that only decisions or alarms can be forwarded to the cloud servers, rather than raw data; • Load-balance the user, application or network requests based on changes in the edge or core infrastructure, adapting to temporary failures or maintenance procedures			Weaknesses • Most applications in the areas like Industry 4.0, Virtual Reality and Smart Cities are data intensive or time sensitive and depend on a lot of data from sensors and devices being processed almost in real time. • Required data volume and available bandwidth • Need for intermittent connectivity • Credibility and (decentralized) trust • Self-organization, self-configuration, and self-discovery • East/west communication between multiple Edge Computing Nodes (ECN) • Implementation of algorithms for Machine Learning • Definition of basic functionality of ECNs • Semantic interoperability • Fault detection Standards • Embedded system containerization for application programming interface (API), and execution level capability and tenancy		

	• Taking decisions based on the alarms or pre-processed information exchange between the edge devices, i.e. east/west (E/W) communication between two peers on the edge.	
	Opportunities • Take decisions more quickly and efficiently, as the roundtrip delay in contacting the cloud is removed; • Reach decisions according to local identity management and access control policies, securing the data close to its source; • Reduce communication costs by limiting communication over public wide area networks. • Credibility and (decentralized) trust • Self-organization, self-configuration and self-discovery • Industry automation • Implementation of algorithms for Machine learning • Most applications in the areas like Industry 4.0, Virtual Reality and Smart Cities are data intensive or time sensitive and depend on a lot of data from sensors and devices being processed almost in real time.	Threats • Credibility and (decentralized) trust • Self-organization, self-configuration, and self-discovery • East/west communication between multiple Edge Computing Nodes(ECN) • Implementation of algorithms for Machine Learning • Definition of basic functionality of ECNs • Semantic interoperability • Fault detection Standards • Embedded system containerization for application programming interface (API), and execution level capability and tenancy • Carrier mode selection for avoiding connectivity loss • Information must be extracted from the data and transmitted securely.
Mapping to Needs and Trends		
Addresses (Trend)	Machine Learning	
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

The public safety assessment						
Description (& Link)	The PSA produces a score that represents the likelihood that a defendant who is released before trial will commit a new crime or will fail to appear for a future court appearance. The PSA also flags the small number of defendants who pose an elevated risk of committing a crime of violence if released before trial (http://www.arnoldfoundation.org/wp-content/uploads/PSA-Infographic.pdf).					
Type	Model (metric)					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	Justice, Legal System & Public Safety					
TRL	8		**Implementation /Customisation Cost**			Low
Ease of use	High		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**20**
SWOT	Strengths • Predicting the likelihood of committing a new crime if the defendant is released pending trial, • Predicting the likelihood of the defendant failing to return for a future court hearing. • Flags cases that it calculates present an elevated risk of committing a violent crime • Help judges gauge the risk of pretrial failure. • Improves decision making in the criminal justice system • Promotes public safety, • Improves efficiency • Ensures that all defendants are treated fairly. • The PSA is being rigorously evaluated by independent research organizations to ensure that it works as expected without predictive bias. • The PSA factors and the algorithm are publicly available, which LJAF recognizes is an important step in the transparency and understanding of pretrial risk assessments that often is lacking with other pretrial risk assessments.			Weaknesses • Judges don't often have access to basic information, such as a defendant's criminal history, and decisions are frequently made in a subjective manner or with the use of fixed bail schedules.			

	Opportunities	Threats
	- Improve judicial decision making - Increase public safety, - Promote the fair treatment of all individuals - Ensure the responsible use of taxpayer funds.	Judges don't often have access to basic information, such as a defendant's criminal history, and decisions are frequently made in a subjective manner or with the use of fixed bail schedules.
Mapping to Needs and Trends		
Addresses (Trend)	Algorithmic Regulation	
Serves (Need)	Standardisation of processes	

€CONOMIA - The Monetary Policy Game					
Description (& Link)	Serious Game on Monetary Policy Making (http://www.ecb.europa.eu/ecb/educational/educational-games/economia/html/index.en.html).				
Type	Framework (serious game)				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Economy & Finance				
TRL	8		**Implementation /Customisation Cost**		Low
Ease of use	High		**Open License Availability**		Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	• Education in economics and monetary policy. • Players learn about indicators that make the economy and monetary policy stable. • Players train in decision-making process. • Players can read most important pieces of information about monetary policy and its indicators in the glossary.	• For performance and security reasons, modern browsers either discourage the use of, or block completely, the Flash Player plug-in
	Opportunities	Threats
	• Education in economics and monetary policy. • Increasing acceptance by the market: Gamification is having such a great success in the business world that many financial analysts see a rapid increase of its adoption in the next future • Push of Videogame Industry: There is no doubt that the success of gamification is also driven by the recent growth in the gaming industry and the mass appeal that videogames have in the entertainment arena. • Increasing interest of the academic world: Gamification is receiving an increasing attention by the academic world. Researches aimed at investigating the effects of game	• Cyber-attack: For performance and security reasons, modern browsers either discourage the use of, or block completely, the Flash Player plug-in. you need to give explicit permission to your browser to run it • Unclear effects on user attitudes and behaviours • Simplification and limitation of the game elements employed: Some designers believe that limiting its perspective to the use of points, badges and leader boards is the main problem of gamification. • One-size fits all: The spreading of third-part services on the one hand has promoted the adoption of gamification, on the other

	elements on users are more and more • Inclusion of new game elements: Although points, badges and leaderboards are the most common game elements used in gamification, game designers have a huge quantity of components at their disposal, almost unexplored in the gamification practices	hand has highlighted the problem of the one-size-fits-all approach currently applied to many gamification interventions. This design technique is mainly actualized as a cut and paste methodology, lacking originality not only for the scarce variety of the elements commonly employed, but also for a perspective that is inclined to consider different contexts and different users in the same way. -Side effects: many researches highlighted that different forms of extrinsic rewards could determine, in specific contexts, a detrimental effect on the users' intrinsic motivation
Mapping to Needs and Trends		
Addresses (Trend)	Nudging	
Serves (Need)	Strengthen citizens' trust in public administration Link between impact, quality, performance measurements and financial information	

Thousand Visions						
Description (& Link)	Engage and educate stakeholders in a compelling and complicated set of trade-offs regarding future regional transportation projects (http://www.migtownsquare.com/app_pages/view/22).					
Type	Tool/ Serious Game					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Urban Planning & Transportation					
TRL	9		**Implementation /Customisation Cost**			High
Ease of use	High		**Open License Availability**			No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	3	**3.8**
SWOT	Strengths			Weaknesses		
	- Educate and engage your community or track your performance via interactive games and charts that help you make better decisions. - Availability of a shared minimal language in gamification: users recognizing common features in different applications, can immediately gain a clear perception of the actions required by them, shortening the learning curve and favouring a quick user engagement - Availability of ready-to-use solutions: any website, application or social network can add game elements, by simply embedding codes in their systems or integrating pre-packaged software modules. - Enhancement of user engagement and motivation: Gamification generally aims at leveraging the most involving aspects of games for enhancing motivation and engagement of users and, thus, increasing their productivity and performances			- No open License availability - High implementation /customisation Cost - Unclear effects on user attitudes and behaviours - Simplification and limitation of the game elements employed: Some designers believe that limiting its perspective to the use of points, badges and leader boards is the main problem of gamification. - One-size fits all: The spreading of third-part services on the one hand has promoted the adoption of gamification, on the other hand has highlighted the problem of the one-size-fits-all approach currently applied to many gamification interventions. This design technique is mainly actualized as a cut and paste methodology, lacking originality not only for the scarce variety of the elements commonly employed, but also for a perspective that is inclined to consider different contexts and different users in the same way. - Side effects: many researches highlighted that different forms of extrinsic rewards could determine, in specific contexts, a detrimental effect on the users'		

		intrinsic motivation
	Opportunities • Increasing acceptance by the market: Gamification is having such a great success in the business world that many financial analysts see a rapid increase of its adoption in the next future • Push of Videogame Industry: There is no doubt that the success of gamification is also driven by the recent growth in the gaming industry and the mass appeal that videogames have in the entertainment arena. • Increasing interest of the academic world: Gamification is receiving an increasing attention by the academic world. Researches aimed at investigating the effects of game elements on users are more and more • Inclusion of new game elements: Although points, badges and leaderboards are the most common game elements used in gamification, game designers have a huge quantity of components at their disposal, almost unexplored in the gamification practices	Threats • Unrealistic expectations: The spread of gamification in work process, educational dynamics and interactive systems generated a series of expectation, among companies, designers and researchers, related to the power of games in driving human behaviour now the risk of disappointment is more concrete than ever. Nor every context is suitable of being addressed with it, neither are the game elements able to engage all type of users. A reduction of expectations and interests in the next years is somehow physiological, since many applications are failing in reaching their goals. • Failure by poor design: By not recognizing what is really rewarding for users and the meaningful aspects of gamification has recently generated a sense of scepticism if these practices will continue to implement poor design application and services, it is easy to imagine that the sort of fame achieved up until now will soon be fading
Mapping to Needs and Trends		
Addresses (Trend)	Nudging	
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making Strengthen citizens' trust in public administration	

LEED					
Description (& Link)	LEED, or Leadership in Energy and Environmental Design, is the most widely used green building rating system in the world (https://new.usgbc.org/leed#rating).				
Type	Framework (rating system)				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Urban Planning and Transport, Environment & Energy				
TRL	9		**Implementation /Customisation Cost**		High
Ease of use	High		**Open License Availability**		No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	3	2	**3.4**
SWOT	Strengths • Most widely used green building rating system in the world: 2.4 million+ square feet are certified every day with more than 94,000 projects using LEED. • Flexibility: Available for virtually all building, community and home project types. Works for all building types anywhere. (over 165 countries and territories.) • Provides a framework to create healthy, highly efficient and cost-saving green buildings. Buildings save energy, water, resources, generate less waste and support human health. • LEED certification is a globally recognized symbol of sustainability achievement.			Weaknesses • High implementation/ customization cost • No open License availability		
	Opportunities • Inspire project teams to seek innovative solutions • Support public health and our environment • Saving building owners money over a project's life cycle. • Investment in sustainability and green buildings • Lack of sophisticated categorization of green building types and reflecting the			Threats • Restriction of database and case studies to the availability of data and reflecting only specific types of green buildings. • High implementation/ customization cost • No open License availability • Difficulty of demanding empirical studies (subjective and objective). • Lack of sophisticated categorization of green building		

	heterogeneity of green building costs	types and reflecting the heterogeneity of green building costs, which may result in finding false correlations between variables. • Normalization of data if gathered from various sources to minimize data collection errors
Mapping to Needs and Trends		
Addresses (Trend)	Performance Measurement	
Serves (Need)	Standardisation of processes Development of domain specific target and indicator systems	

SPLASH					
Description (& Link)	Splash is a research project aimed at building a framework that supports the integration of multiple existing models, simulations, and data that represent parts of the broader health ecosystem. Specifically, the goal is to create a platform that takes expert models of constituent real-world systems related to health, synthesising and integrating those models, resulting in an interoperating complex composite system model with which policy-makers can try out alternatives in a low-cost, highly responsive way. The key research question is whether such integration of independently created, deep domain models can be made feasible, practical, flexible, cost-effective, attractive, and usable (http://www2.gsu.edu/~matrhc/documents/splashvision20100728.pdf).				
Type	Framework				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Health				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	Low	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	2	3	2	2	2	**2.2**

SWOT	Strengths	Weaknesses
	• Building a framework that supports the integration of multiple existing models, simulations, and data that represent parts of the broader health ecosystem. • Create a platform that takes expert models of constituent real-world systems related to health, synthesizing and integrating those models, resulting in an interoperating complex composite system model with which policy-makers can try out alternatives in a low-cost, highly responsive way. • Focus primarily on integrating and composing, i.e., "mashing up," simulation and statistical models aimed at informing health policy decision making,	• Policies and interventions that will have reliable and effective impact require changes to a large set of interconnected systems • The health ecosystem comprises a large set of complex, intricately connected subsystems. • Different categories of models are constructed, maintained, and used by different people and organizations, each using different terms, conventions, and approaches. If models are not too diverse or too complex, it might be feasible to manually and tightly integrate them into a common framework, But if models are very heterogeneous and complex, it might not be feasible to combine them at all. • Today there are no reliable and manageable means to explore the health system consequences of many interacting subsystems. Although individual deep-domain models can be made

		more comprehensive, there will always be important factors that lie outside the expertise of a given group of modelers, and it can be difficult to nimbly adapt very large and complex models as new questions arise.
	Opportunities	Threats
	• Requirement for combination of multiple deterministic and stochastic simulation models, as well as statistical models and data sources, to project the effects of policy or investment choices into the future • Health-Focused Policy Decision Making: Recent years have seen great innovations in both technologies and organizational mechanisms for promoting human health, but effective policy and investment decisions are needed to reap the benefits of these advances. • Creating a framework for integrating disparate individual models to create effective and useful composite models. • Need to enable a community of disparate stakeholders – those with health-related data, deep domain models, and health policy issues or questions – to work together, using the platform to make progress and solve problems. The community must be set up as an effective service system, creating more value through interaction than through isolation • There exists no standard way to describe models in sufficient depth to determine compatibility: Here, the challenge is to create mechanisms and methods for describing models so that it is easy to determine how to integrate them into larger, more complex models of larger, more complex systems. The goal is for the Splash platform to semi-automatically identify models that are potentially compatible with a specified model,	• Health-related investment and policy decisions by government agencies, healthcare providers, insurers, and other stakeholders may lead to complex interactions and have far-flung consequences, many of which may be difficult to foresee. • Not all models can be combined in a sensible way. The assumptions, time scales, capabilities, level of detail, and indeed the selection of the key aspects to represent may be quite different: What factors characterize the models that are compatible with one another? • There exists no standard way to describe models in sufficient depth to determine compatibility: Here, the challenge is to create mechanisms and methods for describing models so that it is easy to determine how to integrate them into larger, more complex models of larger, more complex systems. • There are no tools or platforms to support mashing up independently created models and datasets in a simple, flexible, and useful way. This adds the challenge of providing efficient mechanisms for searching and identifying applicable models, for establishing an appropriate execution environment, for semi-automatically generating connectors between models and between models and datasets, and for enabling reuse, result pruning, data transformations, flexible model transformations, experiment management,

	perhaps after some transformation of model inputs and outputs. • There is no targeted technology and set of practices to facilitate collaboration between the varied people and organizations that develop and use deep-domain models: We envision an active community of participants contributing models and data, combining models, discussing models, exploiting previous results, and optionally sharing their models and modelling results. The final challenge is to develop a deep understanding of what is required for such an open integrated community system to successfully enable cooperation among all	visualization, simulation output analysis, and so on • There is no targeted technology and set of practices to facilitate collaboration between the varied people and organizations that develop and use deep-domain models
Mapping to Needs and Trends		
Addresses (Trend)	E-Governance	
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

Business Process Re-engineering (BPR)						
Description (& Link)	Business process re-engineering (BPR) is a business management strategy, originally pioneered in the early 1990s, focusing on the analysis and design of workflows and business processes within an organization. BPR aimed to help organizations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors.					
Type	Framework (Strategy)					
Origin	Private/Public Sector					
Policy Cycle Stage (s)	Agenda Setting					
Policy Domain (s)	All					
TRL	n/a		**Implementation /Customisation Cost**			High
Ease of use	Low		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	2	2	**3.2**

SWOT

Strengths

- Improving the organization's alignment with strategic goals, its effectiveness, efficiency, competitiveness
- Cut operation costs
- Overcome the shortcoming of seeking incremental improvements
- Radically improve a process instead of 'patching up'

Weaknesses

- Low ease of use
- High implementation /customization cost
- Resistance of Personnel to Changes
- Fear of Unknown
- Uncertain Financial Condition
- Low Capacity of Organisation
- Bad relationships with employees
- Uncoordinated IS and HR departments

Opportunities

- Changing technical & business environment: IT offers new opportunities for business, market expectations and pressures are changing
- Global business opportunities
- Current business are:
  a. customer-focused and market driven or process-focused and team oriented
  b. focused on speed & response time or focused on customer relationships

Threats

- Changing nature of the workforce
- Powerful customers
- Government regulations
- Government deregulation
- Shrinking budgets and subsidies
- Policy and legislative constraints
- Budgetary constraints
- Ethical issues
- Information overload
- Cost-cutting focus
- Narrow technical knowledge and focus
- Market Leads are reversable in seconds.

	• Lack of sustained management commitment and leadership • Unrealistic scope and expectations -Resistance to change • Lack of Communication

Mapping to Needs and Trends	
Addresses (Trend)	E-Governance
Serves (Need)	Process and resource optimisation

I.5 Platforms / Portals

EU Open Data Portal						
Description (& Link)	European Union Open Data Portal (EU ODP) gives you access to open data published by EU institutions and bodies. All the data you can find via this catalogue are free to use and reuse for commercial or non-commercial purposes. (https://ec.europa.eu/isa2/sites/isa/files/leaflet_dcat-ap_lr_v13.pdf).					
Type	Portal					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Evaluation					
Policy Domain (s)	Employment & Social Security					
TRL	8	**Implementation /Customisation Cost**			Low	
Ease of use	High	**Open License Availability**			Yes	
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • Data catalogues can describe their dataset collections using a standardised description, while keeping their own system for documenting and storing them. • Content aggregators, such as the European Data Portal, can easily aggregate such descriptions into a single point of access. • Data consumers can more easily search and find datasets by using the same parameters on different portals thanks to a harmonised vocabulary. • The current version of DCAT-AP has been implemented by 12 countries in Europe, including Germany and Italy. -Many more data portals at the European, regional and local level are compliant with the DCAT Application Profile. • Sufficient flexibility but at the same time covers the most essential metadata requirements.			Weaknesses • Data quality: the format and structure of metadata differ from portal to portal. • Focused mainly on European administrations. • Long standardization processes • Digital divide		

	Opportunities	Threats
	- The use of an international standard for metadata publishing is crucial for interoperability of data portals and harmonisation of data coming from different sources - Modern technological challenges and moving towards trustful linked open data. - Modernisation of public administrations in Europe through the development of eGovernment solutions.	- Data quality: the format and structure of metadata differ from portal to portal. - Balance between openness and protection of information. - Technological challenges - Long standardization processes
Mapping to Needs and Trends		
Addresses (Trend)	Open Data	
Serves (Need)	Ensure availability of (real-time) information and knowledge	

EtherSport: Blockchain Sports Prediction Platform					
Description (& Link)	EtherSport improves the service in this business field by new technologies, namely, blockchain, smart contracts and cryptocurrencies. Such improvement is directed not only to the convenience of the technical service for the players, but also to the guarantee of the fairness and full transparency of the process, which is done thanks to the new technologies. Based on this message, namely - convenience and comfort for the players, based on the confidence and fairness of the decentralised and fully open process, EtherSport team is sure that in such system and on our platform, the players will be comfortable with participating in the game and get satisfaction from the process itself, compared to the traditional companies that are working on the market in the generally accepted web limits. The main idea of our project is that our lottery, contrary to many similar services, is not based on guessing the random numbers, but involves exact determination of the sports events results, which cannot be influenced by anyone. This implies that the players have analytical skills. Such lottery type allows players not only to guess the game results by using their knowledge, but also get an additional satisfaction from the view of the sports events and support of their favourite teams, which they have chosen in the ticket. The same can be said about the bets placed between the players within our project, an analogue of the betting exchange (https://ethersport.io/).				
Type	Portal				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	*Education, Youth, Culture &* Sport				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Provides a completely new betting experience for players all over the globe. - Easy registration that requires a minimum of personal information. - No third-party system will hold the user data. - No limitations on bet and reward amounts. - Fast and cheap withdrawals in cryptocurrency. - No hidden fees and manipulations. - Transparent results and payout system. - Every 4 hours a new lottery ticket comes out.	- The usage of cryptocurrency and insufficient legal support may result the problems in the business processes. However, the probability of these factors is low - The weak brand recognition (i.e., insufficiently developed marketing policy) - Insufficient funds may affect holdups and delays of withdrawals, which may in its turn affect reputational losses, downgrades in professional rankings.

	• It contains the most popular sport events from all around the world. • Easy to play: Just get a lottery ticket with a line of sport events and predict results. Win a prize or even a jackpot! • Earn money	• Lack of worldwide network of analysts
	Opportunities • Growth of internet gambling market • Regular increase of online traffic due to availability and quality of the network • Increase of mobile platforms users.	Threats • State-Regulations (including tax laws) • Competition: The dumping price of services on the market and weak brand recognition can lead to a slow-down of the product development, including additional services and new gambling markets releases, games. • Low legal support may result a negative reputation on the market. • Fixed matches may result losses sometimes, but the ratio of such games is extremely low, about 0.01%. • Lack of working assets and the possibility can significantly affect the financial condition of the company. Particularly critically important is the capital for marketing purposes. • Insufficient funds may affect holdups and delays of withdrawals, which may in its turn affect reputational losses, downgrades in professional rankings. • Hacker attack (DDoS, stolen funds) • Reputational losses • Possibility of sanctions from the local state.
Mapping to Needs and Trends		
Addresses (Trend)	Predictive Analytics	
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making	

Creativechain					
Description (& Link)	Blockchain platform for multimedia registration and distribution that indelibly certifies the intellectual properties and their distribution licenses of digital art (https://www.creativechain.org/project/).				
Type	Portal				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	*Education, Youth,* Culture *& Sport*				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	4	3	4	4	**3.6**

SWOT	Strengths	Weaknesses
	• Blockchain platform for multimedia registration and distribution that indelibly certifies the intellectual properties and their distribution licenses of digital art • Offer a public and transparent alternative to intellectual property registration making an intelligent use of the revolutionary and distributed blockchain technology. • The platform applies the power of attorney of the revolutionary Blockchain technology in the process of registering content to create incorruptible proof of existence (POE) that certify the authorship of any digital work. • Creativechain incorporates multiple peer to peer content distribution systems with Creativecoin (CREA), the official cryptocurrency of the platform. • Apply smart multisig contracts to close agreements on your publications.	• The role of Creativechain could be played by a competent Counterparty or Ethereum project, eliminating its novelty. On the same note, Factom could simply expand to do everything Creativechain intends to do. • Creativechain uses a Scrypt proof-of-work mining algorithm. Many altcoins experience periods where, right after a large mining outfit disconnects from the network, no one remaining has the hash power to mine another block for hours until the difficulty drops. Creativechain should be aware of this hazard and implement smarter difficulty adjustment algorithms as a result, since accessibility of the content and payment rails is of the utmost importance. • Much of the communications seem to be based in the Spanish language.
	Opportunities	Threats
	• Aims at all artists, musicians, designers, writers and professionals in the audio-visual sector who produce digital content and use the Internet to sell or distribute their creations among their fans and followers.	• The role of Creativechain could be played by a competent Counterparty or Ethereum project, eliminating its novelty. On the same note, Factom could simply expand to do everything Creativechain intends to do.

• A decentralized social network without censorship, where you can freely share your creations in an economic system managed by the community itself. • Creativechain incorporates multiple peer to peer content distribution systems with Creativecoin (CREA), the official cryptocurrency of the platform.	• Creativechain uses a Scrypt proof-of-work mining algorithm. Many altcoins experience periods where, right after a large mining outfit disconnects from the network, no one remaining has the hash power to mine another block for hours until the difficulty drops. Creativechain should be aware of this hazard and implement smarter difficulty adjustment algorithms as a result, since accessibility of the content and payment rails is of the utmost importance. • Hacker attack
Mapping to Needs and Trends	
Addresses (Trend)	Privacy by Design
Serves (Need)	Secure organisational framework Process and resource optimisation

Europeana						
Description (& Link)	Europeana works with thousands of European archives, libraries and museums to share cultural heritage for enjoyment, education and research. Europeana Collections provides access to over 50 million digitised items - books, music, artworks and more - with sophisticated search and filter tools to help you find what you're looking for. The dedicated thematic collections on art, fashion, music, photography and World War I contain galleries, blogs and exhibitions to inform and inspire (https://www.europeana.eu/portal/en).					
Type	Portal					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	*Education, Youth,* Culture *& Sport*					
TRL	8		**Implementation /Customisation Cost**			Low
Ease of use	High		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	3	3	2	3	2	**2.6**
SWOT	Strengths • Provides access to over 50 million digitised items, books, music, artworks and more, with sophisticated search and filter tools • The dedicated thematic collections on art, fashion, music, photography and World War I contain galleries, blogs and exhibitions to inform and inspire. • The network of cultural heritage institutions • The work on standardisation on a technical and legal level • The diversity of the available data.			Weaknesses • Average quality of the metadata and therefore the discoverability of the content • Too much focus on quantity • No clear value for cultural institutions • No direct access to content		
	Opportunities • Data must be of high quality so the material can actually be found and used for meaningful purposes. • Europeana Cloud Services can create a much more efficient aggregation infrastructure in Europe			Threats • The aggregation model as it is now has worked reasonably well, but it is difficult to scale up. • Average quality of the metadata and therefore the discoverability of the content • Too much focus on quantity • No clear value for cultural institutions • No direct access to content • Sustainability of Europeana and this service is seen to be uncertain		

Mapping to Needs and Trends	
Addresses (Trend)	Open Data
Serves (Need)	Cross-linked information exchange
	Ensure availability of (real-time) information and knowledge

PETER SERVICE					
Description (& Link)	PETER Service (https://billing.ru/) is a Russian telecommunication Service, who saves civil meta telecommunication data from the Russian people and works very close with FSB and national security. This is interesting in so far, because it is extremely likely that many other international telecommunication services as Deutsche Telekom and Telefónica are doing the same for their countries or at least for all concerned Homeland Secret services where these companies operate (https://wikileaks.org/spyfiles/russia/document/SVC-BASE-COMMON-DOC_SVC-BASE-DOC-G3_RUS-17_0/page-1/#pagination).				
Type	Platform				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Foreign Affairs and Defence				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • Major supplier of software for the mobile telecommunications industry in Russia. • Traffic Data Mart (TDM) • The Traffic Data Mart is a system that records and monitors IP traffic for all mobile devices registered with the operator. It maintains a list of categorized domain names which cover all areas of interest for the state. These categories include blacklisted sites, criminal sites, blogs, webmail, weapons, botnet, narcotics, betting, aggression, racism, terrorism and many more. Based on the collected information the system allows the creation of reports for subscriber devices (identified by IMEI/TAC, brand, model) for a specified time range: Top categories by volume, top sites by volume, top sites by time spent, protocol usage (browsing, mail, telephony, bittorrent) and traffic/time distribution. • Data Retention System (DRS) • The data retention system is a mandatory component for			Weaknesses • The European Court for Human Rights deemed Russia's SORM legislation in breach of the European Convention on Human Rights in 2015 (Zakharov v. Russia). • Legal constraints and democratic norms • Invasion of privacy • Historically Powerful government surveillance tools are almost always abusively used • Threat for activists and minorities • Surveillance is a huge expense on the economy and on the safety of citizens without security benefits making the program worth it, considering its loopholes and its inability to halt terrorism.		

	operators by law; it stores all communication (meta-)data locally for three years. State intelligence authorities use the Protocol 538 adapter built into the DRS to access stored information. According to PETER SERVICE, their DRS solution can handle 500,000,000 connections per day in one cluster. The claimed average search time for subscriber related-records from a single day is ten seconds.	
	Opportunities • Data Mining technologies and solutions for collection and analysis of information, as well as means of predicting social and business trends. • Scalable national solution for control of the digital network • Curbing crime • Smart city	Threats • The European Court for Human Rights deemed Russia's SORM legislation in breach of the European Convention on Human Rights in 2015 (Zakharov v. Russia). • Legal constraints and democratic norms: International law states that people have certain human rights, such as the right to free speech, the right to association and the right to protest (United Nations 1948). • Suspicion as to a state's motives, however, may lead to cynicism as to how the state will employ its surveillance technology in self-protection. Records may then be used against citizens at a later date by the state, or by a future iteration of the state if the individuals running the executive change. The knowledge of the accumulation and possession of these records by the state may disincline some citizens from engaging in these legitimate activities, preferring to keep their heads down and avoid notice by the state. These so-called "chilling effects" are at odds with human rights and democratic practice and can lead to behavioural uniformity and a stifling of creativity • Invasion of privacy

		• Historically powerful government surveillance tools are almost always abusively used • Threat for activists and minorities • Surveillance is a huge expense on the economy and on the safety of citizens without security benefits making the program worth it, considering its loopholes and its inability to halt terrorism. • Threat to democracy: Government can use information gathered for its own benefit. Through collection of intelligence voting patterns can be predicted and used to government's advantage. • There is no evidence to show that extra surveillance helps in curbing crime
Mapping to Needs and Trends		
Addresses (Trend)	Smart City / Smart Government	
Serves (Need)	Cross-linked information exchange	

Virtuose DE					
Description (& Link)	A Cloud-based video platform to analyse traffic movements. The German part of the project by Fraunhofer HHS aims to develop low-complexity, real-time algorithms for analysis of large-scale visual data. In consideration of increasingly growing cities in European industrial countries it becomes more and more important that the traffic situation has to be optimised. The service tries to solve this issue by analysing data streams to discover free park spaces for instance (https://www.hhi.fraunhofer.de/en/departments/vca/projects/virtuose-de.html).				
Type	Platform				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Urban Planning & Transport				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	3	4	4	4	4	**3.8**
SWOT	Strengths		Weaknesses		

SWOT

Strengths

- Flexible usage of different computing platforms for robust and scalable video delivery and analysis.
- Develop low-complexity, real-time algorithms for analysis of large-scale visual data.
- Developing low-complexity algorithms that mainly operate on compressed video data to vastly reduce storage and processing requirements.
- Investigation of Hierarchical approaches that combine deep learning-based computer vision techniques with compressed domain processing.
- Crowd control
- Project consortium consists of 19 partners from Germany, Finland, Spain, Turkey and Romania

Weaknesses

- Large-scale visual data
- Plenty of different video services, will need to be started rapidly, scaled up or down, or moved to another computing platform
- Poorly designed interface
- Storage and processing requirements.
- Data privacy
- System prototype demonstration in operational environment

Opportunities	Threats
- Develop low-complexity, real-time algorithms for analysis of large-scale visual data. - Parking lot management and surveillance as well as smart on-street parking in the frame of the emerging smart-City concept, and video-based security in public transportation. - Utilizing the most recent advancements in cloud, virtualisation and video delivery techniques. - Analyse the business case for selected video services. - Investigation of Hierarchical approaches that combine deep learning-based computer vision techniques with compressed domain processing.	- Large-scale visual data - Plenty of different video services, will need to be started rapidly, scaled up or down, or moved to another computing platform - Poorly designed interface - Storage and processing requirements. - Data privacy - Actual system not proven in operational environment

Mapping to Needs and Trends	
Addresses (Trend)	Smart City / Smart Government
Serves (Need)	Process and resource optimisation Ensure availability of (real-time) information and knowledge Forward-looking strategic planning for the use of data and technologies as well as for practical implementation

MASAR					
Description (& Link)	Saudi Arabia, currently offers MASAR a real-time tracking system, to create more space between the streets of Mecca and Medina, the most holy cities of ISLAM (Shia and Suni) during the days of Hadji. For this reason, the house AL Saud has created a Smart city research centre for Crowd Control (one of the biggest of the world). The researchers developed MASAR a tracking platform for guests and citizens to help them by planning their root towards the Kaaba (http://tcmcore.net/platforms/masar).				
Type	Platform				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Urban Planning & Transport				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	• Transportation analysis and visualization which helps people to analyse road traffic and crowded area using different visualization techniques. • Provide solution to government organization for transportation and crowd management	• GPS: The mobile application and wearable sensors are constrained by the system interface to the GPS navigation system within the device. Since there are multiple system and multiple GPS manufacturers, the interface will most likely not be the same for every one of them. • Need for intermittent connectivity • The Internet connection is also a constraint for the mobile application, car counting device, intersections cameras, wearable devices and Masar web portal. Since all those data collection sensor devices send data to the database over the internet and Masar web portal fetches data from the database over the Internet, it is crucial that there is an Internet connection for the platform to function. • Database capacity Both the web portal and the sensor devices will be constrained by the Capacity of the database. Since the database is shared between all sensor devices it may be forced

		to queue incoming requests and therefor increase the time it takes to post/fetch data
	Opportunities • Cooperation with Transportation companies, big event management companies, buildings and areas where crowd management is required	Threats • Multiple GPS interfaces: The mobile application and wearable sensors are constrained by the system interface to the GPS navigation system within the device. Since there are multiple system and multiple GPS manufacturers, the interface will most likely not be the same for every one of them. • Need for intermittent connectivity • The Internet connection is a constraint for the mobile application, car counting device, intersections cameras, wearable devices and Masar web portal. Since all those data collection sensor devices send data to the database over the internet and Masar web portal fetches data from the database over the Internet, it is crucial that there is an Internet connection for the platform to function. • Database capacity: both the web portal and the sensor devices will be constrained by the Capacity of the database. Since the database is shared between all sensor devices it may be forced to queue incoming requests and therefor increase the time it takes to post/fetch data
Mapping to Needs and Trends		
Addresses (Trend)	Smart City / Smart Government	
Serves (Need)	Process and resource optimisation Ensure availability of (real-time) information and knowledge Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

UrbanSim					
Description (& Link)	UrbanSim is a simulation platform for supporting planning and analysis of urban development, incorporating the interactions between land use, transportation, the economy, and the environment. UrbanSim leverages state-of-the-art urban simulation, 3D visualisation, and shared open data to empower users to explore, gain insights into, and develop and evaluate alternative plans to improve their communities (http://www.urbansim.com/).				
Type	Platform				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Monitoring and Evaluation				
Policy Domain (s)	Urban Planning & Transport				
TRL	8	**Implementation /Customisation Cost**			High
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	3	3	**3.6**
SWOT	Strengths • Simulation platform for supporting planning and analysis of urban development, incorporating the interactions between land use, transportation, the economy, and the environment. • Leverages state-of-the-art urban simulation, 3D visualization, and shared open data to empower users to explore, gain insights into, develop and evaluate alternative plans to improve their communities • Cooperation with the San Francisco Mayor's Office of Housing and Community Development to design software that allows staff to quickly evaluate a land parcel or a building's suitability for affordable housing development, a timely project given the ongoing nature of San Francisco's housing crisis • UrbanSim created a tool called Penciler, which analyses in a matter of minutes if it would feasible for the city to turn a given property into affordable housing. • Launched UrbanCanvas Modeler, the world's first cloud-based urban simulation platform.			Weaknesses • UrbanSim team should explore the reinforcement of the initiative's relationship with social media; both as a way of identifying and collecting data and as a way of disseminating the project to citizens and stakeholders. • Need for intermittent connectivity: if your internet connection is offline, you will not be able to access any of your applications, server or data from the cloud. • Increasing pace of technological change and higher level of technical sophistication • Downtime: As cloud service providers take care of a number of clients each day, they can become overwhelmed and may even come up against technical outages. This can lead to business processes being temporarily suspended.		

