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Executive Summary

This document is an updated version of the initial conceptual and methodological framework of the WeGovNow initiative. A first version (D1.1) was developed earlier in the project with a view to detailing key concepts and some aspects of the methodological approach set out in the project's work plan. To our knowledge for the first time, WeGovNow aims at integrating different civic engagement applications within a single online platform, thereby relying on software applications that existed already prior to WeGovNow as well as on new components to be developed within the project. Against this background, the work pursued within WP1 focused on a thorough examination of the various components to be integrated with a view to developing a suitable integration concept. This integration concept is to ultimately enable the project to implement a platform architecture that does not only fit the purposes of prototype piloting within project duration. At the same time, it is to enable further mainstreaming of the WeGovNow prototype after successful piloting. The result of this particular work strand (WP1) within the overall project is presented throughout the remainder of this document.

The WeGovNow platform is envisaged to be realised via a layered architecture approach which integrates a number of existing and newly developed software components within the overall system in conjunction with:

- a) a mechanism for orchestrating user management such as registration, single sign-on authentication, profile handling and in general trusted accreditation,
- b) a mechanism for analysing user profiles and personal preferences and automatically suggesting events or users with similar interests and
- c) a mechanism for keeping track of actions in a unified manner (Logger) and thus making it possible to provide personalised timelines, unified search, etc.

A dedicated architectural component, the Unified WeGovNow User Management (UWUM), acts as the orchestrator of user management within the overall platform. In general, the proposed integration approach relies on the utilisation of open interfaces wherever possible in order to ensure a maximum level of reusability through recombination with other components. This is also intended to facilitate the sustainability of project outputs beyond the immediate project duration.

In methodological respect, the iterative development of different versions of the prototype platform will be supported by adapting the scrum methodology to the particular requirements of WeGovNow, thereby enabling effective and efficient sharing of tasks across the individual technical partners participating in the project and their development teams respectively.

When it comes to user related requirements, widely accepted "Design for All" principles are applied. Beyond the methodological approach adopted towards usability issues more

generally, particular attention is given to accessibility related requirements of users with disabilities.

Finally, a number of regulative and ethics related standards potentially deserve attention when developing the envisaged WeGovNow solutions. Beyond data protection and data privacy legislation enacted at the European and national governance levels, a number of other regulatory fields potentially need to be considered in this context. With a view to facilitating straight forward exploitation of project outcomes after the ending of the project duration, licensing issues deserve appropriate attention as well.

1 Introduction

This document is an updated version of the initial conceptual and methodological framework of the WeGovNow initiative. A first version (D1.1) was developed earlier in the project with a view to detailing key concepts and some aspects of the methodological approach set out in the project's work plan. To our knowledge for the first time, WeGovNow aims at integrating different civic engagement applications within a single online platform, thereby relying on software applications that existed prior to WeGovNow as well as on new components to be developed within the project. Against this background, the work pursued within WP1 focused on a thorough examination of the various components to be integrated with a view to developing a suitable integration concept. The integration concept is to ultimately enable the project to implement a platform architecture that does not only fit the purposes of prototype piloting within project duration. At the same time, it is to enable further mainstreaming of the WeGovNow prototype after successful piloting. The result of this particular work strand (WP1) within the overall project is presented throughout the remainder of this document.

This starts with a presentation of the general integration concept underlying the development of the WeGovNow platform architecture, including a description of how the final system is envisaged to be accessed by the end users (Chapter 2). When compared with the previous version of this document (D1.1), the description of the individual platform components has been further elaborated to enable a better understanding of key functionalities envisaged to be provided within the overall platform. Also, the envisaged user experience of the system has been further consolidated in terms of several interface mock-ups that have been developed in the meanwhile. Moreover, the individual components to be integrated are briefly described in relation to key characteristics potentially relevant for their operational integration into the platform, which is to be achieved within WP3. Here, descriptions of several software components which are to be newly developed within the project for integration purposes have been added to the previous version of this report (D1.1).

The methodological approach adopted by the project towards iterative platform development is presented in Chapter 3. This is augmented by a description of the approach taken towards addressing interoperability issues in particular. When compared with the previous version of this document (D1.1) it is further detailed how this will be achieved with help of dedicated platform components developed for the purpose of WeGovNow. In addition, the approach taken towards assessing the quality of geo-spatial data has been further detailed.

A dedicated chapter (Chapter 4) focuses on the description of the methodological approach taken towards user-related requirements by applying widely accepted "Design for All" principles. Here, two somewhat different aspects are addressed. Beyond the approach

adopted towards user-centred design (UCD) more generally, particular attention is given to accessibility related requirements of users with disabilities.

Finally, Chapter 5 presents a description of regulative and ethics related standards potentially deserving attention when developing the envisaged WeGovNow solutions. Beyond data protection and data privacy legislation enacted at the European and national governance levels, a number of other regulatory fields potentially need to be considered in this context. With a view to facilitating straight forward exploitation of project outcomes after the ending of the project duration, licensing issues deserve appropriate attention as well.

Further to this, supporting materials are annexed to the main report. These include a list of detailed dependencies and licensing of the existing core components provided in Appendix A. Also, a tabular list of data quality metrics is provided in Appendix B. By example of the ImproveMyCity platform component, Appendix C illustrates how the current licensing status of individual WeGovNow components has been analysed and how this is related to external sources of information utilised by the project¹. Finally, a detailed listing of accessibility related requirements on web-based services is presented in Appendix D.

2 Conceptual framework

2.1 The general concept underlying the WeGovNow platform

The WeGovNow platform is envisaged to be realised via a layered architecture approach which integrates a number of existing and newly developed software components within the overall system in conjunction with:

- a) a mechanism for orchestrating user management such as registration, single sign-on authentication, profile handling and in general trusted accreditation,
- b) a mechanism for analysing user profiles and personal preferences and automatically suggesting events or users with similar interests and
- c) a mechanism for keeping track of actions in a unified manner (Logger) and thus making it possible to provide personalised timelines, unified search, etc.

A dedicated architectural component, the Unified WeGovNow User Management (UWUM), is introduced to act as the orchestrator of user management (login/registration, authentication). Exhibit 1 schematically presents the overall architecture concept together with functionalities available to the users:

- **UWUM:** The Unified WeGovNow User Management (UWUM) allows a distributed operation of individual WeGovNow applications as well as operation of third party

¹ C. f. “Working Paper on the legal implications of certain forms of Software Interactions (a.k.a linking)”. Available at: <http://www.ifosslr.org/public/LinkingDocument.odt> (latest access: 22/11/2016)

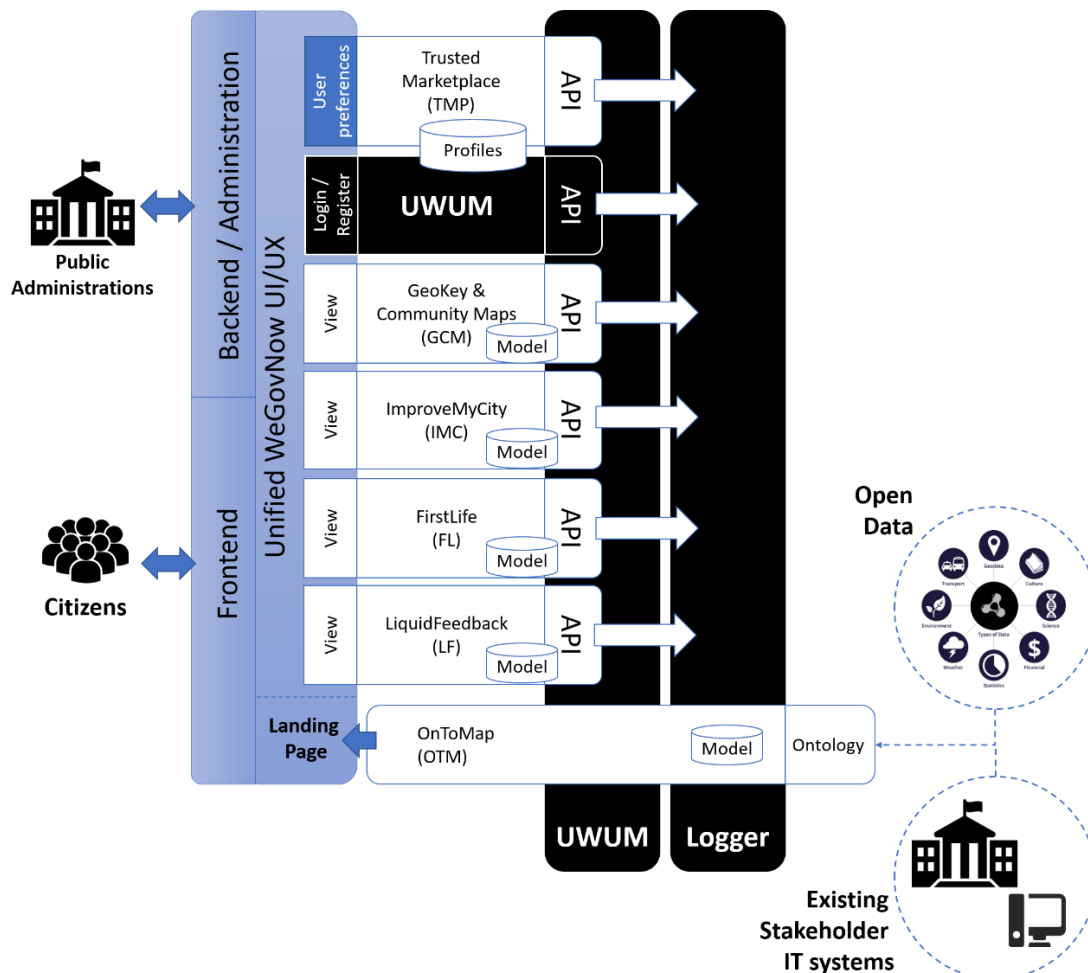
applications (e.g. e-government applications already existing at the WeGovNow pilot sites and any applications that might be added in the future) while the users experience the system as one seamless service. UWUM provides the backbone for a distributed system which is modular in terms of different applications used and different identity providers respectively.

- **LandingPage (LP):** This is the common entry point to the WeGovNow platform providing a map-based overview of the current status of the application and a modular space to support users' navigation across WeGovNow features based on their activities. The LP is the main frontend that orchestrates all functionalities and allows users to interact seamlessly with all core components under a unified look and feel.
- **Trusted Marketplace (TMP):** The TMP provides functionalities concerning i) suggestions of posts (issues/events, etc.) with potential relevance to registered users (through UWUM) based on their interests and ii) a matching of user requests with offerings (e.g. volunteers) concerning support or co-operation.
- **LiquidFeedback (LF):** LF provides functionalities concerning opinion formation for democratic self-organization of large scale groups. LiquidFeedback combines concepts of a collectively moderated, self-organized discussion process (quantified, constructive feedback) and Liquid Democracy (delegated or proxy voting).
- **FirstLife (FL):** FL provides functionalities connecting crowd-sourced and institutional information about urban life and daily life in the community more generally.
- **ImproveMyCity (IMC):** IMC provides functionalities enabling citizens to report issues in their neighbourhood, such as potholes, to the public administration. Further to this, the application supports the administration in handle reported issues in a transparent manner.
- **GeoKey & Community Maps (GCM):** GCM provides functionalities to support constructing digital representations of physical space through participatory action. It offers the flexibility to map what the end users wish to see on a map - things of importance to them and add comments, images, video and other media as required (including social media). It also allows the data to be shared via an API-enabled back end storage that exposes the data to other platform components within WeGovNow and elsewhere as needed. This allows for very community-centred, community-driven initiatives, without defining what is mapped a priori.
- **OnToMap (OTM):** OTM provides functionalities concerning centralized data logging within the WeGovNow platform and data integration. These functionality, aimed at integrating the knowledge about users and about geographical data shared across the overall platform, is supported in terms of managing a semantic knowledge representation layer which supports integration of heterogeneous data and explicit representation of semantic relations between information items.
- **OnToMap Logger (OTML):** OTML provides functionalities to support the collection of user actions in a unified data structure by each core component of the overall

platform with a view to assisting in the creation of personalised queries, timeline, searches, match making and other features.

With a view to facilitating the further exploitation of project outcomes beyond the immediate pilot duration, the conceptual approach adopted for the purposes of the WeGovNow platform architecture enables integrating additional applications at a later stage. To this end, the modular architecture has been designed to be generally open towards third party applications that may potentially be added at any time. This approach is supported by the introduction of the so called **AreaViewer** (AV) as part of the LandingPage (LP). This is a new concept enabling WeGovNow to embed a consolidated interactive map within each of its current components or any third-party component potentially to become part of the WeGovNow ecosystem at a later stage. This approach enables seamless integration even of applications not possessing a map-based user interface into the WeGovNow overall platform (for details see 2.2.2.3).

Exhibit 1: The overall conceptual architecture of the WeGovNow platform



As can be seen from Exhibit 1 as well a dedicated presentation layer, the Unified WeGovNow UI/UX, creates a unified interface to the citizen (frontend) and to the public administration (backend). When it comes to the visual user experience, the look and feel of the WeGovNow UI is based on Google's Material² design guidelines. In accordance with a responsive design approach, the WeGovNow interfaces should be usable with help of multiple access devices (desktops, tablets, smartphones), based on standard open-source technologies. Concerning the map interface and other geo-referenced information mechanisms that play key role in WeGovNow, OpenStreetMap³ (OSM) will form the basis. The common look and feel will be orchestrated by UWUM (since it is also containing the logic for the single sign-on procedures, making it easier to handle this as well) by providing the rules (CSS pre-processors or other) through its API. As mentioned earlier, the Landing Page will be the main entry portal to the WeGovNow ecosystem.

Special consideration was given during the conceptual design phase to the interlinking of the WeGovNow platform with existing open data repositories and the participating stakeholders' IT systems. WeGovNow is intended to complement the ICT infrastructure already existing at the part of the participating pilot municipalities rather than replacing them. As depicted in the diagram in Exhibit 1, this interconnection is achieved through OnToMap and its semantic representation of external data through a well-defined ontology. In more operational terms, this approach enables for instance adding a map layer with bus stops, open pharmacies and the like on top of the WeGovNow functionalities described earlier.

Part of the OnToMap approach is also the Logger that enables every core component to push predefined structured data containing user actions along with a timestamp and an originator id. The purpose of conceptually keeping user actions in one place is to enable any component to query OnToMap and to personalise the resulting output (e.g. personalised timeline, match making, etc.).

It is also worth noting that although the diagram depicts a common profile database between UWUM and TMP to highlight their strong connection, there is no shared database but rather a logical link. In general, all models (data storage) of each core component will be autonomous and any bilateral data exchange among them is taking place through their API. For that reason, special attention will be given to strong interactive documentation of the programming interface of each component.

As mentioned earlier, the entry point is envisaged to be a map-based interface (Exhibit 2), where the information is displayed geographically in terms of POI markers or areas (e.g. polygons) on the map. Clicking on a marker or area will forward the user to the detailed screen of the respective core component (Exhibit 3), using the appropriate core

2 <https://material.io/guidelines/>

3 <https://www.openstreetmap.org>

component's API and OnToMap for receiving additional information regarding the action. For example, a marker on the map representing an issue or an idea submitted through the FirstLife platform component will lead to a call at the Firstlife interface (having common look and feel) so that more details are fetched and presented in the specific screen. Using API calls the presentation layer (common UI) will interact with the operational logic of the WeGovNow platform. In conceptual regard, the architecture is to enable provision of seamless unified software to the end users who are to perceive the different components as one single web application.