	Opportunities	Threats
	- Need for tools that enable communities to understand the forces of change, and how local actions might improve outcomes for local communities, from the site level, to the neighbourhood, to the metropolis. - Exploring transport and land use domains as well as urban design. - Environmental issues (e.g. greenhouse gas emissions) have been motivating some projects (such as UrbanSim for Canada25); environmental planning is also quite relevant. - Energy consumption and / or water consumption - Modelling the impact of climate change - Dealing with interdependencies among different policies (e.g. through complex systems science). The visualization of the various interdependencies would be a very interesting research initiative. - Could also be a catalyst for collecting, organizing and (probably most important) enriching the globally available open / public data - Explore the reinforcement of the initiative's relationship with social media; both as a way of identifying and collecting data and as a way of disseminating the project to citizens and stakeholders.	- Climate change - Crises in housing affordability - New technologies and business models disrupting transportation and housing sectors - Massive disruptions from natural and man-made causes. - Urge for large amounts of data: it is a great challenge to locate, collect and transform into a useful form the necessary (statistical, demographic, etc.) data. - Real estate markets, but also transport systems, are rather different from place to place. Thus, another challenge is to ascertain that the UrbanSim models are flexible enough to fit the various needs.

Mapping to Needs and Trends	
Addresses (Trend)	Smart City / Smart Government
Serves (Need)	Cross-linked information exchange Forward-looking strategic planning for the use of data and technologies as well as for practical implementation Involvement of the public and citizens, as well as the development of citizen-centred policy-making

KNIME Analytics Platform						
Description (& Link)	KNIME Analytics Platform is the open source software for creating data science applications and services. Intuitive, open, and continuously integrating new developments, KNIME makes understanding data and designing data science workflows and reusable components accessible to everyone. (https://www.knime.com/knime-software/knime-analytics-platform).					
Type	Platform					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Urban Planning & Transport					
TRL	7	**Implementation /Customisation Cost**				Low
Ease of use	High	**Open License Availability**				Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	4	4	4	4	**3.8**

SWOT	Strengths
	
	• KNIME Analytics Platform is not a cut-down version and there are no artificial limitations, such as machine processing size or numbers of data rows: If you have enough hard disk and memory, you can run projects with hundreds of millions of rows, as many KNIME users currently do.
	• Build end to end data science workflows:
	   o Create visual workflows
	   o Blend tools from different domains.
	   o Choose from over 2000 modules ("nodes") to build your workflow.
	   o Get up and running quickly.
	• Blend data from any source
	   o Open and combine simple text formats, unstructured data types, or time series data.
	   o Connect to a host of databases and data warehouses to integrate data
	   o Access and retrieve data from sources such as Twitter, AWS S3, Google Sheets, and Azure.
	• Shape your data
				Weaknesses
				
				• Intellectual property and patents issues are complicated and there is a risk that code is illegally used and propagated Also licenses are complex – there is over 60 different licenses that comply with the open source definition
				• Resources are required for switching to an open source from a proprietary system. This results in further expenses in the form of switching costs.
				• Migration of data
				• Retraining personnel
				• Less suitable option for large complex workflows.
				• Partitioning ability is limited for dataset.		

	- o Derive statistics, or apply statistical tests to validate a hypothesis. - o Aggregate, sort, filter, and join data - o Clean data through normalization - o Extract and select features. - Leverage Machine Learning and AI - o Build machine learning models for classification, regression, dimension reduction, or clustering. - o Optimize model performance - o Validate models - o Make predictions - Discover and share insights - o Visualize data - o Display summary - o Export reports for presenting results to stakeholders. - o Store processed data or analytics results in many common file formats or databases. - Scale execution with demands - o Build workflow prototypes - o Scale workflow performance. - o Exercise the power of in-database processing or distributed computing on Apache Spark to further increase computation performance.	
	<u>Opportunities</u> - Maintaining an open source platform containing all functionality that any individual might require and continue delivering extended functionality - Innovation: Opening previously closed or exclusive platforms, processes, tools, organizational boundaries, idea sourcing or funding can speed up innovation.	<u>Threats</u> - Intellectual property and patents issues are complicated and there is a risk that code is illegally used and propagated Also licenses are complex – there is over 60 different licenses that comply with the open source definition - Resources are required for switching to an open source from a proprietary system. This results

	• Open platforms, their very committed users and their advanced ecosystems will bring about the most interesting breakthroughs in data-driven innovation. • Increase of the number of large global organizations and institutions that actively consider and adopt open platforms for their data science teams.	in further expenses in the form of switching costs. • Migration of data • Retraining personnel
Mapping to Needs and Trends		
Addresses (Trend)	Next Generation of BI and Data Analytics platforms	
Serves (Need)	Deeper understanding of IT potential and IT processes	

RapidMiner					
Description (& Link)	RapidMiner is an open source software platform for data science teams that unites data prep, machine learning, and predictive model deployment. It operates through visual programming and is capable of manipulating, analysing and modelling data. Its unified data science platform accelerates the building of complete analytical workflows – from data prep to machine learning to model validation to deployment – in a single environment, dramatically improving efficiency and shortening the time to value for data science projects (https://rapidminer.com/).				
Type	Platform				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	8	**Implementation /Customisation Cost**			High
Ease of use	High	**Open License Availability**			No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	3	2	**3.4**

SWOT	Strengths	Weaknesses
	- Visual workflow for predictive analytics: Visual Workflow Design. Quick-to-learn and easy-to-use drag & drop approach accelerates end-to-end data science for improved productivity - Build predictive models, faster - Intuitive data prep - Collaboration, management, and deployment - Real-Time Scoring: Turn insight into action - Code free data science for Hadoop and Spark - Unified Platform. One platform, one user interface, one system, support the complete workflow from data prep, through model deployment to ongoing model management - Breadth of Functionality. More pre-defined machine learning functions and third-party libraries than any other visual platform - Open Source Innovation. Well-accepted open languages and technology, a community of over 250K data science experts, and a	- High implementation /customization cost - Competition - Storage and processing requirements. - More tutorials/samples needed - Limited partitioning abilities for dataset to training and testing sets - Doesn't allow changes on the behaviour of a machine learning algorithm that already exists in the repository

	robust marketplace keeps pace with evolving data science requirements • Broad Connectivity. More than 60 connectors provide easy access to all types of data: structured, unstructured & big data • Data Science at Every Scale. Run workflows in-memory or in-hadoop, providing the best option for projects of all sizes. • 400000 users	
	<u>Opportunities</u> • Churn Prevention: Identify customers likely to leave, take preventative action. • Customer Lifetime Value: Distinguish between customers based on business value. • Customer Segmentation: Create meaningful customer groups for more relevant interactions. • Demand Forecasting: Know what volumes to expect to improve planning. • Fraud Detection: Identify fraudulent activity quickly and end it. • Next Best Action: The right action at the right time for the right customer. • Predictive Maintenance: Predict equipment failure, plan cost-effective maintenance. • Price Optimization: Set prices that balance demand, profit, and risk. • Product Propensity: Predict what your customers will buy, before even they know it. • Quality Assurance: Resolve quality issues before they become a problem. • Risk Management: Understand risk to manage it. • Up- and Cross-Selling: Convince customers to buy more. • Automatic programming • Innovation	<u>Threats</u> • High implementation /customization cost • Competition • Storage and processing requirements. • Limited partitioning abilities for dataset to training and testing sets • Doesn't allow changes on the behaviour of a machine learning algorithm that already exists in the repository
Mapping to Needs and Trends		
Addresses (Trend)	Open Data	

Serves (Need)	Deeper understanding of IT potential and IT processes
	Establishment of a comprehensive technical infrastructure and IT architecture

Pentaho					
Description (& Link)	Pentaho is a Unified Data Integration and Analytics Platform that addresses the barriers that block an organisation's ability to get value from all their data. The platform simplifies preparing and blending any data and includes a spectrum of tools to easily analyse, visualise, explore, report and predict. Open, embeddable and extensible, Pentaho is architected to ensure that each member of the team — from developers to business users — can easily translate data into value (http://www.pentaho.com/).				
Type	Platform				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	8	**Implementation /Customisation Cost**			High
Ease of use	Low	**Open License Availability**			No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	2	1	**3**
SWOT	Strengths • Pentaho lets you manage and process data in hybrid and multi cloud environments and solve business problems by using connectors to streaming data. • Comprehensive software that helps to access, prepare, blend and analyse any data from any source. • Internet of Things Analytics: Expect better business outcomes, from improved customer satisfaction to higher profitability • Big Data Integration and Analytics • Drive maximum value from your data with a complete platform for full data integration and business analytics. • Quickly and easily deliver the best data to your business and IT users without coding or complexity. • Business Analytics: Empower business users with interactive, real-time visual data analysis and predictive modelling, with minimal IT support.		Weaknesses • No open license availability • Low ease of use • Poorly designed interface • No 24x7 support for standard users • No unified interface for all components • Basic user manual, which does not detail many of the concepts, which hinders the development and deployment of the solution. • User-Profiling is available only in Enterprise edition • Data Integration can be a resource hog when working with large data sets		

	Opportunities	Threats
	• Deep learning: More investments are pouring into deep learning after the initial traction on artificial intelligence. As deep learning technologies march on, we will see more of their application on BI software, primarily on image recognition and machine translation. • Internet of Things: It's a staple of consumer technology fantasy, but internet-of-things is legitimately happening. We can see advances in algorithms, sensors and integration that drum up predictive analytics. The same technology will further enhance OLAP capabilities in BI solutions.	• Competition • No open license availability • Low ease of use • No 24x7 support for standard users • Poorly designed interface • Basic user manual, which does not detail many of the concepts, which hinders the development and deployment of the solution. • User-Profiling is available only in Enterprise edition • Data Integration can be a resource hog when working with large data sets
Mapping to Needs and Trends		
Addresses (Trend)	Next Generation of BI and Data Analytics platforms	
Serves (Need)	Coherent use of digital technology across policy areas Standardisation of data management	

SAHARA Smart analysis					
Description (& Link)	A medical smart analysis platform for health care (https://www.sahra-plattform.de/).				
Type	Platform				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Health				
TRL	6	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	2	4	4	2	3	**3**

SWOT	Strengths	Weaknesses
	- Combine billing data, treatment data as well as study and registry data in a legally secure manner and make it accessible to the authorized health care providers and users. - Make various types of supply data analysable, in order to transfer the resulting findings into the care practice. - Uses pseudonymized (after release) or anonymized data. - Data privacy: Personal data protected on the SAHRA platform by appropriate and proven technical and organizational measures. All procedures are legally assessed in advance and approved by the relevant data protection authorities. - Data security: Personal data is protected against accidental or intentional manipulation, partial or total loss, destruction or against unauthorized access by third parties through appropriate technical and organizational security measures.	- Data privacy - Data security - Low TRL - Lack of system Integration: Clinical, administrative, and financial systems are not linked, and as a result, many healthcare institutions are not yet maximizing their IT potential - Slow IT Adoption: Traditionally, healthcare has been slow to adopt IT and has lagged significantly behind other industries in the use of IT.

	Opportunities	Threats
	- In the whole healthcare area, there is an increasing cost pressure and every gain in efficiency has to be utilized - Improvement in reporting and data presentation capabilities - Improvement in quality of healthcare services - Effective and efficient resources utilization procedures - Improvement in patients trust and satisfaction - Encouragement in proactive healthcare practices - Public awareness and community support programs - Training programs and facilities - Unification and integration of Public and Private sector health records - Improved support for knowledge management and decision making - Productive, efficient and effective healthcare management - Better human resource management - Costing and budget analysis for enhanced funds utilization - Sufficient allocation of resources for supporting IT infrastructure - Internet availability and enhanced bandwidth	- Economic and medical challenges - Data protection - Cyber-attack - Data quality - Users resistance to systems change and implementation - Rapid changes in technology and IT systems - Unreliable and unrealistic system and reporting requirements
Mapping to Needs and Trends	
Addresses (Trend)	Next Generation of BI and Data Analytics platforms	
Serves (Need)	Cross-linked information exchange Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

IBM Watson					
Description (& Link)	Watson is the AI platform for professionals (https://www.ibm.com/watson/about/index.html).				
Type	Platform				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	9	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	• Powered by the latest innovations in machine learning: Has the capability of understanding natural language and the ability to learn through repeated use. It literally "gets smarter" through tracking feedback from its users, learning from its successes and failures, and being presented new information. • Learn more with less data. • Integrate AI into your most important business processes: Reimagines your workflows. Your business processes get smarter with Watson. It embeds into your workflows to provide AI when you need it, where you need it. • IBM'S Reputation: Rich industry expertise. • Build models from scratch or leverage APIs and pre-trained business solutions. • Data ownership: When you train with Watson, your insights belong to you. As your models gain value, you maintain ownership of your data. • Accelerate research and discovery • Enrich your interactions: Reduce response times, increase the number of transactions, and make every interaction meaningful and productive. • Anticipate and pre-empt disruptions	• Available Only in English (Limits areas of use) • Seen as disruptive technology • Maintenance • Doesn't process structured data directly • Increasing rate of data • High switching costs • Takes time to integrate Watson and its services into a company • Targeting towards bigger organizations that can afford Watson • Takes time and effort to learn Watson in order to use it to its full potential

	• Use AI to constantly monitor the condition of systems that power your business to ensure problems don't disrupt your work. • Recommend with confidence • Scale expertise and learning
	Opportunities • The volume of unstructured data is growing at a significant rate • Cognitive computer systems • Creating a more natural relationship between humans and computers: Watson has the capability of understanding natural language and the ability to learn through repeated use. It literally "gets smarter" through tracking feedback from its users, learning from its successes and failures, and being presented new information.	Threats • Competition • Available Only in English (Limits areas of use) • Seen as disruptive technology • Maintenance • Doesn't process structured data directly • Increasing rate of data, with limited resources • High switching costs • Takes time to integrate Watson and its services into a company • Targeting towards bigger organizations that can afford Watson • Takes time and effort to learn Watson, in order to use it to its full potential • Government regulations

Mapping to Needs and Trends	
Addresses (Trend)	Next Generation of BI and Data Analytics platforms
Serves (Need)	Cross-linked information exchange Forward-looking strategic planning for the use of data and technologies as well as for practical implementation

Employment Ontario Geo Hub					
Description (& Link)	Platform for exploring and downloading Employment Ontario open data (http://www.eo-geohub.com/).				
Type	Platform/Data Source				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Employment & Social Security				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	Strengths • Making data available through interactive dashboards • Makes data more accessible to a broader audience that may not have the technical skills to use datasets alone. • Supports the Open Data Engagement principles in the Open Data Directive, including supporting participation by allowing Ontarians to develop their own analysis, insights, and digital products. • Creating a more open and transparent government by sharing our data and information, and consulting with the people of Ontario.	Weaknesses • Focused on Canada • Users may lack the technical skills to use datasets.
	Opportunities • Making products that encourage participation. We want people to visit our site, download and interact with our data and make decisions with our data. • Hackathons, open data conferences, and civic tech meet-ups, conferences • Creating a more open and transparent government by sharing our data and information, and consulting with the people of Ontario.	Threats • Data ownership • Missing Interpretive Predominance • Populist mobilization of masses • Balance between openness and protection of information.

Mapping to Needs and Trends	
Addresses (Trend)	Open Data
Serves (Need)	Ensure availability of (real-time) information and knowledge Improve the process of recruiting in order to acquire suitable staff in a timely manner

GENIX					
Description (& Link)	GENIX is a huge software company and the official Partner of Australia's defence system to create a Big Data Solution for the Military of Australia. They are working closely together with the most renowned universities and science institutes, similar to Fraunhofer Society or Max-Planck-Society in (Germany/Europe), Sciences Po Paris in France (France/Europe) or Fraunhofer Society (international), (https://www.genixventures.com/).				
Type	Platform/Model/Application				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Foreign Affairs and Defence				
TRL	8	**Implementation /Customisation Cost**			High
Ease of use	Low	**Open License Availability**			No

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	2	2	**3.2**

SWOT	Strengths	Weaknesses
	- Expertise in process automation and re-engineering, analytics, optimisation, project delivery and risk management - Provides a rich, personalised user experience while meeting privacy, security and other regulatory compliance requirements - High-security, federal government registered cloud service providers house the high-availability infrastructure used to deliver services to customers - Full help-desk and customer support is offered through Genix's Melbourne-based call centre. - Flexible licencing models to reflect changing environments - Award recipient	- Low ease of use - High implementation /customization cost - No open license availability - Competition - Increasing pace of technological change and higher level of technical sophistication. - Some would say that traditional BI and dashboard capabilities can deliver similar results without the added complexity of another software layer
	Opportunities	Threats
	- Solving problems in complex, regulated, high-volume and novel environments. - Advance the platform in the fields of advanced analytics, complex events processing and optimisation. - Use of the Conscious Machines tools to address the marking of essay-type questions, improved	- Low ease of use - High implementation /customization cost - No open license availability - Competition - Cyber attack - Data security-privacy - Data quality

	search efficiency and time savings, deliver results based on the most current content, aggregate results across multiple content sources, improve ranking of results drawn from multiple content sources, de-duplicate of content (rules based).	• Users resistance to systems change and implementation • Rapid changes in technology and IT systems
Mapping to Needs and Trends		
Addresses (Trend)	Next Generation of BI and Data Analytics platforms	
Serves (Need)	Continuous Evaluation of Policies Development of domain specific target and indicator systems Process and resource optimisation	

SMART Energy Hub						
Description (& Link)	A research Project dealing with the question, of how to improve the Energy-Management in the public sector (http://smart-energy-hub.de/).					
Type	Platform					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Environment & Energy					
TRL	6		**Implementation /Customisation Cost**			Low
Ease of use	Low		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	3	2	3	**3.2**
SWOT	Strengths • Combining energy management data, weather forecasts and the connection to external marketplaces for optimization of energy management • Is part of the "Smart Data - Innovations from Data" research program funded by the Federal Ministry for Economic Affairs and Energy (BMWi)			Weaknesses • Rapidly changing energy market • Processing large amounts of real-time sensor data • Low TRL • Low ease of use • Site only available in German language		
	Opportunities • Secure cloud-based solution for SMEs as a basis for new services • Internal optimization of infrastructure operation • Rapidly changing energy market • Optimization of the energy network of infrastructure managers • Development of new business models • In-memory database solution • Decision support and visualization • Sensor, forecast and market-based energy production and deployment planning			Threats • Rapidly changing energy market • Normalization of data if gathered from various sources to minimize data collection errors • Data quality • Increasing pace of technological change and higher level of technical sophistication. • Competition		
Mapping to Needs and Trends						
Addresses (Trend)	Next Generation of BI and Data Analytics platforms					
Serves (Need)	Process and resource optimisation					

I.6 Software / Engines

NodeXL					
Description (& Link)	NodeXL is a data visualisation and analysis software of relationships and networks that provides exact calculations. It is a free (Basic package not the pro one) and open-source network analysis and visualisation software and one of the best statistical tools for data analysis which includes advanced network metrics, access to social media network data streams, sentiment analysis and automation (http://nodexl.codeplex.com/).				
Type	Software				
Origin	Research Domain				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	3	3	**3.6**
SWOT	Strengths • Makes it easy to explore network graphs. • Providing easy access to social media network data streams, advanced network metrics, text and sentiment analysis, and powerful report generation. • Supported by a global network of academics from a wide variety of disciplines. • Creates insights into social media streams with just a few clicks • Graph Metric Calculations: easily calculate basic network metrics like degree, and NodeXL Pro adds calculation of betweenness centrality, closeness centrality, eigenvector centrality, PageRank, clustering coefficient, graph density and more. • Flexible Import and Export: import graphs from GraphML, Pajek, UCINet, and matrix formats • Direct Connections to Social • Zoom and scale: zoom into areas of interest, and scale the graph's vertices to reduce clutter. • Flexible Layout.		Weaknesses • Low ease of use • Importing data from social networks not working properly • Dependence on Windows: Not running on Excel for Mac OS • No undo option when moving the vertices in the graph and making layout changes. • Always tries to fit the graph in one window size. It seems that the output of the graph layout is different when using a larger screen and zooming out on a small screen. • Not possible to align all or a set of vertices to left/right or top/botttom. making manual layout manipulation difficult.		

	- Easily Adjusted Appearance - Dynamic Filtering - Powerful Vertex grouping: group the graph's vertices by common attributes, - Task Automation: Perform a set of repeated tasks with a single click.
Opportunities - Mapping, measuring and understanding the landscape of social media. - Social network analysis (SNA) is a powerful way to organize a connected world. Network analysis can reveal insights into the way things connect with one another and form groups.	Threats - Dependence on Windows: Not running on Excel for Mac OS - Low ease of use - Competition - License and intellectual property rights issues - Data ownership

Mapping to Needs and Trends	
Addresses (Trend)	Cloud Computing
Serves (Need)	Cope with the production of huge volumes of data Deeper understanding of IT potential and IT processes

LiquidFeedback					
Description (& Link)	Open-source software, powering internet platforms for proposition development and decision making (http://liquidfeedback.org/).				
Type	Software				
Origin	Private sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Innovation, Science & Technology				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	4	4	4	4	**3.8**

SWOT	Strengths	Weaknesses
	- Fair, robust, reliable. - Equal Privileges, Large Groups, , Strong Transparency, Reliability - Decisions are made by recorded vote. All data is available, both human- and machine-readable. - Easy to use.: Optimal user guidance. Modern user interface which is easy to use. Help and guidance to its features. Voting on an issue by simply drag and drop the alternatives to "approval" or "disapproval" box. - Can be adapted to your corporate identity. integration with existing solutions is possible. - Using the "active" member count as reference population - Include a mechanism called "issue limiter", which adaptively adjusts the admission quorum for issues based on the number of currently open issues that have already been admitted in the respective subject area. The basic principle behind the "issue limiter" is that increasing the number of open and admitted issues by a given absolute count increases the required supporter count by a certain (constant) factor. In turn, issues that are closed (e.g. because of finally having been voted upon) reduce the required supporter count by the same factor. This results in an exponential (or logarithmic) correlation between	- Legally binding privacy statement in German only - Security experts have voiced significant concerns over the trustworthiness of e-voting systems. - The effects of enlisting in a subject area are difficult to explain to a user of the software. Often participants won't actively update the subject areas they are interested in or engaged in. - The requirement to select subject areas is an obstacle when integrating with other software components. - A minority exceeding the configured quorum in its size will be capable to flood the system with proposals. While LiquidFeedback provides a system that restricts participants to not post more than a configurable count of proposals within a given time, this approach doesn't scale as the number of participants grows. - The "issue limiter" approach doesn't yet take into account that different issues may have different runtimes. Counterintuitively, open issues that have a shorter runtime should be weighted more (i.e. increase the required supporter count more) because an

	the number of open issues and the currently required supporter count to let a new issue pass to discussion phase.	equilibrium of N open issues that have a short runtime require more interactions of the participants than N open issues with a longer runtime. • Its adoption by political parties has yielded mixed results.

	Opportunities
	
	• Various application fields including:
	  ○ Corporations (employee participation, product development, data revision systems)
	  ○ Cooperatives (digital assembly)
	  ○ Political Parties (digital assembly)
	  ○ Civil Society Organizations (digital assembly)
	  ○ Cities, counties and other municipalities (civic participation)
	• Digital transformation: majority of continuously successful global organisations are evolving traditional methods to obtain customer feedback
		Threats
		
		• Not suitable for consultations where secret voting is desired or required.: It implements a voting system that is recorded and verifiable by anybody. The public nature of voting, however, comes at a cost. Because in modern democracies the privacy and anonymity of voting are considered essential to protect individual autonomy and freedom of choice
		• Electronic frauds
		• Security experts have voiced significant concerns over the trustworthiness of e-voting systems.

Mapping to Needs and Trends		
Addresses (Trend)	Smart City / Smart Government	
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making Forward-looking strategic planning for the use of data and technologies as well as for practical implementation Strengthen citizens' trust in public administration	

APACHE Spark					
Description (& Link)	Apache Spark™ is a unified analytics engine for large-scale data processing (https://spark.apache.org/).				
Type	Analytics Engine				
Origin	Private sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	3	3	**3.6**

SWOT	Strengths	Weaknesses
	- Run workloads faster: achieves high performance for both batch and streaming data, using a state-of-the-art DAG scheduler, a query optimizer, and a physical execution engine - Write applications quickly in Java, Scala, Python, R, and SQL. - Combine SQL, streaming, and complex analytics. - Spark runs on Hadoop, Apache Mesos, Kubernetes, standalone, or in the cloud. It can access diverse data sources. - Used at a wide range of organizations to process large datasets.	- No File Management - Apache Spark does not have its own file management system, thus it relies on some other platform like Hadoop or another cloud-based platform which is one of the Spark known issues - No Support for Real-time Processing - Problem with Small File - If we use Spark with Hadoop, we come across a problem of a small file. HDFS provides a limited number of large files rather than a large number of small files. - Back pressure is build up of data at an input-output when the buffer is full and not able to receive the additional incoming data. No data is transferred until the buffer is empty. Apache Spark is not capable of handling pressure implicitly rather it is done manually. - Memory management

	Opportunities	Threats
	<u>Opportunities</u> • Simplify the challenging and compute-intensive task of processing high volumes of data • Real time data processing • Seamlessly integrating complex capabilities such as machine learning and graph algorithms	<u>Threats</u> • There are various technologies that are overtaking Spark • In-memory processing is expensive when we look for a cost-efficient processing of big data
Mapping to Needs and Trends		
Addresses (Trend)	Smart Work	
Serves (Need)	Deeper understanding of IT potential and IT processes	

Gephi					
Description (& Link)	Gephi is an open-source network analysis and visualisation software package written in Java on the NetBeans platform. It is a tool for exploring and understanding graphs that allows users to interact with the representation, manipulate the structures, shapes and colours to reveal hidden patterns. Its goal is to help data analysis to make hypothesis, intuitively reveal trends and patterns, highlight outliers and tell stories with their data. It uses a 3D render engine to display large graphs in real-time and to speed (https://gephi.org/).				
Type	Software package				
Origin	Non-profit sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	3	3	3	**3.4**
SWOT	Strengths • Real-time visualization: Profit from the fastest graph visualization engine to speed-up understanding and pattern discovery in large graphs. Powered by its ad-hoc OpenGL engine, Gephi is pushing the envelope on how interactive and efficient network exploration can be. • Layout: Layout algorithms give the shape to the graph. The Layout palette allows user to change layout settings while running, and therefore dramatically increase user feedback and experience. • Metrics • The statistics and metrics framework offer the most common metrics for social network analysis (SNA) and scale-free networks. • Networks over time: forefront of innovation with dynamic graph analysis: o Visualize how a network evolve over time by manipulating the embedded timeline.		Weaknesses • Low ease of use • Integration with traditional statistical data sets, like raw SAS datasets • Memory requirements • Doesn't work with Java 8		

	- o Import temporal graph with the GEXF file format
	    o Run metrics over time
	    o Graph streaming ready - Create cartography: Use ranking or partition data to make meaningful the network representation. - Dynamic filtering: Filter the network to select nodes and/or edges based on the network structure or data. Use interactive user interface to filter the network in real-time. - Data Table and Edition: Gephi has its own Data Laboratory with an Excel-like interface to manipulate data columns, search and transform the data. - Input/Output
	    o Read the majority of graph file formats but also supports CSV and relational databases import.
	    o Spreadsheet import wizard
	    o Database import
	    o Save/Load project files - Ergonomic interface: no programming skills needed - High-performance: built-in rendering engine. - Various tutorials available in more languages than English. - Support	

	Opportunities - Development of dynamic features - Exploratory Data Analysis: intuition-oriented analysis by networks manipulations in real time. - Link Analysis: revealing the underlying structures of associations between objects. - Social Network Analysis: easy creation of social data connectors to map community organizations and small-world networks. - Biological Network analysis: representing patterns of biological data. - Poster creation: scientific work promotion with hi-quality printable maps.	Threats - Competition - Problematic in installation: Doesn't run on the latest version of Java - Security risk - Incompatible with xml, xlsx, and txt files - Is in open beta, and will likely have a few bugs - The interface and some simple interactions such as zooming in and out can be unintuitive at times.

	• Help data analysts to make hypothesis, intuitively discover patterns, isolate structure singularities or faults during data sourcing	
Mapping to Needs and Trends		
Addresses (Trend)	Smart Work	
Serves (Need)	Deeper understanding of IT potential and IT processes	

Solver BI360					
Description (& Link)	Solver specialises in providing world-class financial reporting, budgeting and analysis with push-button access to all data sources that drive company-wide profitability. Solver provides BI360, a Corporate Performance Management (CPM) software suite for companies of all sizes, which is available for cloud and on-premise deployment, focusing on four key analytics areas. (https://www.solverglobal.com/)				
Type	Software suite				
Origin	Private sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Economy & Finance				
TRL	8	**Implementation /Customisation Cost**			High
Ease of use	High	**Open License Availability**			No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	2	2	**3.2**

SWOT	Strengths	Weaknesses
	- Leading Corporate Performance Management (CPM) software suite for companies of all sizes - Providing world-class financial reporting, budgeting and analysis with push-button access to all data sources that drive company-wide profitability. -available for cloud and on-premise deployment - Focusing on four key analytics areas: - Reporting: Whether in the office or working remotely, on-premise or Cloud, BI360 Reporting offers you robust, business user friendly financial and operational reporting. - Budgeting: Eliminate the manual planning processes and back-and-forth emails to achieve modern, dynamic budgets and forecasts with self-service BI360 Planning. - Dashboards: Whether you're an executive or a coordinator, BI360 Dashboards deliver easy-to-understand insights into the health of your organization, enabling smarter strategy.	- High implementation /customization cost - The Configuration process and the need of a lot human resources. - Implementation time - Not Mac friendly - Can only be used online, no on-premise version is available

	o Data warehouse: Connect the dots of your diverse data sources with the BI360 Data Warehouse, which allows you to consolidate company information in one easy-to-use, high performance platform. • Awards & Recognitions: Solver Wins Acumatica Innovation Partner of The Year Award, Partner solution voted most unique and innovative by the VAR partner community, G2 Crowd Recognizes Solver as a Leader in the Los Angeles Tech Scene	
	Opportunities • Delivering innovative, business driven solutions to the global market place • Enabling world-class decisions for mid-market customers by creating innovative solutions and being the global leader in corporate performance management through a culture of creativity and problem-solving. • Changing the face of CPM with next generation, collaborative and action-driven solutions for planning, reporting and analysis to deliver complete insight into every facet of the enterprise, giving the entire organization the ability to truly understand their data, make better decisions, and ultimately drive efficiency and performance in their business.	Threats • Cyber threats • Data privacy • Competition • Increasing pace of technological change and higher level of technical sophistication needed.

Mapping to Needs and Trends	
Addresses (Trend)	Smart Work
Serves (Need)	Link between impact, quality, performance measurements and financial information Standardisation of processes

DataMelt					
Description (& Link)	DataMelt or DMelt is a software for numeric computation, statistics, analysis of large data volumes ("big data") and scientific visualisation. The program can serve many areas, such as natural sciences, engineering, modelling and analysis of financial markets and (as it is a computational platform) it can be used with different programming languages on different operating systems (http://jwork.org/dmelt/).				
Type	Software				
Origin	Private sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	3	3	**3.6**

SWOT	Strengths	Weaknesses
	- Software for numeric computation, statistics, analysis of big data and scientific visualization. - It is not limited by a single programming language. - Is a computational platform. It can be used with different programming languages on different operating systems. DMelt runs on the Java platform, but can be used with the Python language too. Thus this software combines the word's most-popular enterprise language with the most popular scripting language used in data science. - Python programming can use more than 40,000 Java classes for numeric computation and scientific visualization. In addition, more than 4000 classes come with Java API, plus 500 native Python modules. Not to mention modules of Groovy and Ruby. - Creates high-quality vector-graphics images (SVG, EPS, PDF etc.) that can be included in LaTeX and other text-processing systems. - Runs on Windows, Linux, Mac and Android operating systems. Thus the software represents the ultimate	- Low ease of use - Poorly designed interface - Documentation for commercial applications comes with the full membership and DMelt activation. - TRL: System prototype demonstration in operational environment

	analysis framework which can be used on any hardware, such as desktops, laptops, netbooks, production servers and android tablets.	
	<u>Opportunities</u> • The program can be used in many areas, such as natural sciences, engineering, modelling and analysis of financial markets • High demand on tools that help extracting insight from big data: The enterprise-generated data is expected to exceed 240 exabytes daily by 2020	<u>Threats</u> • Low ease of use • Poorly designed interface • Documentation for commercial applications comes with the full membership and DMelt activation. • TRL: System prototype demonstration in operational environment • Data quality
Mapping to Needs and Trends		
Addresses (Trend)	Big Data	
Serves (Need)	Coherent use of digital technology across policy areas	

Weka					
Description (& Link)	Weka, an open source software, is a collection of machine learning algorithms for data mining tasks. The algorithms can either be applied directly to a data set or called from the user's own JAVA code (as Weka itself has been fully implemented in the JAVA programming language). Weka features include machine learning, data mining, pre-processing, classification, regression, clustering, association rules, attribute selection, experiments, workflow and visualisation (https://weka.wikispaces.com/).				
Type	Software				
Origin	Private sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	3	**3.8**

SWOT	Strengths	Weaknesses
	• Weka is data mining software that uses a collection of machine learning algorithms. These algorithms can be applied directly to the data or called from the Java code. • Platform Independent • Open source and free • Three graphical User's interfaces • Flexibility for scripting experiments.	• The visualization of data, results, and processes is not highly colourful or as detailed as other data mining software packages • Low ease of use • TRL • "Java's insanely complex, difficult and unintuitive installation" process • Java lacks a few features that some C++ programmers find useful, for example, macros and operator overloading
	Opportunities	Threats
	• The program can be used in many areas, such as natural sciences, engineering, modelling and analysis of financial markets • High demand on tools that help extracting insight from big data: The enterprise-generated data is expected to exceed 240 exabytes daily by 2020	• Open source software is much more vulnerable to security holes, since the code is open to everyone.

Mapping to Needs and Trends	
Addresses (Trend)	Data Governance

Serves (Need)	Deeper understanding of IT potential and IT processes
	Establishment of a comprehensive technical infrastructure and IT architecture

OpenText					
Description (& Link)	The OpenText Sentiment Analysis module is a specialised classification engine used to identify and evaluate subjective patterns and expressions of sentiment within textual content. The analysis is performed at the topic, sentence, and document level and is configured to recognise whether portions of text are factual or subjective and, in the latter case, if the opinion expressed within these pieces of content are positive, negative, mixed, or neutral (https://www.opentext.com/).				
Type	Engine				
Origin	Private sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology, All				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	2	2	**3.2**

SWOT	Strengths	Weaknesses
	- Automated extraction of sentiment on topics, sentences and documents. - Full language support of English, French, Spanish, German and Portuguese. - Specific configuration for user-generated content out of the box. - Flexible infrastructure for minimal time-to-business deployment. - On-premise installation or as a Cloud service. - Simple XML output. - Easy customization for specific requirements. - API library of sentiment-centric and data visualization widgets. - Create custom queries: Tap into the Content Analytics repository and select topics to create rich queries. Add sources of content; track these queries through time. - Interactive data visualizations: Use trends and topic maps to navigate through the data; add filters, refine your searches, and get to the heart of what you really want to know. - Create alerts: Receive notices when a topic of interest pops up in the conversion.	- Low ease of use - No open license availability

	• Get recommendations: Let the engine recommend influencers that you should contact, communities that you should join or issues that you should address.	
	Opportunities • Brand monitoring: Monitor the sentiment around a brand and its products. • Campaign monitoring: Create and follow the development of a marketing campaign as it unfolds within internal and external content channels. • Competitive intelligence: Follow competitors and assess the perception of customers around their activities. • Identifying influencers: Find out who is talking about your brand across several channels.	Threats • The initial coding of texts is crucial in establishing the categories to be analysed: if the coding is inaccurate then the findings are invalid • Misinterpretation: the researcher may ignore the context that the words are used in • It's imperative to have a sufficiently sophisticated and rigorous enough approach that relevant context can be taken into account
Mapping to Needs and Trends		
Addresses (Trend)	Smart Work	
Serves (Need)	Standardisation of processes	

Trackur					
Description (& Link)	Trackur's automated sentiment analysis looks at the specific keyword one is monitoring and then determines if the sentiment towards that keyword is positive, negative or neutral with the document. That's weighted the most in Trackur algorithm. It can be used to monitor all social media and mainstream news, to gain executive insights through trends, keyword discovery, automated sentiment analysis and influence scoring, (http://www.trackur.com/).				
Type	Software				
Origin	Private sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology, All				
TRL	8	**Implementation /Customisation Cost**			High
Ease of use	High	**Open License Availability**			Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	3	**3.8**

SWOT	Strengths	Weaknesses
	• Full monitoring of all social media and mainstream news, including Twitter, Facebook, Google+ and millions more! • Social Analytics: Fresh data, proprietary sentiment analysis, and accurate influencer scores. • Fully Integratable: Add media monitoring to your own tools and customer dashboards. • More than 10 years of monitoring mainstream & social media. • Affordable pricing options & a 10-day trial. • Superb customer service, with 94% satisfaction rate for support requests!	• High implementation /customization cost
	Opportunities	Threats
	• Brand monitoring: Monitor the sentiment around a brand and its products. • Campaign monitoring: Create and follow the development of a marketing campaign as it unfolds within internal and external content channels. • Competitive intelligence: Follow competitors and assess the	• Misinterpretation: may ignore the context that the words are used in. • Difficulty in recognizing things like sarcasm and irony, negations, jokes, and exaggerations. • Validity/Quality of results • It's imperative to have a sufficiently sophisticated and rigorous enough approach that

	perception of customers around their activities. • Identifying influencers: Find out who is talking about your brand across several channels.	relevant context can be taken into account
Mapping to Needs and Trends		
Addresses (Trend)	Smart Work	
Serves (Need)	Standardisation of processes	

I.7 Standards

<table>
<tr><td colspan="6" align="center">Document, Discover and Interoperate</td></tr>
<tr>
<td>Description (& Link)</td>
<td colspan="5">The Data Documentation Initiative (DDI) is an international standard for describing the data produced by surveys and other observational methods in the social, behavioral, economic, and health sciences. DDI is a free standard that can document and manage different stages in the research data lifecycle, such as conceptualization, collection, processing, distribution, discovery, and archiving. Documenting data with DDI facilitates understanding, interpretation, and use (https://www.ddialliance.org).</td>
</tr>
<tr>
<td>Type</td>
<td colspan="5">Standard</td>
</tr>
<tr>
<td>Origin</td>
<td colspan="5">Private Sector</td>
</tr>
<tr>
<td>Policy Cycle Stage (s)</td>
<td colspan="5">Policy Design and Analysis</td>
</tr>
<tr>
<td>Policy Domain (s)</td>
<td colspan="5">All</td>
</tr>
<tr>
<td>TRL</td>
<td>n/a</td>
<td colspan="3">Implementation /Customisation Cost</td>
<td>n/a</td>
</tr>
<tr>
<td>Ease of use</td>
<td>High</td>
<td colspan="3">Open License Availability</td>
<td>n/a</td>
</tr>
<tr>
<td>Big Data Readiness</td>
<td>Feasibility</td>
<td>Reasonability</td>
<td>Value</td>
<td>Integrability</td>
<td>Scalability</td>
<td>Total Score</td>
</tr>
</table>

Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
4	4	4	4	4	**4**

SWOT

Strengths

- An international standard for describing the data produced by surveys and other observational methods in the social, behavioural, economic, and health sciences.
- DDI is a free standard that can document and manage different stages in the research data lifecycle, such as conceptualization, collection, processing, distribution, discovery, and archiving.
- Documenting data with DDI facilitates understanding, interpretation, and use -- by people, software systems, and computer networks.
- Generating interactive codebooks
- Implementing data catalogues
- Building question banks
- Creating concordance mappings
- Harmonizing and comparing data
- Managing longitudinal data sets

Weaknesses

- Resourcing: Since it is free of charge for everyone to use, funding is needed
- Sustainability: DDI needs to connect to other standards and domains. Need a stable structure and add content to that structure instead of releasing a new version every time.
- Initially, taking part in standardization does require an investment in terms of sending experts, travel costs and the overall costs of participation.

	Opportunities	Threats
	<u>Opportunities</u> • Prioritize the Functional View Data Management Plans (DMPs) since most funding agencies now require DMPs. • Integrating existing DDI Working Groups into the model-based development process. • International standards that describe the production of data make understanding, interpretation, and use of the data easier. • Assisting patrons and data analysts. • Reusing structured, standardized metadata makes good business sense. • Partnerships with organizations, companies, apps that involve data and metadata exchange. • Optimizes machine-actionability • Used with relational databases to increase flexibility. • Increasing value-quality of data	<u>Threats</u> • Resourcing: Since it is free of charge for everyone to use, funding is needed • Lack of a Project Coordinator • or Manager to guide the model-based development • Sustainability: DDI needs to connect to other standards and domains. Need a stable structure and add content to that structure instead of releasing a new version every time.
Mapping to Needs and Trends		
Addresses (Trend)	Next Generation of BI and Data Analytics platforms	
Serves (Need)	Deeper understanding of IT potential and IT processes	

Blockcerts: An open Standard for Blockchain educational certificates						
Description (& Link)	Blockcerts is an open standard for creating, issuing, viewing, and verifying blockchain-based certificates. These digital records are registered on a blockchain, cryptographically signed, tamper-proof, and shareable. The goal is to enable a wave of innovation that gives individuals the capacity to possess and share their own official records. The initial design and development was led by MIT's Media Lab and Learning Machine. For ongoing development, this open-source project actively encourages other collaborators to get involved. The goal of this community is to create technical resources that other developers can utilise in their own projects. Rather than independently developing custom implementations, the community works together to build an interoperable future (https://www.blockcerts.org/).					
Type	Standard					
Origin	Public and Private Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	Education, Youth, Culture & Sport					
TRL	n/a	**Implementation /Customisation Cost**				n/a
Ease of use	Low	**Open License Availability**				n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	3	3	**3.6**

SWOT		
	Strengths • Creating, issuing, viewing, and verifying blockchain-based certificates. • Digital records are registered on a blockchain, cryptographically signed, tamper-proof, and shareable.	Weaknesses • Low ease of use • Because of the nature of blockchains, it will always be slower than centralized databases • Initially, taking part in standardization does require an investment (in terms of sending experts, travel costs and the overall costs of participation, training personnel etc.)
	Opportunities • Enable a wave of innovation that giving individuals the capacity to possess and share their own official records. • Standardization promotes efficiency and quality assurance in industry, technology, science and the public sector. It serves to safeguard people and goods and	Threats • Professional reputations: Need to be thoughtful about its design, and the type of institutions that will be trusted to govern it. • Nascent technology: resolving challenges such as transaction speed, the verification process and data limits • Uncertain regulatory status.

	to improve quality in all areas of life.
	• Interoperable future: Create technical resources that other developers can utilize in their own projects. Rather than independently developing custom implementations, work together to build an interoperable future.
	• Collaborations: Ongoing development, actively encourages other collaborators to get involved.
	• Areas in which digital certificates provide exciting opportunities include:
	   o Corporate/ enterprise training: Many large companies offer a myriad of training opportunities to their employees, but they lack systems to reliably track and store the results. Existing HR systems are often monolithic and don't talk to other corporate databases, there are no consistent ways to compare skills, and accomplishments are not portable
	   o Workforce development: There are millions of apprenticeship records and certificates, but no systems to manage them.
		• Control, security, privacy: while solutions exist, including private or permissioned blockchains and strong encryption, there are still cyber security concerns that need to be addressed
		• Integration concerns: Blockchain applications offer solutions that require significant changes to, or complete replacement of, existing systems. In order to make the switch organizations must strategize the transition
		• Cultural adoption: Blockchain represents a complete shift to a decentralized network, which requires the buy-in of its users and operators

Mapping to Needs and Trends	
Addresses (Trend)	Smart Work
Serves (Need)	Cross-linked information exchange Establishment of a comprehensive technical infrastructure and IT architecture Coherent use of digital technology across policy areas

Smart City Reference Architecture German Institute for Standardization					
Description (& Link)	Reference Architecture Model Open Urban Platform, (https://www.din.de/de/wdc-beuth:din21:281077528).				
Type	Standard				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	All				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	Low	**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	3	4	**3.8**
SWOT	Strengths • Guides and constrains the instantiations of logical and solution architectures. • Provides common language for the various stakeholders • Provides consistency of technology implementation to solve problems • Supports the validation of solutions against a proven Reference • Encourages adherence to common standards, specifications and patterns. • Offers a catalogue of terms and definitions to unify the language used in this complex interdisciplinary context • Creates a systemic comparability, which enables the interoperability of systems • Defines of open interfaces (known as API), to upload and download data that is their provision and usage • Clarifies licensing models for open data that is free-of-charge as well as chargeable access • Provides an overview of current and for this area relevant valid norms and standard in a coherent manner.		Weaknesses • Low ease of use • Pool of urban data exists within the various urban infrastructures. • However, these infrastructures operate quite independently with little to no integration. Thus, harvesting the urban data has become a difficult task, especially due to the fact that interesting use cases such as autonomous driving in the city or measuring environmental data at various hot spots in the city are not owned by single infrastructure operators but rather require a collective approach. • Initially, taking part in standardization does require an investment • Does not specify requirements for data storage or data processing. This document is aimed at decision makers, procurer, planner		

	Opportunities	Threats
	- Autonomous driving in the city - Measuring environmental data at various hot spots in the city - A collective and cooperative approach between various local stakeholders is required to harvest the full potential of the new digital era. - Urban data has become a resource of high interest a number of use cases, namely for urban mobility, energy efficiency, safety and security, as well as climate change and health. - Need to create an open and aligned approach towards harvesting the urban data by avoiding proprietary and thus single vendor dominated infrastructures. Instead, a federated and open approach to exchange and share data for mutual benefits both social and commercial is envisioned. A logical digital framework like an "urban platform" which aggregates all the different services and connects the data is required - Several Standard Developing Organizations (SDOs) are considering standardization projects in the realm of urban data platform	- The fact that European urban regions are dominated by rather small and medium size cities and thus lacking the Mega Cities and Mega Metropolitan regions often referred to when considering Asia and America. Thus, the challenges of European cities are to find affordable, scalable solutions, which can be tailored to their needs and size as well as having a pluralism of available solutions encouraging the engagement of local providers and start-ups. - Data security: OUP must provide an end-to-end security covering data security, access control, authentication, security monitoring, transport encryption from Infrastructure (Sensors/Devices), transport encryption to third party management systems and platform services - IoT , M2M communication covers a wide field of possible applications and devices. Each purpose of use can have very different requirements and it is impossible to cover all those requirements with one standard in particular because of possibly different framework conditions like e.g. legal frameworks, existing applications etc.
Mapping to Needs and Trends		
Addresses (Trend)	Smart City / Smart Government	
Serves (Need)	Standardisation of processes	

FoodEx2						
Description (& Link)	Standardised food classification and description system consisting of descriptions of a large number of individual food items aggregated into food groups and broader food categories in a hierarchical parent-child relationship (http://www.efsa.europa.eu/en/data/data-standardisation).					
Type	Standard					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Agriculture, Fisheries, Forestry and Foods					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	Low		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	3	3	3	3	**3**

SWOT	Strengths
	
	• Makes it easier to compare data from different sources and perform more detailed types of data analysis.
	• Flexibility in the names of the food groups
	• Basic food list and facets: Facets are collections of single descriptors from defined points of view applicable to specific food items (examples of facets are source, packaging material and production method.)
	• The system consists of descriptions of a large number of individual food items aggregated into food groups and broader food categories in a hierarchical parent-child relationship.
	• Two support tools:
	  o A browser for navigating the system and creating codes
	  o Microsoft Excel®
	• Tool for interpreting and checking the codes.
	• Central to the system is a core list of food items or generic food descriptions that represent the minimum level of detail needed for intake or exposure assessments. A parent-child relationship exists between a
				Weaknesses
				
				• Low ease of use
				• The success of the system will depend on ongoing support.
				• Procedures should be developed to allow active contributions from all stakeholders and the link to legislative needs in the different food safety domains at European Union level.
				• Initially, taking part in standardization does require an investment (in terms of sending experts, travel costs and the overall costs of participation, training personnel etc.)		

	core list food item and its related extended list food items. The terms of the core and extended list may be aggregated in different ways according to the needs of the different food safety domains.	
	Opportunities • The ability to capture all the useful details of food groups in exposure assessments by EFSA, is a crucial requirement for the process of risk assessment.	Threats • The success of the system will depend on ongoing support. • Procedures should be developed to allow active contributions from all stakeholders and the link to legislative needs in the different food safety domains at European Union level. • Initially, taking part in standardization does require an investment (in terms of sending experts, travel costs and the overall costs of participation, training personnel etc.)
Mapping to Needs and Trends		
Addresses (Trend)	Open Data	
Serves (Need)	Ensure availability of (real-time) information and knowledge	

ISO		
Description (& Link)	ISO is an independent, non-governmental international organization with a membership of 161 national standards bodies. Through its members, it brings together experts to share knowledge and develop voluntary, consensus-based, market relevant International Standards that support innovation and provide solutions to global challenges (https://www.iso.org/about-us.html).	
Type	standard	
Origin	Private Sector	
Policy Cycle Stage (s)	Policy Implementation	
Policy Domain (s)	All	

TRL	9	**Implementation /Customisation Cost**	High
Ease of use	High	**Open License Availability**	No

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	2	**3.6**

SWOT	Strengths	Weaknesses
	• Creates documents that provide requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose. • Internationally recognised and validated: It is internationally recognised and verified and validated by thousands of security professionals and participating countries • Regulators and governments count on ISO standards to help develop better regulation, knowing they have a sound basis thanks to the involvement of globally-established experts. • Brings together experts to share knowledge and develop voluntary, consensus-based, market relevant International Standards that support innovation and provide solutions to global challenges. • Scalability: It can be scaled to fit small or large organizations with one or multiple sites in any sector.	• High implementation /customization cost. • Doesn't issue certificates and isn't involved in the certification process • Adoption cost and effort: The adoption, certification and recertification costs and efforts (e.g. man hours needed to produce the documentation, • Does not ensure the effectiveness of measures implemented but only their existence.
	Opportunities	Threats

	• International Standards on air, water and soil quality, on emissions of gases and radiation, and environmental aspects of products, they protect the health of the planet and people, beyond bringing economic benefits. • Add credibility, by demonstrating that a product or service meets the expectations of your customers. For some industries, certification is a legal or contractual requirement. • Helps regulators ensure that health, safety or environmental conditions are met • Global Trade: reduces the need for duplication of testing when importing or exporting thus facilitating global trade.	• Registrars are allowed to play both the role of the auditor and implementation consultant creating a conflict of interest • Increased competition from other standards: Examples are the ones driven by individual countries, which are seen by some organizations as easier to implement. • Risk of over-regulation by introducing too many regulations calling for the same thing (e.g. HIPAA, Data Protection, PIPEDA, PIPA, FOIPPA, etc.) • More and more business look at certification as a marketing tool only • More and more business look at certification as a marketing tool only
Mapping to Needs and Trends		
Addresses (Trend)	Performance Measurement	
Serves (Need)	Standardisation of processes Development of domain specific target and indicator systems	

	ISO 27001				
Description (& Link)	ISO/IEC 27001 is an information security standard, part of the ISO/IEC 27000 family of standards, of which the last version was published in 2013, with a few minor updates since then. It is published by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) under the joint ISO and IEC subcommittee, ISO/IEC JTC 1/SC 27. ISO/IEC 27001 specifies a management system that is intended to bring information security under management control and gives specific requirements. Organisations that meet the requirements may be certified by an accredited certification body following successful completion of an audit (https://www.iso.org/isoiec-27001-information-security.html).				
Type	Standard				
Origin	Private Sector				
Policy Cycle Stage (s)	Agenda Setting				
Policy Domain (s)	Institutional Questions / Internal Affairs				
TRL	n/a	**Implementation /Customisation Cost**			High
Ease of use	n/a	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	3	3	**3.6**

SWOT	Strengths	Weaknesses
	• Information security: Helps your organization manage the security of assets such as financial information, intellectual property, employee details or information entrusted to you by third parties. • Internationally recognised and validated: It is internationally recognised and verified and validated by thousands of security professionals and participating countries • Providing requirements for an information security management system (ISMS). • Scalability: It can be scaled to fit small or large organizations with one or multiple sites in any sector. • Enables interoperability: Allows certified organisations to be able to exchange and manage shared data (e.g. within the Cloud) with some degree of confidence. • Brings together experts to share knowledge and develop	• Doesn't issue certificates and isn't involved in the certification process • Adoption cost and effort: The adoption, certification and recertification costs and efforts (e.g. man hours needed to produce the documentation, • Does not ensure the effectiveness of measures implemented but only their existence.

	voluntary, consensus-based, market relevant International Standards that support innovation and provide solutions to global challenges.	
	Opportunities • Add credibility, by demonstrating that a product or service meets the expectations of your customers. For some industries, certification is a legal or contractual requirement. • Regulators and governments count on ISO standards to help develop better regulation, knowing they have a sound basis thanks to the involvement of globally-established experts. • Cloud Security relies on the standard, so there is opportunity for wider adoption. • Can be used to implement lean management given it can be applied to any kind of information (physical assets, data protection, intellectual property, etc.)	Threats • Registrars are allowed to play both the role of the auditor and implementation consultant creating a conflict of interest • Misconception that compliance means 100% security. Some organisations are under the misconception that compliance to the standard would make them experience no security breaches. • Risk of over-regulation by introducing too many regulations calling for the same thing (e.g. HIPAA, Data Protection, PIPEDA, PIPA, FOIPPA, etc.) • More and more business look at certification as a marketing tool only • Increased competition from other standards: Examples are the ones driven by individual countries (e.g. UK's CESG standard), which are seen by some organizations as easier to implement.

Mapping to Needs and Trends	
Addresses (Trend)	Security by Design, Data Governance
Serves (Need)	Ensuring data security taking into account the protection of citizens' privacy, Standardisation of data management

Risk Assessment and Horizon Scanning (RAHS)						
Description (& Link)	A strategic risk assessment and analysis tool, which aims to provide early alerts on potential threats to national security by developing a network that links various independent government agencies. Some of the latest technologies employed in the RAHS system allow for model-building, monitoring, weak signal detection and pattern analysis (https://www.nscs.gov.sg/public/content.aspx?sid=191). https://www.nscs.gov.sg/rahs-programme-office.html					
Type	Tool					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Foreign Issues & Defence					
TRL	7		**Implementation /Customisation Cost**			Low
Ease of use	High		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	4	4	3	4	**3.6**
SWOT	Strengths • With the help of international partners, as well as through experimentation, the Programme has developed an extensive range of processes that enabled agencies to collect, analyse, inform, model and monitor emerging strategic issues. • RAHS software platform which is specifically designed and developed with capabilities to support research and analysis using information extraction and visualisation, modelling and survey tools. • Information products such as SKAN and Vanguard. • Three different centres of expertise connected to the RAHS Programme Office: RAHS Think Centre (RTC), RAHS Solutions Centre (RSC), RAHS Experimentation Centre (REC). • Explores methods and tools that complement scenario planning in anticipating strategic issues with			Weaknesses • System prototype demonstration in operational environment • A RAHS system needs to assist analysts in identifying patterns from seemingly disparate data. This can only be done using discovery-based methods which machine systems are weak at. • There is a constant impetus to update the RAHS system: The RAHS concept is still evolving as methodologies are continually integrated into operational processes, resulting in new functional requirements. RAHS also uses a broad range of technology areas such as text analytics and modelling which are developing rapidly. Therefore, a robust process is needed to manage the system changes and continually validate the system against the analyst's operations which are constantly changing.		

	significant possible impact on National security.	
	Opportunities	**Threats**
	• Secure & resilient nation: • Networked government, a cohesive society, an engaged people. • Scanning for risks and opportunities that will impact Singapore's future. • Complexity: dealing with problems that have the potential to "spin" out of control. • Integrating the many parts and agencies which collectively ensure National Security by looking ahead, catalysing capability development and creating shared central awareness, being a collaborative pathfinder to all.	• Risk that individuals may have inappropriate access to these systems: Policy requires that components ensure that user access is controlled and limited based on positive user identification and authentication mechanisms that support the minimum requirements of access control, least privilege, and system integrity. • Delivering a system that supports RAHS analysis involves, complex and challenging engineering problems: RAHS analysts operate in a different paradigm that requires systems to support the mental processes of discovery rather than deduction. • There is a constant impetus to update the RAHS system: The RAHS concept is still evolving as methodologies are continually integrated into operational processes, resulting in new functional requirements. RAHS also uses a broad range of technology areas such as text analytics and modelling which are developing rapidly. Therefore, a robust process is needed to manage the system changes and continually validate the system against the analyst's operations which are constantly changing.
Mapping to Needs and Trends		
Addresses (Trend)	Predictive Analytics	
Serves (Need)	Coherent use of digital technology across policy areas	

	Cooperative working between decision-makers, departments, hierarchy levels (e.g. information exchange between different departments and administrations)

Meieraha					
Description (& Link)	Esthonian Budget Visualisation Calculator (http://meieraha.ee/view/10).				
Type	Tool				
Origin	Public Sector				
Policy Cycle Stage (s)	Agenda Setting				
Policy Domain (s)	Economy & Finance				
TRL	9		**Implementation /Customisation Cost**		Low
Ease of use	High		**Open License Availability**		Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

• **SWOT**	Strengths	Weaknesses
	• Shows major income and expenditure articles at a glance, structured by government functions. • Integrity: non-profit and has not been funded by any political group • Interactive visualization: The visualization shows two sides of the equation, income (mostly taxes) and expenditure by category. The size of bubbles is proportional to the size of budget items. This simple visual helps to compare the sums. • Ability to see cost articles within each budget heading by clicking on a bubble • Dragging the outline of a bubble to see how manipulating different sums results in the balance of the budget. Ideally, every budget needs to be balanced, so the changes you make on the spending sides should be balanced on the income side.	• Refers only to Estonia's tax rates • Not clear difference between gross and net income: The concepts of gross and net income have different meanings, depending on whether a business or a wage earner is being discussed. • User interface: a) doesn't provide a Clear All option b) clicking on the bubble will appear cost articles within each budget heading that you cannot undo
	Opportunities	Threats
	• Promoting transparency and accountability. • Facilitate understanding: The official Budget Bill is made up of long tables that do little to	• Misinterpretation: once you input your income a percentage is shown of the amount of money you spend on taxes 'taxes burden', however this includes

	explain how the taxpayers' money is spent. Meieraha shows major income and expenditure articles at a glance, structured by government functions, making it easier for taxpayers to understand.	taxes that are payed by the employer e.g put 1000€ income and you'll get 51% or 683€ which includes the taxes paid by the employer
Mapping to Needs and Trends		
Addresses (Trend)	E-Governance	
Serves (Need)	Ensure availability of (real-time) information and knowledge	