Exhibit 2: Mock-up of the WeGovNow map-based entry point

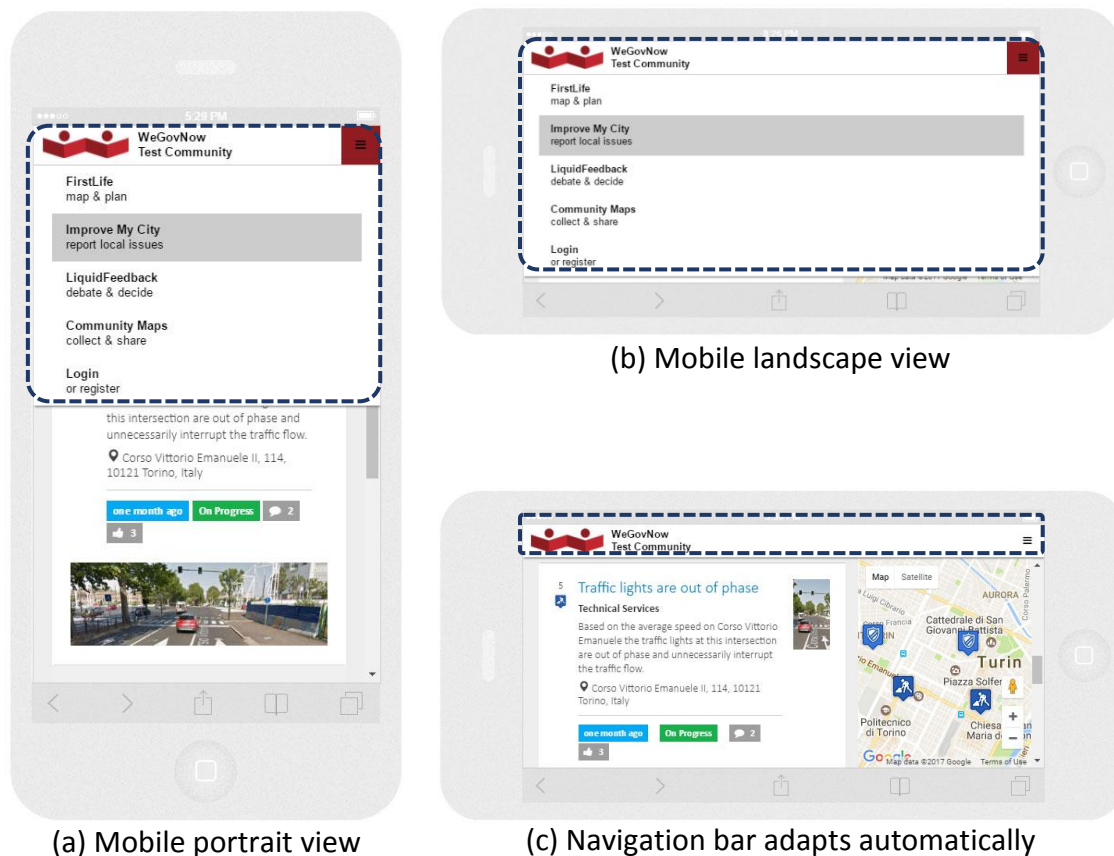


Exhibit 2 depicts a mock-up of the Landing Page as it is envisaged to be displayed in a tablet. As mentioned earlier, responsive design approach has been adapted for the purposes of the WeGovNow platform relying on best practices to make the unified user interface accessible to mobile users. In the background (no UI), OnToMap is responsible for feeding-in information either from available open data repositories or by providing a unified structure of data collected and shared across the individual WeGovNow platform components. OnToMap It also feeds the Landing Page which provides a unified way to retrieve and present the shared information crowd sourced within the overall platform. For

instance, it can provide a unified view of the information available about a geographical entity, initiatives and all other issues connected with these information items.

The navigation bar provided by UWUM (displayed at the top) provides a common gateway for browsing through the overall platform across individual application. The navigation bar is dynamically adjusted according to the selected overall platform features based on particular local requirements, and also according to user preferences.

Exhibit 3: Mock-up of the mobile friendly layout of WeGovNow



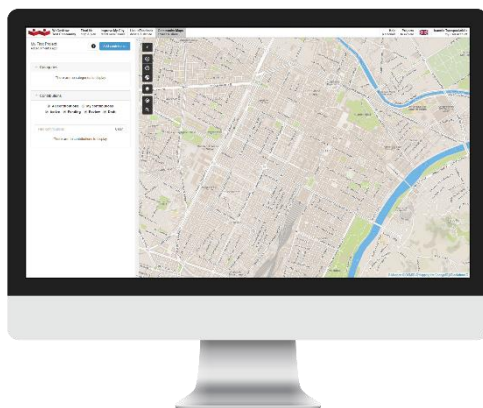
As already mentioned, WeGovNow follows the responsive web design (RWD) approach. This approach aims at allowing desktop webpages to be viewed in response to the size of the screen or web browser used. Exhibit 3 demonstrates how the navigation bar changes its layout (collapses) according to the size of the viewing screen. It also demonstrates adaptations concerning individual components. For example, the layout (a) hides the map completely and increases the size of the photos in full width and also increases slightly the font size in comparison to layout (c) where the map has room to fit on the right side by side with the textual list.

The detailed view of content and layout will depend on the individual platform components respectively. In any case, the look and feel will remain identical for every

component, based on Google’s Material design guidelines as mentioned earlier. In operational terms, this common look is envisaged to be orchestrated by the UWUM module. This will be achieved either by providing predefined SASS or LESS stylesheets or by setting basic colour schemes in JSON format (for details see D3.1).

Both approaches are suitable to support the general concept of having one common navigation bar as well as a common look and feel across all platform components, thus enabling a user to perceive the orchestrated platform components as a single application and achieve a coherent user experience also in terms of integrated functionalities.

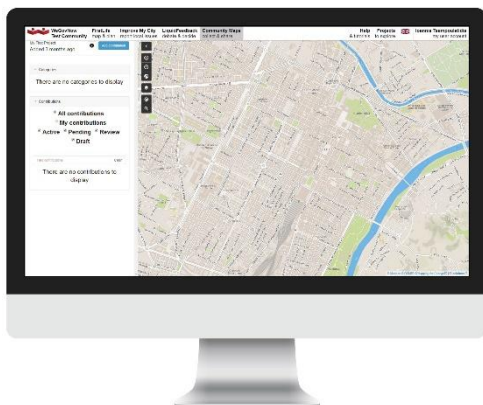
Exhibit 4: Mock-up: WeGovNow with various accessibility preferences



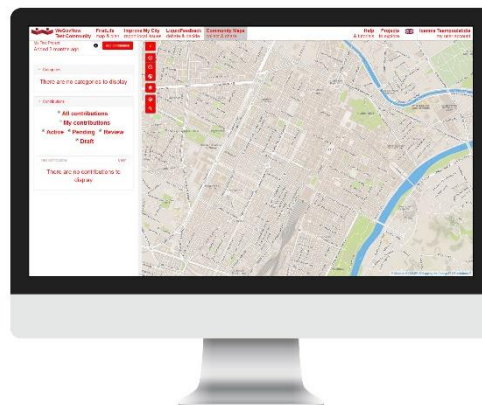
(a) Desktop normal view



(b) Desktop high-contrast view



(c) Desktop big fonts



(d) Desktop big highlighted fonts

The mock-ups depicted in Exhibit 4 show the entry point to the WeGovNow platform according to four different display modes relating to different user profiles. The Trusted

Marketplace component analyses the user profile and personal accessibility preferences with a view to suggesting an appropriate viewing mode. For example, a visually impaired user may prefer using a high-contrast mode. Adaptations do not merely concern colours. They might also include icons instead of colour-bars, textual description instead of logos and the like. The layout itself might also be adapted. For example, the map could be reduced in size and listings with textual descriptions may cover most of screen. Detailed specifications of how web accessibility related requirements of users with disabilities will be accommodated are currently being developed within a dedicated work task (WT 3.8) lead by the specialist organisation FunkaNu.

2.2 Platform components

As described in the previous chapter, the platform architecture enables the seamless incorporation of a number of civic engagement applications that existed prior to WeGovNow. Moreover, a new application, the Trusted Marketplace, will be developed and integrated into the common platform as well. In the following subsections, the main concept underlying each of the individual applications are briefly described. These are augmented by a fiche-type description according to a common set of 14 descriptive dimensions. They do not only concern aspects relevant to the technical integration of the individual components into a single, seamlessly working civic engagement platform, but also concerns the participating pilot municipalities as they will redesign existing working models with a view to ultimately enabling delivery of new types of public services based on the advantages of the new technical infrastructure features as part of the project⁴. Moreover, aspects that are of relevance with respect to the further exploitation of the WeGovNow platform beyond the immediate project duration are addressed as well, e.g. when it comes to licensing issues.

2.2.1 Existing platform components

Each of the WeGovNow components that existed prior to the current project is briefly presented according to the following dimensions:

1. What development languages, environments and APIs used for any frontend elements of the tools - e.g. Google Maps API, Open Layers, JavaScript, Java.

⁴ At an early stage within the overall project, the existing application components were demonstrated online and during a first physical meeting. The purpose of these live demonstrations was to help all project participants, including the three pilot municipalities, to:

- clearly understand the features and details offered by each core component;
- clarify how the pilot municipalities can benefit from each component;
- make clear what is the added value to combine all of them under a common umbrella;
- collate feed back by the pilot sites on whether any further features might possibly be added or modified to meet any particular needs they may have

2. What development languages, environments and APIs used for any backend elements of the tools - e.g. PHP, Node.js, ASP.net, Java, Apache, Tomcat
3. What data storage formats are used - e.g. spatial databases (PostGIS, Oracle, MySQL), ESRI shape files, KML, CSV, non-spatial databases, NoSQL databases
4. Are the tools available as open software - and if so provide links to the GitHub or other location where the software can be found
5. Is documentation available – and if so include a link to the location of this documentation
6. What is the level of maturity of the tools - number of users, where the users are located, how long have the tools been used in a production environment, number of data points captured using the tools?
7. Do you use any secure mechanisms - especially SSL - to enable secure login and/or secure data transfer?
8. What is the availability of any of the services offered by the tools as APIs to facilitate integration?
9. Are any methods of extending the tools available - e.g. by developing plug-ins?
10. Any support offered – online, phone etc. – and if so what are the response times.
(Note that the overall WeGovNow platform will be a prototype and a production support service will not be provided though)
11. What are the main features of your tool/platform?
12. Any additional links to other information?
13. What is the license of your tool/platform - e.g. Apache, MIT, GPLv3 etc., including licensing of the dependencies such as libraries, 3rd party tools, etc.
14. Are you able/willing to re-license?

2.2.1.1 Firstlife

Firstlife is an urban data platform developed to connect crowd sourced and institutional information concerning urban life. In technological regard, it relies upon a GIS-based backend providing REST APIs for CRUD operations on place, events, news, posts and groups. Users can collaborate in mapping the city through a web client, and share different points of view about the same urban entities. Users can explore the data according to time and space dimensions, in terms of different scales using a timeline and an interactive map. Furthermore, users can choose different map themes by switching among category sets. Groups and individual users can easily view and share their maps through URL.

Firstlife conveys public information only. It does not provide any tools or any other form of support directed towards private content, nor is it directed to support personal relations. Users engage in the application in order to collaborate for achieving results of public interest. The platform is open to any institutional or private initiative of public interest.

Firstlife through its web client and APIs provides the following features:

- 1) CRUD operations on “place”, “event”, “new”, “post”, “group”
- 2) Bounding box queries including a time interval and a since parameters
- 3) Adding images, comments and descriptions to existing entities
- 4) Joining/leaving groups
- 5) Subscribe entities and retrieve notifications
- 6) Retrieve personal contents
- 7) Notify improper contents
- 8) Moderate contributions

Ongoing development activities are addressing the geographical aggregation of content and the creation of simplified map-based views exploiting ontologies and geographical information.

Exhibit 5: key characteristics of the Firstlife component

1. Development languages, environments and APIs used for any frontend elements of the tools - e.g. Google Maps API, Open Layers, JavaScript, Java
JavaScript, HTML5, CSS3, Leaflet, AngularJS, ionic, nominatim API, MapBox tileserver API, CartoDB tileserver API
2. Development languages, environments and APIs used for any backend elements of the tools - e.g. PHP, Node.js, ASP.net, Java, Apache, Tomcat
JavaScript, Node.js, Express, Loopback, Strongloop
3. Data storage formats - e.g. spatial databases (PostGIS, Oracle, MySQL), ESRI shape files, KML, CSV, non-spatial databases, NoSQL databases
Postgres/PostGIS, MongoDB, Neo4j
4. Availability of the tools as open software - and if so a link to the GitHub or other location where the software can be found
None
5. Availability of documentation for the tools, including a link to the location of this documentation

API documentation at http://api.firstlife.di.unito.it/docs
6. Level of maturity of the tools - number of users, where the users are located, how long have the tools been used in a production environment, number of data points captured using the tools
Kick off at march 2015, with a main project plus 8 branch projects, 800 users from around the city of Turin and 4.400 data points
7. Use of any secure mechanisms - especially SSL - to enable secure login and/or secure data transfer
None
8. Availability of any of the services offered by the tools as APIs to facilitate integration
REST APIs
9. Methods (if any) of extending the tools - e.g. by developing plug-ins
Angular 1.5 components or any web app using FirstLife APIs
10. Support offered – online, phone etc., response times. Note that the overall WeGovNow platform will be a prototype and a production support service will not be provided though
Ticketing system http://legal-informatics.di.unito.it/firstlife-helpdesk/
11. The main features
FirstLife provides: a map-based interface for collecting and visualize public information about the urban life from institutions organizations and users. The platform supports two types of users: citizen and organizations. Users can create places, events, news, posts and groups on maps. The entities can be interconnected creating a representation of real structures. Groups can share group maps for specific purposes. Users can extract the map of their contents. The platform offers a multidimensional filtering system through map and timeline interaction and category selection.
12. Additional links to other information
http://firstlife.org User sandbox: http://sandbox.firstlife.di.unito.it/ Test: http://test.firstlife.di.unito.it/
13. Licensing - e.g. Apache, MIT, GPLv3 etc, including licensing of the dependencies

such as libraries, 3rd party tools, etc
(licensing details are listed in Appendix A)
14. Are you able/willing to re-license
Yes

2.2.1.2 GeoKey and Community Maps

GeoKey provides a database-driven backend storage, together with a custom API that allows two main tasks namely interaction with data (data creation, editing, deleting) and the creation of projects which group data together. The latter is accessed via a web-based project management interface. In addition to this functionality, an API is also provided for user management, which is again enabled via a web-based frontend. The GeoKey architecture allows the data store to be accessed by any frontend application from the WeGovNow suite (web or mobile based) which can be customised making use of the provided APIs.

A flexible and stylish participatory mapping frontend, Community Maps can visualise data, compare information, and encourage conversation about the places which matter. Designed using the latest web development technologies, Community Maps offers a fast, reliable and intuitive interface. The display is clear, professional, and engaging for all screen types.

The Community Maps tools have been developed to make use of the GeoKey public REST API and separation between GeoKey and Community Maps allows to have one user interface for project management (more technical) and another for data collection/visualisation (intuitive and easy to use). This method hides complexity of the technology behind the minimalistic and modern approach for end-user interaction. All information within Community Maps is stored on GeoKey, where the API enables storage and retrieval of the data via secure SSL connection. This includes user information, which will be unified with the WeGovNow user module (UWUM).

API interaction between GeoKey and Community Maps supports the following activities:

- User authentication and authorisation, editing of user information;
- Retrieving all or singular projects;
- Retrieving all or singular contributions (observation + location + comments + media files);
- Adding and editing contributions (including all relevant information).

Further development will add social media layer to the interaction model of the systems, including user authentication using Google, Facebook, Twitter or any other social account.

Exhibit 6: key characteristics of the GeoKey and Community MapsFirstlife components

1. Development languages, environments and APIs used for any frontend elements of the tools - e.g. Google Maps API, Open Layers, JavaScript, Java
Common: JavaScript, HTML5, CSS3, Twitter Bootstrap, MomentJS. Community Maps: Less for CSS3, AngularJS + plugins, lodash, Mapbox.js + Leaflet plugins, messageformat, moment. GeoKey: jQuery + plugins, Handlebars, Modernizr.
2. Development languages, environments and APIs used for any backend elements of the tools - e.g. PHP, Node.js, ASP.net, Java, Apache, Tomcat
GeoKey: Python + libraries, Django + plugins. For the full list please refer to https://github.com/ExCiteS/geokey (bottom of the page).
3. Data storage formats - e.g. spatial databases (PostGIS, Oracle, MySQL), ESRI shape files, KML, CSV, non-spatial databases, NoSQL databases
PostgreSQL/PostGIS with the HSTORE extension to allow flexible data structures and data storage as key/value pairs
4. Availability of the tools as open software - and if so a link to the GitHub or other location where the software can be found
GeoKey - https://github.com/ExCiteS/geokey
5. Availability of documentation for the tools, including a link to the location of this documentation
GeoKey - http://geokey.org.uk Community Maps - http://excites.github.io/communitymaps/#/api (code API) & http://help.communitymaps.org.uk/en/ (end-user help & tutorials)
6. Level of maturity of the tools - number of users, where the users are located, how long have the tools been used in a production environment, number of data points captured using the tools
Established since 2007, with 167 projects, 960 active users from around the world on both local and multinational projects and 12,000 data points.
7. Use of any secure mechanisms - especially SSL - to enable secure login and/or secure data transfer
SSL certificate issued by COMODO RSA Domain Validation Secure Server CA.
8. Availability of any of the services offered by the tools as APIs to facilitate integration

GeoKey offers public REST API - <http://geokey.org.uk/docs/web-api.html>.