The European Data Market Monitoring Tool						
Description (& Link)	Measures a set of indicators assessing the number of data workers in Europe, the value of data-related products and services, the number of data users and data supply companies, as well as the overall impact of the data economy on Europe's GDP (http://datalandscape.eu/european-data-market-monitoring-tool).					
Type	Monitoring tool					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Economy & Finance					
TRL	7		**Implementation /Customisation Cost**			Low
Ease of use	High		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	3	4	**3.8**
SWOT	**Strengths** • Define, assess and measure the European data economy, supporting the achievement of the Data Value Chain policy of the European Commission. • Provides a unique perspective of the development of the data ecosystem in Europe, through 6 main indicators measuring its key components (see Figure 1): the skills (the number of data professionals and the gap between demand and supply of data skills); the enterprises and their roles (both data suppliers and data user companies); the demand-side value (the market) and the supply-side value (the data suppliers revenues); and finally the overall impacts on the economic system, through the estimate of the European Data Economy as a share of EU GDP. • Measures a more limited set of indicators for three other international economies, the U.S., Brazil and Japan. • Forecasts the indicators to the year 2020 according to three distinct scenarios: a) A Baseline scenario characterized by stable economic			**Weaknesses** • Restriction to movement of data across EU state members: European Data Economy depends more and more on data, their accessibility, usability and, more importantly, their unhindered mobility. Taking away all disproportionate restrictions to the movement of data across Member States is in fact one of the key prerequisites for a competitive Data Economy within the Digital Single Market		

	picture and a moderate growth, b) A High-growth scenario still characterized by a stable economy but with stronger impact played by digital innovation and higher growth of ICT investments and c) A Challenge scenario where both the economy and International Data Corporation (ICT) investments grow much slower than in the other two scenarios.	
	Opportunities • The European Data Market - i.e. the marketplace where digital data is exchanged as "products" or "services" as a result of the elaboration of raw data – is estimated to grow at an average rate of 6.0% out to 2020. This makes the market valued at close to 77.5 Euro Billion with the vast majority of Member States showing strong growth, well ahead of the expected growth for the IT market as a whole, which is projected to grow at an annual rate of 1.7% to 2020 • The European market has the potential to be the largest digital market in the world in size and value, if investments and policy decisions will provide momentum	Threats • Restriction to movement of data across EU state members: European Data Economy depends more and more on data, their accessibility, usability and, more importantly, their unhindered mobility. Taking away all disproportionate restrictions to the movement of data across Member States is in fact one of the key prerequisites for a competitive Data Economy within the Digital Single Market • Increasing concern about the new ethical and social issues arising from the diffusion of Big Data • Brexit: Given the strengths of the British Data Market and Data Economy, keeping digital data flowing between the EU and the U.K is crucial both for Britain itself and for the rest of Europe. • Law reforms are needed introducing into EU law the principle of free flow of nonpersonal data across borders and seeking to establish the same free movement for non-personal data as the General Data Protection Regulation (GDPR) does for personal data. • The pace of growth of the European Data Economy Relies on economic climate and the pace of innovation

Mapping to Needs and Trends	
Addresses (Trend)	Performance Measurement
Serves (Need)	Link between impact, quality, performance measurements and financial information

Correctional Offender Management Profiling for Alternative Sanctions (COMPAS)						
Description (& Link)	Correctional Offender Management Profiling for Alternative Sanctions (COMPAS) is a research-based, risk and needs assessment tool for criminal justice practitioners to assist them in the placement, supervision, and case management of offenders in community and secure settings. The COMPAS is an objective risk and needs assessment instrument (https://www.cdcr.ca.gov/rehabilitation/docs/FS_COMPAS_Final_4-15-09.pdf).					
Type	Tool					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	Justice, Legal System & Public Safety					
TRL	8		**Implementation /Customisation Cost**			Low
Ease of use	High		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	3	3	3	3	**3**

SWOT	Strengths	Weaknesses
	- Uses evidence-based principles, including providing rehabilitative programming to the higher risk-to-reoffend prisoners and parolees, and provide other types of programs to low-risk-to-reoffend prisoners and parolees. - Helps correctional staff assign the right inmates to the right programs at the right time based on individual risk and needs assessments. - Aids in reducing the likelihood that the inmate will reoffend upon reentry to society. - COMPAS assists CDCR in determining: Risk (who to target), Needs (what to treat) and Responsivity. - Consists of: A series of questions used to determine overall risk potential and criminogenic needs profile, and Data on the inmate's history of substance abuse, education, family background, criminal activity, and social functioning.	- Issues around data collection: many of the items on the COMPAS questionnaire ask respondents to recall events and experiences that occurred in the past. As is the case with all such data collection efforts, certain details of respondents' pasts may be reported inaccurately, either because of intentional misrepresentation or faulty memory. - Implementation milestones: a) adopting use of an automated risk and needs assessment instrument and beginning initial implementation at reception centres b) Training for Correctional counsellors at Reception Centres to use the COMPAS risk and needs assessment as part of the process to classify and endorse offenders to an institution c) Need for Correctional staff in all reception centres to use inmate

		COMPAS profiles for prison placement as it is a critical toward assignment of inmates to appropriate programs based on individual risk and needs assessment.
		• Data quality: the COMPAS data as they currently exist are seriously biased, and there are a number of limitations to the interpretation of these data

	Opportunities
	
	 • Reducing the inmate's chance of reoffending: Placing inmates in the appropriate programs that will aid in their re-entry to society and will most likely reduce the inmate's chance of reoffending.
		Threats
		
		 • Unemployment rates
		 • Issues around data collection: many of the items on the COMPAS questionnaire ask respondents to recall events and experiences that occurred in the past. As is the case with all such data collection efforts, certain details of respondents' pasts may be reported inaccurately, either because of intentional misrepresentation or faulty memory.
		 • Implementation milestones:
		  a) adopting use of an automated risk and needs assessment instrument and beginning initial implementation at reception centres
		  b) Training for Correctional counsellors at Reception Centres to use the COMPAS risk and needs assessment as part of the process to classify and endorse offenders to an institution
		  c) Need for Correctional staff in all reception centres to use inmate COMPAS profiles for prison placement as it is a critical toward assignment of inmates to appropriate programs based on individual risk and needs assessment.

Mapping to Needs and Trends	
Addresses (Trend)	Algorithmic Regulation
Serves (Need)	Standardisation of processes

	OpenRefine				
Description (& Link)	OpenRefine (formerly Google Refine) is a powerful tool for working with messy data: cleaning it, transforming it from one format into another, and extending it with web services and external data. OpenRefine allows to explore large data sets with ease (http://openrefine.org/).				
Type	Tool				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	6	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	2	3	3	3	3	**2.8**

SWOT	Strengths	Weaknesses
	- Excellent tool to clean, transform and explore data - Reconcile and Match Data: - OpenRefine can be used to link and extend your dataset with various webservices. Some services also allow OpenRefine to upload your cleaned data to a central database, such as Wikidata. - More powerful than Excel with large sets of data - Platform independent - Great history tracking - Can export commonly used functions for reuse - Powerful Undo/Redo functionality - Excellent support for UTF-8 and other character sets; - GREL and, for example, the possibility to "join" columns from different datasets - Its interactive templating export tool - Available in English, Chinese, Spanish, French, Russian, Portuguese (Brazil), German, Japanese, Italian, Hungarian, Hebrew, Filipino, Cebuano, Tagalog - Online courses available	- Low TRL - Low ease of use - Some frequent operations on data are more complicated than necessary. (e.g. 5 steps are required to remove duplicate rows when exact values are found in a column). - Some functions require light programming knowledge - Some queries run slowly - Relies on many external services that may no longer be supported - Much more annoying is the lack of stability of the tool which degrades after a while introducing inconsistencies into data (for example, facets return wrong terms and omit some relevant ones which potentially introduce inconsistencies). The only solution in this case is to restart OpenRefine and in the worse case, when this is not enough, to start the project over.

	Opportunities	Threats
	• Getting a better understanding of the data before automating the processing of the full dataset using python or java on hadoop. • High need for tools that help extract valuable information from big volume of complex data.	• Competition: Emergence of other self-service data preparation tools like Trifacta and Talend Data Preparation. • Software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. • Data privacy
Mapping to Needs and Trends		
Addresses (Trend)	Big Data	
Serves (Need)	Cope with the production of huge volumes of data Deeper understanding of IT potential and IT processes	

Datawrapper					
Description (& Link)	Datawrapper is an online data-visualisation tool for making interactive charts. Once the user uploads the data from CSV/PDF/Excel file or pastes it directly into the field, Datawrapper generates a bar, line, map or any other related visualisation. Datawrapper graphs can be embedded into any website or CMS with ready-to-use embed codes (https://www.datawrapper.de/).				
Type	Tool				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	3	4	4	**3.8**
SWOT	Strengths • Fully responsive: charts look great on every device your readers use: (text doesn't become too small, fewer labels appear, the color key changes its position, etc). it offers the option to preview how the chart will appear on mobile, tablet and desktop devices directly while designing. • No need for coding or design skills. • No installation required. • Interactive: charts become interactive. Readers can hover over lines, bars or map areas to see the underlying values and understand the chart better. • Visualization of data: Choose from many chart and map types, Customize and annotate your chart to make it more effective, Match your chart design to your style guide. (fonts, colours and spacing) • Easy import of data: Simply copy and paste your data from Excel or Google Sheets. You can also upload CSV files or link to an URL for live-updating charts.	Weaknesses • Limited possibilities of customisation or extension of its standard functionalities: user must fork the source code, modify it and install it into his server. • Data Privacy, Data ownership: Once the data are uploaded they are placed on Datawrapper's free hosting service or fork Datawrapper via Github so they will be accessible to the internet. In order to keep the data safe, it is advisable to install Datawrapper on users own servers			

	• Easily publish charts: Copy the ready-to-use embed code into your CMS or website or export the chart as an image or PDF to print it.	
	Opportunities • Makes it easy to create interactive, responsive and easy embeddable in websites charts and maps. • Visualization of data	Threats • Data Privacy, Data ownership: Once the data are uploaded they are placed on Datawrapper's free hosting service or fork Datawrapper via Github so they will be accessible to the internet. To keep the data safe, it is advisable to install Datawrapper on users' own servers
Mapping to Needs and Trends		
Addresses (Trend)	Smart Work	
Serves (Need)	Cope with the production of huge volumes of data Deeper understanding of IT potential and IT processes	

Agora Voting					
Description (& Link)	Election management system (https://nvotes.com/agoravoting-com-redirect/).				
Type	Tool / System				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Institutional Questions/ Internal Affairs				
TRL	7		**Implementation /Customisation Cost**		High
Ease of use	High		**Open License Availability**		No
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	2	3	3	3	**2.8**
SWOT	Strengths • Online voting system trusted by millions around the world • Grants election's legitimacy with auditable online voting software • Easy: voters easily cast their votes from a computer, tablet or smartphone in minutes with an intuitive web ballot. • Security features and embedded best practices to ensure election's success • Used by public administrations and political parties: Several city councils (such as Madrid) have chosen nVotes to carry out voting processes open to all their citizens and more than 100 political parties use the software to carry out their electoral processes. • End-to-end verifiability • Privacy: Keeps ballots truly secret so that a vote does not identify a voter and any traceability between the voter and its vote is removed. Not even the administrators of the voting system or anyone with privileged access to hardware/software can violate this privacy.		Weaknesses • Electronic voting poses a threat to both private integrity (anonymity) and public integrity (verifiability) • Equality of access: A major reason people do not use the Internet—even when they have access—is cost. If political participation is a right, and the Internet is required to participate, it follows that Internet access for that purpose should also be a right			
	Opportunities • Increase voters' turnout. • Various application fields including: Corporations		Threats • Electronic frauds • Cyberattacks.			

	(employee participation,), Cooperatives (digital assembly), Political Parties (digital assembly), Civil Society Organizations	• Security experts have voiced significant concerns over the trustworthiness of e-voting systems. • Electronic voting poses a threat to both private integrity (anonymity) and public integrity (verifiability) • Equality of access: Not all households have access to internet due to its cost. If political participation is a right, and the Internet is required to participate, it follows that Internet access for that purpose should also be a right • Some people are not familiar with technology or don't own a computer
Mapping to Needs and Trends		
Addresses (Trend)	Security by Design	
Serves (Need)	Strengthen citizens' trust in public administration	

D-CENT					
Description (& Link)	A federated architecture/toolbox enabling to choose and combine tools for democratic processes it includes: Collaborative policy making, Blockchain Reward scheme, Citizen priorities and budgeting, Citizens notifications, Citizens initiatives, Collective deliberation, Electronic Voting (http://tools.dcentproject.eu/).				
Type	Project/ Toolbox/ Federated Architecture				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Institutional Questions/ Internal Affairs				
TRL	7	**Implementation /Customisation Cost**			Low
Ease of use	Low	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	4	4	3	3	**3.6**
SWOT	Strengths		Weaknesses		
	- D-CENT democracy tools are used by thousands of citizens across Europe, with active pilots in the cities of Barcelona, Madrid, Helsinki and Reykjavik. - The tools have proven to be very successful and are now mature enough to be adopted by many other cities, democratic organisations, parties and parliaments around the world. - D-CENT is co-funded by the European Commission and run by a strong international consortium with ten partners all across Europe. - Developing the next generation of open source, distributed, and privacy-aware tools for direct democracy and economic empowerment. - Promotes transparency - Enhances citizen participation in the definition and development of policies. - Propose and draft solutions and policy collaboratively - Be notified and keep informed on issues that matter to you - Decide and vote on solutions collectively		- Low ease f use - Technology readiness level - Equality of access: Not every household has access to internet due to its cost. If political participation is a right, and the Internet is required to participate, it follows that Internet access for that purpose should also be a right		

	- Blockchain trust to let people run reward schemes that are transparent and audible - Implement and reward everyone while tracking progress - A set of standalone interoperable tools which deliver democratic capabilities for communities. - Easy to deploy and maintain, allowing communities to own their servers and data. - Communities are free to use as many or as few of the tools as they need. - Web-based integration across the tools to allow members of communities to use them easily. - Web-based integration built on open standards to allow for integration with existing and future tools.	
	Opportunities - Developing the next generation of open source, distributed, and privacy-aware tools for direct democracy and economic empowerment. - Enhancing citizen participation in the definition and development of policies. - E-voting	Threats - Equality of access: Not every household has access to internet due to its cost. If political participation is a right, and the Internet is required to participate, it follows that Internet access for that purpose should also be a right - Some people don't use computers and are not familiar with technology (e.g. elder people, people leaving on remote areas)
Mapping to Needs and Trends		
Addresses (Trend)	E-Governance	
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making Strengthen citizens' trust in public administration	

Orange					
Description (& Link)	Orange enables open source data visualisation and data analysis for novice and expert. It provides a large toolbox to create interactive workflows to analyse and visualise data. Orange is packed with different visualisations, from scatter plots, bar charts, trees, to dendrograms, networks and heat maps (https://orange.biolab.si/).				
Type	Toolbox				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	8	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	3	3	3	3	**3.2**

SWOT	Strengths	Weaknesses
	- Interactive Data Visualization -component-based data mining and machine learning software suite, - Visual programming front-end for explorative data analysis and visualization, - Python bindings and libraries for scripting. - Includes a set of components for data pre-processing, feature scoring and filtering, modelling, model evaluation, and exploration techniques. - It is implemented in C++ and Python.	- To achieve full functionality from Orange, additional add-ons, known as widgets, have to be obtained and added to the program. - In order to have API functionality, additional libraries and routines must be downloaded and added to the software - Little built-in support for other database systems. - Users must be able to understand and work with SQL documents and statements in order to import database files. Any database files in other formats are much more difficult to import into the system, if some of them can be imported at all - The visualization support within Orange is somewhat limited. While visualization is certainly available, and users are able to visualize data, processes, and results, the visualization is not as appealing to the eye or easy to work with as other data mining packages.

	Opportunities	Threats
	• Open platforms, their very committed users and their advanced ecosystems will bring about the most interesting breakthroughs in data-driven innovation. • Increase of the number of large global organizations and institutions that actively consider and adopt open platforms for their data science teams	• Competition • Intellectual property and patents issues are complicated. • Licenses are complex – there is over 60 different licenses that comply with the open source definition • Migration of data -Retraining personnel

Mapping to Needs and Trends	
Addresses (Trend)	Smart Work
Serves (Need)	Ensure availability of (real-time) information and knowledge

BudgIt						
Description (& Link)	Budget visualisation (http://yourbudgit.com/).					
Type	Tool					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Monitoring and Evaluation					
Policy Domain (s)	Economy and Finance / Institutional Questions					
TRL	8		**Implementation /Customisation Cost**			Low
Ease of use	High		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	3	3	3	3	**3.2**
SWOT	Strengths • View Infographics • Access Data • Easily make request for open data • Uses an array of tech tools to simplify the budget and matters of public spending for citizens • Collaborates across the public-private sectors to deliver programs that shore up the capacity of its peers and willing government institutions. • Use creative technology to simplify public information, stimulating a community of active citizens and enabling their right to demand accountability, institutional reforms, efficient service delivery and equitable society • Empower citizens with budgets and public finance data, allowing them to take action within their communities • Building a community of urban and rural citizens who use civic tech to track public projects and demand efficient service delivery. • Enlightens citizens on issues of extractive resources with focus on accountability and fiscal inclusion • Supports willing institutions - media, civil society to advance transparency and civic engagement.		Weaknesses • Applies only to Nigeria • Integration with other apps			

	Opportunities • Simplify the Nigerian budget and public data, making it accessible to the general public to aid participatory governance. • Raising standard of transparency and accountability in government. • Facilitate societal change by applying technology to intersect citizen engagement with institutional improvement.	Threats • Integration with other apps • State Regulations (including tax laws)
Mapping to Needs and Trends		
Addresses (Trend)	Smart Work	
Serves (Need)	Ensure availability of (real-time) information and knowledge	

Qlik					
Description (& Link)	Qlik enables to create visualisations, dashboards, and apps that answer a company's most important questions (https://www.qlik.com/us/).				
Type	Tool				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	8	**Implementation /Customisation Cost**			High
Ease of use	Low	**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	3	3	**3.6**

SWOT	Strengths	Weaknesses
	• End-to-end data management and analytics platform • Its end-to-end strategy takes raw data from all corners of the enterprise and transforms it into analytics-ready information that everyone can explore. • Puts all your data, from any source and location, into an easy-to-use, governed enterprise catalogue from which, users can "shop" for the right data without compromising security policies. • Artificial Intelligence combined with human intuition. That's Augmented Intelligence, and Qlick use it to increase the data literacy of everyone in the workforce. • Extends analytics to wherever data can benefit an organisation-business. • Its unique Associative Engine associates every piece of data with every other piece. So you can explore in any direction, making discoveries as you go. • Extends to every team, process, application and device.	• High implementation /customization cost • Low ease of use • Does not integrate 3rd party visuals • Not user friendly interface
	Opportunities	Threats
	• Data literacy for all: a data literate workforce is the key to move fast, make change, and lead in your industry.	• Competition • High implementation /customization cost

	• Rapid change of business • Data visualization has turned into an irreplaceable standard for today's business intelligence (BI). Data visualization tools now play an integral role in democratizing data and analytics, opening up access to data-driven insights to workers throughout an organization.	• Low ease of use
Mapping to Needs and Trends		
Addresses (Trend)	Next Generation of BI and Data Analytics platforms	
Serves (Need)	Ensure availability of (real-time) information and knowledge Comprehensive knowledge and information management	

Tableau Public					
Description (& Link)	Tableau democratises visualisation in an elegantly simple and intuitive tool. It is exceptionally powerful in business because it communicates insights through data visualisation. In the analytics process, Tableau's visuals allow to quickly investigate a hypothesis, sanity check the latter, and just go explore the data before embarking on a treacherous statistical journey (https://www.tableau.com/).				
Type	Tool				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	7	**Implementation /Customisation Cost**			High
Ease of use	High	**Open License Availability**			No

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	3	3	3	3	**3.2**

SWOT	Strengths	Weaknesses
	- Create visualizations with ease: Save and store your visualizations on your Tableau Public profile (10GB of space). Personalize your profile and connect with other authors. - Share your visualizations with the world via social media or embed them on a site or blog. Your published vizzes are always live and interactive. - Automatic mobile layouts: Build mobile-friendly dashboards in seconds with automatic phone and tablet layouts. Use the layouts as they come or customize further to create the best mobile experience for your dashboard. - Dashboard grids: Gridlines appear as an overlay above dashboards to help with better visual alignment of dashboard elements. Toggle on or off as desired. See a preview of dashboard zones when moving their position for better layout alignment and design and use keyboard arrows to nudge or resize.	- High implementation /customization cost - No open license availability - Limited Data Pre-processing. - Tableau is strictly a visualization tool and allows you do to very basic pre-processing. - Doesn't offer entire business analytics suite. - Import limitations: any new visuals need to be recreated instead of imported.

• Transparent filters, highlighters, and parameters: make filters, highlighters, and parameters transparent, making it easy to have a consistent look across your entire dashboard. • Spatial join: join datasets where the only common element between the two is location. Easily analyze points within a geographic area for deeper understanding of spatial data. • Lets bloggers publish data visualizations on any topic, and make them interactive making it accessible to the reader	
Opportunities • In 2020 the world will generate 50 times the amount of data as in 2011 and 75 times the number of information sources (IDC, 2011). Within these data are huge opportunities for human advancement. • Increasing interest in data science, artificial intelligence, and machine learning	Threats • High competition • Very expensive product to scale across a large organization. compared to cheaper and more well rounded BI tools. • Increasing interest in data science, artificial intelligence, and machine learning, • Doesn't offer entire business analytics suite.

Mapping to Needs and Trends	
Addresses (Trend)	Next Generation of BI and Data Analytics platforms
Serves (Need)	Ensure availability of (real-time) information and knowledge Comprehensive knowledge and information management

Semantria						
Description (& Link)	Semantria is a tool that offers a unique service approach by gathering texts, tweets, and other comments from clients and analysing them meticulously to derive actionable and highly valuable insights. Semantria offers text analysis via API and Excel plugin, incorporates a big knowledge base and uses deep learning (https://www.lexalytics.com/semantria).					
Type	Tool					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Innovation, Science & Technology					
TRL	8		**Implementation /Customisation Cost**			High
Ease of use	Low		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	3	3	3	3	**3.2**
SWOT	Strengths • Monitor consumer sentiment in real-time and over time • Catch trending topics before they go viral • Identify problems before they blow up • Capitalize on hype cycles to grow brand awareness • Multi-User Seat Packages • Categorization • It's easy to perform text analysis in Excel as Semantria for Excel provides fast and accurate categorization of your input content. • Easy Customization • Multilingual for All Industries • Visualization: Use the Excel visualization tools you're already familiar with to create rich charts and graphs: all the results are displayed in simple visual terms, while retaining the deep insights Lexalytics is known for. • Is offered via API and Excel plugin, and in that it incorporates a bigger knowledge base and uses deep learning.		Weaknesses • Low ease of use • High implementation /customization cost: extra pricing option for more languages • Limited transactions for basic license			
	Opportunities		Threats			

	• Sentiment analysis (SA) techniques are commonly based on textual sources. In fact, many other multimedia sources should also be processed, some of which are important sources for examples exhibiting expressions of mocking, sabotaging and sarcasm, which are sensitive content for companies' reputations and for competitiveness planning. Therefore, multi-modal SA techniques are going to be in high demand • Brand monitoring: Monitor the sentiment around a brand and its products. • Campaign monitoring: Create and follow the development of a marketing campaign as it unfolds within internal and external content channels. • Competitive intelligence: Follow competitors and assess the perception of customers around their activities. • Identifying influencers: Find out who is talking about your brand, campaign across several channels.	• The velocity issue relates closely with the volume and variety, because the data is generated continuously and thus increases the challenge in its analysis • Data quality: social media messages are by nature shorter and generally not constructed with proper grammatical rules and hence may decrease the text classification accuracy • Need for continuous evolution: depending on an ad-hoc or one-off developed model without continuous adaptation and evolving ability might result in limiting the power of the social media analysis • Difficulty in recognizing things like sarcasm and irony, negations, jokes, and exaggerations. • Trustworthiness of the data: Determining trustworthiness of the data demands more norms and logical reasoning which should be considered using many factors and not limited to only the current message being processed but also other messages being posted by the same message sender, for his profile to be considered. • Quality of data: SA techniques should be updated to be able to reason and determine the levels of uncertainty, validity, messiness and trustworthiness of the data. The quality and accuracy of the developed model must be prioritized. SA algorithms for filtering and pre-processing also have to be updated, to process and consider data which are curated with low control and are possibly meaningless.
Mapping to Needs and Trends		
Addresses (Trend)	Next Generation of BI and Data Analytics platforms	
Serves (Need)	Ensure availability of (real-time) information and knowledge Comprehensive knowledge and information management	

Infogram					
Description (& Link)	Infogram offers over 35 interactive charts and more than 500 maps to help visualise data beautifully. It enables users to create a variety of charts including column, bar, pie, or word cloud or even add a map to their infographics or reports to impress their audience (https://infogram.com/).				
Type	Tool				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Innovation, Science & Technology				
TRL	8	**Implementation /Customisation Cost**			High
Ease of use	High	**Open License Availability**			No

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	3	3	3	3	**3.2**

SWOT	Strengths	Weaknesses
	- Infographics: Create infographics that boost visitor engagement on a website or blog. - Reports: interactive marketing reports, sales collateral, and more. - Charts: High-quality graphs and charts. Easy to import your data, customize, and share. - Dashboards: Connect your data to build live, easily shareable dashboards that visually track your business. - Maps: map maker to publish professional-quality interactive maps. - Social Media Visuals: huge bank of photos and icons to create stunning images for Facebook, Instagram, and Twitter. - Easy drag-and-drop intuitive, lightweight data editor: easily edit colours and styles, add icons, and set display options. - Input directly in editor, upload a spreadsheet, get live data integration from cloud service or use API.	- High implementation /customization cost - Limitations on the amount of pictorial graphics that you can add with the free version. - Need for intermittent connectivity: As it is a web solution an internet connection is needed. Standalone version would be helpful, as some other solutions have this option.
	Opportunities	Threats

	• Data visualization is great for reporting in to stakeholders, colleagues or customers that don't have the time or knowledge to understand or extract the data points themselves. • Mapping, measuring and understanding the landscape of social media. • Social network analysis (SNA) is a powerful way to organize a connected world. Network analysis can reveal insights into the way things connect with one another and form groups	• Need for intermittent connectivity: As it is a web solution an internet connection is needed. Standalone version would be helpful, as some other solutions have this option. • Competition • Visualisations risk: oversimplification of complex ideas or the loss of detail • Data ownership
Mapping to Needs and Trends		
Addresses (Trend)	Smart Work	
Serves (Need)	Ensure availability of (real-time) information and knowledge	

3D City Model		
Description (& Link)	The City of Adelaide has created a digital 3D City Model that is helping visualise the City's future, particularly in relation to growth scenarios and land use planning (https://www.cityofadelaide.com.au/planning-development/building-renovating/3d-city-model/).	
Type	Tool	
Origin	Public Sector	
Policy Cycle Stage (s)	Policy Monitoring and Evaluation	
Policy Domain (s)	Urban Planning & Transport	
TRL	9	**Implementation /Customisation Cost**	Low
Ease of use	High	**Open License Availability**	Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	• Available for public access: Ability to walk and fly through the Model and be fully immersed in the virtual City. The entire 3D City Model (excluding digital terrain data) can be downloaded free-of-charge and with no restrictions on its use from the State Government's Data SA website. The models are in .3DS format with JPEG textures • Accuracy of terrain: locations and buildings within the Model are generally within 50cm accuracy.	• Downloading significant amounts of data and the responsiveness will depend on the speed of internet connection. • The data usage may also have implications on internet plan's download usage, and limit restrictions.
	Opportunities	Threats
	• Provide a public consultation tool to assist in visualising transport, urban design and planning. • Provide architects and building designers with 3D model data to assist in developing and refining their building proposals in a simulated real-world environment. • Assist in assessment of development applications for new buildings, enabling accurate	• Limitations on personal privacy and anonymity • Unauthorised access to georeferenced building information • It is not unambiguous what Level of Detail (LOD) is in 3D city modelling • There is not a single and widely-accepted LOD paradigm in 3D city modelling. There are no

	overshadowing, overlooking and simulation of how the building will look within the City context.	general guidelines and it is not clear what drives the LOD
	• Illustrating the location of heritage sites and (in the future) other important public facilities and attractions, linking in with photos and text information. • Collaborating with government agencies and other bodies in visualising future transport, urban design and infrastructure projects. • 3D city models prove to be quite suitable for the handling and visualization of 3D spatial information, have a very broad spectrum of needs, values and uses in diverse areas such as urban planning, virtual reality, tourism, property management, maintenance of infrastructure infrastructures, disaster management, among others. These models offer a true and real image of the planet earth as much as possible, which allows planners / engineers / architects visualize all aspects of easy and objective way, and even the ability to archive, manage, and analyse large amounts of information either at the building level, as the level of urban space.	• Mixed-scale / perspective-view in 3D city modelling is not researched.

Mapping to Needs and Trends	
Addresses (Trend)	Smart City / Smart Government
Serves (Need)	Ensure availability of (real-time) information and knowledge

EVOKE					
Description (& Link)	The goal of the social network game is to help empower people all over the world to come up with creative solutions to our most urgent social problems (http://www.urgentevoke.com/).				
Type	Tool (Serious Game)				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Institutional Questions / Internal Affairs				
TRL	9	**Implementation /Customisation Cost**			Low
Ease of use	High	**Open License Availability**			Yes

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	3	3	3	3	**3.2**

SWOT	Strengths	Weaknesses
	- Ability to innovate and experiment to creatively solve problems and reach goals. - Mobile & low-bandwidth version available - Award-winning - Multi-player online educational game, which uses storytelling, game mechanics, and social networks, - Has been played in three languages by student groups in over 100 countries over the past seven years. - Better learning experience - Instant feedback. Since gamification provides metrics it can be easily seen, as trainer, how a participant is progressing. - Learning experience is personalized; the learners could evolve in their own rhythm, in a safe way. Gratification system provides an effective, informal learning environment that helps learners practice real life situations and challenges.	- Applies only to young people and people familiar with technology - Internet connection is needed.
	Opportunities	Threats
	Preparing young people to become social innovators who create solutions that address global 'grand challenges' (e.g.,	For performance and security reasons, modern browsers either discourage the use of, or block completely, the Flash Player

	displacement, hunger, poverty, water scarcity). • Large-scale Alternate Reality Games can reach and impact far more individuals than a typical classroom intervention. The ability to tap into the masses makes ARGs ideal for content areas related to large-scale social phenomena such as globalization, economics, environmental science, social media, and social innovation • Support young people in developing an understanding of complex challenges and acquiring 21st century skills (e.g. creativity, collaboration, critical reflection), socio-emotional skills (e.g. curiosity, empathy, generosity), and gain the confidence to experiment, collaborate, and create innovative solutions. • Push of Videogame Industry: The success of gamification is also driven by the recent growth in the gaming industry and the mass appeal that videogames have in the entertainment arena. - Increasing interest of the academic world: Gamification is receiving an increasing attention by the academic world. Researches aimed at investigating the effects of game elements on users are more and more • Inclusion of new game elements: Although points, badges and leaderboards are the most common game elements used in gamification, game designers have a huge quantity of components at their disposal, almost unexplored in the gamification practices	plug-in. you need to give explicit permission to your browser to run it -Unclear effects on user attitudes and behaviours • Simplification and limitation of the game elements employed: Some designers believe that limiting its perspective to the use of points, badges and leader boards is the main problem of gamification. • One size fits all: The spreading of third-part services on the one hand has promoted the adoption of gamification, on the other hand has highlighted the problem of the one size-fits-all approach currently applied to many gamification interventions. This design technique is mainly actualized as a cut and paste methodology, lacking originality not only for the scarce variety of the elements commonly employed, but also for a perspective that is inclined to consider different contexts and different users in the same way. • Side effects: many researches highlighted that different forms of extrinsic rewards could determine in specific contexts, a detrimental effect on the users' intrinsic motivation

Mapping to Needs and Trends		
Addresses (Trend)	Socio-Technical Systems	
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making	

Inflation Island						
Description (& Link)	Explore the different areas of Inflation Island, see how people react to inflation and deflation, and how the scenery changes. You can also test your knowledge and try to identify the different inflation scenarios (http://www.ecb.europa.eu/ecb/educational/educational-games/inflationisland/html/index.en.html).					
Type	Tool					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Economy & Finance					
TRL	8		**Implementation /Customisation Cost**			Low
Ease of use	High		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	3	3	3	3	**3.2**
SWOT	Strengths • Learn about inflation, you will also discover that deflation is not good for a stable economy either. In the game you will be switching from price stability to deflation, high inflation, or hyperinflation to see how it affects various people's lives. • Designed to educate: have fun while learning about the benefits of price stability, the risks of inflation or deflation and the workings of central banks • Better learning experience • Instant feedback. Since gamification provides metrics it can be easily seen, as trainer, how a participant is progressing. • Learning experience is personalized; the learners could evolve in their own rhythm, in a safe way. Gratification system provides an effective, informal learning environment that helps learners practice real life situations and challenges.			Weaknesses • Uses Adobe Flash technology: For performance and security reasons, modern browsers either discourage the use of, or block completely, the Flash Player plug-in. You need to give explicit permission to your browser to run it. (security risk) • Applies only to young people and people familiar with technology • Need for intermittent connectivity: an internet connection is needed.		
	Opportunities • Helps you discover how inflation affects the economy			Threats • The success of the European Central Bank's policies depends		

- Designed to educate: have fun while learning about the benefits of price stability, the risks of inflation or deflation and the workings of central banks - The success of the European Central Bank's policies depends heavily on being understood by a wide audience	- heavily on being understood by a wide audience - For performance and security reasons, modern browsers either discourage the use of, or block completely, the Flash Player plug-in. you need to give explicit permission to your browser to run it -Unclear effects on user attitudes and behaviours: many researches highlighted that different forms of extrinsic rewards could determine in specific contexts, a detrimental effect on the users' intrinsic motivation - Simplification and limitation of the game elements employed: Some designers believe that limiting its perspective to the use of points, badges and leader boards is the main problem of gamification. - One size fits all: The spreading of third-part services on the one hand has promoted the adoption of gamification, on the other hand has highlighted the problem of the one size-fits-all approach currently applied to many gamification interventions. This design technique is mainly actualized as a cut and paste methodology, lacking originality not only for the scarce variety of the elements commonly employed, but also for a perspective that is inclined to consider different contexts and different users in the same way.
Mapping to Needs and Trends	
Addresses (Trend)	Nudging
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making Strengthen citizens' trust in public administration

Nowcasting for economic policy and beyond					
Description (& Link)	Nowcasting is a forecasting methodology that is becoming increasingly popular in economics. The use case considers the potential use of Nowcasting in the context of economic policy setting and sets the potential value of an extended use of Nowcasting against different contexts. (http://media.wix.com/ugd/c04ef4_83de2898b6bf4fe091d2d0ab7105821b.pdf)				
Type	Use Case				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Economy & Finance				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	Low	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	3	4	2	3	**3**

SWOT	Strengths	Weaknesses
	- Help increasing responsiveness of decision-making in areas with moving targets and quick intervention cycles. - Estimating complex variables in the short-term, - It is a statistical method that can be applied to a broad range of policy fields and purposes. - Based on predictive analytics and models that are applied to real-time or close to real-time monitoring data of complex variables in order to define an estimate - Central banks are exploring or testing nowcasting applications	- Low ease of use - Nowcasting always depends on the accuracy of the real-time information - Nowcasting can lead to flawed conclusions. E.g. Google Flu Trends proved to persistently overestimate flu prevalence because, amongst other reasons, the search queries used by people seemed to be biased - Nowcasting can be used by policymakers only when the conceptual model is valid, the data sources are reliable and the data collection and analysis are sound - The concept of Nowcasting is blurring the lines between forecasting and monitoring, especially when similar datasets are being used
	Opportunities	Threats
	Support in policymaking in the economic sphere through real-time monitoring	Privacy issues especially when used for public consultations: People might state opinions or comments on social media but

	• Nowcasting methods are expected to add value in those cases where the data collection and computing of the main variable is too slow a process compared to the needed or desirable pace of decision-making. Essentially, it is a statistical method that can be applied to a broad range of policy fields and purposes. • Can be applied to infer sentiment data in real-time or close to real-time, in substitution of, for example, surveys. This idea of using nowcasting for public consultations is closely connected to the methodologies of text and sentiment mining, • Central banks all over the world are exploring Nowcasting methods in order to improve their monetary policy responses to such developments. The main aim consists in assessing changes in the economy during or shortly after they occur, which would enable more timely policy interventions.	would not want to have them included in any public consultation process. • Challenges in data collection and modelling for nowcasting: the identification of observable factors that influence the main variable and which, factored into a reliable conceptual model, allow for extrapolation and an estimate of the dependent variable
Mapping to Needs and Trends		
Addresses (Trend)	Nudging	
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

Using learning analytics systems for educational policies						
Description (& Link)	This case focuses on the opportunity that micro - data on learning processes (e.g. within universities) and the use of learning analytics provide for the design of educational strategies by policy makers at a national and European level (http://media.wix.com).						
Type	Software						
Origin	Private sector						
Policy Cycle Stage (s)	Policy Design and Analysis						
Policy Domain (s)	Innovation, Science & Technology, Education, Youth, Culture & Sport						
TRL	7		**Implementation /Customisation Cost**			Low	
Ease of use	Low		**Open License Availability**			Yes	
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**	
	3	3	4	3	3	**3.2**	
SWOT	Strengths • Improve efficiency and effectiveness of their organisation • Present data about learners in a usable form, either through visualisations or by summarizing and describing the data. • Providing useful opportunities for reflecting on work that has been carried out and for making comparisons between individual learners, specific cohorts or institutions				Weaknesses • More empirical evidence is needed about the effects of learning analytics, in order to support a process of quality assurance • Comparability of the data depending on standardisation, their consistency over time, and their overall reliability and quality. • Lack of clear vision on the purpose of learning analytics in education, and guidance and frameworks on the use of learning analytics • Lack of leadership for the implementation and monitoring of learning analytics • Lack of student involvement, particularly when it comes to data protection • Insufficient skills and training in using learning analytics or analysing resulting data. • Stakeholder engagement needs to be increased by reaching out to groups including teachers, students, staff, employers and parents. • As legislation changes and individuals become more aware of data use, institutions need help to understand their			

		responsibilities and obligations regarding data privacy and data protection.
		• The coherence between data sets in terms of scope and definitions. Micro-data sets such as the ones resulting from learning analytics are built to satisfy the needs at an institutional level which does not always coincide with the needs and intended use of these data at national or European level.
	Opportunities	Threats
	• Learning analytics has the potential to contribute to the quality of teaching and learning and the modernisation of educational systems in Europe • Increased amount of data available in education (due to data collected in Learning Management Systems, online education, social media and the increased use of digital technology more generally in education). Students "digital footprint" is growing. • Increased interest in measuring and improving performance and efficiency in education. • The current interest in learning analytics also reflects the growing use of data in other sectors including retail and manufacturing • Improve efficiency and effectiveness of organisations • The use of the data collected about the micro-level (students/institutions) can complement the survey data collected at the meso- or macro-level (i.e. country or European levels) by providing insight on processes and enabling factors, which data at the meso- and macro-level can rarely provide. The data can be used for the monitoring of skills levels and the identification of gaps. The	• Data protection, ownership and control of data are amongst the most challenging areas of learning analytics, in particular if commercial companies are involved in the process • Data storage and access need to be looked at more closely and the approaches of different countries could provide best practices • Inclusion of countries and regions with a weak educational data system or lower levels of online learning: Learning analytics relies on strong educational data systems, the right skills to extract data and the actual use of these systems as well as online educational platforms. These prerequisites will differ between countries and between regions. Consequently, the data gathered might not reflect reality due to these differences. • Few technology-enhanced learning implementation projects or policy documents from government level downwards are likely to deal with culture or values in their documentation. • Lack of clear vision on the purpose of learning analytics in education, guidance and frameworks on the use of learning analytics

	increasing demand for and development of data sources on skills gaps by policymakers demonstrate that there is a concrete need for this data.	- Lack of leadership for the implementation and monitoring of learning analytics - Lack of student involvement, particularly when it comes to data protection - Insufficient skills and training in using learning analytics or analysing resulting data. - Learning analytics is a relatively new area for most national/regional authorities and education stakeholders, there is a need to gather and examine evidence on the potential and actual benefits of learning analytics and develop guidelines and reference documents.
Mapping to Needs and Trends		
Addresses (Trend)	Cloud Computing	
Serves (Need)	Coherent use of digital technology across policy areas	

Text and opinion mining for policy making					
Description (& Link)	This use case covers the methods that can assist policymakers throughout all stages of the policy cycle. It explains the sources for these data and how the outputs can be used to gain understanding of stakeholders' and citizen's opinions on policies and strategies. (http://media.wix.com/ugd/c04ef4_83de2898b6bf4fe091d2d0ab7105821b.pdf)				
Type	Use Case				
Origin	Public Sector				
Policy Cycle Stage (s)	All				
Policy Domain (s)	All				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	4	4	2	3	**3.2**

SWOT	Strengths	Weaknesses
	- Assist policymakers throughout all stages of the policy cycle: from getting feedback on different policies, creating a map of a current crisis, or shedding light on places where citizen's feedback is needed. - These methods are tools that can be used across the board on many policy areas and topics. - Text mining allows finding trends in a large canon of text. The method assists in highlighting topics by creating numeric indices. It can create summaries of the frequency of a word, clusters of words, trends, and the like - Opinion mining refers to analysing positive or negative valences around topics: Opinion mining allows for the categorization of content to either binary values of positive and negative or scales of values such as very good, good, satisfactory etc. This is done through algorithms that classify documents and search key words that underline a sentiment. - Text and opinion mining are based on natural language	- Text and sentiment analysis are strong only in the main European languages - Sample of the data and data analysis abilities of both text and opinion mining can entail a bias towards specific populations or types of stakeholders. populations. - Difficulties in terms of understanding the cultural context of a sentence, detection of sarcasm, and typos - Data ownership: Many sources on the web are prohibited from re-use of the data and some of them might contain private information (need to check that the sources can be used for these types of analyses). In many cases, the raw, existing data that is mined continues to be owned by the original authors and platforms, while the results of the text and opinion mining analysis can be owned by the policymaker that funds and oversees this process. -Data privacy: anonymisation and aggregation of data are among the points of attention in publishing the results.

	processing, a computational process that retrieves high quality information from texts by detecting of patterns and trends in a corpus. • The tools offer visualisation of the data that can help the policymaker understand the complex data.	• Legal and cultural aspects of freedom of speech
	Opportunities • Can be undertaken on many types of text from different types of media. Examples are social media, online and offline newsletters and study reports, letters, blogs and other documents by experts and citizens. • Many research projects, including EU funded projects, are operating to improve text and opinion mining for economic and research purposes. • Collecting data for framing policy: by using text and opinion mining on social media networks, policymakers can gather information that can allow them to understand the stakeholders' needs and wants for a societal issues and an upcoming policy. • Creating a map of the current state of opinion and satisfaction levels from different groups of stakeholders: during the implementation stage of policies, opinion mining can help detect the satisfaction level from the policy interventions launched or the policies that have been adapted. This can inform policymakers in discussions about further improvements of policies. • Evaluating the implementation of policies: halfway or at the final stage of the policy cycle, text and opinion mining can help summarise the feedback of stakeholders and to feed it again	Threats • Data source, Quality of data: Analysis of social media for example, can exclude some populations, like the elderly or lower class, from participating in the process, since they are not using social media networks (or using them to a lesser extent or for different purposes). Surveys can help in actively seeking feedback however, there can be gaps and inconsistencies in the data since people tend not to answer full length answers in surveys or have incomplete answers that can burden the algorithms. (policymakers should be clear about the population they want to include or want to hear from). • Data ownership: many sources on the web are prohibited from re-use of the data and some of them might contain private information. need to check that the sources can be used for these types of analyses). In many cases, the raw, existing data that is mined continues to be owned by the original authors and platforms, while the results of the text and opinion mining analysis can be owned by the policymaker that funds and oversees this process. -Data privacy: anonymisation and aggregation of data are among the points of attention in publishing the results. • Legal and cultural aspects of freedom of speech

	into the (re)design of policy interventions	
Mapping to Needs and Trends		
Addresses (Trend)	E-Governance	
Serves (Need)	Deeper understanding of IT potential and IT processes	

Smart Fire Department						
Description (& Link)	Tracking Behaviour, Enhanced Situational Awareness, Sensor-driven Decision Analytics, Process Optimisation, Optimised Resource Consumption, Complex Autonomous Systems. (http://ojs.imodev.org/index.php/RIDDN/article/download/178/289)					
Type	Use Case					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Justice, Legal System & Public Safety					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	Low		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • Focusing on cyber physical systems, such as fire protection systems, for the control of the operational forces. • Emergency rescue teams and security staff can be directly detected and geo-located as well as remotely controlled in large-scale emergency situations. • Smart assistants support on-site. • Autonomous robots and drones could also be used wherever there is high risk for human action. • Intelligently networked objects such as smoke detectors, smartphones, surveillance cameras and drones automatically detect certain conditions and report them to the control center • Smart clothing and other wearables can quickly alert in dangerous situations: Smart firefighter glasses and displays in helmets provide emergency personnel with additional information and predictions that provide guidance. (e.g. in the search for the fire alarm center of a building). • Enhanced Situational Awareness			Weaknesses • Low ease of use • Development needs effort and time • Financial expenses required: smart government is about the complete redesign of paper based processes with digital record and workflow management systems, e.g. relying entirely on virtual objects • Insufficient scientific foundation • Research & development capacity • Sensor-data enables behaviour tracking • Insufficient political prioritization		

	Opportunities	Threats
	• The effect of intelligently networked objects, cyber-physical systems, the Internet of Things, and the Internet of Services will substantially change politics, administration, economy, and society • Better prepared for challenging and unpredictable situations • Reduce risk of human casualties • Innovation potential and impulses • Novel intelligently networked objects • Novel intelligently networked services • Innovative cyber-physical systems -Increases in efficiency • Cost and fee reductions	• Uncertainty vs. winning implementation • Disruptive nature of changes • Lack of permanent funding • Lack of acceptance and participation • Strategic exploitations of fears of transparency • From the perspective of public sector informatics and business informatics, until now the opportunities and risks of smart government have neither been systematically captured nor comprehensively developed.

Mapping to Needs and Trends	
Addresses (Trend)	Smart Work
Serves (Need)	Process and resource optimisation Coherent use of digital technology across policy areas

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Smart Construction Administration						
Description (& Link)	Sensors perfect the transport infrastructures by reporting automatically about its utilisation and current condition. Sensor-generated information about the stress on roads, tracks, canals, bridges and tunnels helps civil engineering authorities to better estimate the condition of the infrastructure. They recognise and repair damages in the transport infrastructure in order to ensure an optimal traffic flow. This is supplemented by indications from citizens via apps. Strong vibrations registered by smartphones during car trips simplify the early identification and removal of road damages. (http://ieeexplore.ieee.org/document/7781917/)					
Type	Use Case					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Monitoring and Evaluation					
Policy Domain (s)	Urban Planning & Transport					
TRL	n/a	**Implementation /Customisation Cost**				n/a
Ease of use	High	**Open License Availability**				n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • Tracking: Stress on roads and bridges, Identification of road damages based on vibrations of smartphones, Progress in building projects • Enhanced Situational Awareness: Smart testing glasses for construction approvals, which combine plans, reality and standards for the auditor, Drones for the detailed examination of complex buildings • Sensor-driven Decision Analytics: Sensor-based stress tests of the transport infrastructure, Supportive statics checks during the approval process for civil engineering structures. • Process optimization: Automated data recording tasks, Semi-automated building control, Fast detection and removal of damages, Joint processing of building applications • - Optimized Resource Consumption: Minimizing the consumption of electricity, oil			Weaknesses • Development needs effort and time • Financial expenses required: smart government is about the complete redesign of paper based processes with digital record and workflow management systems, e.g. relying entirely on virtual objects • Insufficient scientific foundation • Research & development capacity • Sensor-data enables behaviour tracking • Insufficient political prioritization		

	and gas for a building, Optimized process-integration for building applications • Complex Autonomous Systems: Automated electronic communication on during the building application procedures, Smart & intelligently connected buildings, Smart & intelligently connected roads, Smart & intelligently connected tunnel	
	Opportunities • Roads, highways, railways, rivers, canals and bridges are key pillars for the transport infrastructure of a state. Therefore, they must be inspected on a regular basis, and if necessary be overhauled or replaced • Electronic communication opens up new opportunities for process workflows in a smart construction administration, based on collaborative, transparent and efficient building application processes. • Upcoming changes towards smart government that are triggered by the Internet of Things and Services. • Reduce risk of human casualties • Innovation potential and impulses • Novel intelligently networked objects • Novel intelligently networked services • Innovative cyber-physical systems -Increases in efficiency • Cost and fee reductions	Threats • Disruptive nature of changes • Lack of permanent funding • Lack of acceptance and participation • Strategic exploitations of fears of transparency • From the perspective of public sector informatics and business informatics, until now the opportunities and risks of smart government have neither been systematically captured nor comprehensively developed.

Mapping to Needs and Trends	
Addresses (Trend)	Smart City / Smart Government
Serves (Need)	Ensure availability of (real-time) information and knowledge

Lisbon City Hall - Participatory Budgeting					
Description (& Link)	Lisbon Participatory budgeting (here in after, Lx-PB) structure is designed in such a way that the public and the city council should work together. It also embraces ICT, that is, it uses the internet and SMS, encourages the people to take part – face-to-face as well as through online platform (https://www.lisboaparticipa.pt/). The face-to-face platform where the citizens of Lisbon could take part in budgeting process is known as Participatory Assemblies (PAs, here in after). Often, several PAs take place during Spring and Autumn time period. PAs allow the participants to propose new proposals, present to the audience and discuss. Comments and inputs from the participants will be included into the proposal. Nevertheless, where in PAs a person can submit two proposals, an online portal can only accept one proposal. The rationale behind is to encouraged citizens to meet and deliberate on their proposals face-to-face. Besides, it sparks "contest of ideas" (Dias, 2010) among proposers and the latter also invite citizens to vote on the proposal. (https://participedia.net/en/cases/ten-years-lisbon-participatory-budgeting-portugal)				
Type	Use Case				
Origin	Public Sector				
Policy Cycle Stage (s)	Agenda Setting				
Policy Domain (s)	Economy & Finance				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	3	3	**3.6**
SWOT	Strengths • Promotes transparency: open to any person over 18 years of age to take part in the process. Open to officials, representatives of associations, companies, civil society and NGOs in the city. • The development of Participatory Associations (PAs) and Polling stations (PSs), in 2012. PAs serve as the space for question formulation and discussion, PSs serves as a space for casting votes for those who lack access to the internet facility. • Capability to generate a concrete decision-making space beyond representative elections • Flexibility		Weaknesses • Limitation in decision-making capacity of citizens, since "filtering" is performed by an institutional entity and the choices made can be perceived by citizens as ´discretionary´ and ill-founded • The process and implementation of projects is time consuming. • Limited Deliberation: lack of discussion on proposals		

	• Evolutive essence: continuously evolve and updates itself. has working rules and working groups dedicated to Lx-PB process. • Open process: has annual review of the process and receives feedbacks from the stakeholders	
	Opportunities • Promotes transparency: open to any person over 18 years of age to take part in the process. Open to officials, representatives of associations, companies, civil society and NGOs in the city. • It activates citizens to play active role in decision-making process in defining public policies and strategies of their municipality. • A remarkable result has been achieved in terms of increasing participants. Every year, the number of participants, proposals and projects increases	Threats • Credibility of the voting process is being compromised due to Lack of supervision over the procedure of registration of voters, voting mechanism, lack of clarity of web portals displaying proposals, and infiltration of fake emails and names the online voting mechanism is susceptible to falsely "organized lobbies and subscribers" • Lacks broader transformative goal such as "redistributive justice ... greater transparency and accountability • Lack of commitment of the City Council • General distrust in public institution

Mapping to Needs and Trends	
Addresses (Trend)	Smart City / Smart Government
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making Strengthen citizens' trust in public administration Continuous Evaluation of Policies

Madrid Participa						
Description (& Link)	Dynamic and continuous dialogue between political representatives and citizens. (https://www.madrid.es/portal/site/munimadrid)					
Type	Use Case					
Origin	Public Sector					
Policy Cycle Stage (s)	Agenda Setting					
Policy Domain (s)	Institutional Questions / Internal Affairs					
TRL	n/a	**Implementation /Customisation Cost**				n/a
Ease of use	High	**Open License Availability**				n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths - Increase citizen participation in the decision-making process - Has been used regularly in 22 citizen consultations involving more than 3.5 million citizens. - Convenient and user-friendly consultations - Includes younger citizens as well as immigrants in the consultation initiatives. - Promotes transparency and making government more responsive to citizens. - e-democracy project that aims at the following: - Foster citizen engagement in local governance - Strengthen local citizen associations - Help bridge the digital divide in society - Increase awareness of the numerous public access Internet centres deployed throughout the city since 2004 - Provide citizens with electronic means to participate in the local decision-making processes that directly affect them		Weaknesses - Voting channels such as Java mobile phones or SMS are complementary, and their use depends on the available budget and on security and usability issues. - Need for high awareness of the project among the citizens, so they know that they can give their opinion on different issues -Issues must be explained in order for all people to understand what they are being asked			
	Opportunities			Threats		

	- Increase citizen participation in the decision-making process - Offering a more dynamic and continuous dialogue between political representatives and citizens. - Council regulations that define telematic transactions and e-government initiatives to improve the communication between the Council and the citizens/business. - Foster citizen engagement in local governance - Strengthen local citizen associations - Help bridge the digital divide in society - Increase awareness of the numerous public access Internet centres deployed throughout the city since 2004 - Provide citizens with electronic means to participate in the local decision-making processes that directly affect them	- Data privacy - Security experts have voiced significant concerns over the trustworthiness of e-voting systems. - Not suitable for consultations where secret voting is desired or required.: It implements a voting system that is recorded and verifiable by anybody. The public nature of voting, however, comes at a cost. Because in modern democracies the privacy and anonymity of voting are considered essential to protect individual autonomy and freedom of choice - Misinterpretation: Need to achieve a high awareness of the project among the citizens, so they have knowledge of the issues they are being asked to express opinions about

Mapping to Needs and Trends	
Addresses (Trend)	E-Governance
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making Strengthen citizens' trust in public administration Continuous Evaluation of Policies Strengthen citizens' trust in public administration Continuous Evaluation of Policies

Maryland Budget Game						
Description (& Link)	The Maryland Budget Game allows users to develop their own proposals for balancing the state budget. The game presents different budget options in a range of policy areas, along with background information and factors to consider. (http://www.participatedb.com/tools/115)					
Type	Use Case					
Origin	Public Sector					
Policy Cycle Stage (s)	Agenda Setting					
Policy Domain (s)	Economy & Finance					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**
SWOT	Strengths • Allows users to develop their own proposals for balancing the state budget. • The game presents different budget options in a range of policy areas, along with background information and factors to consider. • Players train in decision-making process. • Better learning experience - Instant feedback. Since gamification provides metrics it can be easily seen, as trainer, how a participant is progressing. • Learning experience is personalized; the learners could evolve in their own rhythm, in a safe way. Gratification system provides an effective, informal learning environment that helps learners practice real life situations and challenges.			Weaknesses • Applies only to young people and people familiar with technology • Internet connections needed.		
	Opportunities • Games can reach and impact far more individuals than a typical classroom intervention. The ability to tap into the masses makes games ideal for content			Threats • Simplification and limitation of the game elements employed: Some designers believe that limiting its perspective to the use of points, badges and leader		

areas related to large-scale social phenomena such as globalization, economics, environmental science, social media, and social innovation • Instant feedback. Since gamification provides metrics it can be easily seen, as trainer, how a participant is progressing. • Push of Videogame Industry: The success of gamification is also driven by the recent growth in the gaming industry and the mass appeal that videogames have in the entertainment arena. • Increasing interest of the academic world: Gamification is receiving an increasing attention by the academic world. Researches aimed at investigating the effects of game elements on users are more and more	boards is the main problem of gamification. • One size fits all: The spreading of third-part services on the one hand has promoted the adoption of gamification, on the other hand has highlighted the problem of the one size-fits-all approach currently applied to many gamification interventions. This design technique is lacking originality not only for the scarce variety of the elements commonly employed, but also for a perspective that is inclined to consider different contexts and different users in the same way. • Side effects: many researches highlighted that different forms of extrinsic rewards could determine in specific contexts, a detrimental effect on the users' intrinsic motivation

Mapping to Needs and Trends	
Addresses (Trend)	Nudging
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making Strengthen citizens' trust in public administration Continuous Evaluation of Policies

Modelling the Early life-course (MELC)						
Description (& Link)	The aim of the project is to construct a computer-based simulation model as a decision-support tool for policy-making in the early life course. This entails building a model with micro-level data derived from existing longitudinal studies to quantify, for policy purposes, the underlying drivers and determinants of progress in the early life course. (https://researchspace.auckland.ac.nz/handle/2292/27653)						
Type	Use Case						
Origin	Public Sector						
Policy Cycle Stage (s)	Policy Design and Analysis						
Policy Domain (s)	All						
TRL	n/a		**Implementation /Customisation Cost**				n/a
Ease of use	High		**Open License Availability**				n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability		Scalability	Total Score
	3	3	3	3		3	**3**
SWOT	Strengths • Ability to test scenarios that are relevant to policy makers via a user-friendly interface. • Dynamic discrete-time micro-simulation model • Focusses on three main outcomes: health service use, early literacy, and conduct problems. • Acts as a decision-support tool for policy makers • Relies on data from the real world to create an artificial one that mimics the original but upon which virtual experiments can be carried out • Does not model population growth and demographic change. Instead, it models the same group (cohort) of individuals from birth to age 13 and assesses the type of factors that could be modified to improve child outcomes.			Weaknesses • Is a discrete-time dynamic MSM with status updates every year, so it not designed to handle events in continuous time. • Covers a limited lifespan (from birth to age 13) for a limited range of factors. • Simulates a closed cohort rather than a current and growing population: does not model population growth and demographic change. Instead, it models the same group (cohort) of individuals from birth to age 13 and assesses the type of factors that could be modified to improve child outcomes.			
	Opportunities • Understand the factors upon which policies can be devised to			Threats • Is a discrete-time dynamic MSM with status updates every year,			

	improve the lives of children and young people • Construct a computer-based simulation model as a decision-support tool for policy-making in the early life course • Understanding the factors upon which policies can be devised to improve the lives of children and young people • Improving early literacy	so it not designed to handle events in continuous time • Covers a limited lifespan (from birth to age 13) for a limited range of factors. • Simulates a closed cohort rather than a current and growing population: does not model population growth and demographic change. Instead, it models the same group (cohort) of individuals from birth to age 13 and assesses the type of factors that could be modified to improve child outcomes.
Mapping to Needs and Trends		
Addresses (Trend)	Next Generation of BI and Data Analytics platforms	
Serves (Need)	Deeper understanding of IT potential and IT processes Coherent use of digital technology across policy areas	

OpenGov.gr					
Description (& Link)	Opengov.gr has been designed to serve the principles of transparency, deliberation, collaboration and accountability and includes three initiatives: Open calls for the recruitment of public administration officials; Electronic deliberation; Labs OpenGov. (http://opengov.gr/)				
Type	Use Case				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Monitoring and Evaluation				
Policy Domain (s)	Institutional Questions / Internal Affairs				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Open calls for recruitment of public administration officials: Top level and mid-level openings in the public sector are available on the Internet. Applications are submitted on-line using a platform available on the opengov.gr website - Electronic deliberation: Almost every piece of draft legislation or policy initiative by the government is posted in a platform prior to their submission to parliament. Citizens and organisations comment and post suggestions. - Labs OpenGov: An open innovation initiative that brings together ideas and proposals of citizens, the public and the private sectors.	- Increases vulnerability to criticism - Cultural shift of the public administration - Apply only to people who are familiar with technology: can exclude some populations, like the elderly or lower class, from participating in the process, since they are not using social media networks (or using them to a lesser extent or for different purposes).
	Opportunities	Threats
	- Promotes decentralised knowledge - Strengthening of society by a cautious opening of the state - Increases Transparency, participation, collaboration.	- General distrust in public institution - Increases vulnerability to criticism - Cultural shift of the public administration

	273	• Apply only to people who are familiar with technology: can exclude some populations, like the elderly or lower class, from participating in the process, since they are not using social media networks (or using them to a lesser extent or for different purposes).
Mapping to Needs and Trends		
Addresses (Trend)	E-Governance	
Serves (Need)	Strengthen citizens' trust in public administration Ensure availability of (real-time) information and knowledge	

Opinion Space						
Description (& Link)	Expressing and visualising opinions on policies. (https://opinion.berkeley.edu/)					
Type	Use Case / Tool					
Origin	Public Sector					
Policy Cycle Stage (s)	Agenda Setting					
Policy Domain (s)	Institutional Questions / Internal Affairs					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • Social media technology designed to help communities generate and exchange ideas about important issues and policies. • A version of Opinion Space is being used by the U.S. State Department, where it has attracted thousands of participants from around the world to organize, visualize, and analyze constructive suggestions on foreign policy. • Is a self-organizing system that uses an intuitive graphical "map" that displays patterns, trends, and insights as they emerge and employs the wisdom of crowds to identify and highlight the most insightful ideas. • The system uses a game model that incorporates techniques from deliberative polling, collaborative filtering, and multidimensional visualization. • Provides participants dynamic visual feedback about their position on key social issues, relative to other participants. • Increasing participant engagement in decision-making processes • The platform applies statistical models and collaborative filtering to rapidly discover			Weaknesses • Excludes some populations, like the elderly or lower class, from participating in the process, since they are not using social media networks (or using them to a lesser extent or for different purposes). • Need for intermittent connectivity		

	emerging trends as data is collected.	
	Opportunities • By fostering open-ended dialogue and facilitating a more nuanced assessment of public opinion about complex issues, it enables more informed organizational decisions while increasing participant engagement in decision-making processes. • The platform has been used to assess government performance in California and Mexico, to crowdsource insights on the effectiveness of family planning trainings in Uganda, to gather ideas on how to improve typhoon preparedness in the Philippines.	Threats • Government can use information gathered for its own benefit. Through collection of data, patterns can be predicted and used to government's advantage • Excludes some populations, like the elderly or lower class, from participating in the process, since they are not using social media networks (or using them to a lesser extent or for different purposes). • Need for intermittent connectivity
Mapping to Needs and Trends		
Addresses (Trend)	E-Governance	
Serves (Need)	Ensure availability of (real-time) information and knowledge	

energie atlas					
Description (& Link)	Information to the citizens and companies of the State of Bavaria in Germany in the domain of energy sources, including renewable energy. (https://www.energieatlas.bayern.de/)				
Type	Use Case				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Monitoring and Evaluation				
Policy Domain (s)	Environment & Energy				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	3	3	3	3	**3**