9. Methods (if any) of extending the tools - e.g. by developing plug-ins

GeoKey has been designed from the outset to be easily extensible, for example to allow the incorporation of a wide variety of sources of third party datasets and data streams. It can be extended developing extensions using a boilerplate template that is publically available via GitHub:
<https://github.com/ExCiteS/geokey-extension-boilerplate>

Currently there are extensions developed for:

- Importing data
- Exporting data
- Allow to attach web resources to projects and visualise them on Community Maps alongside native data points
- Integrating with Sapelli mobile app
- Integrating with EpiCollect mobile app
- Integrating with GeoTag-X
- Integrating with CartoDB

Extensions can be developed by anyone: <http://geokey.org.uk/help/how-to-create-an-extension.html>

10. Support offered – online, phone etc., response times. Note that the overall WeGovNow platform will be a prototype and a production support service will not be provided though

Both GeoKey and Community Maps support a live user base of over 900 users and 167 projects outside the scope of WeGovNow, and as such the team will promptly address any issues that arise.

GeoKey - GitHub issue management is used, and non-urgent issues are usually addressed within a week (sprint time).

Community Maps - the system is designed to enable users to report issues via a 'contact us' option which then alerts the specific project administrator to the issue. Assistance is also provided by a help page for the user, accessed via the website <http://help.communitymaps.org.uk/en/>

If using our own hosting, up to one-month backup/recovery time of the server is held as part of our contract with our hosting providers.

11. The main features

GeoKey - <http://geokey.org.uk/help/what-is-geokey.html>

Community Maps supports constructing digital representations of physical space through participatory action. Community Maps provides a map-based interface to create, edit and visualise geographic information. Its map-based interface provides means to add new data as well as editing and deleting existing data. The applications further provide a search to find contributions matching a given keyword and filtering according to the status of a contribution, also by the category.

12. Additional links to other information

Testing environments:

GeoKey – <https://wegovnow-gk.geokey.org.uk>

Community Maps – <https://wegovnow-cm.geokey.org.uk>

13. Licensing - e.g. Apache, MIT, GPLv3 etc, including licensing of the dependencies such as libraries, 3rd party tools, etc⁵

(licensing details are listed in Appendix A)

14. Are you able/willing to re-license

GeoKey is used by multiple platforms and relicensing would need to consider not only WeGovNow but other users and platforms. No current need to relicense has been identified, as GeoKey is not a vital feature of WeGovNow (such as UWUM, logger, and landing page) but rather pre-dates the WeGovNow platform. GeoKey also makes use of an API, which means that as a separate component we are able to make use of our pre-existing licensing.

2.2.1.3 ImproveMyCity

ImproveMyCity is an open source, scalable platform that enables residents to directly report, to their public administration, local issues about their neighbourhood such as discarded trash bins, faulty street lights, broken tiles on sidewalks, illegal advertising boards and the like. Also, more general ideas and suggestions can be submitted more generally [4]. The reported issues are automatically transmitted to the appropriate department in public administration so as to schedule their settlement. Reporting is feasible through a web- and a smartphone-based frontend that adopts a map-based visualisation, making issue reporting a user-friendly and intriguing process. The management and routing of incoming issues is performed through a backend

⁵ Note that the licenses listed here relate to the core GeoKey components as current present. The list will be updated as new functionality - e.g. social media - is brought on stream.

administration infrastructure that serves as an integrated management system with easy to use interfaces.

Apart from reporting a new issue, the frontend allows citizens to add comments or vote on existing issues, which adds a social dimension to the collected content. Also, the platform makes provision for informing the citizens about the progress status of the reported issue and in this way, facilitates the establishment of a two-way dialogue between the citizen and public administration.

The main functionalities of **IMC frontend** can be summarised as follows:

Map-based view of the issues: The reported issues are displayed on the city's map using a different icon for each issue category. The user can navigate by utilising standard map-based functionalities and acquire more information about a certain issue by clicking on corresponding icons.

List-based view of the issues: The reported issues can also be displayed in terms of a list-based view. This view enables providing the user with the most important information about each issue such as: the title, the address, its progress status, the days passed from the submission date and the number of positive votes.

Issue-based view: Upon clicking an icon or a list entry the issue-based view appears. This view presents in a separate page detailed information about the selected issue such as: title, category, address, name of the citizen who submitted it, the date of submission, photos, description, user comments, location on the map, and the number of votes.

Filtering: Users can filter the issues that appear in the map-based or list-based views. The displayed issues can be filtered by: a) the issue category, b) the progress status, c) vote-based ranking, d) owner and e) submission-date ranking.

New issue reporting: The user can submit a new issue by: a) providing a short title, b) selecting the issue category among a predefined set of categories and subcategories that have been determined by the municipality, c) determine the exact location of the problem by moving a marker on the city map (or provide a written address by hand), d) attach an image that describes the problem (this is optional), and f) provide the full description of the issue.

Commenting: Through the "issue-based" view registered users can comment on issues submitted by other users, or answer to the comments made for their own issues by opening a discussion thread.

Voting: Through the "issue-based" view registered users can provide a positive vote on issues they consider significant, allowing the municipality to prioritize the reported problems.

Feedback: Employees of the municipality can also use the commenting functionality to provide written feedback about the reported issues.

Progress status (timeline): The citizens are informed about the progress status of their requests by email, as well as through a progress status bar that appears in the “list-based” and “issue-based” views. A timeline provides transparency to citizens because it makes clear what action was taken by whom and when (“who-what-when”).

IMC backend

Following their submission, reported issues should automatically become visible to the clerks of the appropriate municipality department based on the issue category and/or location concerned. The actual assignment of issues to departments depends on the organisational structure internal to the municipality concerned (e.g. technical service, municipal police, urban planning department, cleaning department, water supply & drainage department, etc.), and it should be aligned with the categories presented to the user when submitting a new issue. The task of the designated employees is to initiate a pre-established resolution process, reply to users’ comments and change the progress status of the issues accordingly. To facilitate this process, ImproveMyCity includes a number of supportive functionalities as follows:

Integrated issue management system: The submitted issues are managed through an integrated environment that is based on a Joomla or WordPress content management system. This environment provides interfaces and rights management mechanisms required to enable the distribution of related management efforts across different departments internal to the municipality.

Web-based administration: The authorized employees manage the entries through a web form that presents all necessary pieces of information and applicable actions.

User comments management: The application provides a special page for displaying the submitted comments allowing the administrators and city officials to have an overview of the discussions about each issue.

Responsibility distribution: The backend interface makes provisions for assigning responsibilities for different categories and/or departments to different municipal employees. Moreover, the application allows setting up many accounts per category which enables distributing the administrative effort across several municipal employees.

Easy customization: The backend interface is fully customizable in terms of user rights, comments, number of categories, notifications on new issues and comments, etc.

Reporting: The application can produce reports with statistically aggregated information, so as to effectively support an assessment of the overall performance of the municipality.

Analytics: A complete ecosystem that provides a dashboard of useful real-time analytics combines citizens’ data in a smart manner to gain strategically and operationally useful insights.

Exhibit 7: Key characteristics of the ImproveMyCity component

1. Development languages, environments and APIs used for any frontend elements of the tools - e.g. Google Maps API, Open Layers, JavaScript, Java
HTML5, CSS3, jQuery, JS, Google Maps API, Google Graphs API, Joomla!, WordPress
2. Development languages, environments and APIs used for any backend elements of the tools - e.g. PHP, Node.js, ASP.net, Java, Apache, Tomcat
Apache recommended (or other web server), PHP (version 7 is also supported as of April 2016), Joomla!, WordPress
3. Data storage formats - e.g. spatial databases (PostGIS, Oracle, MySQL), ESRI shape files, KML, CSV, non-spatial databases, NoSQL databases
MySQL, export to CSV is also available with extra plugin installed
4. Availability of the tools as open software - and if so a link to the GitHub or other location where the software can be found
The web-based version of IMC is completely free and open source. Github repository can be found at: Latest version: https://github.com/itsam/imc Older version https://github.com/icos-urenio/Improve-my-city
5. Availability of documentation for the tools, including a link to the location of this documentation
http://www.improve-my-city.com
6. Level of maturity of the tools - number of users, where the users are located, how long have the tools been used in a production environment, number of data points captured using the tools
TRL9; ImproveMyCity was installed officially for the first time in 2012 and this first installation is still up and running in Municipality of Thermi in Greece. The current implementation status can be summarised as follows: <ul style="list-style-type: none"> ● Installed officially in 28 cities worldwide ● Translated in 19 languages including Dutch, Finnish, German, Greek, Italian, Portuguese (Brazil), Romanian, Spanish, Swedish, Turkish, Vietnamese and Arabic ● More than 1.000 downloads of the open source web-based application ● More than 14.000 registered users ● About 340 officials/clerks handling more than 750 categories

<ul style="list-style-type: none"> • More than 1.700 notification emails per day • Over 8.000 submitted issues and suggestions
7. Use of any secure mechanisms - especially SSL - to enable secure login and/or secure data transfer
SSL is supported and in advance, API incorporates an encryption layer based on AES-256 algorithm. Special care is also given to avoid “Man in the Middle” attacks by using “use-only-once” security token per service call.
8. Availability of any of the services offered by the tools as APIs to facilitate integration
IMC functionality covered by REST-based API. API will be enriched/edited according to WeGovNow needs and requirements. Interactive programmers documentation is also available.
9. Methods (if any) of extending the tools - e.g. by developing plug-ins
<ol style="list-style-type: none"> 1) Modules: Adds new features (e.g. Top Active Users) 2) Themes: Overriding the look ‘n feel (applied to IMC core and modules) both for Joomla! and WordPress versions 3) Plugins: Extends the core usability (e.g. Notifications by SMS) 4) Packages (e.g. new reports, new languages, etc) 5) Libraries (any PHP library, e.g. tcpdf to export in PDF format)
10. Support offered – online, phone etc., response times. Note that the overall WeGovNow platform will be a prototype and a production support service will not be provided though
Up to 24/7 according to support plan. For WeGovNow, Infalia offers the highest support plan available that includes issue ticketing and live Skype calls/chat GitHub issue management is used, and non-urgent issues are usually addressed within two days
11. The main features
Report (Citizens requests, complaints & suggestions) <ul style="list-style-type: none"> • Reported via web or mobile: By allowing citizens to report issues from their home using the web version, or while on the street using the mobile app (iOS & Android). • Accurately positioned: By offering a map to facilitate citizens in determining the exact location of their issue. • Categorized based on their nature: By urging citizens to select one of the pre-specified categories reflecting the municipality departments.

- Easily composed but descriptive: By asking citizens to provide only the information necessary to locate and resolve the issue, such as title, description, location and category.
- Picture enabled: By allowing to attach photos on the spot for describing the issue.
- Commented and voted: By offering the mechanisms to post comments or vote for issues that have been submitted by other citizens.

Administer (Citizens issues through an integrated management system)

- Browse effectively: Issues are presented on the city map, as an ordered list but also in a single-issue page displaying the full set of submitted details.
- Track pending issues: Issues are automatically routed not only to the appropriate department but also to the inbox of the responsible officer.
- Provide direct feedback: Provide written feedback to the citizens giving non-standard explanations for each specific case.
- Distribute responsibilities: Assign one or more officers per category and split the administration effort across the municipality departments.
- Monitor progress and update citizens: Resolve issues and inform citizens by email or through a progress indicator bar (Open -> Acknowledged -> Closed, etc.)
- Customize easily: Fully customize the system in terms of user rights, number and nature of categories, notification rules and localization settings.

Analyse (Citizens data to gain city insights)

- Filter and explore: Combine temporal filters with free keyword-based search and dynamically explore citizens' data through interactive visualizations.
- Discover hidden patterns: Observed spatio-temporal tendencies, unexpected periodicities, significant outliers, popular issues and prevailing terms.
- Aggregate and visualize: Aggregate data based on their spatial density or statistical frequency and visualize them using heat-maps, tag-clouds, colour codes and pie charts.
- Translate patterns into insights: Identify areas with dissatisfied citizens, under-performing departments due to heavy workload, seasonal burden on city infrastructures, etc.

12. Additional links to other information

The sandbox of ImproveMyCity for WeGovNow can be found at <http://WeGovNow.improve-my-city.com>

13. Licensing - e.g. Apache, MIT, GPLv3 etc, including licensing of the dependencies

such as libraries, 3rd party tools, etc
(licensing details are listed in Appendix A and Appendix C)
14. Are you able/willing to re-license
Not possible to re-license to a permissive license due to strong dependency on Joomla! CMS which is under GPL2

2.2.1.4 LiquidFeedback

In WeGovNow LiquidFeedback is the collective opinion formation and participatory decision making component and will be used to organise discussions among stakeholders and allow citizens to express their opinions. This is done in a transparent process (credibility) using collective moderation (self-organising process; no need for a moderator), proxy voting/Liquid Democracy (mutual empowerment; dynamic division of labour, scalability), and preferential voting (no encouragement for tactical voting).

Data flow from LiquidFeedback to map based user interface: LiquidFeedback will be invoked by API calls, e.g. deliver information on existing initiatives in the vicinity of a given location. The LiquidFeedback API will also allow any WeGovNow component to access every user function in LiquidFeedback and this way allow for a seamless integration.

LiquidFeedback also provides the interoperability framework (UWUM).

Exhibit 8: Key characteristics of the LiquidFeedback component

1. Development languages, environments and APIs used for any frontend elements of the tools - e.g. Google Maps API, Open Layers, JavaScript, Java
SQL (PostgreSQL), PL/pgSQL, Lua, WebMCP, Moonbridge Network Server for Lua Applications
2. Development languages, environments and APIs used for any backend elements of the tools - e.g. PHP, Node.js, ASP.net, Java, Apache, Tomcat
see 1.
3. Data storage formats - e.g. spatial databases (PostGIS, Oracle, MySQL), ESRI shape files, KML, CSV, non-spatial databases, NoSQL databases
PostgreSQL
4. Availability of the tools as open software - and if so a link to the GitHub or other

location where the software can be found
http://www.public-software-group.org/liquid_feedback
5. Availability of documentation for the tools, including a link to the location of this documentation
http://dev.liquidfeedback.org/trac/lf/ as well as INSTALL files and SQL comments being part of the distribution
6. Level of maturity of the tools - number of users, where the users are located, how long have the tools been used in a production environment, number of data points captured using the tools
TRL 9; several thousand; worldwide
7. Use of any secure mechanisms - especially SSL - to enable secure login and/or secure data transfer
TLS via reverse proxy (e.g. nginx) is recommended and supported
8. Availability of any of the services offered by the tools as APIs to facilitate integration
- / REST API by the end of project month 8
9. Methods (if any) of extending the tools - e.g. by developing plug-ins
-
10. Support offered – online, phone etc., response times. Note that the overall WeGovNow platform will be a prototype and a production support service will not be provided though
SLA possible
11. The main features
The main features are summarized on http://liquidfeedback.org/ and thoroughly explained in "The Principles of LiquidFeedback".
12. Additional links to other information
http://www.interaktive-demokratie.org/

http://principles.liquidfeedback.org/ http://www.liquid-democracy-journal.org/
13. Licensing - e.g. Apache, MIT, GPLv3 etc, including licensing of the dependencies such as libraries, 3rd party tools, etc
(licensing details are listed in Appendix A)
14. Are you able/willing to re-license
Not necessary (all licenses permissive)

2.2.1.5 OnToMap

The WeGovNow platform includes the backend of OnToMap (excluding all the map management functions offered by the application). Specifically, OnToMap is used as a container of Open Data, as a cross-application data integrator, and as a centralized user activity logger for tracking user activities across WeGovNow applications. The data integration support to be offered for all these functions is achieved thanks to a semantic knowledge representation layer which supports the mapping of heterogeneous domain conceptualizations to a common terminology, the one defined in the OnToMap Ontology. This terminology is used for generating (i) a unified user activity log that captures the actions performed by users in all the WeGovNow applications, and (ii) an integrated view on the information about geographical objects shared by the applications.

The OnTomap Ontology is written in the OWL Web Ontology Language (<https://www.w3.org/OWL/>) and describes domain concepts and relations in a declarative way. Given the ontology, the centralized logging and the integration of information are achieved by collecting log data pushed to OnToMap by WeGovNow applications, and by applying concept translation rules for the translation of data expressed in an external format to the unified format of the OnToMap Ontology:

- The events to be logged and the concept translation rules are represented as JSON objects (www.json.org)
- Geographical data is described in GeoJSON format (<http://geojson.org/geojson-spec.html#feature-objects>)

Moreover, the management of Open Data is achieved by translating information items to a RDF representation consistent with the OnToMap Ontology, which supports its exploration by browsing the relations among items through SPARQL queries. For this translation,

standard open source tools can be used; we exploited GeoTriples (<https://github.com/LinkedEOData/GeoTriples>).