SWOT	Strengths • Provides citizens, municipalities and companies with information and tools for implementing the energy transition. • Shows the current status of the energy transition in the Bavarian municipalities, districts and districts and an overview of about 500,000 renewable energy plants in Bavaria, • Provides Information on technologies, funding programs and permits. • Data assistance • Digital and interactive maps from all over Bavaria • Available for citizens municipalities and corporations	Weaknesses • The volume of energy big data is increasing at an exponential speed. At the same time, difficulties also arise up in data storage, mining, querying, processing, etc • Processing large amounts of Realtime sensor data
	Opportunities • Effective reduction of CO_2 emissions • Lower energy consumption • Increase energy efficiency • Expanding renewable energies • The volume of energy big data is increasing at an exponential speed. At the same time, difficulties also arise up in data storage, mining, querying, processing, etc. Therefore, cryptography technologies, fuzzy	Threats • The volume of energy big data is increasing at an exponential speed. At the same time, difficulties also arise up in data storage, mining, querying, processing, etc • Processing large amounts of Realtime sensor data • Increasing pace of technological change and higher level of technical sophistication

	data computing, qualified data processing are all essential for big data applied better in smart grid • Internal optimization of infrastructure operation • Rapidly changing energy market • Optimization of the energy network of infrastructure.	
Mapping to Needs and Trends		
Addresses (Trend)	Performance Measurement
Serves (Need)	Strengthen citizens' trust in public administration Ensure availability of (real-time) information and knowledge

2050 Pathways Web Tool					
Description (& Link)	Exploring how the UK can meet the 2050 emission reduction target using the web-based 2050 Calculator. (https://www.gov.uk/guidance/2050-pathways-analysis)				
Type	Use Case / Tool				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Environment & Energy				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	3	4	3	3	3	**3.2**

SWOT	Strengths	Weaknesses
	  • Award-winning • User-friendly model that lets the user create his own UK emissions reduction pathway and see the impact using real scientific data. • The original Calculator was released by DECC (now BEIS) and is currently available in three versions to allow a range of audiences to explore the fundamental question of how the UK can best meet energy needs while reducing emissions: a) the new look web-tool version of the Calculator for a detailed look at the issue with a user-friendly interface b) the "classic" version of the webtool that allows you to see all your options in one view and c) the full Excel version of the Calculator for experts who want to look at the underpinning model. • Transparency: the full Calculator model is published	 • Excludes some populations, like the elderly or lower class, from participating in the process, since they are not using social media networks (or using them to a lesser extent or for different purposes). • Applicable only for the UK • Not available at the moment: will be available again once the update is complete. • The 2050 Calculator is quite complex and can not be understood and used easily by the ordinary end user (eg an everyday citizen). • Regarding dissemination, there has been a high critique of not using social media
	Opportunities	Threats
	  • International collaboration: BEIS is working with the Foreign and Commonwealth Office (FCO), and the	 • Excludes some populations, like the elderly or lower class, from participating in the process, since they are not using social media

		networks (or using them to a lesser extent or for different purposes).
	Department for International Development (DFID) to engage with experts from other parts of the world to build their own 2050 Calculators. • Increase awareness on climate change • The 2050 Pathways Analysis team should consider the integration of social channels in their dissemination strategy. • It would be interesting to see the comparison of the actual results to those calculated in the 2050 model; in case of course the propositions made through the 2050	• Applicable only for UK • Not available at the moment: will be available again once the update is complete. • Population growth • Climate change • Increasing pace of technological change and higher level of technical sophistication needed
Mapping to Needs and Trends		
Addresses (Trend)	E-Governance	
Serves (Need)	Ensure availability of (real-time) information and knowledge	

A systematic quantitative backcasting on low-carbon society policy in case of Kyoto city						
Description (& Link)	Based on the concept of backcasting, this paper proposes a methodology and a model, called the backcasting model (BCM), that organises a system of various LCS options and projects their detailed schedule toward a given target year. The methodology and model mainly focus on describing a complex system of LCS options and the consistency of their schedule. (http://www.sciencedirect.com/science/article/pii/S0040162511000059)					
Type	Use Case					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Environment & Energy					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	Low		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	4	4	3	3	**3.4**
SWOT	Strengths • The model investigates and selects which options (countermeasures and policies) to introduce and when and at what intensity in order to best achieve the future social and economic activities portrayed in the scenarios while satisfying the service demand today and throughout the period up to the target year based on certain criteria. • The model also presents a Gantt chart with pathways of CO_2 emission, investment			Weaknesses • Low ease of use • It takes time to construct infrastructure (city infrastructure, transportation systems, energy infrastructure, buildings, etc.) generally has a long service life and cannot easily be modified once constructed.		
	Opportunities • Technologies have learning-by-doing effects: the additional cost of low-carbon technologies will fall as the technologies spread. • If actions are delayed, learning-by-doing effects may fail to work sufficiently, resulting in higher total investment requirements to achievea LCS. • No infrastructure can be built immediately; hence it would be			Threats • If actions are delayed, learning-by-doing effects may fail to work sufficiently, resulting in higher total investment requirements for achieving a LCS. • No infrastructure can be built immediately; hence it would be difficult to switch suddenly to a LCS in the years just before 2050:		

	difficult to switch suddenly to a LCS in the years just before 2050. • Future technological development has several uncertainties. If one of the currently dominant technologies falls behind schedule, it will fail to spread as expected and CO_2 emission targets will not be met. • Early actions will open up new opportunities for the spread of alternative actions toward the LCS should a dominant technology fail in some way • The infrastructure built today is likely to be in use in 2050. Thus, the framework of a LCS is already being established.	• Future technological development has several uncertainties.
Mapping to Needs and Trends		
Addresses (Trend)	E-Governance	
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

African Highland Farmer – the Game						
Description (& Link)	Creating awareness among decision makers on land degradation and sustainable land management. (https://ypard.net/sites/ypard.net/files/Machteld.%20A.%20Schoolenberg.pdf)					
Type	Use Case					
Origin	Public Sector					
Policy Cycle Stage (s)	Agenda Setting					
Policy Domain (s)	Environment & Energy					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	2	3	3	3	**2.8**

SWOT	<u>Strengths</u>
	
	• Make policy makers aware of the problems
	• To gather input data for the game, a farming system analysis was done in order to understand the choices a farmer faces regarding his land management, providing:
	  a) Insight into farmers' choices in land management
	  b) Insight in the critical decision moments that farmers face for socio-economic issues and physical phenomena
	  c) Insight in the coping strategies and investment behaviour of farmers at critical decision moments
	  d) Translation of results into rules and input data for the game
			<u>Weaknesses</u>
			
			• Many soil conservation techniques have been introduced in the area, the acceptation and wide implementation of these techniques by local communities is limited and land degradation (LD) is increasingly destructive regarding agricultural production
			• Part of the communication gap between the scientific studies and policy makers comes from the working schedule of these policy makers that leaves little room studying research reports			

	<u>Opportunities</u> • The degradation of arable land has been an increasing problem on smallholder farmer communities • A lot of research on LD and sustainable land management (SLM) has been done, trying to		<u>Threats</u> • Lacks communication between these scientific studies and policy makers, especially on district level • Simplification and limitation of the game elements employed			

	involve institutes and NGOs to improve the situation in the area. • Using innovative communication tools [among which a computer game] in a policy maker workshop to bridge this communication gap between the scientific studies and policy makers • Both statistical research and literature reviews have shown over the last decades that gaming has significant learning potential and increases the efficiency in instruction time	
Mapping to Needs and Trends		
Addresses (Trend)	Evidence-based policy	
Serves (Need)	Ensure availability of (real-time) information and knowledge Development of domain specific target and indicator systems	

Crowdsourcing Through Social Media-The Icelandic Constitution Case						
Description (& Link)	The Icelandic Constitutional Council has made it possible for the public to send messages which are published on the Council's website in order to foster a lively discussion. Thereby every citizen had the opportunity to take part to the drafting of the constitution. (http://www.crossover-project.eu/Details.aspx?EntityId=438)					
Type	Use Case					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Design and analysis					
Policy Domain (s)	Institutional Questions / Internal Affairs					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	**Strengths** • Transparency and openness: to facilitate crowdsourcing, the government shares data and other inputs, enabling the public and ordinary citizens to be a significant part of democratic processes. • Combination of social networking tools and an active audience allows any individual to inspire and coordinate collective action outside a formal hierarchy • The transparency of each process was ensured by extensive use of social media and other technological tools • The review work and the participation policies were conducted through three overlapping ways: a) Each week the CAC published online on its official site all then new articles discussed internally within the Council that encouraged letters, email and Facebook messages, to suggest how the text could be strengthened and improved, what should be added or what should be removed. • The discussion took place all around Iceland, favouring			**Weaknesses** • Multiple comments made in the various social media are not from Icelandic people, but from international supporters. • Comments in the final draft seem to have been essentially quite limited the wider role of the public was mostly consultative rather than truly participative Increases vulnerability to criticism -Cultural shift of the public administration • General distrust in public institution • Comment tools of social media platforms are not conducive to deliberative dialogue.		

	complete independence from interference by political and corporate lobbying, • Suggestions from citizens were taken into consideration and discussed at meetings of subgroups and, if approved by the council, directly entered into the draft.	
	Opportunities • The rise of participatory tools and ease of communication increases the pressure on government structures to bring more transparency and openness, which in turn requires a more active involvement, with the release of public, open and searchable data • Lead to proper "cultivation of public consensus to address governance issues, strengthen communities, empower marginalized groups, and foster civic participation • Strong participation of citizens, by exploiting new crowdsourcing practices. Collaborative knowledge production: Crowdsourcing, is "the act of taking a job traditionally performed by a designated agent and outsourcing it to an undefined, generally large group of people in the form of an open call. Enabling a community to aggregate and produce something together.	Threats • International law does not currently regard an act of official corruption as the violation of a human right, as noted in an interesting, recent article by two lawyers. An international consensus is emerging that corruption is a pervasive and pernicious social problem, structural obstacle to economic growth and threat to global security. • Resistance to Changes • Fear of Unknown • Increases vulnerability to criticism -Cultural shift of the public administration • General distrust in public institution • Exclude some populations, like the elderly or lower class, from participating in the process, since they are not using social media networks (or using them to a lesser extent or for different purposes).

Mapping to Needs and Trends	
Addresses (Trend)	Smart City / Smart Government
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making Strengthen citizens' trust in public administration

DEMOS Plan						
Description (& Link)	Interactive land use planning. (http://demos-plan.eu/)					
Type	Use Case					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and analysis					
Policy Domain (s)	Urban Planning & Transport					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • Information: plan texts and geodata can be displayed online. This facilitates access to all relevant planning documents. • Comments: public authorities and the public can focus their comments on individual text paragraphs or geodata. • Coordination: organizations can coordinate their opinions and then submit them bundled. • Evaluation: powerful evaluation functions • All statements are combined in the balancing table and can be exported • The add-on module enables convenient notification and contact management of the participating institutions and the participating individuals. • The public authorities can efficiently coordinate the work of their specialist departments. • Individual opinions can be reviewed, consolidated and released as overall opinions. • Postal communications can be imported and processed digitally together with all other comments. • All statements are filterable and sortable via their properties such as text references, keywords or other properties. Extensive			Weaknesses • Site in German language available only • Slow-paced formation of the local communities of interest • Excludes some populations, like the elderly or lower class, from participating in the process, since they are not using social media networks (or using them to a lesser extent or for different purposes).		

	comments can be subdivided and sorted according to content. • Following the political decision, the information about the result can be automatically sent to the respondents.	
	Opportunities • A service for planners and planning offices to carry out the support and public participation in urban development planning as well as in regional and regional planning, traffic planning and in planning approval procedures. • Encourage a shared management of the spatial planning process among all competent authorities and a reduction in the amount of time and cost implied by the collection of formal and informal comments and observations to the plan draft. • Implementing eParticipation projects as participatory budgets and urban planning discussions for public sector customers	Threats • Slow-paced formation of the local communities of interest • Exclude some populations, like the elderly or lower class, from participating in the process, since they are not using social media networks (or using them to a lesser extent or for different purposes).

Mapping to Needs and Trends	
Addresses (Trend)	E-Governance
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation

Enquete-Kommission "Internet und digitale Gesellschaft"						
Description (& Link)	Collaborative text, discourse, delegation and coordination tool designed for constructive collaboration and decision-making with many participants. (https://enquetebeteiligung.de/)					
Type	Use Case					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Design and analysis					
Policy Domain (s)	Institutional Questions / Internal Affairs					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	3	3	3	4	**3.2**
SWOT	Strengths • Simple registration just press a button to join the desired group and participate in the discussions. • Ability to create groups • Verification prosses: organizations, parties, companies, NGOs or other interest groups can have their authenticity verified. This means that a verification process confirms that a users' profile represents the organization specified. • Officially confirmed organizations receive a corresponding badge, which confirms their authenticity on the platform and makes it visible to all visitors. • Organizations and communities of interest can involve their members and all interested citizens in their work and discussions in order to use new ways of democratic participation and co-decision. • Gives all citizens the chance to actively share their views and ideas, discuss them and help shape decisions. • Designed to be as efficient, open and accessible as possible to ensure they can be used by a		Weaknesses • Comment tools of social media platforms are not conducive to deliberative dialogue. • Slow-paced formation of the local communities of interest • Cultural shift of the public administration			

	variety of users at any given time.	
	Opportunities • Democratic decision-making needs to be more flexible, dynamic and transparent. • Advantages of civic engagement through online participation. • Democracy in its current form would benefit from increased flexibility and greater opportunities for direct engagement in the political process	Threats • Equality of access: A major reason people do not use the Internet— even when they have access—is cost. If political participation is a right, and the Internet is required to participate, it follows that Internet access for that purpose should also be a right • Exclude some populations, like the elderly or lower class, from participating in the process, since they are not using social media networks (or using them to a lesser extent or for different purposes). • Privacy of communication, including accessible encryption, must be available. There must be ways to verify the accuracy of information and solutions to the problem of fake news.

Mapping to Needs and Trends	
Addresses (Trend)	E-Governance
Serves (Need)	Cross-linked information exchange Cooperative working between decision-makers, departments, hierarchy levels (e.g. information exchange between different departments and administrations)

In the Air					
Description (& Link)	In the Air is a visualisation project which aims to make visible the microscopic and invisible agents of Madrid´s air (gases, particles, pollen, diseases, etc.), to see how they perform, react and interact with the rest of the city. (http://www.intheair.es/)				
Type	Use Case				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Environment & Energy				
TRL	n/a		**Implementation /Customisation Cost**		n/a
Ease of use	High		**Open License Availability**		n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	3	4	4	4	4	**3.8**

SWOT	Strengths	Weaknesses
	- Track of five of the key pollutants that most detrimentally effect health and quality of life: a) Sulfur dioxide (SO_2) b) Carbon monoxide (CO) c) Nitrogen oxide (NO) d) Particulate PM10 e) Ozone (O_3) - Explore emergent patterns through two different media, one physical and one digital, in order to compare the communicative capacities of each. - Uses an interpolation function to fill the information gaps of pollutant levels in the Madrid atmosphere. This yields an approximate value for points that are close or not so close to the 15 sensors informing this prototype - Proposes a platform for individual and collective awareness and decision making, where the interpretation of results can be used for real time navigation through the city, opportunistic selection of locations according to their air conditions and a base for political action	- Data obtained by the interpolation is approximate, - Did not include Pollen (which is also a significant pollutant) in the study - Poorly designed interface

	Opportunities	Threats
	• Makes visible the microscopic and invisible agents of Madrid´s air (gases, particles, pollen, diseases, etc), to see how they perform, react and interact with the rest of the city. • The prototype could be integrated into the entire facade of a building. At this scale multiple pollutants could be monitored and displayed at the same time, allowing for more complexity in the visualization. • Construction of a collective map of personal environmental interests: An individual can "tune" their unit to select the pollutant they are interested in tracking	• Climate change • Data obtained by the interpolation is approximate, • Did not include Pollen (which is also a significant pollutant) in the study. • Poorly designed interface

Mapping to Needs and Trends	
Addresses (Trend)	Smart City / Smart Government
Serves (Need)	Ensure availability of (real-time) information and knowledge

Smart City - City Information Modelling Rotterdam					
Description (& Link)	The focus of this use case is developing and initial 3D city information model that brings together as many meaningful city information datasets that currently exist separately, in different formats and in different databases. (http://espresso.espresso-project.eu/espresso-pilots/tartu/use-case-2-city-information-modelling/)				
Type	Use Case				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	All				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	4	4	3	4	**3.6**

SWOT	Strengths
	
	• Demonstrating the level of effort needed (i.e. how easy or difficult it is) to integrate data from different databases and in different formats to such a 3D city information model based on open standards, facilitating interoperability and data exchange among different products or services.
	• Information includes:
	  a) Architectural changes made in the context of the retrofitting
	  b) Placement/positioning of electric vehicle rental and charging points
	  c) Placement/positioning of new smart street lighting (lampposts)
	  d) Existing vegetation in the area (trees; also important for use case 1, energy, as vegetation affects solar potential)
	  e) Existing bus stops in the area (coordinates)
	  f) Designs of artworks to be created on the building façades (murals)/ areas near the buildings (sculptures)
			Weaknesses
			
			• Integrating the existing data is difficult
			• Technological complexity, as well as the complexity of the various sectorial services involved, require a system approach to standardisation			

	• In the context of the BIM ideology IFC (International Foundation Classes) format is used to for data exchange between different parties involved in the construction process (architecture, construction, ventilation, heating, electricity, etc). IFC is registered as ISO 16739:2013 standard.

Opportunities	Threats
• Developing and initial 3D city information model that brings together as many meaningful city information datasets that currently exist separately, in different formats and in different databases. • Facilitates interoperability between various city departments and it also allows potential development of new services relevant for city development if access is given to third parties (e.g. tech startups). • Technological complexity, as well as the complexity of the various sectorial services involved within a Smart City, require a system approach to standardisation	• It is not unambiguous what Level of Detail (LOD) is in 3D city modelling - There is not a single and widely accepted LOD paradigm in 3D city modelling. There are no general guidelines and it is not clear what drives the LOD - Mixed-scale / perspective-view in 3D city modelling is not researched • Limitations on personal privacy and anonymity • Unauthorised access to georeferenced building information

Mapping to Needs and Trends	
Addresses (Trend)	Smart City / Smart Government
Serves (Need)	Ensure availability of (real-time) information and knowledge

KDI Project for optimizing patient therapy						
Description (& Link)	Scientists started a project for collecting some clinical data. (http://www.klinische-datenintelligenz.de/startseite/)					
Type	Use Case					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Health					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	Low		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	3	4	4	2	3	**3.2**
SWOT	Strengths			Weaknesses		

Strengths

- Patient data are evaluated holistically: structured data (e.g. laboratory values), unstructured data (e.g. free-text findings), images and OMICS data (e.g. SNPs and gene expression data) are merged to give each patient a holistic picture of all data traces.
- Identifying and evaluating at first inconspicuous dependencies across departmental boundaries.
- Research Database: An important foundation for data intelligence / big data solutions in the healthcare sector is a research database for the storage and management of patient-specific data (both from the clinical process as well as from molecular biological and genetic analyzes)
- Data Analytics: consists of extensions to the approaches of machine learning in semantic networks that have been developed in THESEUS 'Core Technology Cluster. They represent the state-of-the-art and are based on the mathematics of matrix and tensor factorization. The approaches have proven to be particularly effective for the high-dimensional sparse data in clinical data.
- Platform for medical apps: develop concepts for app

Weaknesses

- Low ease of use
- Large volume of data needed
- Web page in German only (English version not working properly
- Need to properly represent and process the security / insecurity of information sources
- Training personnel needed
- Data security
- Patients' Privacy: High security requirements in terms of data security and patient privacy

	implementation in order to support innovative usage and business models.	
	Opportunities • Data intelligence: solutions are developed and validated directly from a typically large data set: data reflect the complexity of reality with all its nuances and developed solutions found by the direct means of validation clinical acceptance. • In order to provide a synopsis of the data sources for everyday medical practice but also for subsequent (Remind-) projects or methods of artificial intelligence, is a systematic analysis of the data and diversity of a concept for the ontologically guided work-up and utilization of data aim of this project. • Improving patient care • Detect deviations from standard and the reasons for. • An important new aspect is the modelling of temporal information and a modelling of the sequential processes in the clinic. With very large numbers of patients and patient-specific data, growing training times may require scalable distributed computing software, so we will explore implementations of our approach in the Hadoop framework.	Threats • Diversity: in all fields of medicine very many different databases, in the context of digitization, were built. The diversity currently makes an integrated visualization or even processing with underlying common ontologies or ordering hierarchies impossible. • Low ease of use • Data quality: need to properly represent and process the security / insecurity of information sources • Training personnel. • Data security, Patients' Privacy: High security requirements in terms of data security and patient privacy.

Mapping to Needs and Trends	
Addresses (Trend)	Big Data
Serves (Need)	Coherent use of digital technology across policy areas

Watson Super Computer Project					
Description (& Link)	The Watson Super Computer project developed by IBM is the latest technology used by international organisations as the ISS as well as the US military forces. Is one of the best developed IT technology. Quantum Computer technology is often used as a decryption solution for several secret services all around the world, since the quantum technology is capable to crack every password within milliseconds due to its architecture. The QBits are capable to have 3 conditions (0,1, 0AND1). Thus, they are faster than every normal computer on earth a very useful for complex learning algorithms behind Big Data as neural networks and learning. (https://www.ibm.com/watson/)					
Type	Platform/Use Case					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	Foreign Affairs and Defence					
TRL	n/a	**Implementation /Customisation Cost**			n/a	
Ease of use	Low	**Open License Availability**			n/a	

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Powered by the latest innovations in machine learning: Has the capability of understanding natural language and the ability to learn through repeated use. It literally "gets smarter" through tracking feedback from its users, learning from its successes and failures, and being presented new information. - Learn more with less data. - Integrate AI into your most important business processes: Reimagines your workflows. Your business processes get smarter with Watson. It embeds into your workflows to provide AI when you need it, where you need it. - IBM'S Reputation: Rich industry expertise. -build models from scratch or leverage APIs and pre-trained business solutions. - Data ownership: When you train with Watson, your insights	- Low ease of use - High implementation/ customization cost - Available Only in English (Limits areas of use) - Seen as disruptive technology - Maintenance - Doesn't process structured data directly - Increasing rate of data - High switching costs - Takes time to integrate Watson and its services into a company - Targeting towards bigger organizations that can afford Watson - Takes time and effort to learn Watson in order to use it to its full potential

	belong to you. As your models gain value, you maintain ownership of your data. • Accelerate research and discovery • Enrich your interactions: Reduce response times, increase the number of transactions, and make every interaction meaningful and productive. • Anticipate and pre-empt disruptions: Use AI to constantly monitor the condition of systems that power your business to ensure problems don't disrupt your work. • Recommend with confidence • Scale expertise and learning	
	Opportunities • The volume of unstructured data is growing at a significant rate • Cognitive computer systems • Creating a more natural relationship between humans and computers: Watson has the capability of understanding natural language and the ability to learn through repeated use. It literally "gets smarter" through tracking feedback from its users, learning from its successes and failures, and being presented new information. • Applications for Watson's underlying cognitive computing technology are almost endless. Because the device can perform text mining and complex analytics on huge volumes of unstructured data, it can support a search engine or an expert system with capabilities far superior to any previously existing.	Threats • Competition • Available Only in English (Limits areas of use) • Seen as disruptive technology • Maintenance • Doesn't process structured data directly • Increasing rate of data, with limited resources • High switching costs • Takes time to integrate Watson and its services into a company • Targeting towards bigger organizations that can afford Watson • Takes time and effort to learn Watson, in order to use it to its full potential • Government regulations

Mapping to Needs and Trends	
Addresses (Trend)	Next Generation of BI and Data Analytics platforms
Serves (Need)	Cope with the production of huge volumes of data Deeper understanding of IT potential and IT processes

SmartRegio						
Description (& Link)	Management Consultant for Smart Energy in rural regions. Provides statistics from social media platforms as well as individual data of little regions in terms of mobility, energy and so on. (https://smartregio.org/)					
Type	Platform/Use Case					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Environment & Energy					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	3	3	4	**3.6**
SWOT	Strengths - Recognition of trends from different data sources that have low cost: include search queries, transactions, case numbers contributions in (social) media and open platforms such as OSM and Wikipedia, but also information from city, community or infrastructure providers from energy, mobility and much more. - Is based on a three-tier architecture model: a) data integration and data retention b) evaluation and analysis of data and c) visualization of data. - Integration: All three levels are decoupled by open interfaces, and each level is given its own API. In this way, third-party vendors at all levels can deliver their own contributions and create marketplaces for data, analysis services and special visualization tools - Standardization and labelling of data as well as a form of data management that enables their high-performance processing		Weaknesses - For small-scale areas, the data base is often more expensive. SmartRegio is developing a solution that combines mass data from many different sources as a basis for decision-making (heterogenous mass data). - The use of heterogeneous mass data poses high technical and legal challenges. - Heterogeneous mass data are distributed across many different data silos, not linked, and the potential data providers have no experience on this role - Heterogeneous mass data exist in many different formats and structures, many of which need extensive pre-processing to unlock their content. - Heterogeneous mass data spatial-temporal parameters differ, which makes their comparison difficult. E.g. While statistics are collected for administrative areas, infrastructures require their own spatial classification for technical reasons, and in the case of media or discussions in social networks, it is often difficult to determine the spatial relationship. - Data ownership issues			

		• Data privacy issues: Many of the data sources contain personal information, and their anonymisation is particularly difficult due to the spatial reference and the combination of many sources.
	Opportunities • Small and medium enterprises are at a disadvantage. First, their financial resources are limited and, secondly, they are much more rooted in their region. For small-scale areas, the data base is often more expensive and worse. SmartRegio is therefore focusing on these players and is developing a solution that combines mass data from many different sources as a basis for decision-making. • Smart home, home automation, variable tariffs, decentralized energy generation, storage or mobile charging.	Threats • Small and medium enterprises are at a disadvantage. First, their financial resources are limited and, secondly, they are much more rooted in their region. For small-scale areas, the data base is often more expensive and worse. • The use of heterogeneous mass data poses high technical and legal challenges. • Heterogeneous mass data are distributed across many different data silos, not linked, and the potential data providers have no experience • Heterogeneous mass data exist in many different formats and structures, many of which need extensive pre-processing to unlock their content. • Heterogeneous mass data spatial-temporal parameters differ, which makes their comparison difficult. While statistics are, for example, collected for administrative areas, infrastructures require their own spatial classification for technical reasons, and in the case of media or discussions in social networks, it is often difficult to determine the spatial relationship. • Data privacy issues: Many of the data sources contain personal information, and their anonymisation is particularly difficult due to the spatial reference and the combination of many sources.

Mapping to Needs and Trends	
Addresses (Trend)	E-Governance
Serves (Need)	Include scientific knowledge and expertise Comprehensive knowledge and information management

Google ECO Projects						
Description (& Link)	Google pursues several Big Data projects around the globe to support humans and nature as for instance the pollution sensors added to google cars to log the air pollution within metropoles and cities. (https://environment.google/projects/airview/). The latest perceptions are published in an environmental report. (https://storage.googleapis.com/gweb-environment.appspot.com/pdf/google-2017-environmental-report.pdf)					
Type	Use Case					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Environment & Energy					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths			Weaknesses		
	- Became carbon neutral in 2007 - Google Cloud Platform and G Suite applications like Gmail, Docs, and Drive are enabling millions of businesses to switch from locally hosted solutions to Google Cloud's highly efficient, renewable energy–based computing infrastructure. - Empowering all energy users with cheap, clean options by continuing to drive down the cost of existing renewable energy sources like wind and solar and developing new policies, technologies, and tools that help users, businesses, and activists drive change - Google's scale, resources, and technological expertise can help the world meet its energy and resource needs in a way that drives innovation and growth while reducing greenhouse gas (GHG) emissions and the use of virgin materials and water. - Working with other leading companies to help bring initiatives to scale, thereby			- Only 3 billion people who are already online, that's less than half of Earth's population - Shift of economic model: "take-make-waste" economic model that human societies have followed since the Industrial Revolution, in which we take a natural resource, make a product from it or burn it for fuel, and eventually send what remains to the landfill as waste - Demand for computing continues to skyrocket, with millions more people coming online every month, and data center capacity continues to expand to meet this need - Environmental challenges. - State deregulation		

	accelerating the transition to a circular economy.	
	Opportunities • Organize the world's information and make it universally accessible and useful • Create a more sustainable world. • Growing number of regions where renewable resources like wind and solar are now less expensive than standard grid power are helping save money over the long term • Google's scale, resources, and technological expertise can help the world meet its energy and resource needs in a way that drives innovation and growth while reducing greenhouse gas (GHG) emissions and the use of virgin materials and water. • Demand for computing continues to skyrocket, with millions more people coming online every month, and data centre capacity continues to expand to meet this need. • Use of mobile devices increases and more IT users transition to public clouds is reducing the IT energy use • Helping researchers study global water challenges and awarding millions in grants to promising water conservation solutions.	Threats • Challenges posed by climate change • Population growth • Humanity is consuming natural resources at an astonishing rate. During the 20th century, global raw material use rose at about twice the rate of population growth. • State deregulation

Mapping to Needs and Trends	
Addresses (Trend)	Internet of Things
Serves (Need)	Ensure availability of (real-time) information and knowledge

MAPR		
Description (& Link)	A Medical Data Solution for hospitals and governments. The [MapR Platform](https://mapr.com/solutions/) can be used to quickly combine, organize, and analyze a variety of structured and unstructured data in a single platform for pervasive insights that are actionable. Use real-time and predictive data to manage and optimize patient flow, safety, and experience. (https://mapr.com/solutions/)	
Type	Platform/Use Case	
Origin	Private Sector	
Policy Cycle Stage (s)	Health / Institutional Questions / Internal Affairs	
Policy Domain (s)	Health	
TRL	n/a	**Implementation /Customisation Cost**	n/a
Ease of use	Low	**Open License Availability**	n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	3	3	**3.6**

SWOT	Strengths	Weaknesses
	- Supports not only the standard Hadoop HDFS and HBase APIs but also expands the platform to support POSIX NFS which enables easier integration and access." - Combine, organize, and analyse a variety of structured and unstructured data in a single platform - Use real-time and predictive data to manage and optimize patient flow, safety, and experience. - Reduce Risks and Fraud: healthcare providers can analyze patient records and billing to detect anomalies such as a hospital's overutilization of services within short time periods, patients receiving healthcare services from different hospitals in different locations simultaneously, or identical prescriptions for the same patient being filled in multiple locations. - Improve Care Delivery - Effectively integrate and share medical data to provide personalized care faster. With solutions like Customer 360,	- Low ease of use - Training personnel - Data security - Lack of system Integration: Clinical, administrative, and financial systems are not linked, and as a result, many healthcare institutions are not yet maximizing their IT potential - Slow IT Adoption: Traditionally, healthcare has been slow to adopt IT and has lagged significantly behind other industries in the use of IT.

	healthcare providers gain a 360-degree view of the patient by storing, processing, and correlating all patient information while protecting privacy rights. • Supports both big data applications and data science applications due to many of the aforementioned capabilities. • Support a variety of open APIs. • Supports the AI software development lifecycle, exploration, training, deployment and putting the models into a production environment. Including full support for real-time event streaming and hot-swappable models.	
	Opportunities • Hybrid Cloud, Multi-Cloud Environment • In the whole healthcare area, there is an increasing cost pressure and every gain in efficiency has to be utilized • Development of a data-driven way to link and optimize processes and tasks in the operating room area	Threats • Lack of system Integration: Clinical, administrative, and financial systems are not linked, and as a result, many healthcare institutions are not yet maximizing their IT potential • Slow IT Adoption: Traditionally, healthcare has been slow to adopt IT and has lagged significantly behind other industries in the use of IT. • Economic and medical challenges • Data protection - Cyber-attack • Rapid changes in technology and IT systems
Mapping to Needs and Trends
Addresses (Trend)	Cloud Computing
Serves (Need)	Cope with the production of huge volumes of data Cross-linked information exchange

Electronic Health Records						
Description (& Link)	The same as ID 108(KDI Project). A Medical Data Solution for hospitals and governments. They are primary using the software solution parts developed by Big Data International (https://www.bigdatainternational.com). (https://mapr.com/solutions/)					
Type	Use Case/Application					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Health					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	Low		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • Genome Processing and DNA Sequencing: There is exponential growth occurring in the genomics sequencing market, as evidenced by increases in data volume produced by DNA sequencers and in the number of individuals being sequenced. MapR provides efficient storage and compute in a single platform, is well suited for storing large volumes of sequencing data at a lower cost, while enabling efficient data processing with minimal downtime. • Personalized treatment planning is a way to customize treatment for a patient to continuously monitor the effects of medication. Providing real-time access, at both the summary and detailed level when it comes to patient data making treatment decisions easy to adjust in a timely manner. • Assisted Diagnosis: Being able to access a broad combination of knowledge across multiple data sources aids in the accuracy of diagnosing patient conditions. The Platform can allow for predictive modelling and			Weaknesses • Low ease of use • Training personnel • Data security patient's privacy • Lack of system Integration: Clinical, administrative, and financial systems are not linked, and as a result, many healthcare institutions are not yet maximizing their IT potential • Slow IT Adoption: Traditionally, healthcare has been slow to adopt IT and has lagged significantly behind other industries in the use of IT.		

	machine learning to be performed on large sample sizes and uncover the nuances that couldn't be previously uncovered. • Fraud Detection: The Platform uses anomaly detection to detect these incidents in real time and alert providers to investigate them before payment is made. • Monitor Patient Vital Signs: Helps in collecting the very fast growing data and stream it in real-time for actionable alerts that can help in detecting changes. Improved algorithms can be built that improve the likelihood of knowing when a particular patient might have an emergency and allow for effective interventions.	
	Opportunities • MapR provides efficient storage and compute in a single platform, is well suited for storing large volumes of sequencing data at a lower cost, while enabling efficient data processing with minimal downtime. This will accelerate the development of clinical applications, including drug re-targeting and diagnostic testing. • Healthcare organizations need to be able to detect fraud based on analysis of anomalies in billing data, procedural benchmark data or patient records. • Reduce healthcare spending • Improving patient care and increasing efficiency: Unstructured data forms close to 80% of information in the healthcare industry and is growing exponentially. Getting access to this unstructured data (such as output from medical devices, doctor's notes, lab results, imaging reports, medical correspondence, clinical data,	Threats • Lack of system Integration: Clinical, administrative, and financial systems are not linked, and as a result, many healthcare institutions are not yet maximizing their IT potential • Slow IT Adoption: Traditionally, healthcare has been slow to adopt IT and has lagged significantly behind other industries in the use of IT. • Economic and medical challenges • Data protection • Cyber-attack • Rapid changes in technology and IT systems • State deregulations

	and financial data) is an invaluable resource for improving patient care and increasing efficiency.	
Mapping to Needs and Trends		
Addresses (Trend)	Cloud Computing	
Serves (Need)	Ensure availability of (real-time) information and knowledge	

Streetlights Solar System					
Description (& Link)	The Greenshine company has developed a Solar System for streetlights. According to Streetlights-solar renewable energy is enjoying a rising support from private organisations and individuals due to the gradual decline in its production cost. According to Bloomberg New Energy Finance, the price of building an offshore wind farm has fallen 22% in 2016, across Europe. From 2012 to 2016, the cost fell by almost 46%. At present, erecting turbines in the seabed costs an average $126 per megawatt-hour capacity compared to $155 per megawatt-hour price for new nuclear developments across Europe. (https://www.streetlights-solar.com/)				
Type	Use Case				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Environment & Energy				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	3	4	4	4	**3.8**
SWOT	Strengths • More than 30 years of experience in developing solar LED lighting systems. • Provides high intensity of lighting at night while consuming no electricity. • No energy consumption cost. • Uses LEDs (Light Emitting Diodes) as a lighting source which provide better brightness, higher quality and more reliable lighting. • Provides a light system that meets the standard lighting requirements for public areas while avoiding the cost of installation of standard grid-powered lights • Rechargeable battery up to 6 days of autonomy with the use of Greenshine smart power technology • Solar panels are composed of mono-crystalline silicon, which provides more efficient performance and, as a result, our solar street lights battery last		Weaknesses • Due to the advanced technology required for solar lights, their average cost is about $3,000 per light. • Require higher initial investment compared to conventional street lights		

| | longer and deliver a better lighting result.
• Provides lighting photometric simulations, layouts specific to your application and appropriate system configurations for your local solar conditions
• Customization: Options for light output and pole height are available in order to provide sufficient light for numerous applications | |
| | Opportunities

• Help minimize safety risks when traveling at night or during low light conditions, promoting safer and more accessible community environments
• Reducing energy consumption
• Promoting safer and more accessible community environments
• The risk of accidents is minimized: Since solar wires do not have external wires, (accidents happen to the personnel who fixes the street light).
• Eliminating your carbon footprints contribution: Solar street lights are environment-friendly because its panels are solely dependent to the sun. | Threats

• Extreme weather: Snow or dust, and moisture can accumulate on horizontal PV-panels. This leads to reduced or full stoppage of energy production
• Require higher initial investment compared to conventional street lights |

Mapping to Needs and Trends	
Addresses (Trend)	Lean Approach
Serves (Need)	Coherent use of digital technology across policy areas Standardisation of data management

Big data analytics: The case of the social security administration		
Description (& Link)	Public agencies are investing significant resources in big data analytics to mine valuable information, predict future outcomes, and make data-driven decisions. In order to foster a strong understanding of the opportunities and challenges associated with the adoption of big data analytics in the public sphere, we analyse various efforts undertaken by the United States Social Security Administration (SSA). (https://www.scopus.com/record/display.uri?eid=2-s2.0-84919448428&origin=inward&txGid=20711044614a40f92e5e8c2829f1bf5e)	
Type	Use Case	
Origin	Public Sector	
Policy Cycle Stage (s)	All	
Policy Domain (s)	Innovation, Science & Technology / Employment & Social Security	

TRL	n/a	Implementation /Customisation Cost	n/a
Ease of use	High	**Open License Availability**	n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Transform organizational decision making - Increase process efficiency - Identify future areas for innovation -Engage citizens in the policy analysis, design and implementation process - Address social issues - Seize economic and social values - Growing interest in the use of Big Data - Large amounts of data is being collected and liberated	- Modernizing legacy IT systems is complex. Public agencies considering IT investments should allocate significant resources - Public agencies are not prepared to take advantage of big data - Developing of new data governance needed - Public agencies have a poor track record of investment in IT - Risk of poor quality conclusions and insights gathered from the data
	Opportunities	Threats
	The advances in information and communication technologies (ICT) have provided public institutions, businesses, non-governmental organizations (NGOs) and citizens with new platforms and media for generating, sharing and applying data	Confidentiality: issues related to confidentiality of big data analytics. Although public agencies take steps to mask and de-identify personal information, recent research in the big data sphere suggests that it is possible to re-identify individuals in public datasets.

	- Online platforms are increasingly becoming important mediums to communicate and share information in the policy realm - Developing systems architecture, - Cultivating a culture of cross-agency collaboration: use of similar platforms, makes it easy to collaborate with one another, cross-verify sources, reduce redundancies, and provide enhanced service delivery - Consolidating databases - Adopting crowd-centric approaches: many federal agencies have moved beyond their organizational limits and have begun to engage the public in decision-making processes - Managing issues of data security - Investing in employee training and capacity building, - Developing collaborative leadership and management support - Creating resources to streamline service delivery to end-users - Developing metrics to measure performance: evaluate the actual outcome of investments and the impact they have on the organization's capacity to deliver services - Granting public access to administrative data can potentially - Allow for the Development of innovative tools public agencies must consider all applicable data governance laws and regulations	- Data privacy: Given the granularity of data collected to derive evidence-driven customized solutions, data leaks can lead to disclosure of sensitive information, loss of public trust. - Unintended use of big data analytics - A sub-section of the population might benefit at the cost of others - Deriving patterns from a large volume of datasets depends on the analysts' capability to explore the datasets several times to understand discover relationships and test different hypotheses (use different approaches to analyse the same datasets. Analysis of big data requires new kinds of significance tests or other validation techniques that gauge the temporal variability to discover patterns and relationships.

Mapping to Needs and Trends	
Addresses (Trend)	Next Generation of BI and Data Analytics platforms
Serves (Need)	Deeper understanding of IT potential and IT processes

Qlik					
Description (& Link)	Qlik helps the world's largest insurance and financial organisations detect fraud through improved analytics. Strengthening fraud detection through analytics is a major initiative for the Social Security Administration—one that's heavily powered by discovery of the unexpected. While many analytical tools exist to generate predictive models and visualisations, most fall short in enabling non-technical business users (fraud analysts, investigators, security and policy advisors, etc.) to navigate their data. With Qlik, organisations can quickly search and interrogate data from all systems – allowing everyone within SSA to easily navigate their data and create interactive visualisations and sophisticated analysis made easy. (https://www.qlik.com/us/resource-library/social-security-administration)				
Type	Use Case				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Employment & Social Security				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Patented associative engine automatically identifies relationships and disassociations within the data through built-in logic (no data modelling required) - Leverages in-memory storage and compresses data by 90% to pull together large volumes of multiple disparate sources, resulting in rapid query and navigation performance - Users have google-like search capabilities to locate data - Users can easily drill into transactional-level detail to identify areas for additional investigation - Easy access on any device, with an intuitive interface designed for mobility. - Build simple or complex, interactive reports - Data governance offers organizations balance for	- High implementation /customization cost -low ease of use - Does not integrate 3rd party visuals - Accessing that variety of data is a challenge from the start. Insurers typically have a lot of legacy applications, including separate systems for policies and claims that may be as much as 30 years old - Different divisions might use completely different systems, though they hold many customers in common. - Resolving individual entities - Data quality - The insurance company typically has no universal way of identifying an individual across all the different systems.

	Business and IT—giving users unprecedented data access and flexibility, while maintaining data integrity and security. • Detect fraud through improved analytics. • Offering flexible and scalable license models	
	Opportunities • Strengthening fraud detection through analytics is a major initiative for the Social Security Administration • Uncovering hidden insights or anomalies by exploring all your data: associated to your selected query and unrelated data, which can provide unexpected insights. • Easy data search	Threats • Competition • Data integrity and security • High implementation /customization cost • Data quality

Mapping to Needs and Trends	
Addresses (Trend)	Next Generation of BI and Data Analytics platforms
Serves (Need)	Link between impact, quality, performance measurements and financial information Development of domain specific target and indicator systems

e- Social Security Interoperability Platform					
Description (& Link)	The Slovenian government decided to implement the "Interoperable Data Gathering for e-Social Security" in 2010 following the "National Strategy on Electronic Services Development and Electronic Data Exchange" launched in 2009. The Slovenian government decided to implement the "Interoperable Data Gathering for e-Social Security" with the aim of reducing the efforts by applicants but also to simplify the decision process in relation to the allocation of different social security measures. The system is composed of 4 flexible and reusable building blocks and it has been developed in cooperation with several public and private stakeholders. The system can be defined as an Open eGovernment Service. (http://workspace.unpan.org/sites/internet/documents/UNPAN90166.pdf)				
Type	Use Case				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Employment & Social Security				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Efficient and effective public administration with the help of e-government - Increasing user take-up of online e-government services - Sharing the infrastructure among public institutions and reuse of different modules and other horizontal measures - Support for cross-border services: ability of multiple and disparate organisations' databases to freely and securely exchange and reuse data between their respective system - Quickly check whether the economic operator meets certain requirements to participate in a certain bid and is eligible to be awarded a contract	- Government institutions agree to share - Same data standards needed in order for the data to be successfully exchanged and reused between institutions - Interoperability is a process that can always be improved, as even the most experienced MS are continuously setting new targets for themselves for the coming years - Adjusting the legislation and policy set-up
	Opportunities	Threats

	• European Commission has developed a European Interoperability Framework, which presents a set of guidelines and recommendations to be adopted by MS to promote interoperability between various information systems, from national to local level. • Reduce administrative burden: bring efficiency to procurement procedures and save time. • Advance modernisation and digitisation	• Economic crisis • Cultural sift of public administration • Requires strong risk management: new risks that materialize frequently • Requires flexible project management • Data-protection and security • Need for strong and stable political support • Trust between institutions
Mapping to Needs and Trends		
Addresses (Trend)	E-Governance	
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation Take into account local and regional specificities	

AKE Semantical analysation of complex events						
Description (& Link)	A Platform for the integration of big data streams with the support of machine learning (https://www.sake-projekt.de/start/)					
Type	Use Case					
Origin	Private Sector					
Policy Cycle Stage (s)	All					
Policy Domain (s)	Innovation, Science & Technology					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	3	3	**3.6**

SWOT	Strengths	Weaknesses
	- Optimization of internal processes and reduction of production costs - Analysing vast streams of data - Reduction in the workload required of the system resources: data gathered by the sensors will be modularized, in order to process only the aspects of data relevant to the purpose of the analysis. - Automatic language generation provides high degree of user friendliness: Analytical results and the causes of errors to be processed in natural language available via a combination of modern learning methods and automatic language generation processes - Unsupervised learning in streaming is able to detect novel patterns in streaming data in real time without any re-analysis of previously examined data - To cope with the potentially large amount of data, the architecture utilizes state-of-the-art distributed cloud-based big data technologies	- Enormous amounts of real time data generated - The technological advances related to real-time data analytics are moving and changing as rapidly as data itself. - Basic design of the architecture is considered complete, there is still room for further developments on the module level
	Opportunities	Threats

	- Facilitate the timely detection and data driven prediction of failures from event data - Increase of data: Increasing use of automation in machine and plant construction has led to a large growth in the amount of data generated from the number of industrial production processes being recorded and monitored by sensors. - Centrally evaluating the data in real time, could lead to optimization of internal processes and reduction of production costs - Strongly heterogeneous data streams can be consolidated and subsequently analysed using modern machine learning processes. - Development of a scalable distributed data storage layer relating to event descriptions in accordance with the Resource Description Framework (RDF) - Efficient supervised and unsupervised machine learning modules for modularised data to discover the causes of errors and to predict sensor configurations which can lead to errors - Development of intuitive user interfaces	- The technological advances related to real-time data analytics are moving and changing as rapidly as data itself. - Enormous amounts of real time data generated - Data quality
Mapping to Needs and Trends		
Addresses (Trend)	Machine Learning	
Serves (Need)	Cope with the production of huge volumes of data	

Interoperability Centre					
Description (& Link)	The Interoperability Centre of the Greek Ministry of Finance is an information system, developed by the General Secretariat of Information Systems, aiming at the interconnection of Public Administration electronic services. The Interoperability Center provides a unified infrastructure for the installation and use of online services through which operational data is exchanged between the Ministry of Finance and other public bodies (http://www.gsis.gr/gsis/info/gsis_site/Services/DimosiaDioikisi/ked).				
Type	Use case				
Origin	Public Sector				
Policy Cycle Stage (s)	Agenda Setting				
Policy Domain (s)	All				
TRL	9	**Implementation /Customisation Cost**			Medium
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Immediate and up-to-date exchange of information between public operators, - Provides guidance on: a) Users Authentication, User Authorization, Auditing, b) Digital Signature Verification and c) Exception Handling. - Scale economies through the proper processing of information by the Agency which is responsible for its management. - Ensures high information security. - Data Protection: does not store operational or administrative information. - Promotes transparency in the Public Sector. - Easy to use	- Search for Business register has not been integrated into the Interoperability Centre - Electronic submission of Customs Documents has not been integrated into the Interoperability Centre - Retraining personnel - Cultural shift of public administration - Reluctance to change - Same data standards needed in order for the data to be successfully exchanged and reused between institutions
	Opportunities	Threats
	- Enhancing transparency in public sector - Improving efficiency of public operators - Reducing time and cost	- Retraining personnel - Cultural sift of public administration - Reluctance to change

	• Same data standards needed in order for the data to be successfully exchanged and reused between institutions
Mapping to Needs and Trends	
Addresses (Trend)	E-Governance
Serves (Need)	Establishment of a comprehensive technical infrastructure and IT architecture

Military Simulation Big Data Background, State of the Art and Challenges						
Description (& Link)	Use Cases and Explanation of Big Data in the defence Industry (https://www.hindawi.com/journals/mpe/2015/298356/).					
Type	Use case					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Foreign Affairs and Defence					
TRL	3		**Implementation /Customisation Cost**			Low
Ease of use	Low		**Open License Availability**			Yes
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	2	3	3	1	2	**2.2**
SWOT	Strengths • Military applications are producing massive amounts of data with plenty of Intelligence, Surveillance, and Reconnaissance (ISR) sensors, and data generated by Live, Virtual, and Constructive simulations • Sometimes the simulation generates data in a period of less than 1 ms • A high-performance computing (HPC) technique is employed as a fundamental infrastructure • Big simulation data has potential value for revealing patterns, if not accurate results .			Weaknesses • High-performance simulation algorithms and software are still insufficient: Large-scale military simulation is one of the most complex distributed applications, and performance optimization is very difficult to achieve • Limited applications for military simulation • Collecting massive data from distributed large-scale simulations may consume extra resources in terms of processor or network, which is often critical for simulation performance. • Datasets must be analysed at a rate that matches the speed of data production • Requires simulation time to advance faster than real-time and sometimes the simulation generates data in a period of less than 1 ms • Data processing technology difficulty: The data formats include unstructured (e.g., simulation log file), semi-structured (e.g., scenario configuration and simulation input), and structured (e.g., database table) types. • There is no proven formula that can be used for behaviour modelling.		

	Opportunities	Threats
	• Bigger Simulation and Data: military simulation is advancing rapidly with bigger scale and higher resolution under the impetus from modern HPC system increasing the simulation data • Unified Framework Serving Both Large-Scale Simulation and Big Data: a complete platform serving both military simulation and big data is rather limited in number. There's need for an integrated platform to access the models, applications, resources, and data via a single entrance point • MS big data needs to be generated and analysed faster than real-time when the objective is to rapidly assess a situation and enhance decision-making • Need for development of versatile and flexible tools to mine value from the data effectively: The data formats include unstructured (e.g., simulation log file), semi-structured (e.g., scenario configuration and simulation input), and structured (e.g., database table) types • Model and input data should be verified and validated. • The concept of data farming has been proposed for many years, but it is still not broadly applied.	• Data quality: simulation data is generated by computer and can be incorrect because of flawed model • There is no proven formula that can be used for behaviour modelling • Limited applications for military simulation • People often doubt the simulation result. • Techniques and systems are still limited in their ability to provide complete solutions
Mapping to Needs and Trends		
Addresses (Trend)	Open Data	
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

I.9b Best practices

<table>
<tr><td colspan="6" align="center">Troubled family program</td></tr>
<tr>
<td>Description (& Link)</td>
<td colspan="5">The English government is committed to working with local authorities and their partners to help 120,000 troubled families in England turn their lives around by 2015. The family monitoring data was collected by Ecorys as part of the national evaluation of the programme. Please read the Ecorys interim report on family monitoring data for more detail and additional results.

(https://www.gov.uk/government/news/troubled-families-programme-turning-117000-lives-around)</td>
</tr>
<tr>
<td>Type</td>
<td colspan="5">Best Practice</td>
</tr>
<tr>
<td>Origin</td>
<td colspan="5">Public Sector</td>
</tr>
<tr>
<td>Policy Cycle Stage (s)</td>
<td colspan="5">Policy Implementation</td>
</tr>
<tr>
<td>Policy Domain (s)</td>
<td colspan="5">Employment & Social Security</td>
</tr>
<tr>
<td>TRL</td>
<td colspan="2">n/a</td>
<td colspan="2">Implementation /Customisation Cost</td>
<td>n/a</td>
</tr>
<tr>
<td>Ease of use</td>
<td colspan="2">High</td>
<td colspan="2">Open License Availability</td>
<td>n/a</td>
</tr>
</table>

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	3	2	2	3	**2.8**

<table>
<tr>
<td rowspan="2">SWOT</td>
<td>

<u>Strengths</u>

- Succeeded in reaching almost all the hardest to help homes in the country.
- Working with 99% of households in England identified as having multiple problems, including high levels of truancy, youth crime, anti-social behaviour and worklessness
- Councils had met payment-by-results criteria for turning around the lives of more than 69,000 families.
- Levels of youth crime and anti-social behaviour have been significantly reduced across the family
</td>
<td>

<u>Weaknesses</u>

- Wide variations in local practice: need for more standardised training, quality assurance.
- Mixed evidence regarding the extent to which scaling-up had been achieved without sacrificing some level of quality of family intervention practice
- Payment-by-Results (PbR) progress data counts the number of positive outcomes observed for families on the Programme (i.e. gross rather than net outcomes). It doesn't estimate how many net positive outcomes there are over and above any positive outcomes that would have occurred in the absence of the programme (i.e. deadweight or counterfactual outcomes)
</td>
</tr>
<tr>
<td>

<u>Opportunities</u>

- Help bring security and opportunity to families and communities.
- Getting children back into school
</td>
<td>

<u>Threats</u>

- Questionable whether deep and sustained improvements were achieved to partnership working at a local level, beyond
</td>
</tr>
</table>

	- Cutting youth crime and anti-social behaviour across the whole family - Getting adults into work - Reducing the costs to the taxpayer of tackling their problems	individual examples of good practice - The requirement to work with greater numbers of families on reduced funding poses a risk of 'diluting' the intervention - Lack of evidence that it has had an impact on the outcomes that it seeks to affect for families: PbR progress data counts the number of positive outcomes observed for families on the Programme (i.e. gross rather than net outcomes). It doesn't estimate how many net positive outcomes there are over and above any positive outcomes that would have occurred in the absence of the programme
Mapping to Needs and Trends		
Addresses (Trend)	Evidence-based policy	
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

X-Road					
Description (& Link)	Different organisations and information systems must be interoperable, or in other words able to work together so that data only needs to be requested from the citizen once. Estonia's solution for maintaining a modern state is X-Road, which saves Estonians 800 years of working time every year. (https://e-estonia.com/it-sector/) (**X-tee** is a data exchange layer used in Estonia. Until 2018, it was named X-Road in English. Since 2018, however, **X-Road** is only used to refer to the technology developed together by Estonia and Finland through MTÜ Nordic Institute for Interoperability Solutions. The Estonian X-tee is now also called X-tee in English.)					
Type	Best Practice					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	All					
TRL	n/a	**Implementation /Customisation Cost**			n/a	
Ease of use	High	**Open License Availability**			n/a	

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	<u>Strengths</u> • Versatile security solution: authentication, multi-level authorisation, high-level system for processing logs, and data traffic that is encrypted and signed • Independence of platform and architecture: X-tee enables the information systems of X-tee members on any software platform to communicate with the information systems of data service providers on any software platform. • Multilateralism: X-tee members are able to request access to any data services provided through X-tee. • Availability and standardisation: for managing and developing X-Road, international standards and protocols are used where possible. • Security – exchanging data through X-tee does not affect the integrity, availability or confidentiality of the data.	<u>Weaknesses</u> • The complexity of the process, • Abundance of different stakeholders • A number of costs • Little awareness • Little understanding of profitability

	• Time saving: 5% of requests on X-Road are submitted by human users. Assuming every request saves 15 minutes - those requests have saved 804 working years during previous calendar year. There are no estimates on the rest of the queries. • Unique aspect of e-Estonia is that it lacks a centralised or master database, all information is held in a distributed data system and can be exchanged instantly upon request. All state-related operations can be done online 24/7, prescriptions are issued digitally and only a tiny fraction of individual tax declarations are filed on paper. • Over 20 years of expertise and experience in automating public and private sector services. • Estonia has shared its e-governance journey with 60 governments and exported its solutions to over 130 countries around the world • Most start-ups per capita established than anywhere else in Europe	
	<u>Opportunities</u> • Raising Public Awareness about the Information Society • Enabling a secure Internet-based data exchange between information systems. • Enhancing efficiency of public administration • Reducing cost and time • Creating innovative solutions that change the world including services as different as Mobile Parking and self-driven delivery robots • IT reputation and high engagement of citizens.	<u>Threats</u> -

Mapping to Needs and Trends	
Addresses (Trend)	Smart City / Smart Government
Serves (Need)	Cross-linked information exchange

Fix My Street					
Description (& Link)	Civic participation that allows the active involvement of citizens in managing their street or neighbourhood. (https://www.fixmystreet.com/)				
Type	Best Practice				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Urban Planning & Transport				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- User friendly Interface: Report a problem by entering a nearby UK postcode, or street name and area, locating the problem on a map of the area and entering details of the problem - Map based website and app that helping people in the United Kingdom inform their local authority of problems needing their attention, such as potholes, broken streetlamps, etc. - Reports are published on the site - Matches users' postcodes and the category of their problem to the correct local authority. No need for the user to know which authority is responsible for a specific type of problem in a specific location. - Monitoring tools: citizens can track and discuss the performance of their governments in response to the overall state of their environments - Democratizing an otherwise bureaucratic process	- Inclusion of people from different sociodemographic backgrounds: Access and use of these platforms, in particular, might be difficult for marginalized groups in society as it requires skills and aptitude that are often out of their reach - The cost of the equipment to access the platforms (e.g. smartphones, tablets, or computers) is a potential factor promoting exclusion. - Need to better understand the degree of sociodemographic inequality on platforms. - No user authentication
	Opportunities	Threats

	• Recent advances in crowd-based production technologies and other associated methods have triggered numerous crowdsourcing initiatives for a wide range of government, civic, and commercially oriented causes. • Web-based platforms that crowdsource civic participation for urban governance have become increasingly prominent in recent years • Promoting civic engagement: citizens can track and discuss the performance of their governments in response to the overall state of their environments • Public service improvement • Promote accountability • Democratizing bureaucratic processes	• Marginalizing certain groups of the population • The cost of the equipment to access the platforms (e.g. smartphones, tablets, or computers) is a potential factor promoting exclusion.
Mapping to Needs and Trends		
Addresses (Trend)	Smart City / Smart Government	
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making Strengthen citizens' trust in public administration	

Global Pulse					
Description (& Link)	Global Pulse is an innovation initiative of the UN Secretary-General, harnessing today's new world of digital data and real-time analytics to gain a better understanding of changes in human well-being. Global Pulse hopes to contribute a future in which access to better information sooner makes it possible to keep international development on track, protect the world's most vulnerable populations, and strengthen resilience to global shocks. (https://www.unglobalpulse.org/)				
Type	Best Practice				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	All				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Functions as a network of innovation labs where research on Big Data for Development is conceived and coordinated. - Achieve a critical mass of implemented innovations - Lower systemic barriers to adoption and scaling - Strengthen the big data innovation ecosystem - Partners with experts from UN agencies, governments, academia, and the private sector - Implement data innovation programmes through Pulse Labs to provide UN and development partners with access to the data, tools and expertise required to discover new uses of big data for development. - Develop toolkits, applications and platforms to improve data-driven decision-making and support evaluation of promising solutions. - Contribute to the development of regulatory frameworks and technical standards to address data sharing and privacy protection challenges.	- There are important gaps in knowledge and understanding between development evaluators and big data specialists - There are also differences in the role of theory. - Access to big data can be a challenge as much of the data is proprietary and may only be available to certain groups and only on a restricted basis. However, data philanthropy, can create the basis for obtaining data from private sector companies. - Data privacy and data protection. Big data frequently involves the analysis of large amounts of personal data, much of which may be very personal and in some cases put people at risk. Organizations working with new sources of data should have in place data privacy and data protection mechanisms that mitigate the risk of harms to individuals and groups of individuals. - Capacity development and strengthening computing

	• Engage key stakeholders on a priority innovation agenda. • Provide public sector organisations with policy guidance and technical assistance to strengthen their capacity for integrating real-time insights into operations.	infrastructure are additional challenges requiring upgrading big data knowledge and skills of M&E specialists as well as management and operational staff. Often organizations will also have to make major investments in upgrading their computing capacity, or building relationships with agencies that already have this capacity. • The incorporation of big data into programme evaluation requires the development of a big data responsive evaluation culture. • National statistics offices are often under–staffed or most of their resources are committed to conducting conventional surveys.
	Opportunities • Exponential increase in the number of non-profit entities, like Flowminder, Data Pop Alliance, World Pop, working with mobile data to develop big data for social good case studies • Promote awareness of the opportunities Big Data presents for sustainable development and humanitarian action, • Forge public-private data sharing partnerships, • Generate high-impact analytical tools and approaches through its network of Pulse Labs • Drive broad adoption of useful innovations across the UN System. • Global Pulse and social media platform Twitter signed an agreement to provide the UN system access to Twitter's data and tools. The collaboration builds on existing research and development that has shown the power of social media for social impact.	Threats • Data privacy and data protection. Big data frequently involves the analysis of large amounts of personal data, much of which may be very personal and in some cases put people at risk. • Natural disasters • Economic crisis • Failure to capture information on processes of behavioural change.
Mapping to Needs and Trends		

Addresses (Trend)	Predictive Analytics
Serves (Need)	Ensure availability of (real-time) information and knowledge

GovTrack						
Description (& Link)	Easily track the activities of the United States Congress. (https://www.govtrack.us/)					
Type	Best Practice					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Monitoring and Evaluation					
Policy Domain (s)	All					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Providing weekly tips on how to get the most out of GovTrack in your regular email update - Enables its users to track the bills and members of the United States Congress. - Ability to narrow the scope of the information received: Users can add trackers to certain bills - Collects data on members of Congress, allowing the users to check voting records and attendance relative to peers. - Makes federal legislative information comprehensively available in an open, structured data format for researchers, journalists, other public interest projects and anyone to freely reuse for any purpose	- Volume of readily information available makes it hard to keep track. - Inclusion of people from different sociodemographic backgrounds: Access and use of these platforms, in particular, might be difficult for marginalized groups in society as it requires skills and aptitude that are often out of their reach
	Opportunities	Threats
	- Promotes transparency - Building better communication between the general public and the government. - Making federal legislative information comprehensively available in an open, structured data format for researchers, journalists, other public interest projects, and anyone to freely reuse for any purpose	Marginalizing certain groups of the population: the cost of the equipment to access the platforms (e.g. smartphones, tablets, or computers) is a potential factor promoting exclusion.
Mapping to Needs and Trends		

Addresses (Trend)	Open Data
Serves (Need)	Ensure availability of (real-time) information and knowledge
	Strengthen citizens' trust in public administration

Ideas for Bristol						
Description (& Link)	Ideas for Bristol was a crowdsourcing website that was developed to engage and involve the city's residents in the redevelopment of the city centre. (https://www.nesta.org.uk/ideas-bristol-adaptive-lab-and-bristol-city-council)					
Type	Best Practice					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	Urban Planning and Transport					
TRL	n/a	**Implementation /Customisation Cost**				n/a
Ease of use	High	**Open License Availability**				n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	• Gives local residents the opportunity to contribute their own ideas on how they wanted to shape the city and refine these with other people. • Enhances citizen participation: people could put forward ideas, comment on and rate ideas put forward by other people, tag contributions, map their ideas, share photos and videos, and push content to their wider social networks through Facebook and Twitter	• No longer available site • Marginalizing certain groups of the population: e.g. the elderly or lower class, since they are not using social media networks (or using them to a lesser extent or for different purposes). • Need for Internet connectivity
	Opportunities	Threats
	• Crowdssourcing website, developed to engage and involve the city's residents in the redevelopment of the city centre. • Enhances citizen participation: people could put forward ideas, comment on and rate ideas put forward by other people, tag contributions and share content to their social media networks.	• Marginalizing certain groups of the population: e.g. the elderly or lower class, since they are not using social media networks (or using them to a lesser extent or for different purposes).