The dataflow between OnToMap and the other system components will be based on software APIs which will support the following types of activities:

- log user activities captured by WeGovNow applications;
- retrieve filtered information about user activities performed in the WeGovNow platform;
- integration of Open Data;
- integration of data shared by WeGovNow applications through the activity logs;
- search for information items based on the specification of geographical queries involving multiple concepts, and exploration of related concepts and items through the exploration of semantic relations between concepts;
- possibly, the exposition of Open Data as Linked Data.

Exhibit 9: Key characteristics of the OnToMap component

1. Development languages, environments and APIs used for any frontend elements of the tools - e.g. Google Maps API, Open Layers, JavaScript, Java
Note: The OnToMap frontend will not be used in WeGovNow; therefore, it is not included as a module of the WeGovNow platform.
2. Development languages, environments and APIs used for any backend elements of the tools - e.g. PHP, Node.js, ASP.net, Java, Apache, Tomcat
<p>Languages: Java, SPARQL (for querying the ontology)</p> <p>Technologies (libraries):</p> <ul style="list-style-type: none"> • JENA (https://jena.apache.org/, for interacting with the ontology and managing linked data) • Guava (https://github.com/google/guava, helper for Java development) • Esri Geometry API (https://github.com/Esri/geometry-api-java), used for geometry processing <p>Frameworks: Play (playframework.com, as web server and for developing OnToMap as a MVC application)</p> <p>Web Servers: Nginx (https://nginx.org/), used as reverse proxy</p>
3. Data storage formats - e.g. spatial databases (PostGIS, Oracle, MySQL), ESRI shape files, KML, CSV, non-spatial databases, NoSQL databases
Representation formats for spatial data:

<ul style="list-style-type: none"> • RDF (w3.org/RDF/, for Linked Data representation) • GEOSPARQL (opengeospatial.org/standards/geosparql, for spatial data representation and queries) <p>Storage services:</p> <ul style="list-style-type: none"> • Parliament (http://parliament.semwebcentral.org/, for storing and managing linked data and spatial data as RDF triples) • MongoDB (https://www.mongodb.com), used for storing the logged activities and the concept translation rules for mapping heterogeneous data to OnToMap conceptualization
4. Availability of the tools as open software - and if so a link to the GitHub or other location where the software can be found
Not at the moment
5. Availability of documentation for the tools, including a link to the location of this documentation
<p>Documentation sources include:</p> <ul style="list-style-type: none"> • OnToMap Logger API specification: https://ontomap.eu/ • OnToMap API specification for data retrieval: https://ontomap.eu/ • Grammar for the specification of concept translation rules for integrating application data into OnToMap Ontology: https://ontomap.eu/mapping_schema.json • Grammar for the specification of user activities to be logged: https://ontomap.eu/logging_schema.json • Link to download the OnToMap ontology in OWL format: http://ontomap.eu/ontology/ • Link to visualize the OnToMap ontology via web browser: http://vowl.visualdataweb.org/webvowl/index.html#iri=http://ontomap.eu/ontology/
6. Level of maturity of the tools - number of users, where the users are located, how long have the tools been used in a production environment, number of data points captured using the tools
OnToMap is a prototype. It has been tested with groups of university students and Ph.D students.
7. Use of any secure mechanisms - especially SSL - to enable secure login and/or secure data transfer
The OnToMap APIs are available under HTTPS and TLS is used to support secure communication between applications. The APIs are available only to authorized

<p>WeGovNow applications: every request must include a X.509 client certificate signed by LiquidFeedback.</p> <p>OnToMap Logger assumes that the users of the user activities to be logged have previously been authenticated by the WeGovNow applications through the UWUM platform; it accepts UWUM IDs.</p>
<p>8. Availability of any of the services offered by the tools as APIs to facilitate integration</p>
<p>The interaction with OnToMap is carried out via REST API invocation (see above APIs). OnToMap also offers an API for uploading the concept translation rules needed for data integration.</p>
<p>9. Methods (if any) of extending the tools - e.g. by developing plug-ins</p>
<p>No, OnToMap is a server-side application and must be queried via HTTP.</p>
<p>10. Support offered – online, phone etc., response times. Note that the overall WeGovNow platform will be a prototype and a production support service will not be provided though</p>
<p>Support can be retrieved by sending e-mails to ontomap@di.unito.it.</p>
<p>11. The main features</p>
<p>Data retrieval in the WeGovNow platform:</p> <ul style="list-style-type: none"> • Provide WeGovNow applications with a unified access point for retrieving Open Data and information crowdsourced by the WeGovNow applications • Heterogeneous data integration by mapping data to a common representation format through the OnToMap Ontology • Centralized user activity logging, integrating heterogeneous user activity information collected by WeGovNow applications
<p>12. Additional links to other information</p>
<p>OnToMap APIs with examples: https://ontomap.eu/</p>
<p>13. Licensing - e.g. Apache, MIT, GPLv3 etc, including licensing of the dependencies such as libraries, 3rd party tools, etc</p>
<p>(licensing details are listed in Appendix A)</p>
<p>14. Are you able/willing to re-license</p>
<p>Possibly, in conformance with the decisions taken by the rest of the consortium</p>

2.2.2 Newly developed platform components

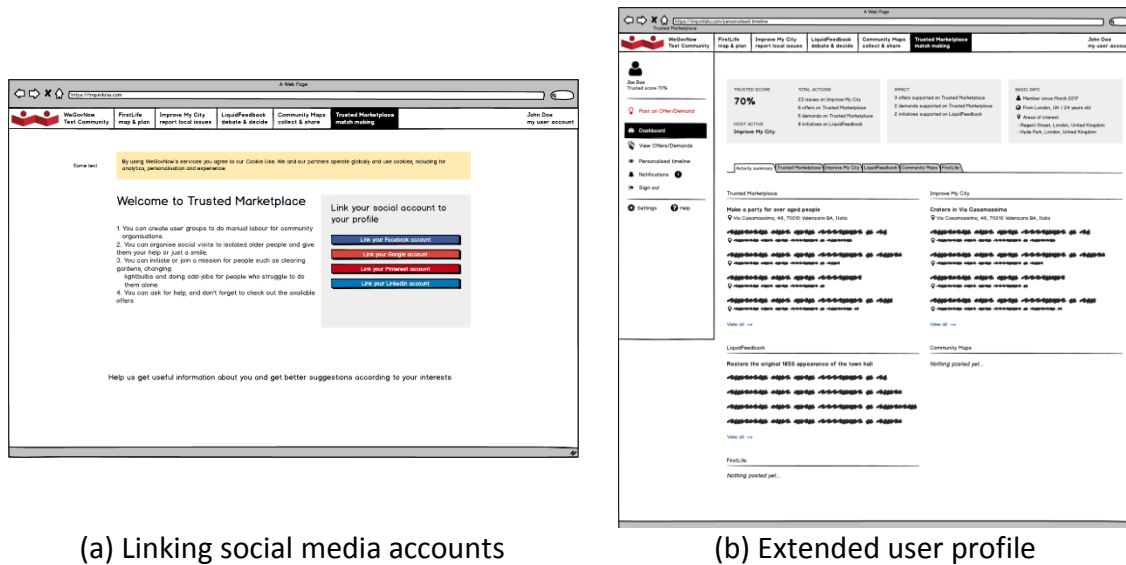
The conceptual approach towards the architectural design of the WeGovNow platform as described earlier (2.1), includes also a number of components which are currently being developed. These are described in the following sub-sections.

2.2.2.1 Trusted Marketplace

The purpose of this component is to design a robust reputation management mechanism that will impose trust among the users of the match-making procedure as part of the overall Trusted Marketplace. The goal of this component is to suggest relative posts to registered users based on their interests, and also to match requests (e.g. by volunteers) offering support or co-operation based on trust among the participating parties. The reputation mechanism being part of this component, although it is not based on an existing production solution, is considered a core component due to its role within the overall platform. Permissive license software will be used for the implementation of the Trusted Marketplace.

The first prototype will be refined according to requirements derived from the trial municipalities. The indicative mock-ups presented overleaf (Exhibit 10) depict envisaged core features. On the left (a), the home screen is shown suggesting the possibility to the users to link their social accounts and achieve better results in the match making process by collecting more data about their interests. On the right (b), the envisaged screen of the extended user profile is shown, including personalised preferences. The complete list of the TMP mock-ups is available in D3.1 in the appendix section 7.5.

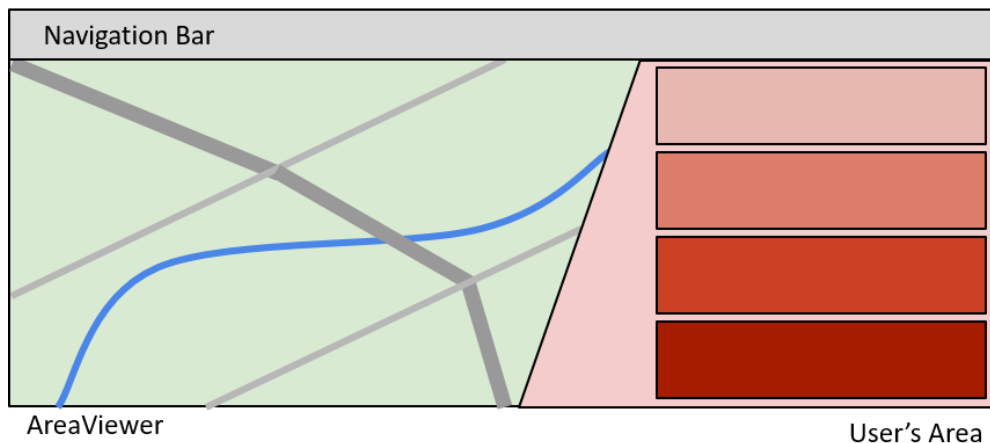
Exhibit 10: Trusted Marketplace mock-ups



2.2.2.2 LandingPage

The LandingPage is the platform component handling the first access of the user to WeGovNow overall platform (for details see D3.1). It serves as an entry point to the platform, capable of handling common errors and providing a summary of the current status of the platform.

Exhibit 11: Initial mock-up of the components of the LandingPage



As depicted in Exhibit 6, the LandingPage comprises different features. An Area Viewer shows a visual, map-based summary of the activities on the platform. In addition, a dedicated User Area provides direct references to user's latest activities, and a dedicated Navigation Bar provides references to components and the user's profile. In particular, the LandingPage supports the user in navigating through the specific features provided by the

individual WeGovNow components. It hosts modules from the various WeGovNow components based on the user's activities.

2.2.2.3 AreaViewer

The AreaViewer is a map-based web application providing a view of aggregated WeGovNow data based on OnToMap. It works in combination with an InputMap component, exploiting the explicit relations between application data of WeGovNow components and OnToMap entities. Up to now, the components in WeGovNow can be classified as:

- Map dependent components (e.g. FirstLife, CommunityMap)
- Alternative components offering hybrid mechanisms, i.e. they can operate with or without a map (e.g. ImproveMyCity)
- Optional dependent components (e.g. LiquidFeedback)

All components require or may use a web map to propose a spatial representation, and all components already produce or will produce spatial data at a later stage. Moreover, assuming that an increasing amount of open data and even additional components may be integrated into the WeGovNow platform in the longer run the costs of providing a map-based view of the spatial information in WeGovNow can be expected to increase respectively. Against this background, the OnToMap logger translation system, converting component logs in a common schema, enables the presentation of a unified summary of the current activities within the platform (activity logs). The AreaViewer's role is to provide a map based view within the LandingPage and within any other component potentially requiring this, thereby avoiding a one-to-one request for information to each component. Conceptually, it will be based on an area-based indexing system exposed via an API rest endpoint. Technically, the AreaViewer represents a component of the LandingPage which can be included in any current or future WeGovNow component through iFrame (embedded) and controlled via URL (with Javascript). More generally, the purposes of the AreaViewer are to enhance the overall look and feel of WeGovNow platform and to provide a coherent visualisation of the current status of WeGovNow instances across components.

2.2.2.4 UWUM

The Unified WeGovNow User Management (UWUM) allows the distributed operation of the WeGovNow applications as well as third party applications (existing e-government applications and future applications) while the users experience the system as one seamless service. UWUM provides the backbone for a distributed system which is modular in terms of the applications and identity providers used. A detailed description of UWUM

can be found in a dedicated deliverable on the WeGovNow architecture (D3.1), including a work report on its development provided as an annex.

2.2.2.5 OnToMap Logger

The OnToMap Logger (OTM Logger) fulfils two primary roles within the WeGovNow platform:

- It enables centralized logging of user activities within the WeGovNow platform. The OTM Logger is a centralized collector of the history of actions performed by WeGovNow users by interacting with the WeGovNow applications. The goal is to overcome the limitations of local activity logging, which would provide each application with a partial view on what users do in the platform. To this end a centralized model is adopted, within in which applications push their log data to a single component (the OTM Logger), which again merges the information managing a unified history of user activities.
- Moreover, data are integrated across WeGovNow applications. The Logger provides a unified view on the data shared in the WeGovNow platform, including the Open Data managed by OnToMap, in order to enable applications to retrieve information collected about geographical objects, initiatives, issues, etc., cross-application.

2.3 Non-functional platform requirements

In order to design a system that meets commonly accepted standards in every aspect, the following basic properties have to be taken into account [1]:

- **Versatility:** offers flexible and efficient mechanisms to address a variety of problems with an economy of expression.
- **Conceptual integrity:** offers a single, optimal, non-redundant way for expressing the solution of a set of similar problems.
- **Independently changeable:** keeps its elements isolated so as to minimise the number of changes required to accommodate changes.
- **Automatic propagation:** maintains consistency and correctness, by propagating changes in data or behaviour across modules.
- **Buildability:** guides the software's consistent and correct construction.
- **Growth accommodation:** caters for likely growth.
- **Entropy resistance:** maintains order by accommodating, constraining, and isolating the effects of changes.

On top of those, compliance with accessibility standards has been taken into account from the very early phases of the WeGovNow project. The above properties can be translated

into a number of questions guiding the development of a conceptual design of the WeGovNow platform:

Changeability: What changes may be needed in the software in the future, and what changes are unlikely and do not need to be made especially easy the future?

The possible changes in a research project with a long lifecycle are implied by the fact that trends in research topics are evolving. Moreover, no one can guarantee that external systems that we are referring to (e.g. social networks) will remain stable, in terms of API, content etc. Therefore, flexibility in changes has to be taken into account as a top priority. This will be achieved by adapting an “agile methodology” development approach.

Performance: What will the performance of the product be?

Performance is a critical factor for the WeGovNow platform in three basic processes, including (a) data acquisition from/to the different components (especially UWUM), (b) analysis (e.g. OntoMap and TMP) and (c) map-based representation. The particularity of the WeGovNow platform is that it needs to be capable of dealing with non-homogenous content that eventually should appear under one common umbrella so that users can interact with a single, unified user interface only. The WeGovNow platform prototype is to demonstrate a pilot application (i.e. showcase the system capabilities in a limited environment) which is to be sufficiently scalable to be able to deal with the real-life number of end-users (citizens).

Capacity: How many individuals will use the system simultaneously? How much data will the system need to store for its users?

The number of users for the prototype system is expected to be relatively small for testing and evaluation purposes. However, the target of the project is to be able to serve a potentially large number of users as well as to store a profound repository in size. For that reason, expandability in capacity deserves sufficient attention. Moreover, the capacity for large volume persistence is an important issue for the project. This is handled by using a capable DB solution for the storage of data per component and beyond individual components where necessary (e.g. UWUM).

Ecosystem: What interactions will the system have with other systems in the ecosystem within which it will be deployed?

The ecosystem consists of both established apps/tools currently in use as well as various online data sources (e.g. social networks). Those systems might change over time. The solution to cope with this challenge is to keep a loose interface with external systems, with generic calls encapsulating the underlying details of each external part of the ecosystem.

Modularity: How is the task of writing the software organised into work assignments (modules), particularly modules that can be developed independently and that suit each other’s needs precisely and easily?

WeGovNow divides by definition the work among several partners in various organizational units (modules). This approach affects the design, since the overall architecture has to be split into interoperable units that can be developed, deployed and tested separately, in an isolated environment. The adaptation of a Service Oriented Architecture with functionalities exposed in loosely coupled web services provides the required flexibility to the development team. Moreover, having in mind that the consortium really believes in open-data, enabling third party modules being easily embedded into the system is a top priority.