Mapping to Needs and Trends

Addresses (Trend)	Smart City / Smart Government
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making
	Strengthen citizens' trust in public administration

It's Your Parliament		
Description (& Link)	This website gives you a unique overview of the votes cast in the European Parliament. You can easily find and compare voting records of members of the European Parliament (MEPs) and political groups and you can make your own comments and cast your own votes. (http://www.itsyourparliament.eu/)	
Type	Best Practice	
Origin	Public Sector	
Policy Cycle Stage (s)	Policy Monitoring and Implementation	
Policy Domain (s)	All	
TRL	n/a	**Implementation /Customisation Cost** n/a
Ease of use	High	**Open License Availability** n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT		
	Strengths • Provides a unique overview of the votes cast in the European Parliament • User can easily find and compare voting records of members of the European Parliament (MEPs) and political groups • Users can comment and cast their own votes. • Promoting civic engagement: citizens can easily find and compare voting records of members of the European Parliament and political groups, comment and cast their own votes	**Weaknesses** • Inclusion of people from different sociodemographic backgrounds: Access and use of these platforms, in particular, might be difficult for marginalized groups in society as it requires skills and aptitude that are often out of their reach • Need for Internet connectivity
	Opportunities • Recent advances in crowd-based production technologies and other associated methods have triggered numerous crowdsourcing initiatives for a wide range of government, civic, and commercially oriented causes. • Web-based platforms that crowdsource civic participation for urban governance have	**Threats** • Marginalizing certain groups of the population: the cost of the equipment to access the platforms (e.g. smartphones, tablets, or computers) is a potential factor promoting exclusion.

	become increasingly prominent in recent years • Promoting civic engagement: citizens can easily find and compare voting records of members of the European Parliament (MEPs) and political groups, comment and cast their own votes • Promote transparency and accountability	
Mapping to Needs and Trends		
Addresses (Trend)	Open Data	
Serves (Need)	Ensure availability of (real-time) information and knowledge Secure legal framework Strengthen citizens' trust in public administration	

Integrated Planning and Management of land resources					
Description (& Link)	Integrated Planning and Management of land resources. (http://www.un.org/documents/ecosoc/cn17/2000/ecn172000-6.htm)				
Type	Best Practice				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Urban Planning & Transport				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Generating and strengthening knowledge about the ecology and sustainable development of mountain ecosystems - Promoting integrated watershed development and alternative livelihood opportunities. - Ensures that by managing the underpinning natural resource base and ecosystem services through a coordinated process across sectors and stakeholders, the range of societal needs can be met in the short and long terms. - Diverse landscape management approaches have been developed from different entry points but aimed at realizing multiple outcomes simultaneously. - Generating an agreed vision among stakeholders of long-term and wide-scale landscape goals; adopting practices that achieve multiple objectives; devising strategies to manage spatial interactions across different land uses and users; establishing institutions for stakeholder dialogue, negotiation and action; and shaping markets and policies to support desired outcomes.	- Lack of an enabling environment, including legislative frameworks, supportive policies and socio-economic conditions, and the mixed effects of trade liberalization and globalization - Include all involved sectors, focus on evaluating the range of ecosystem services generated, and involve some form of environmental accounting and land valuation - Adopt processes based on the needs of the various users and taking into account power asymmetries, competing demands on resources and ecosystems, the land potential and the socio-economic context. - Designed to provide information at the scale at which it is needed.
	Opportunities	Threats

	• Technological advances have made possible considerable progress in developing databases on land resources and land use, in processing and integrating information from multiple sources (environmental, social and economic), and in developing more effective analysis and planning tools. • Mechanisms and tools have been developed to make integrated information systems more accessible, facilitating the involvement of multiple stakeholders at different levels of planning and management. • A further advance is the use of the "ecosystem approach" as a framework for action under the Convention on Biological Diversity and as a strategy for the integrated management of land, water and biological resources. • Opportunities for increasing the efficiency of resource use include waste-water reuse for fish production and fish farming in rice fields or other irrigation schemes. • Efforts to increase productivity through intensification and technology development have in some cases led to increasing environmental and health impacts.	• Demand for food is escalating, and so is the pressure and demand of society on land, water and biological resources • Increasing degradation of resources • Stability and resilience of ecosystems • Climate change • Improving efficiency in the use of resources is crucial to sustainable agriculture • Sustainability requires direct action to conserve, protect and enhance natural resources • Agriculture that fails to protect and improve rural livelihoods, equity and social well-being is unsustainable • Enhanced resilience of people, communities and ecosystems is key to sustainable agriculture • Sustainable food and agriculture requires responsible and effective governance mechanisms
Mapping to Needs and Trends		
Addresses (Trend)	Next Generation of BI and Data Analytics platforms	
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

Polish E-Consultations						
Description (& Link)	Legislative editor, with legislative workflow management, that enables user/clerk to write law drafts and other documents and WWW portal that enables to gather views and opinions directly linked to smallest defined editorial unit (i.e. paragraph, article), no matter the stage. (http://konsultacje.gov.pl/)					
Type	Best Practice					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Justice, Legal System & Public Safety					
TRL	n/a	**Implementation /Customisation Cost**				n/a
Ease of use	High	**Open License Availability**				n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • For selected legislative projects, any member of the public can comment on the draft legislation and its accompanying Regulatory Impact Assessment (RIA) by posting remarks on-line on paragraphs or articles, or by supporting remarks posted earlier by other users			Weaknesses • Challenges to fully implement its regulatory policy requirements and to ensure that RIA and consultation comments are actually used to improve decision making. E.g. minimum periods for consultation with stakeholders are not always respected • Enhancing the public's trust in the usefulness of online consultation • Lower rate of comments compared to the number of comments submitted in paper form • Inclusion of people from different sociodemographic backgrounds: Access and use of these platforms, in particular, might be difficult for marginalized groups in society as it requires skills and aptitude that are often out of their reach		
	Opportunities • Increase public engagement • Ensuring support of the public for consultation processes,			Threats • Equality of access: Not every household has access to internet due to its cost. If political participation is a right, and the		

• Enhancing the public's trust in the usefulness of online consultation	Internet is required to participate, it follows that Internet access for that purpose should also be a right • Marginalizing certain groups of the population: the cost of the equipment to access the platforms (e.g. smartphones, tablets, or computers) is a potential factor promoting exclusion. • General distrust
Mapping to Needs and Trends	
Addresses (Trend)	E-Governance
Serves (Need)	Standardisation of processes

POPVOX					
Description (& Link)	Popvox is a non-partisan advocacy platform that aims to improve communication between US Congress, and trade and union organisations, as well as the general public on specific pieces of legislation. (https://www.popvox.com/)				
Type	Best Practice				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Monitoring and Evaluation				
Policy Domain (s)	Justice, Legal System & Public Safety / Public Affairs				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Select regulations that are open for official public comment. - Advocacy groups, organizations and companies create a profile and register their positions endorsing or opposing bills or regulations. - Individuals' comment are delivered to legislators or federal agencies and are aggregated and displayed publicly on POPVOX. - Provides a ground breaking independent metric for advocacy and a public, searchable record of advocacy. - Aggregates, verifies, sorts, and counts opinions and delivers input to lawmakers in a transparent, structured format. - Bringing transparency, efficiency, and accountability to policymaking - Combines legislative data with personal reactions, delivering the users' opinions to governmental officials on policies - User verification - Allows individuals to manage and maintain online civic profiles, build their civic reputation, engage friends and have meaningful impact in the legislative process	- Inclusion of people from different sociodemographic backgrounds: Access and use of these platforms, in particular, might be difficult for marginalized groups in society as it requires skills and aptitude that are often out of their reach - Increase public engagement - Data privacy

Opportunities • Empower effective participation and create a transparent record that influences policy-making and fosters accountable, responsive governing. • Increase public engagement • Enhancing the public's trust in the usefulness of online consultation • Promote transparency	Threats • Equality of access: Not every household has access to internet due to its cost. If political participation is a right, and the Internet is required to participate, it follows that Internet access for that purpose should also be a right • Marginalizing certain groups of the population: the cost of the equipment to access the platforms (e.g. smartphones, tablets, or computers) is a potential factor promoting exclusion.

Mapping to Needs and Trends	
Addresses (Trend)	Open Data
Serves (Need)	Cross-linked information exchange Cooperative working between decision-makers, departments, hierarchy levels (e.g. information exchange between different departments and administrations)

Regulations.gov					
Description (& Link)	Through this portal comments on proposed regulations and related documents published by the U.S. Federal government can be submitted. In addition, this site can be used to search and review original regulatory documents as well as comments submitted by others. (https://www.regulations.gov/)				
Type	Best Practice				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Monitoring and Evaluation				
Policy Domain (s)	Justice, Legal System & Public Safety				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Search for a regulation such as a proposed rule, final rule, or Federal Register (FR) notice - Submit a comment on a regulation or on another comment - Submit an application, petition, or adjudication document - Sign up for e-mail alerts about a specific regulation - Quickly access regulations that are popular, newly posted, or closing soon—directly from the homepage	- Lack of consistency across agencies: various naming conventions for regulatory data maintained by different federal agencies add unnecessary complexity for the agency user. - Lack of comprehensive search capabilities reduces public access to regulatory information and therefore decreases overall participation (e.g. the ability to perform a targeted search by various document subtypes or the ability to search for information specific to regulatory categories) - Lack of plain writing in regulatory content and Regulations.gov: Plain writing is clear, simple, and meaningful; it avoids unnecessary complexity and specialized terms.
	Opportunities	Threats
	Incorporate plain writing descriptions of regulatory content on Regulations.gov: Avoid unnecessary complexity and specialized terms with the use of Plain writing which is clear, simple, and meaningful.	Equality of access: Not every household has access to internet due to its cost. If political participation is a right, and the Internet is required to participate, it follows that Internet access for that purpose should also be a right

	• Increase public engagement in policy making cycle	• Marginalizing certain groups of the population: the cost of the equipment to access the platforms (e.g. smartphones, tablets, or computers) is a potential factor promoting exclusion.
Mapping to Needs and Trends		
Addresses (Trend)	Open Data	
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making Strengthen citizens' trust in public administration	

SeeClickFix					
Description (& Link)	An interactive website that enables users to report non-emergency issues in their communities, such as broken street lights, needed crosswalks, potholes, graffiti, and trees that need trimming. The site notifies local officials and plots of issues to be discussed on Google maps. Community and local government responses are reported and tracked by users. Especially for Washington DC 311, an iPhone and Facebook combination application has been developed and enables users to report physical problems by taking photographs. (https://seeclickfix.com/)				
Type	Best Practice				
Origin	Private Sector				
Policy Cycle Stage (s)	Policy Implementation				
Policy Domain (s)	Urban Planning & Transport				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • Connect neighbours, community groups, and local governments with free, public web and mobile tools to improve the quality of life in the places they live. • Equip citizens with the tools they need to submit service requests and give governments the systems they need to organize, track, and manage them. • Provides full mobile and desktop ecosystem for request submission, management, and tracking • Customizable mobile apps and online tools to increase citizen engagement and improve constituent services		Weaknesses • Inclusion of people from different sociodemographic backgrounds: Access and use of these platforms, in particular, might be difficult for marginalized groups in society as it requires skills and aptitude that are often out of their reach • The cost of the equipment to access the platforms (e.g. smartphones, tablets, or computers) is a potential factor promoting exclusion. • Need to better understand the degree of sociodemographic inequality on platforms.		
	Opportunities • Recent advances in crowd-based production technologies and other associated methods have triggered numerous crowdsourcing initiatives for a wide range of government, civic,		Threats • Substantial criticism for marginalizing certain groups of the population		

	and commercially oriented causes. • Web-based platforms that crowdsource civic participation for urban governance have become increasingly prominent in recent years • Promoting civic engagement: citizens can track and discuss the performance of their governments in response to the overall state of their environments • Public service improvement • Promote accountability • Democratizing bureaucratic processes	
Mapping to Needs and Trends		
Addresses (Trend)	Open Data	
Serves (Need)	Strengthen citizens' trust in public administration Ensure availability of (real-time) information and knowledge	

Technology Horizon Scanning						
Description (& Link)	"Anticipate, identify, and prepare for beyond-the-horizon advancements. As a result, United States Department of Defence can more robustly inform strategic thinking, planning, and research efforts to mitigate technological surprise." (https://www.recordedfuture.com/assets/tech-horiz-case-study.pdf)					
Type	Best Practice					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Innovation, Science & Technology					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**
SWOT	<u>Strengths</u> • To mitigate technological surprise, mathematically analyses a range of possible permutations of technology advances. • Assumes that the greater the distance between any two fields, the more unlikely their combination and the larger the impact of a possible fusion. • Using a robust statistical clustering, their methodology helps identify pairs of topical candidates for examination. • Each technology is disassembled to its various components and those elements are analysed "against" one another. Through a series of conjectures, which accounts for their disparate and distance from one another, permutations are evaluated and ranked. • World's first temporal analytics engine • Recorded Future's temporal analytics engine can test the validity of its evidence-based futures			<u>Weaknesses</u> • The system itself will not determine whether a technology is likely to be disruptive. In the end, people will have to look over the data presented to determine what inventions could make the big differences. • Avoiding confirmation bias proved difficult when assessing technological development on decades-long time horizons • Identifying precursors, before the use of analytical software, to nominate technological areas as potentially emerging • The science is not as mature as expected hence, other evaluations and game plans are necessary.		
	<u>Opportunities</u>			<u>Threats</u>		

	• Recorded Future enabled analysts to anticipate, identify, and prepare for beyond-the-horizon advancements • Allows to rapidly disaggregate new from changing technology • The capabilities these projects seek to detect might be outside the defence realm or might have been previously considered too immature to have much relevance to the technical landscape • Discover the preconditions for technologies to become viable and whether data is available to clue into that.	• The science is not as mature as expected hence, other evaluations and game plans are necessary
Mapping to Needs and Trends		
Addresses (Trend)	Smart City / Smart Government	
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

Social Simulator						
Description (& Link)	Using the language, tools and norms of the social web for social media PR and crisis response. (https://socialsimulator.com/)					
Type	Best Practice					
Origin	Private Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	Justice, Legal System & Public Safety					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	Strengths • Provides realistic simulations: a) practice the language, tools and norms of the social web for social media PR and crisis response. b) Use the Simulator as part of crisis management exercise to see how the teams cope with social media inputs c) Run a full-blown crisis exercise on a private server • Extensive cross sector experience, helping some of the world's biggest organisations to train and test their people and processes • Combining big agency experience with a highly competitive cost structure. • Flexible and responsive to the requirements of each client, creating bespoke training session.		Weaknesses • Primary success factor for crisis communication is the ability to respond fast.			
	Opportunities • Reduces the time it takes for an organization to respond to a crisis: primary success factor for crisis communication is the ability to get the message out fast • Prepare organisation for crisis and protect organizations		Threats • Bad crisis PR destroys brands, whereas strong responses protect or even enhance reputation • Confidentiality: dealing with sensitive information • Natural disasters			

	reputation: At the height of a crisis, there is no time to develop crisis teams, define policies and processes, train spokespeople, or get multiple documents written and approved	• One of the most challenging aspects of any stressful situation is handling one's own emotions
Mapping to Needs and Trends		
Addresses (Trend)	Social Media	
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

Vancouver User Voice					
Description (& Link)	The city of Vancouver used a feedback-gathering web-based software to solicit ideas, votes and comments (a process called "ideation") on how to make the city more environmentally responsible. (https://vancouver.uservoice.com/forums/56390-gc-2020)				
Type	Best Practice				
Origin	Public Sector				
Policy Cycle Stage (s)	Policy Design and Analysis				
Policy Domain (s)	Environment & Energy				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	Strengths • Enhancing urban sustainability • Increasing public engagement • Citizens were able to vote and comment on entries. • City officials followed up on each entry to discuss possible outcomes. • The project team engaged over 10,000 people from Vancouver and 35,000 people from cities around the world to develop its plans.	Weaknesses • Inclusion of people from different sociodemographic backgrounds: Access and use of these platforms, in particular, might be difficult for marginalized groups in society as it requires skills and aptitude that are often out of their reach • Active for one year
	Opportunities • Cut carbon emissions • Reduce our dependence on fossil fuels • Keep energy affordable in the long term • Achieve 100% of our energy needs from renewable sources before 2050 • Recent advances in crowd-based production technologies and other associated methods have triggered numerous crowdsourcing initiatives for a wide range of government, civic, and commercially oriented causes.	Threats • Substantial criticism for marginalizing certain groups of the population -the cost of the equipment to access the platforms (e.g. smartphones, tablets, or computers) is a potential factor promoting exclusion

	- Web-based platforms that crowdsource civic participation for urban governance have become increasingly prominent in recent years - Promoting civic engagement: citizens were able to vote and comment on entries	

Mapping to Needs and Trends	
Addresses (Trend)	Smart City / Smart Government
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making Strengthen citizens' trust in public administration

Improve the Neighborhood						
Description (& Link)	Improve your neighbourhood. (https://www.verbeterdebuurt.nl/)					
Type	Best Practice					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Implementation					
Policy Domain (s)	Urban Planning & Transport					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	• Map based website and app that helps people in the Netherlands inform their local authority of problems needing their attention, such as potholes, broken street lamps, vandalism etc. • Provides reports to the relevant municipality or district council: No need for the user to know which authority is responsible for a specific type of problem in a specific location. • Monitoring tools: citizens can track and discuss the performance of their governments in response to the overall state of their environments • Democratizing an otherwise bureaucratic process	• Inclusion of people from different sociodemographic backgrounds: Access and use of these platforms in particular, might be difficult for marginalized groups in society as it requires skills and aptitude that are often out of their reach • The cost of the equipment to access the platforms (e.g. smartphones, tablets, or computers) is a potential factor promoting exclusion. • Need to better understand the degree of sociodemographic inequality on platforms. • No user authentication
	Opportunities	Threats
	• Recent advances in crowd-based production technologies and other associated methods have triggered numerous crowdsourcing initiatives for a wide range of government, civic, and commercially oriented causes.	• Marginalizing certain groups of the population • The cost of the equipment to access the platforms (e.g. smartphones, tablets, or computers) is a potential factor promoting exclusion.

	- Web-based platforms that crowdsource civic participation for urban governance have become increasingly prominent in recent years - Promoting civic engagement: citizens can track and discuss the performance of their governments in response to the overall state of their environments - Public service improvement - Promote transparency and accountability, - Democratizing bureaucratic processes	
Mapping to Needs and Trends	
Addresses (Trend)	Smart City / Smart Government
Serves (Need)	Involvement of the public and citizens, as well as the development of citizen-centred policy-making Strengthen citizens' trust in public administration

Energy Planning Vienna						
Description (& Link)	Smart and integrated energy planning system. (https://www.wien.gv.at/wienatshop)					
Type	Best Practice					
Origin	Public Sector					
Policy Cycle Stage (s)	Policy Design and Analysis					
Policy Domain (s)	Environment & Energy					
TRL	n/a		**Implementation /Customisation Cost**			n/a
Ease of use	High		**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	- Coordination and further development of energy concepts - Controlling of objectives of existing energy policies and concepts, and drawing up of recommendations and measures - Administering the Fund of the Province of Vienna for the promotion of green electricity and drawing up the relevant funding guidelines - Cooperating in the development and allocation of energy funding - Energy assessment of projects in the framework of administrative procedures - Developing pilot projects to promote new energy technologies - Cooperating in projects to raise awareness on increasing energy efficiency	- Lack of data on energy and CO_2 emission reductions - Awareness: public relation activities and the initiation of show cases is recommended - Regulatory measures required: higher refurbishment rates cannot be achieved if only financial support is offered, regulatory measures are also required
	Opportunities	Threats
	Enhances energy efficiency and climate-friendly mobility, to increase the use of waste heat, and promotes the use of renewables for energy generation.	- Climate change, urban heat - Limited space and resources - Population growth, migration - Slow economic growth, difficult framework conditions - Affordable living

	- Sustainable savings in its own sphere of action of 15 GWh/year - Stabilisation of power consumption - Reduction of power consumption of public lighting - Increased energy management for own assets - Promotion of low energy buildings (funding) - Increased focus on energy efficiency criteria in all tendering	- Excessive dependency on fossil fuels - Risk of energy resources price increase
Mapping to Needs and Trends		
Addresses (Trend)	Smart City / Smart Government	
Serves (Need)	Forward-looking strategic planning for the use of data and technologies as well as for practical implementation	

I.10 Vocabularies

Agrovoc					
Description (& Link)	AGROVOC is a controlled vocabulary covering all areas of interest of the Food and Agriculture Organization (FAO) of the United Nations, including food, nutrition, agriculture, fisheries, forestry, environment etc. It is published by FAO and edited by a community of experts. (http://artemide.art.uniroma2.it:8081/agrovoc/agrovoc/en/)				
Type	Vocabulary				
Origin	Public Sector				
Policy Cycle Stage (s)	All				
Policy Domain (s)	Agriculture, Fisheries, Forestry and Foods				
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a

Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**

SWOT	Strengths	Weaknesses
	 • The maintenance of AGROVOC is decentralized, based on the VocBench Web service for editing, publishing, and maintaining vocabularies. • Partners from the AGROVOC community can add their own translations to existing concepts, and add new, specialized concepts that fit local needs not yet addressed by the concepts from the official core vocabulary. • FAO recognizes and welcomes many contributors to its community of collaborators. • New terms can be suggested using the centralized Web service: These terms can be submitted for integration in the core vocabulary and approved by the relevant editors. But they can also be used in local applications by those who created and need them, as soon as they are created in VocBench. • In a truly Linked Data approach, thanks to mappings to other vocabularies, AGROVOC can be	 • There are discontinuities with other agricultural thesauri used in the world • Too generic to be usefully applied unmodified.

	used as a hub from which to access many other vocabularies available on the Web. • AGROVOC is a large and well supported effort, with a robust community that illustrates how flexibility and good management can build stability over time.	

Opportunities	Threats
• Organize information • Provide terminology to catalogue and retrieve information • Promote consistency in preferred terms and the assignment of the same terms to similar content. • Interest in sharing information grows and questions about appropriate policies and the supporting infrastructure come increasingly into focus. • Many projects are being funded to consider the problems of 'big data,' particularly scientific research data, all depend on stable metadata vocabularies.	• Responsible long-term governance: Need for stability in the vocabulary environment, particularly regarding the need for interoperability as descriptive information moves into the Linked Open Data environment • Funding: Availability for general use is linked to issues around the loss of funding for projects building vocabulary development or management tools, almost all of which were initially developed in time limited circumstances. • Long-term implications of depending on funded projects to build and maintain the infrastructure around vocabularies used for linked open data, not to mention the vocabularies themselves.

Mapping to Needs and Trends	
Addresses (Trend)	Open Data
Serves (Need)	Ensure availability of (real-time) information and knowledge

OECD Taxonomy of Economic Activities Based on R&D Intensity					
Description (& Link)	New taxonomy of industries according to their level of Research and Development (R&D) intensity - the ratio of R&D to value added within an industry. Manufacturing and non-manufacturing activities are clustered into five groups (high, medium-high, medium, medium-low, and low R&D intensity industries), drawing on new and expanded evidence from most OECD countries and some partner economies. (https://www.oecd-ilibrary.org/science-and-technology/oecd-taxonomy-of-economic-activities-based-on-r-d-intensity_5jlv73sqqp8r-en)					
Type	Vocabulary					
Origin	Public Sector					
Policy Cycle Stage (s)	All					
Policy Domain (s)	Economy & Finance					
TRL	n/a	**Implementation /Customisation Cost**			n/a
Ease of use	High	**Open License Availability**			n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	Total Score
	4	4	4	4	4	**4**
SWOT	Strengths • Focuses on a measure of R&D performance intensity as the defining criterion that is an indicative but insufficient measure of high technology • It extends the analysis of R&D intensity to economic activities in services: covering not only manufacturing but also nonmanufacturing industries, namely agriculture, mining, utilities, construction and a broad range of services • It is based on the latest revision of the International Standard Industrial Classification, ISIC Revision 4.		Weaknesses • Measuring R&D intensity or embedded R&D in their purchases may not effectively characterise the innovative performance of firms or industries • R&D intensity may be a rather imperfect indicator of other concepts such as reliance on/use of highly educated personnel, advanced technology or wider forms of knowledge-based capital. • Delimitation between the medium and the medium-low R&D intensity industries, where there is a fairly small distance between the extremes • Risk that for some industries, their measured R&D intensity may be under- or over-stating the true global picture as a result of missing economies like Brazil, India or China, whose share in the global industry's value added and R&D may differ according to specialisation or other factors. • The robustness of the taxonomy over time cannot be completely			

	verified as it is not possible to create a balanced sample across years. Although historical data are available in the National Accounts as National offices produce back-calculations when new industrial classifications are adopted, this is not generally the case for R&D data. • It is not possible at present to fully test whether the rise in absolute levels of R&D intensity in some industries in the OECD area has been associated to a fall in their share of global value added.
Opportunities • Support the pooled presentation of various statistics for groups of industries when R&D is deemed to be a relevant discriminant factor across a number of countries. Within a particular country, a given industry can be more or less R&D intensive that for the aggregate reported here • May be expanded on in the future as evidence collected under the guidelines of the revised Frascati Manual 2015 enables a more accurate assessment of R&D performance and use within and across industries.	Threats • There can be significant heterogeneity across economies in terms of the absolute and relative R&D intensity of specific industries, reflecting what role an economy' s industry plays in the global context. • It is not possible to construct measures of R&D intensity at a detailed industry level for a number of major OECD partner economies. Ideally, these R&D intensity measures should be constructed on a global basis in order to ensure that entire industry value chains are captured

Mapping to Needs and Trends	
Addresses (Trend)	Open Data
Serves (Need)	Ensure availability of (real-time) information and knowledge

Copernicus Marine environment monitoring service						
Description (& Link)	Marine data is an engine for "smart and sustainable growth" in the European Union, as stated in the recent Marine Knowledge 2020 EC Communication. The Copernicus Marine Service has been designed to respond to issues emerging in the environmental, business and scientific sectors. Using information from both satellite and in situ observations, it provides state-of-the-art analyses and forecasts daily, which offer an unprecedented capability to observe, understand and anticipate marine environment events. (http://marine.copernicus.eu/about-us/about-your-copernicus-marine-service/)					
Type	Vocabulary					
Origin	Public Sector					
Policy Cycle Stage (s)	All					
Policy Domain (s)	Innovation, Science & Technology					
TRL	n/a	**Implementation /Customisation Cost**				n/a
Ease of use	High	**Open License Availability**				n/a
Big Data Readiness	Feasibility	Reasonability	Value	Integrability	Scalability	**Total Score**
	4	4	4	4	4	**4**
SWOT	**Strengths** • Observations, monitoring and reporting on past and present marine environmental conditions, the response of the oceans to climate change and other stressors; • Analysing and interpreting changes and trends in observations and measurements of the marine environment; • Provision of short-term forecasts and outlooks for marine conditions and, as appropriate, to downstream services for warnings of and/or rapid responses to extreme or hazardous events; • Provision of detailed descriptions of the ocean state, variability and change to initialise coupled ocean/ atmosphere models to predict changes in the atmosphere/climate. • Integrate data into other models • Merge data with your own ones • The observations and forecasts produced by the service support all marine applications.		**Weaknesses** • Volume limitations download mechanisms (1 gigabyte) for the sake of performance. • Ocean circulation, ocean-wave and ocean-ice coupling. • Biogeochemistry and ecosystems. • Seamless interactions with coastal systems. • Ocean-Atmosphere coupling and climate. • Cross-cutting developments on observation, assimilation and product quality improvements			

	• Annual reporting of the state and health of the global ocean and regional seas. • Open and Free service: open for any user requesting generic information on the ocean, and especially downstream service providers who use this information as an input to their own value-added services to end-users.	

	Opportunities
	
	• Observing and monitoring the oceans is essential: A good knowledge of the environmental status of the marine waters is necessary for better and more sustainable management of our oceans and seas in support of the development of human activities and of the blue economy
	• Delivers a core information service related to 4 areas of benefits:
	  a) Maritime safety,
	  b) Marine resources,
	  c) Coastal and marine environment
	  d) Weather, seasonal forecast and climate.
	• Support to European and Regional decision makers implied in European policies linked to the Marine Environment and Security
	• Regional service provision, related to Pollution combat and Monitoring, Coastal Environment, Water Quality, Maritime Safety, Renewable Energies
	• Respond to issues emerging in the environmental, business and scientific sectors. Using information from both satellite and in situ observations, it provides state-of-the-art analyses and forecasts daily, which offer an unprecedented capability to observe, understand and anticipate marine environment events.
		Threats
		
		• Climate change
		• Population growth
		• Need for establishing homogeneous requirements on data sampling within CMEMS in order to avoid the diverse sampling intervals along the same time series.

Mapping to Needs and Trends		
Addresses (Trend)	Next Generation of BI and Data Analytics platforms	
Serves (Need)	Deeper understanding of IT potential and IT processes	