Building reliability: Is the platform buildable on the required schedule?

In order to monitor and control such a large project with a long lifecycle, an agile development methodology will be adopted. It is based on frequent iterations being built on top of a rapid prototype. An initial prototype is made available at an early stage. Then features will be added in subsequent iterations. Moreover, special attention has to be given on unit testing with the adaptation of a popular unit testing framework. Within the scope of the Continuous Integration approach, this will ensure building reliability and quality of the product.

Security: If the product requires authorisation for its use or must restrict access to data, how can security of data be ensured?

How can “denial of service” and other attacks be withstood? Due to the sensitivity of the personal information gathered (upon user consent), such as user-profile and interests to support the Trusted Matchmaking mechanism, the system has to be very solid in terms of security. To this end, even from the very first versions of the system the access to information has to be restricted only to users with certain privileges. When the system goes public, additional security mechanisms need to be applied (e.g. SSL). Denial of Service is not a possible threat for the moment and will be taken into account depending on the evolution of the project into a commercial application. UWUM allows for privilege separation in regard to user logins and different applications (for further security considerations in the context of UWUM, please also refer to Appendix 2.3.1 of D3.1).

Accessibility: Is the system accessible by people with disabilities?

For ensuring access to the WeGovNow platform by people with disabilities, the Web Content Accessibility Guidelines (WCAG) 2.0⁶ level AA serve as a reference point. Moreover, the goal is to further address some commonly faced accessibility challenges that are not covered by the current WCAG requirements. To this end, the individual platform components and the integrated WeGovNow ecosystem are being checked for accessibility issues by project partner Funka, according to criteria derived from best practice in the field.

⁶ W3C has developed WCAG 2.0 to help authors and developers ensure that all users, including people with disabilities, should have the possibility to access online information and services. <https://www.w3.org/TR/WCAG20/>.

3 Methodological framework

3.1 The WeGovNow case: Agile and Scrum

The Scrum methodology enables agile development, whereby WeGovNow adopts a Scrum variant which is best suited to the project's workflow. This enable all RTD work to be driven by the needs and preferences of the beneficiaries and user groups rather than following a "waterfall model" sequential process as it is often used for technical development projects.

Problems and obstacles can be identified very early in the development process and thus can be taken care of shortly after emerging. In particular, applying a Scrum variant in WeGovNow enables developing a product that can easily respond to the regular feedback received from the project stakeholders while maintaining a predictable schedule for outcome delivery.

As mentioned earlier, the goal of the WeGovNow consortium is to create a single platform integrating several software components which, at least in part, already existed prior to the project. The partners agreed upon an integration approach relying on open interfaces in order to ensure a maximum level of reusability through recombination with other components. This will also help in ensuring sustainability of project outputs beyond the immediate project duration. As stated in Part B of the grant agreement:

"Whenever possible, the project will use generic open interfaces of the individual components, rather than creating a project specific meta-level. This will not only contribute to avoiding overhead but also ensuring sustainability of the development, as these interfaces are not restricted to the WeGovNow system but can also be used for the individual components. Other than that, this will also allow the combination with non-project components without the barrier of a project specific 'standard'."

Against this background, the task is not to manage the work of individual developers but to effectively organise the cooperation between developer teams and all other consortium partners. This comes with the advantage that existing developer teams can continue to apply established and proven work methodologies.

Consequently, WeGovNow can focus on an agile process to organise the cooperation between the teams. A methodological approach based on an adjusted Scrum process is most suitable for accomplishing this task in an efficient manner, and at the same time it minimises overheads for unnecessary communication between the different teams by observing protocols to be agreed upon by consortium partners.

The three main roles of Scrum are adapted to the WeGovNow project cycle as follows:

- Product owner of WeGovNow: PCC

- Developer: each technology partner handled as one developer
- Scrum master: WP leader

To stress the importance of the communities involved, in addition to the traditional scrum roles, another role is added:

- Stakeholder: the community partners

WeGovNow development is essentially cyclical and proceed in sprints with rather short feedback loops. The sprints produce subsequent prototype versions at the end of their cycles and it is planned to have three publishable prototype versions in total. It is worth noting that each partner internally will define sprints according to their needs and their own pace. The first common WeGovNow sprint deals with UWUM integration. Outcomes are going to be reported under WP3.

User stories are developed in collaboration with stakeholders at the pilot municipalities. The first week of a sprint is a warm up phase. Every group internally assesses and describes their items of work in the backlog. Items of work can be software development, but also elaboration of a use case, negotiation of access to a data source, and their activities. At the end of the week, there is a phone conference where the planning group decides which items of work shall be moved to the sprint backlog and carried out in the hot phase during the next two weeks.

After each week, there is another phone conference for coordination. The fourth week is the cool-down phase. It starts with a remote demonstration of the new development and discussion of the work items achieved. Comments can be supplied and new items of work can be added to the backlog during this week, which is assessed at the beginning of each sprint.

The features added to the backlog of things to do are commonly written as user stories. From a use case, multiple user stories can be obtained. The structure of a story is: "As a <user type> I want to <do some action> so that <desired result>". This is done so that the development team can identify the user, action and required result in a request and is a simple way of writing requests that anyone can understand. A story is an *independent, negotiable, valuable, estimable, small, testable* requirement ("INVEST"). Despite being independent i.e. they have no direct dependencies with other requirements, stories may be clustered into epics when represented on a product roadmap or further down in the backlog.

As cross cutting task, a dedicated work strand focus on ensuring that user needs are adequately met right from the beginning when it comes to designing the WeGovNow platform functionalities and user interfaces. Accessibility and usability evaluations under the Design for All approach will be carried out as an integral part of the agile development

process. In contrast to traditional approaches to accessibility and usability evaluation, iterative evaluations within an agile context need to be rapid and efficient, but must still be thorough enough to reveal any problems that newly added features have introduced.

Embedding these evaluations in an agile software development process provides timely feedback from users and as such provides the basis for intensive collaboration between users, accessibility and usability experts and software developers. System developers and usability/accessibility experts (lead by Funka Nu), during the first week of each sprint participate in a conference call to decide what parts of the application they will be testing – in the form of click dummies or live code. This allows the design team to familiarise themselves with the application or feature and to identify the goals of the current iteration of the user evaluation.

During the third week of each sprint, the usability/accessibility team conducts testing with the participants they recruit. To facilitate and speed up the delivery of feedback to the team, a facilitator leads each test session, and a note taker captures users' comments during each session. Typically, five to eight users will participate in each cycle of usability/accessibility testing.

At the end of each four-week sprint, the evaluation team synthesises their observations and the participants' feedback and reports results to the development team, including recommendations for improving the application or feature. Then the two teams (usability/accessibility experts and software developers) participate in another conference call to discuss the findings, provide clear answers to any questions, and address any concerns

3.2 Interoperability framework and data quality issues

The WeGovNow approach and digital tools aims at complementing existing e-Government services and systems rather than substituting them. Nevertheless, a meaningful interlinking will enable smooth integration into local infrastructures and processes, with a view to ultimately improving transparency, accountability, effectiveness and efficiency of public services and promoting civic participation. To this end, a range of technical and non-technical issues need to be addressed, the primary goal being to achieve successful data exchange, meaning exchange and process agreement. WeGovNow applies a multi-layered interoperability framework including technical interoperability (data exchange), semantic interoperability (meaning exchange) and organisational interoperability (process agreement). During the requirement elicitation and development phase of the overall project a particular effort is made to identify and analyse interoperability requirements, thereby taking into account influencing factors such as legal, political (policy) and socio-cultural issues. This is described in more detail in the following sections. Also, the relevance of quality aspects to geospatial data are discussed, as far as these potentially affect the WeGovNow approach.

3.2.1 Technical interoperability

At the technical level (specifying data formats, data exchange and security protocols, etc.), interoperability of data structures will be ensured through widely-used open standards and technologies such as:

- **Web Services**
- **OSM** (OpenStreetMap) will be utilized by all components in terms of technical interoperability.
- **JSON** as a minimal, readable format for structuring data.
- **REST** (Representational State Transfer) as an architecture style.
- **OAuth 2.0**: As the Authorization Framework
- **GeoJSON**: Towards geographical reference of POI, markers, etc.
- **Schema.org**: For web metadata, common schema, accessibility and indexing

From a platform architecture-related point of view, the development of UWUM⁷ enables interoperability of the WeGovNow platform in terms of a modular system which can easily be extended by third party components even beyond the immediate project duration, e.g. due to a “dynamic client registration”. This is supported by achieving full compliance with the proposed OAuth 2.0 standard (RFC 6749) while extending it (compared to any other known OAuth 2.0 implementation) in such way that additional components can be incorporated on a per-site basis (e.g. through the administration of a municipality) or on a per-user basis, thus empowering the users to use a potentially unlimited number of software tools, each in a particular security scope provided by OAuth 2.0. In addition to single-sign-on, UWUM’s capabilities include:

- Three additional API endpoints for integration (described in sections 2.2. - 2.4):
 - a “navigation” endpoint to incorporate a common WeGovNow navigation bar,
 - a “style” endpoint to retrieve style information (e.g. a colour scheme), and
 - a “client” endpoint for application and service discovery,
- Additional support for the Implicit flow of OAuth 2.0 to allow easier authorization of lightweight JavaScript clients,
- Two different methods for dynamic client registration for yet-unforeseen 3rd-party tools:
 - through X.509 certificates (for client operators without DNS zone access),

⁷ After assessing the mutual dependencies in the development work to be pursued by the WeGovNow partners it was decided to kick-off WP3 in April 2016 already, three months ahead of the originally planned schedule, in order to allow the development of components such as UWUM which serve as a foundation for later development works. A first draft of the UWUM was presented in a dedicated WP3 kick-off meeting on April 14, 2016 in Berlin. The underlying concept is a single-sign-on (SSO) solution on OAuth 2.0’s Authorization Code flow. It was further agreed that Transport Layer Security (TLS) is to be used to secure all communication between UWUM and other components.

- through DNS TXT records (which may be easier for lightweight JavaScript clients),
- Asynchronous (background) login checks through Cross-Origin Resource Sharing (CORS),
- Additional security mechanisms (for details, refer to sections 2.9, 2.15, and 5.5 of the UWUM work report).

In operational terms, UWUM is implemented by Liquid Feedback using synergetic effects between the Liquid Feedback API and the new features required by UWUM.

3.2.2 Semantic interoperability

When it comes to Semantic Interoperability, several characteristics of the data to be exchanged will be agreed, thereby relying on existing anthologies wherever possible, including context-specific data attributes such as units (e.g., metric versus imperial units), validity (e.g., retirement-related information is valid only if the age of the person is greater than 65) and time-period (e.g., a policy may not apply if an event occurred during a certain period of time).

The OnToMap semantic layer will be exploited for semantic interoperability among the WeGovNow components. The OnToMap ontology will be used as an “interlingua” among the various services integrated in WeGovNow, in order to share information about user activities and geographical objects. Specifically:

- The concepts defined in the OnToMap ontology will be used as an official description of the content to be shared among WeGovNow applications (user activity logs, integrated information about geographical data items).
- The ontology might be used to support the introduction of new information items (crowdsourcing) from the frontend applications (Firstlife, etc.): the structured definition of information provided by the ontology might be used by WeGovNow applications to retrieve the expected structure of the data to be inputted (attributes, possible values in terms of domains, etc.).

The OnToMap Ontology is under development and will be further extended in an incremental way, as soon as new data types have to be managed by the WeGovNow applications. The current version of the ontology has been defined taking into account the requirements of FirstLife (domain conceptualization) and the Open Data provided by the Municipalities of Torino and San Donà di Piave up until now.

It is worth noticing that the ontology has been defined adhering to current standards for data representation and interoperability among applications. Specifically, it has been developed using the OWL representation language, which supports semantic knowledge representation and is increasingly used in GIS applications for data integration and for Linked Data Management. Moreover, the high-level concepts of the ontology have been defined by taking into account well-known standards for knowledge representation, such

as Schema.org⁸ (e.g., for defining services, places, events, etc.). Furthermore, for the specification of geographic information, geometries and the like, the ontology adheres to the GeoJSON standard.

OnToMap will play the role of an intermediary between WeGovNow applications and Open Data sources. Possible heterogeneity issues emerging in the data representation adopted by different applications must be analysed at application integration time, and they can be addressed by mapping heterogeneous data to the OnToMap Ontology (which might be updated to accommodate new types of information). In addition, though, some core components (e.g. Community Maps) due to their multi-project incorporation capabilities, do not need to have a fixed schema at all - each project identifies its own data and defines its own schema. So, the system will need to be able to cope with this. In such a case, the schema is not defined by people with any ontology expertise, but rather by the community groups themselves. In order to cope with this particular approach towards knowledge representation the OnToMap Ontology includes a special concept, “AtomicThing”, which models geographic information structured in a free way, and tagged with respect to the data categories to which it belongs.

3.2.3 Organisational interoperability

Beyond addressing issues of technical interoperability and semantic interoperability as described above, a programme of multi-dimension requirements elicitation is being pursued at each of the three WeGovNow trial sites in order to identify any requirements potentially emerging from organisational processes and working models⁹ (WP2), and outcomes are fed into the platform development work strand of the overall project respectively (WP3).

As with any innovation, organisational process change is not always easy to achieve. For public administrations, the well-known phenomenon of organisational inertia may hamper the full and/or rapid exploitation of benefits provided by the WeGovNow approach and digital tools. Within the project this issue has been mitigated, as the participating organisations in general – and the validation sites in particular – display strong commitment to achieving structural change, perceiving WeGovNow as a catalyst of change. When it comes to the wider exploitation of successful outcomes beyond the immediate project duration, organisational inertia may well be an issue.

However, there is evidence that governments are starting to take tangible steps towards developing more participatory and collaborative governance modes, albeit ICT infrastructure facilitating such efforts in a more comprehensive manner is still lacking. Pressure on the ground seems sufficient to drive public administrations into overcoming structural inertia, whereby points of departure may vary considerably across/within

⁸ <http://schema.org>

⁹ For details c.f. the subsequent deliverables to be generated with WP2

countries – both technology and strategy wise. To maximise impact, attention will thus need to be given to ensuring that WeGovNow outputs effectively facilitate innovation, yet also enable local governments/administrations to start from where they currently stand. In this context, the intersections between WeGovNow solutions and existing e-government infrastructures will need to deserve sufficient attention throughout the project's life cycle.

3.2.4 Quality of Data

Data quality is defined in ISO 9000:2015 as the degree to which a set of characteristics (e.g., completeness, validity, accuracy, consistency, availability and timeliness) of data fulfils requirements. In other words, it could be expressed as degree of correspondence of information to user's expectations. Data quality indicators could be defined in the various contexts: completeness, accuracy, precision, trustworthiness, credibility, etc. In order to obtain a comprehensive evaluation of quality, a set of approaches covering wide range of contexts should be utilized.

When making use of data with a geospatial aspect, it is important that users are aware of the underlying quality of the data so that they can make an informed decision that the information is "fit for use". With regards to this data quality, standards are available (such as the ISO 19157 standard on geospatial data quality) that define a number of metrics that can be used to assess this. These metrics include aspects such as geographic accuracy, logical consistency, temporal consistency and data omission/commission. Within the WeGovNow project, research has been conducted as a means of identifying what metrics are important for different types of users (i.e. a layman user looking up local initiatives, or a council employee assessing the density of requests for assistance in a local community), determining how these metrics can be derived from the data, and what methods are appropriate for portraying these quality metrics to the end user. Overall, 82 main methods are presented in the review. The first page of document is depicted below. The full document is available in Appendix B.

Exhibit 11: Data quality methods

Id	MId	Metric	Evaluator	Primary Attributes	Method	Source	Intrinsic/Extrinsic	Priority
1	CI1	Completeness It is the presence and the absence of features, their attributes and relationships. Commission (Excess data present in a dataset) Omission (data absent from a dataset)	Commission/Omission	-Geographic coordinates of features -Road data sets	Road length comparison of OSM data with authoritative data in cell grids.	How good is volunteered geographical information? A comparative study of OpenStreetMap and Ordnance Survey datasets.	Extrinsic	2
2	CI2		Commission/Omission	-Geographic coordinates of features -Area data sets	Visual inspection of urban areas for incompleteness in OSM in comparison with authoritative data. The examination of the raster tiles could show the percentage of completeness.	How good is volunteered geographical information? A comparative study of OpenStreetMap and Ordnance Survey datasets.	Extrinsic	2
3	CI3		Commission/Omission	-Geographic coordinates of features -Road, lake and river data sets	OSM data was compared with authoritative data for the number of objects, the total length and the area of objects. Roads zones, lakes and rivers was compared in two datasets and the percentage of OSM completeness comes out.	Quality assessment of the French OpenStreetMap dataset	Extrinsic	2
4	CI4		Commission/Omission	-Geographic coordinates of features -Road data sets	Assess how complete are the OSM data -separated in different feature categories- in comparison with Google and Bing data. Google and Bing datasets need conversions and transportations before	Comparison of the accuracy of OpenStreetMap for Ireland with Google Maps and Bing Maps	Extrinsic	3

The table contains the following columns:

1. methods' ids (numeric and alphanumeric),
2. metrics' names with short descriptions,
3. correspondent evaluators,
4. primary attributes,
5. short description of method itself,
6. source of a method

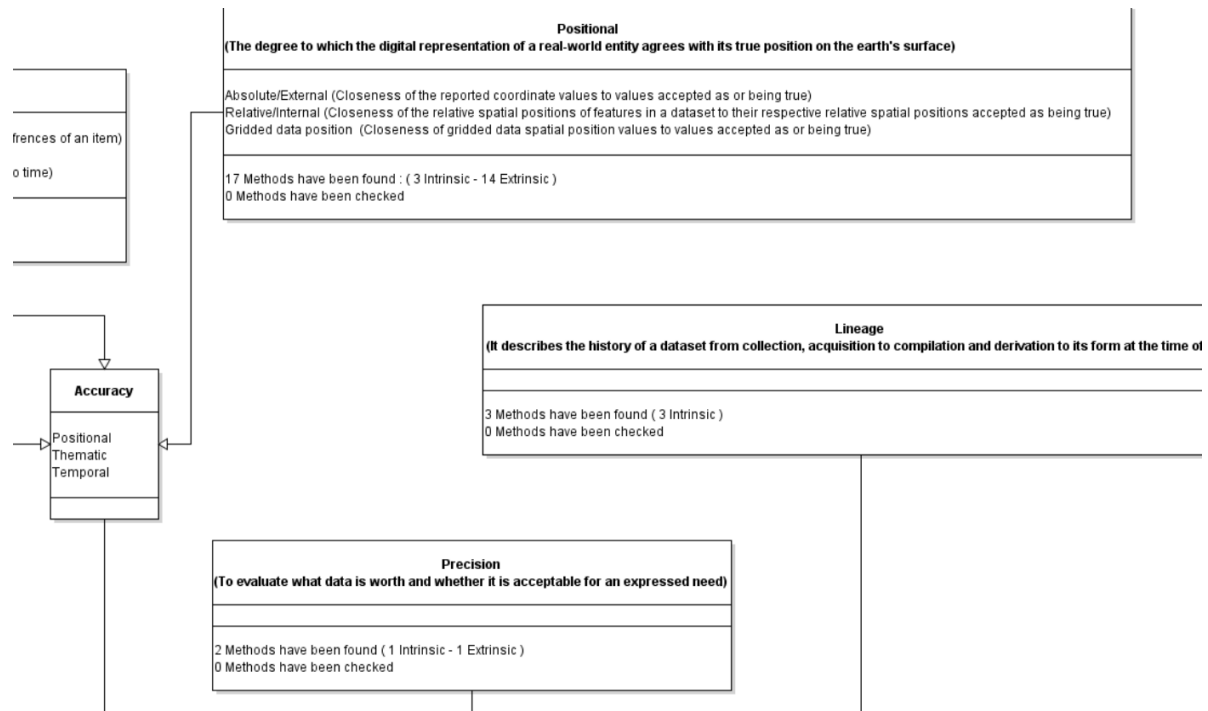
It should be noted that notations and terminology are not well established in spatial data quality assessment area (especially when intrinsic parameters are considered), as well as consensus between authors of methods.

Ids (1) are utilized for internal use, they do not play a meaningful role. Method are classified by the Metric column (2). It is partially based on ISO recommendations. Evaluator column (3) states particular name of quality evaluator. In Method column (4), the implementation is shortly described. Name of relevant paper is described in Source column (5).

Since it is quite problematic to obtain quality data for using as reference sources, it was decided to concentrate attention mainly on intrinsic analysis. In order to distinguish the approaches, Intrinsic/Extrinsic (6) column has been added to the table. The subjective estimation of applicability of methods is provided by Priority column (7): 1 (green) - high priority, 2 (yellow) - medium, and 3 - low.

In order to describe relations of the reviewed methods and present review graphically, UML diagram has been prepared. For illustrative purposes, a part of the diagram is depicted in Exhibit 12. The full version is available in Appendix B.

Exhibit 12: Data quality methods relations in UML



In the previous version of the conceptual framework document (D1.1) it was envisioned that the quality component of the WeGovNow platform would be delivered as a web service that provided feedback relating to quality metrics based on input. After further investigation and findings from the literature review, it was identified that such a service would be infeasible to deliver targeted results due to the inherent concept that fitness for use is largely defined by context and user. For example, though OSM data may be of suitable quality for locating the nearest pharmacy for a person visiting a city for a weekend break, it may not be suitable for use in high risk decision making such as determining a route for an ambulance to get to an emergency. As such, it has been decided that the delivery of quality information will be better suited in the form of reports, which will now be discussed in more detail.

Reporting of data quality will occur at several intervals during the project and cover several aspects. Within the reports, methods identified from the literature review will be implemented and the information portrayed using methods identified from reviewing the literature regarding spatial data quality portrayal methods.

1. An overview of general data quality for OSM in the municipalities – delivered before deployment.
2. Focussed review of data quality for each municipality based on selected scenarios (OSM and data acquired from municipalities where feasible) – delivered alongside deployment.
3. Periodic reviewing of changes in data quality (primarily OSM) during platform deployment – delivered during deployment.
4. Final summary of how the quality of OSM data has changed in the municipalities whilst the platform has been deployed – delivered after deployment.

In addition to these reports, the methods documented from the literature review (as mentioned above) will also be made available in report format. By focussing on a report based approach for addressing spatial data quality, it is possible to place more focus on investigating the methods and to tailor analysis to be more suited for the deployment of the platform in each municipality. The reports will allow municipalities to better understand the data that is being used and the reports can be made available to users of the platform if needed.

Although there is not an intended direct development of a service for the WeGovNow platform, existing tools at UHEI (such as OSMMatrix) will be used and enhanced to allow the assessment of methods identified. Such services currently focus on OpenStreetMap data, but methods investigated will also cover data not necessarily obtained from OSM.

4 User related aspects

In WeGovNow we combine the ‘Design for All’ and ‘User-Centred Design’ approaches to ensure that individual technological components and the proposed integrated solutions are truly inclusive, effective, accessible, and easy to use by different user groups with different perspectives and needs.

4.1 Design for All

Based on widely accepted ‘Design for All’ principles and guidelines a dedicated strand of work addresses common interaction barriers that influence usability and accessibility of the WeGovNow solutions. To this end, the applicability and relevance of the existing ‘Design for All’ guidelines and principles (as discussed in the next sections) in the context of WeGovNow are currently reviewed, especially with respect to the spatial component. We expect that not all guidelines will be relevant in this context, as we are already aware that user interaction differs from the interaction with other types of online information. We will thus further employ guidelines and principles from the spatial context. This is discussed in the following subsections.

4.1.1 Accessibility requirements

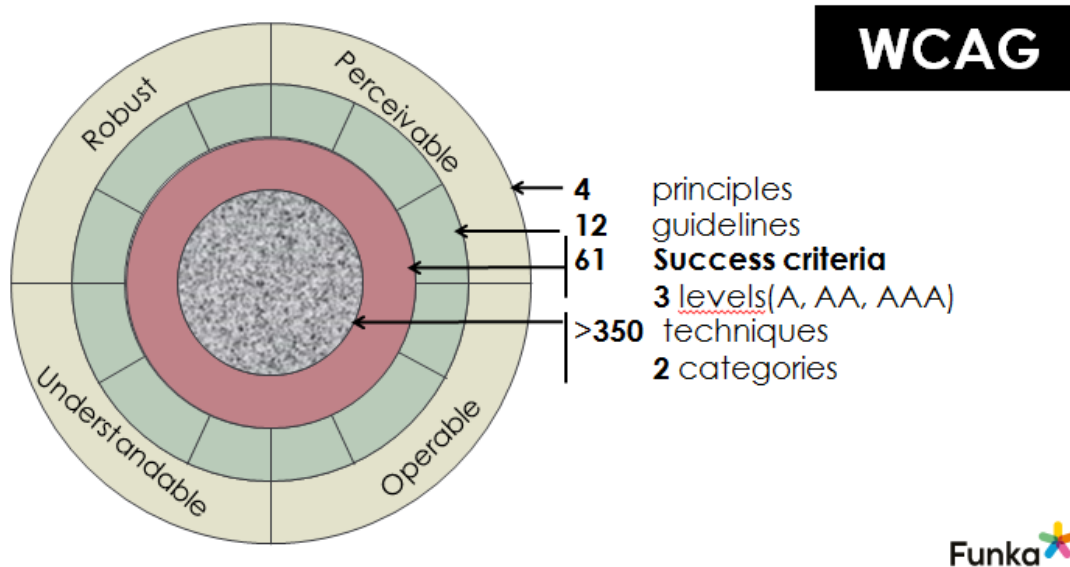
Web Content Accessibility Guidelines 2.0

WCAG 2.0¹⁰ is the most essential standard for web accessibility. It is divided into three levels, A, AA, AAA (with triple A being the most demanding level). WCAG has become a bridge between legislation/policy and the practical work with understanding what constitutes an accessible interface. It is now an ISO standard (ISO/IEC 40500:2012) and by that a globally recognized standard for web accessibility. It is the World Wide Web Consortium (W3C)¹¹ that is responsible for WCAG 2.0 (and other relevant but not as prominent web accessibility standards).

¹⁰ C.f. <https://www.w3.org/TR/WCAG20/>

¹¹ C.f. <https://www.w3.org>

Exhibit 13: An overview of WCAG 2.0



At its core, WCAG 2.0 consists of four general principles and twelve guidelines. These are then translated into 61 measurable success criteria in three levels, A, AA and AAA, with triple A being the most demanding. The success criteria are technology-independent, meaning that they can be applied to any number of different technologies. As a consequence, WCAG is not specific enough to be directly used as requirements for designers and developers. Its guidelines are open for interpretation and specific success criteria can be solved and handled in different ways.

WCAG is often regarded as difficult to understand by designers and developers not familiar with accessibility. An essential part of the work in this project is therefore to transform the general requirements presented in WCAG into specific and easily understood and easily controllable requirements. Also, note that not all of the material presented in WCAG 2.0 is applicable for the WeGovNow platform.

WCAG 2.0, level AA is designed to be the standardized minimum baseline for accessibility. Legislation and standards for public procurement in many parts of the world will address this level of accessibility as the absolute minimum.¹² A failure to comply with the AA level may render the product or service illegal or otherwise not possible to procure.

¹² A new EU Directive on making the websites and mobile apps of public sector bodies more accessible to people with disabilities has been published on 2nd December 2016 and entered into force on 22nd December 2016. The Member States have 21 months (by 23 September 2018) to transpose the Directive into national legislation. C. f. Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32016L2102> (latest access: 15/01/2017)

Level AA is mainly targeting the technical construction of a web interface. To accomplish this level of accessibility, it will be essential for the system to correctly apply standards for HTML and CSS, to correctly use scripts and to be familiar with the specific concepts of WAI-ARIA and the general concepts of Rich Internet Applications.

Level AA also aims to ensure that users are able to connect to the service using their own assistive technologies, such as screen-readers, screen enlarging software, text to speech software and other assistive software and devices.

WCAG 2.0 has been heavily criticized for overlooking cognitive accessibility requirements. To address this problem, the W3C has established a Cognitive and Learning Accessibility Task Force¹³, aiming to identify future needs for updates in WCAG. WCAG 2.0 has also been criticized for having too much of a technical focus^{14,15}.

Authoring Tools Accessibility Guidelines

The Authoring Tool Accessibility Guidelines (ATAG)¹⁶ focus on the publishing environment. In WeGovNow users will both be end-users but also authors, posting information. In this context, it is important to consider relevant guidelines in ATAG as well as WCAG.

Other relevant guidelines

Over the last decade, there has been a growing number of research studies, which explore how people (especially non-expert users) interact with online mapping interfaces in various contexts (i.e. from simple online mapping such as Google Maps, which support way finding, to more advanced applications that support different levels of public engagement in governmental decision-making). There is already evidence that specific interaction aspects (which focus both on the user and on the interface/map design) may pose difficulties and barriers to non-expert users. Together with accessibility principles we will also evaluate the WeGovNow spatial interfaces against popular guidelines, such as Nivala's (2008) [3] usability guidelines for online mapping and Skarlatidou et al., (2013) [2] trust guidelines for public engagement.

Accessibility guidelines for this project

A list of requirements both in regard of concept and design, and techniques can be found in Annex A.

¹³ "Cognitive and Learning Disabilities Accessibility Task Force." [Online]. Available: <http://www.w3.org/WAI/PF/cognitive-a11y-tf/>. [Accessed: 03-Feb-2016].

¹⁴ S. Lewthwaite, "Web accessibility standards and disability: developing critical perspectives on accessibility," *Disabil. Rehabil.*, vol. 36, no. 16, pp. 1375–1383, 2014.

¹⁵ L. Seeman, "Formal Objection to WCAG 2.0," W3C Mailing list, 2006. [Online]. Available: <http://lists.w3.org/Archives/Public/public-comments-wcag20/2006Jun/0118.html>. [Accessed: 24-Jan-2016].

¹⁶ <https://www.w3.org/WAI/intro/atag.php>

4.1.2 Accessibility Validation tools

There are a huge set of different validation tools available when testing for accessibility. They are not used to check for compliance but are used to identify potential problems. Tools that will be used in this project include:

- The W3C Markup Validation Service¹⁷ will be used to verify if the HTML code follow an HTML standard correctly.
- Web Accessibility Toolbar¹⁸ will be used to inspect how different objects are implemented on single web pages, e.g. if something that looks like a heading is created with HTML elements h1 to h6.
- Colour Contrast Analyser¹⁹ will be used to verify if text colours have enough contrast to the background.
- The "Developer Tools" in Internet Explorer²⁰ will be used to inspect and find specific code occurrences, e.g. if a form object is correctly associated with its label text.

4.1.3 Accessibility testing

Expert evaluations and reviews

Project partner Funka has a long-standing track record in accessibility related design in different fields. Their experts have accumulated considerable knowledge about what solution works for different types of users, and also how different types of problems can be solved in order to make a given system accessible and useable. Funka's experts are evaluating the WeGovNow system in order to identify potential problems even before involving any end users. This helps also helps in better targeting user involvement at a later stage. The expert evaluations are documented in terms of dedicated reports, typically according to a common structure including the following dimensions:

- reference to the accessibility problem/the relevant checkpoint;
- background description of the problem/the targeted area;
- description of the actual problem identified;
- description or a recommendation of what to do/how to solve the problems;
- as far as meaningful, code examples that can be directly implemented by developers.

Different experts tend to be involved, depending on the nature of the particular accessibility problems being addressed.

¹⁷ <https://validator.w3.org>

¹⁸ <https://www.paciellogroup.com/resources/wat>

¹⁹ <https://www.paciellogroup.com/resources/contrastanalyser>

²⁰ [https://msdn.microsoft.com/library/hh968260\(v=vs.85\).aspx](https://msdn.microsoft.com/library/hh968260(v=vs.85).aspx)

User testing and involvement

Expert evaluation is a great means of getting feedback based on current knowledge, but when building something new that hasn't been tested with users in previous projects, it is necessary to include users in the process. When testing with users, depending on what is to be tested in a given situation, Funka tries to include users with some kind of impairment that affects their ability to use the system. The latter could be related to problems with:

- Cognition;
- Hearing;
- Vision;
- Reading and writing;
- Motor, physical problems with the body;
- Social interaction.

Funka uses a number of testing tools. Depending on the issues identified, a “toolbox” available for utilisation includes for instance:

- Tools for automated tests of technical issues;
- Eye-tracking (Tobii);
- Concept testing tools (Loop 11, Optimal workshop);
- Prototyping tools (Axure, Zeplin);
- Survey tool (Surveygizmo).

Depending on the issues to be addressed, also number of assistive devices and technologies is available for testing purposes such as:

- Screen-readers;
- Enlarging software;
- Text to speech software;
- In-built features in operating systems;
- In-built features in browsers;
- Devices replacing the use of ordinary mouse and keyboard.

4.2 User-Centred Design

A user-centred design (UCD) approach is adopted in the customisation stage of WeGovNow. First, UCD helps to capture user requirements, needs, and expectations and create our personas and use case scenarios accordingly. Second, UCD is used to evaluate individual and integrated components with real users to ensure that needs are fully met and that the interfaces are effective and efficient to use by different user groups. Third, special emphasis is given towards identifying user trust concerns and implementing a trust-oriented design to ensure that the proposed system is not only easy to use and efficient but that it is verifiable by its intended audience and that it can be used to establish a trusting relationship amongst the users and the local authorities.

4.2.1 User requirements: Personas and use case scenarios

A set of use case scenarios are being identified and consolidated in collaboration with citizens and local stakeholders at the three trial sites. We engage in discussions with local stakeholders from the early stages to identify local problems and needs and work with them towards understanding how WeGovNow can fully support them to address them. For example, while the city of Turin may focus on the use of green spaces and the regeneration of common goods, San Dona di Piave may use our tools to address local concerns about ageing and in social care.

Each use case scenario consists of a descriptive part ('Which party is going to act in what way and for what purposes?') and an analytical part ('Which requirements need to be met when implementing the scenario in technological, organisational, legal and other regards?'). Once the use case scenarios are identified in each of the three trial sites we continue working with local stakeholders and citizens to identify key user needs and expectations and build the key personas for each use case.

In D2.1 (WP2) a preliminary description of the major issues in each of the three trial sites is provided and in addition the following questions are answered:

1. What are the actions, initiatives, use-cases, projects you are currently working on that could benefit from WeGovNow?
2. What is that your Municipality wants to achieve by using WeGovNow from i) their citizens' point of view (end-users) and ii) from the official's / clerk's point of view (backend-administration)?
3. What is your current approach to community engagement (so that we could identify potential aspects that should be included in WeGovNow according to your needs and requirements)?
4. What are the technologies you already using and you want to be integrated with WeGovNow and possible conflicts?

4.2.2 Evaluation: maximising usability, usefulness, and trust

One of the many advantages of working closely with the local stakeholders and citizens to understand local concerns and shape corresponding user requirements and needs is to demonstrate how WeGovNow is used to solve real problems in real settings maximising the perceived usefulness of interacting with WeGovNow tools.

To further understand user requirements with respect to the provided functionality and the interface design we will run usability and co-operative evaluation sessions with real users. As it is the case with most UCD practices, the number of sessions as well as the number of participants that will be engaged in each session, depends greatly on contextual factors and implications of each use case, which makes it impossible to provide a specific methodological plan for user testing at this stage. In the early stages our aim will be to

understand the design and functionality strengths and weaknesses for each tool separately (especially those that influence the perceived usability and trustworthiness) within the context of each use case. The findings from the evaluations will be used to assist development and improve functionality and interface design.

During the pilot phase of the overall project (WP4), one part of the evaluation work will focus on gathering the perceptions of the platform users, including front-end users and back-end users, as to whether desired levels of utility, usability and reliability are achieved by the technical platform under day-to-day conditions (see D4.1). Also, work will be directed towards gathering information on the extent to which any desired and/or undesired impacts are achieved when it comes to the new public services offered with help of the WeGovNow technological infrastructure.

5 Legal, data protection and ethics standards

5.1 Legal requirements on the processing of personal data

WeGovNow will partly obtain personal data of individuals for analysis (e.g. Trusted Marketplace). This could be either the real identity of individuals or metadata which could indirectly lead to the identification of individuals. This can be expected to be the case in all three pilot municipalities; end users (citizens) may want to know the identity of the sources/contributors and possibly create their profiles.

Some of this personal data will be obtained from social media networks. The fact that personal data was made public on social media networks (or anywhere else) does not mean that the data protection legislation stops applying. Particularly, the principles of personal data processing (always under user consent), the obligations of data controllers as well as the rights of data subjects stay intact and need to be given full attention. The same applies for personal data given explicitly in the WeGovNow during registration through UWUM, local registration or profile editing in general.

One of the main points to determine at this stage of the project is the legal ground for processing personal data in WeGovNow. Due to the nature of the project, three options are principally available: a) user consent, and b) legitimate interest of the pilot sites (the set of legitimate interests will be defined, published and it will be clarified how they relate to the WeGovNow project), and c) verifiability of the results. It is envisaged that a combination of these grounds will be utilised, on a case by case by basis. This however posts several research questions that will be addressed in the project. In the planned environment

- 1) how do we request consent that will be valid which will not be possible without unambiguous positive identification (danger of confusion or identity theft), and

- 2) how do we comply with the obligation to inform data subjects about the processing of their personal data when this data is not collected directly from them.

It should be noted that the above list refers solely to WeGovNow as a research project. In the exploitation phase, these formal settings will have to be re-evaluated, taking into account an entity that would be deploying the platform, its location, purpose, etc. In those instances, it will arguably be the best to only collect information necessary to accomplish a legitimate purpose whereas each purpose needs to be publicly documented, and to require an informed consent by the users affected. Following these simple rules, any legal issues with privacy laws should be resolvable for exploitation purposes.

Apart from privacy and data protection requirements, other legal aspects deserve attention in the framework of WeGovNow. In particular, there is a need to take into account rules on intermediary liability, media law and copyright law. Moreover, in the design process the Terms & Conditions for social networks' APIs will be consulted. These rules, set up entirely by social media providers, may create additional limitations to WeGovNow. These aspects will be further analysed during the reminder of the project.

5.2 Ethics standards

All work within WeGovNow is carried out according to relevant legal and ethical standards. The project aims at tapping into emerging technologies for effectively supporting co-production by civic society stakeholders and collective proposition development, whereby citizens are seen as partners as opposed to customers in the delivery of public services. This is to be achieved by integrating a set of innovative technologies within a unified citizen engagement platform. Against this background, legal and ethical requirements concern different fields of activity within the overall project, in particular when it comes to:

- involving human beings in the technology development process;
- processing personal data of WeGovNow platform users;
- piloting the WeGovNow platform under day-to-day conditions in a real-world setting.

Ethics related requirements on the project are specifically addressed in a dictated document, the Ethics & Gender Management Plan (D6.2), generated under WP6.

5.3 European-level regulation

At the European level, different regulatory fields have been identified which are potentially relevant to WeGovNow. These are briefly discussed in the following subsections.

5.3.1 Fundamental human rights

The European Union Charter of Fundamental Rights was adopted in 2000. For the first time in the European Union's history, it has set out in a single text the whole range of civil,

political, economic and social rights of European citizens and all people's resident in the EU. The Charter provides a general value framework for the European Union as a whole and its individual Member States. With respect to the thematic focus of WeGovNow, some basic principles of particular relevance to ICT-enabled citizen participation can be derived from the Charter text as follows:

- respect for the integrity of a person,
- respect for privacy and family life,
- protection of personal data,
- non-discrimination,
- integration of persons with disabilities.

5.3.2 Data Protection and Privacy

Directive 95/46/EC (DPD)

As discussed above, WeGovNow is likely to obtain personal data of individual users for different purposes. Depending on the outcomes of further use case consolidation to be pursued at each of the three pilot sites during the next project phase, this may concern the real identity of individuals or metadata which could indirectly lead to the identification of individuals. Some of this data is likely to be derived from social media networks external to the WeGovNow platform. Also, personal data may be directly entered by the user into the WeGovNow platform, e.g. for local registration or profile editing purposes through UWUM in general. In both cases, WeGovNow has to comply with data protection and privacy legislation.

At the European level, the so called Data Protection Directive complements fundamental rights in the area of personal data protection. Personal data are defined as "any information relating to an identified or identifiable natural person ("data subject"); an identifiable person is one who can be identified, directly or indirectly, in particular by reference to an identification number or to one or more factors specific to his physical, physiological, mental, economic, cultural or social identity;" (art. 2 a).

By adopting the Data Protection Directive of 1995 (Directive 95/46/EC) the European Union set legally binding rules for the protection of individuals with regard to the processing of personal data. Through this regulation basic principles for processing personal data have been stipulated which have to be followed in all Member States:

- Transparency: The data subject has the right to be informed when his or her personal data are being processed. The controller must provide his or her name and address, the purpose of processing, the recipients of the data and all other information required to ensure the processing is fair. (art. 10 and 11). Data may be processed only under the following circumstances (art. 7):
 - when the data subject has given his or her consent

- when the processing is necessary for the performance of or the entering into a contract
- when processing is necessary for compliance with a legal obligation
- when processing is necessary in order to protect the vital interests of the data subject
- when processing is necessary for the performance of a task carried out in the public interest or in the exercise of official authority vested in the controller or in a third party to whom the data are disclosed
- when processing is necessary for the purposes of the legitimate interests pursued by the controller or by the third party or parties to whom the data are disclosed, except where such interests are overridden by the interests for fundamental rights and freedoms of the data subject

The data subject has the right to access all data processed about him or her. The data subject even has the right to demand the rectification, deletion or blocking of data that is incomplete, inaccurate or isn't being processed in compliance with the data protection rules. (art. 12)

- Legitimate purpose: Personal data can only be processed for specified explicit and legitimate purposes and may not be processed further in a way incompatible with those purposes. (art. 6 b)
- Proportionality: Personal data may be processed only as far as it is adequate, relevant and not excessive in relation to the purposes for which they are collected and/or further processed. The data must be accurate and, where necessary, kept up to date; every reasonable step must be taken to ensure that data which are inaccurate or incomplete, having regard to the purposes for which they were collected or for which they are further processed, are erased or rectified; The data should not be kept in a form which permits identification of data subjects for longer than is necessary for the purposes for which the data were collected or for which they are further processed. Member States shall lay down appropriate safeguards for personal data stored for longer periods for historical, statistical or scientific use. (art. 6) When sensitive personal data (including religious beliefs, political opinions, health, sexual orientation, race, membership of past organisations) are being processed, extra restrictions apply. (art. 8)

The Data Protection Directive of 1995 was complemented in 2002 (Directive 2002/58/EC), with particular respect to the processing of personal data in the electronic communication sector. It applies to all matters which are not specifically covered by the 1995 Directive. The main provision made in the 2002 Directive concerns the duty of electronic communication providers is to ensure security of services (art. 4). This obligation also includes the duty to inform subscribers whenever there is a particular risk, such as a virus or other malware attack (art. 4.2). Another provision concerns maintenance of confidentiality of information.

Here the addressees are Member States, who should prohibit listening, tapping, storage or other kinds of interception or surveillance of communication and related traffic unless the users have given their consent or specific conditions (art. 15.1) have been fulfilled.

In January 2012, The European Commission put forward its EU Data Protection Reform (IP/12/46) [5]. In December 2015, an agreement was found with the European Parliament and the Council, following final negotiations between the three institutions (so-called 'trilogue' meetings). On 8 April 2016 the Council adopted the Regulation and the Directive. And on 14 April 2016 the Regulation and the Directive were adopted by the European Parliament. The official texts will shortly be published in the Official Journal of the European Union in all official languages. The new rules will become applicable two years thereafter. The new rules are expected to have a number of impacts on social networks and thus deserve attention by WeGovNow right from the beginning, although they will become effective only in two years time from now. For instance, providers will have to take account of the principle of 'data protection by default', which means that the default settings should be those that provide the most privacy.

Directive 2000/31/EC

The so called e-Commerce Directive defines rules for the provision of so called Information Society Services, both within and between Member States. Although WeGovNow does not intend to develop an e-Commerce platform provisions made by this Directive might be relevant to the project, e.g. when it comes to liability issues, as services that could potentially be delivered through the WeGovNow platform might be regarded as Information Society Services.

5.3.3 eSignature

Directive 1999/93/EC

This Directive establishes the legal framework at European level for electronic signatures and certification services [6]. The aim is to make electronic signatures easier to use and to help them become legally recognised within the Member States. The Directive has introduced two new concepts: the advanced electronic signature and the qualified certificate. The main provision is that an advanced electronic signature based on a qualified certificate satisfies the same legal requirements as a handwritten signature. It is also admissible as evidence in legal proceedings. Furthermore, this Directive lays down the criteria that form the basis for legal recognition of electronic signatures by focusing on certification services, namely: common obligations for certification service providers; common rules on liability to help build confidence among users; and cooperative mechanisms to facilitate trans-border recognition of signatures and certificates with third countries.

The Regulation (EU) No 910/2014

The EU Regulation on electronic identification and trust services for electronic transactions in the internal market (the so called eIDAS Regulation) adopted by the co-legislators on 23 July 2014 aims at enabling secure and seamless electronic interactions between businesses, citizens and public authorities. The eIDAS Regulation, which is based on the Commission Communication (COM (2012) 238 final of 4 June 2012), is expected to increase the effectiveness of public and private online services, eBusiness and electronic commerce in the EU. The aim is to:

- ensure that people and businesses can use their own national electronic identification schemes (eIDs) to access public services in other EU countries where eIDs are available.
- create a European internal market for eTS by ensuring that they will work across borders and have the same legal status as traditional paper based processes. It is assumed that only by providing certainty on the legal validity of all these services, businesses and citizens will use the digital interactions as their natural way of interaction.

This regulation will repeal Directive 1999/93/EC with effect from 1 July 2016. It enhances and expands the acquis of Directive 1999/93/EC.

5.3.4 Re-use of Public Sector Information (PSI)

Directive 2003/98/EC

The term Public Sector Information (PSI) refers to documents, databases and other information produced, collected and stored by public sector bodies. The Directive sets out a framework for the conditions of its reuse and aims to ensure equal treatment for commercial editors within the internal market. Public sector organisations authorising this type of reuse continue to hold copyright and related rights. They are, however, invited to exercise their copyrights in a way that facilitates re-use.

Directive 2013/37/EU

This Directive of 2003 was amended by Directive 2013/37/EU of the European Parliament and of the Council of 26 June 2013 on the re-use of public sector information. The latter lays down a clear obligation for Member States to make all documents re-usable unless access is restricted or excluded under national rules on access to documents and subject to the other exceptions laid down in this Directive. The amendments made by this Directive do not seek to define or to change access regimes in Member States, which remain their responsibility. In addition, the scope of Directive 2003/98/EC is to be extended to libraries, including university libraries, museums, and archives.

5.3.5 eAccessibility

As mentioned earlier (c.f. footnote no. 12), a new EU Directive on making the websites and mobile apps of public sector bodies more accessible to people with disabilities has been published on 2nd December 2016 and entered into force on 22nd December 2016. The Member States have 21 months (by 23 September 2018) to transpose the Directive into national legislation²¹.

Beyond this directive other initiatives are relevant to WeGovNow when it comes to users with disabilities:

- the ratification of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) by the EU in December 2010,
- the finalisation of the work on standardization mandate 376 to incorporate accessibility in public ICT procurements (February 2014) and the publication of the European Standard on Accessibility of ICT products and services in public procurement (EN301549)²²,

The new EU Directive on the accessibility of the public sector bodies' websites as well as the new standard for public procurement (EN301549) refer to WCAG 2.0 level AA. As described earlier, the interface developed within the WeGovNow project therefore will comply with this standard to support exploitability of the platform by municipalities throughout the EU beyond the project duration.

5.3.6 Ethics approval

At the European level, formal ethics approval procedures are currently regulated by Directive 2001/20/EC, the so called Clinical Trial Directive. This directive will soon be superseded by a new Clinical Trials Regulation (CTR) EU No 536/2014 which will become applicable on 28 May 2016. With a view to enforcing compliance with the rules set out in the Clinical Trial Directive of 2003, Member States are required to implement Ethics Committees. In relation to each trial that falls within the scope of the Directive, among other things, they have the duty to express an opinion on the clinical trial protocol, the suitability of the investigators involved in the trial and the adequacy of facilities, and on the methods and documents to be used to inform trial subjects and obtain their informed consent. According to European-level regulation a formal ethics approval is legally required only for clinical trials. As it is not intended to conduct a clinical trial, a formal ethics approval is therefore to be required according to EU-level regulation.

²¹ C. f. Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32016L2102> (latest access: 15/01/2017)

²² www.etsi.org/deliver/etsi_en/301500_301599/301549/01.01.01_60/en_301549v010101p.pdf

However, project partner UCL is required to go through an internal ethics approval process, in particular when a project involves working with groups of citizens and local stakeholders. As part of WeGovNow, UCL will ensure that the project's procedures comply with UCL Research Ethics Committee guidelines. The application process is detailed in [11], and the terms of reference for the Ethics Committee can be found in [12].

5.4 National-level regulation

In the following subsections, legislation and regulation enacted the WeGovNow trial countries are presented.

5.4.1 Italy

Data Protection & Privacy

In 1996, the Italian Data Protection Act was enacted to implement the European Union Data Protection Directive. The Data Protection Code of 2004 replaced the previous Data Protection Law (Law no. 675/1996), as well as a number of other legislative and regulatory provisions [13]. The Data Protection Code updates, completes and consolidates Italy's data protection legislation (1996) by introducing various innovations and conforming national legislation to European regulations, in particular the Data Protection Directive (95/46/EC) and the Directive on privacy and electronic communications (2002/58/EC). The code aims to strengthen the data protection rights of individuals, allowing them to exercise their rights and instigate proceedings more easily. The Code was lastly amended on 4 November 2010. The Data Protection Commissioner ('Garante Privacy') is in charge of supervising and enforcing the application of the Data Protection Code. In an effort to simplify the complaint process, the Commissioner has published a complaints' form on its website.

Freedom of Information

Chapter V of Law n. 241/90 of 7 August 1990 provides for a limited right of access to administrative documents. Public bodies must respond to a request for administrative documents within 30 days. Information can be withheld when it relates to (a) security, national defence and international relations; (b) monetary and foreign exchange policy; (c) public order, prevention and repression of crime; and (d) privacy of third parties. Appeals can be lodged to a regional administrative court, whose decisions can be appealed to the Council of State.

eSignature

Rules regarding the use of electronic signatures and documents were regulated in a series of presidential and government decrees adopted between 1997 and 2001 [13]. Legislative Decree no. 10 of 23 January 2002 brought the Italian electronic signature regulations in line with the Directive 1999/93/EC on a Community framework for electronic signatures. Most recently, the eGovernment Code of 2005 regulates electronic signatures and confirms their

full legal validity. The Italian signature known as 'firma digitale' (digital signature) is compliant with the 'qualified signature', as in the Directive 1999/93/EC.

Re-use of Public Sector Information (PSI)

The legislative decree no. 36 of 2006 has transposed the EU Directive on the re-use of public sector information (Directive 2003/98/EC). The Italian Government drafted an amendment to the Legislative Decree 24 January 2006, No. 36 on the re-use of documents in the public sector that transposes the re-use of public sector information Directive 2003/98/EC correctly, following controversy on the correct transposition of the Directive on PSI re-use in Italy.

eAccessibility

The Italian legislation about accessibility has been based on the Stanca Act (Law n. 4, January 9, 2004) making provisions to support the access to information technologies by people with disabilities, and on various subsequent technical decrees including the following [14]:

- Decree of the President of the Republic, March 1st 2005, No. 75 which introduces the key concept of usability. Web sites must not only be barrier-free but also simple, effective, efficient and they must satisfy the user's needs.
- Ministerial Decree, July 8 2005 which contains the technical Web accessibility requirements, the methodology for the evaluation of Web sites and the requirements for accessible hardware and software.

More recently, the Decree no. 179 of 18/10/2012 (converted into Law 221 of 17/12/2012) extended the Stanca Law to all subjects who receive government grants or subsidies for the provision of information services via the Internet. It introduced new obligations for public administrations and gave to the Italian digital Agency the task to control and update the technical rules according to the international standards of reference. Article 9 refers to digital inclusion. It obliges public authorities to publish on their websites annual goals of accessibility. It also assigns to the Italian Digital Agency the task of monitoring and intervention on providers of public services. The Italian Digital Agency with the note 61/2013 has defined in detail the obligations of Public Administrations, providing a questionnaire that the Public Administrations can use to perform a self-assessment on the state of adaptation of its web sites and web services to the legislation on accessibility.

Formal Ethics Approval

In Italy, there are Ethics Committees at national and regional /local levels, with a focus on overseeing the conduction of clinical. According to the EU Directive 2001/20/EC concerning the implementation of good clinical practice in the conduct of clinical trials on medicinal products for human use was transposed into national law by means of Legislative Decree 24 June 2003, No. 211 [15].

5.4.2 United Kingdom

Data Protection and Privacy

The UK data protection act 1998 (DPA) requires University College London to ensure that personal data is used in a way that is fair to individuals and protects their rights. In this context, personal data is data from which a living individual can be identified. In addition, it also defines the following as sensitive information and requires us to get specific consent in writing if we process this type of data:

- Racial or ethnic origin
- Political opinions
- Religious beliefs
- Trade union membership
- Physical or mental health
- Sexual life
- Commission of offences or alleged offences

We are also required to keep watch for data that could be considered “contextually sensitive” - i.e. data that is innocuous on its own but can be used to identify a person if combined with other data that you’ve collected.

Should data subject to Data Protection restrictions be required to be stored by UCL within the WeGovNow project, we will follow the requisite UCL procedures in this regard, which include applying for a Data Protection Registration Number, which in turn is required for Ethics Approval (see below). Further information is available in [21].

Moreover, the Digital Economy Act (2010) concerns the online infringement of copyright [16]. It creates a system which aims to increase the ease of tracking down and suing persistent infringers, and after a minimum of one year permit the introduction of 'technical measures' to reduce the quality of, or potentially terminate those infringers' Internet connections. It furthermore creates a new ex-judicial process to handle appeals.

Freedom of Information

The Freedom of Information Act 2000 (FOIA) came fully into force on 1 January 2005 [17]. It provides statutory rights for any member of the public to apply for access to information held by bodies across the public sector, together with an enforcement regime. A new Information Commissioner's Office and an Information Tribunal, with powers to enforce the rights created, were established by the Act, along with a duty imposed on public authorities to adopt a scheme for the publication of information. The legislation applies to a wide range of public authorities, including parliament, government departments, local authorities and other entities in England, Northern Ireland and Wales. Scotland has a specific Freedom of Information (Scotland) Act 2002, which makes provision for the disclosure of information held by Scottish public authorities.

eSignature

The Electronic Communications Act 2000 creates a legal framework for the use of electronic signatures in the public and private sectors. It is complemented by Electronic Signatures Regulations (2002), which implements in UK law the European Directive on a Community framework for electronic signatures (1999/93/EC).

Re-use of Public Sector Information (PSI)

The Re-use of Public Sector Information Regulations 2015, which came into force on 18 July 2015, implements into UK law the European Directive 2013/37/EU of the European Parliament and of the Council of 26 June 2013 on the re-use of public sector information (PSI Directive).

eAccessibility

Accessibility of public websites is covered by the Equality Act 2010 which came into force on the 1st October 2010 [18]. The Act identifies eight protected characteristics, including disability and makes it unlawful to discriminate either directly or indirectly against persons because of a protected characteristic. Interpretation of the provisions of the Act is supported by a number of statutory Codes of Practice and non-statutory guidance. There are general provisions in Part 3 of the Act relating to 'Services and public functions' that make it unlawful for anyone concerned with providing such services to the public (whether in private public and voluntary sectors), to discriminate against a person or persons (because of a protected characteristic) in their delivery of those services. The Act also imposes a positive duty (Sections 20 and 29(7)) on the service provider to make reasonable adjustments to ensure that persons with a disability can access services and is 'anticipatory' as it requires service providers to anticipate the need for reasonable adjustments of not just existing, but also potential disabled customers.

Moreover, there are explicit references to the provision of services via web sites in the Equality Act 2010 Statutory Code of Practice (Services, public functions and associations) which contains (11.8) an example of reasonable adjustments in the provision of information by a local public council via its website. Guidance from the Equality and Human Rights Commission (EHRC) on the Act also explicitly mentions the provision of web and internet services as being covered by the Act. Especially for websites, there is guidance from the UK Cabinet office on the minimum standard of accessibility of public sector websites which, inter alia, requires the minimum standard of accessibility for all public-sector websites as WCAG AA and compliance with the WCAG is acceptable at Level Double-A of version 1.0 or the equivalent level in version 2.0. These minimum requirements are also referenced in guidelines issued by the UK Central Office of Information ('COI') (TG102 - last updated in October 2009). Although the COI closed in March 2012, these guidelines do not appear to have been replaced.

In addition to the legislation, generic government policy on web accessibility is set out in the eAccessibility Action Plan, developed by the eAccessibility Forum, a coalition of UK Government, charity and private sector organisations, published by the Department of Culture Media and Sport Culture ('DCMS') and is described as being the Government 'action plan to support the improvement of public websites, IT equipment and online content to suit the needs of disabled people' and section 3.1 deals with the development and maintenance of eAccessibility of public sector online services.

Formal Ethics Approval

When it comes to clinical research, the European Directive (2001/20/EC) was transposed into UK law by means of The Medicines for Human Use (Clinical Trials) Regulations 2004 and subsequent amendments [19]. Apart from this, all research proposals involving living human participants and the collection and/or study of data derived from living human participants undertaken by UCL staff or students on the UCL premises and/or by UCL staff or students elsewhere requires ethical approval to ensure that the research conforms with general ethical principles and standards. [20] The UCL Committee is responsible for considering the ethics of human research (e.g. physical, psychological, attitudinal) carried out by UCL staff or students on the UCL premises and/or by UCL staff or students elsewhere. It is not responsible for considering the ethics of research which falls under the remit of Department of Health approved ethics committees who abide by Governance Arrangements for NHS Research Ethics Committee.

5.5 Licensing

The Open Source licenses of the software components to be integrated into in the WeGovNow platform deserve particular attention. Viral licenses (such as the GNU General Public License (GPL), GNU Affero General Public License (AGPL), and possibly GNU Lesser General Public License (LGPL)) needs to be "quarantined" in such way that code licensed under such conditions does not infect any other code that is being developed by the other project partners.

A viral license is a license which imposes restrictions on combined work under certain circumstances. The borderline between derivation and combination with different levels of separation (isolation through different kinds of programming interfaces) is not always clear and may differ for each jurisdiction and even be decided by judges in particular cases. Conflicting license demands may result in unusable source code.

Therefore, the "quarantine" requires strict tracking of all source code affected by viral licenses as well as clear definitions of interfaces to/by such software components in order to avoid mistakes that could render the overall software product unusable and to avoid unnecessary constraints that may prohibit future recombination of work. Where possible, permissive licenses will be granted to the public.

Dedicated reports were collated from all partners (c.f. Appendix C for ImproveMyCity) explaining the current licensing status of their existing components (and their dependencies) acting as core components with view to take legal advice from experts. The consortium concluded that best way to deal with the heterogeneity of licensing schemas among core components is to provide permissive licensing for the vital features/components of WeGovNow which at the time of this writing are i) UWUM (part of LiquidFeedback), ii) LandingPage, and iii) OnToMap Logger. The above are necessary for WeGovNow to function properly. All other core components which are not vital, should keep their licensing schemas as is and will not be included in the initial WeGovNow package and instead will be pulled from their sources during installation dynamically.

References

1. D. Spinellis and G. Gousios, Eds., *Beautiful Architecture: Leading Software Engineers Explain How They Think*. Sebastopol, CA: O'Reilly Media, Inc, 2009.
2. Skarlatidou, A., Tseng, T and Haklay, M. 2013. Guidelines for trust interface design for public engagement Web GIS. *International Journal of Geographica Information Science*, 27(8), pp. 1668-1687.
3. Nivala, A.M., Brewster, S. and Sarjakoski, L.T. 2008. Usability Evaluation on Web Mapping Sites. *The Cartographic Journal*, 45(2), pp. 129-138.
4. I. Tsampoulatidis, D. Ververidis, P. Tsarchopoulos, S. Nikolopoulos, I. Kompatsiaris and N. Komninos, "ImproveMyCity - An open source platform for direct citizen-government communication", The 21st ACM International Conference on Multimedia – Open Source Software Competition, Barcelona, Catalunya, Spain, October 21-25, 2013.
5. http://ec.europa.eu/justice/data-protection/reform/index_en.htm (latest access: 21/04/2016)
6. <http://eur-lex.europa.eu/legal-content/DE/TXT/?uri=CELEX%3A31999L0093> (latest access: 21/04/2016)
7. https://proxy.suma-ev.de/cgi-bin/nph-proxy.cgi/en/I0/http/europa.eu/rapid/press-release_IP-11-4_en.htm (latest access: 22/04/2016)
8. COM (2005) 425 final - Not published in the Official Journal. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=URISERV%3A124226h> (latest access: 22/04/2016)
9. <https://ec.europa.eu/digital-single-market/en/news/proposal-directive-european-parliament-and-council-accessibility-public-sector-bodies-websites> (latest access: 22/04/2016)
10. <https://www.w3.org/TR/WCAG20/> (latest access: 22/04/2016)
11. The application process: <https://ethics.grad.ucl.ac.uk/procedures.php>
12. The terms of reference for the Ethics Committee: https://ethics.grad.ucl.ac.uk/terms_of_ref.php
13. https://joinup.ec.europa.eu/sites/default/files/ckeditor_files/files/eGovernment%20in%20Italy%20-%20February%202016%20-%2018_00%20-%20v1_00.pdf (latest access: 22/04/2016)
14. Lutz Kubitschke, Kevin Cullen, Ciaran Dolphin, Susanna Laurin and Andreas Cederbom (2013): Study on Assessing and Promoting e-Accessibility, Final Report.

On behalf of the European Commission, Directorate-General of Communications Networks, Content & Technology.

15. <http://www.eurecnet.org/information/italy.html> (latest access: 22/04/2016)
16. https://joinup.ec.europa.eu/sites/default/files/ckeditor_files/files/eGovernment%20Factsheet%20in%20United%20Kingdom%20-%20February%202016%20Edition%2018%20-%20v6%20.pdf (latest access: 22/04/2016)
17. https://joinup.ec.europa.eu/sites/default/files/ckeditor_files/files/eGovernment%20Factsheet%20in%20United%20Kingdom%20-%20February%202016%20Edition%2018%20-%20v6%20.pdf (latest access: 22/04/2016)
18. Lutz Kubitschke, Kevin Cullen, Ciaran Dolphin, Susanna Laurin and Andreas Cederbom (2013): Study on Assessing and Promoting e-Accessibility, Final Report. On behalf of the European Commission, Directorate-General of Communications Networks, Content & Technology.
19. <http://www.legislation.gov.uk/ukxi/2004/1031/contents/made> (latest access: 22/04/2016)
20. <http://ethics.grad.ucl.ac.uk/index.php> (latest access: 22/04/2016)
21. <http://www.ucl.ac.uk/finance/legal/dp-research>

Appendices

Appendix A: Licensing details

This appendix lists of licensing details per component

Firstlife
Apache license
GeoKey and Community Maps
<p>GeoKey: Apache 2.0 License</p> <p>Community Maps: service in a SaaS model, no license is required</p> <p>Python:</p> <ul style="list-style-type: none"> - django: BSD License - django-aggregate-if: MIT License - django-allauth: MIT License - django-braces: BSD License - django_braces: BSD License - django-model-utils: BSD License - django-oauth-toolkit: BSD License - django-pgjson: BSD License - django-simple-history: BSD License - django-youtube: BSD License - django_nose: BSD License - djangoorestframework: BSD License - djangoorestframework-gis: BSD License - easy-thumbnails: BSD License - gdata: Apache 2.0 License - iso8601: MIT License - moment: MIT License - pillow: PIL License - psycpg2: ZPL License - pytz: MIT License - requests: Apache 2.0 License <p>Ubuntu:</p> <ul style="list-style-type: none"> - python-pip: MIT License - python-virtualenv: MIT License - python-gdal: OSG License - libjpeg-dev (jpeg4py): BSD License - binutils: MIT License - libproj-dev: OSG License - gdal-bin: MIT License

Database:

- PostgreSQL: PostgreSQL License
- PostGIS: PostgreSQL License

Extras:

- bcrypt: Apache 2.0 License
- argon2: CC0 License
- six: MIT License
- mock: BSD License
- python-openid: Apache 2.0 License
- coverage: Apache 2.0 License
- factory_boy: MIT License
- pytest-django: BSD License
- pytest-cov: MIT License
- django-discover-runner: BSD License
- tox: MIT License
- sphinx: BSD License
- twine: Apache 2.0 License
- wheel: MIT License
- mccabe: Expat License
- pep8: Expat License
- pyflakes: MIT License
- flake8: MIT License
- pep257: MIT License
- pygments: BSD License
- docutils: BSD License
- check-manifest: MIT License
- pyroma: MIT License
- gnureadline: GPLv3, GNU
- ipython: BSD License
- ipdb: BSD License
- Ipdbplugin: GPLv3, GNU
- babel: BSD License
- jinja2: BSD License
- markupSafe: BSD License
- alabaster: BSD License
- cov-core: MIT License
- coveralls: MIT License
- docopt: MIT License
- jarn.viewdoc: BSD License
- nose-cov: MIT License
- nose: BSD License
- snowballstemmer: BSD License
- pbr: Apache 2.0 License
- fake-factory: MIT License
- importlib: PSF License
- ipaddress: PSF License
- markupSafe: BSD License

OS:

- h5py: BSD License
- libgif-dev: MIT License
- libhdf4-alt-dev: MIT License
- libhdf5-dev: MIT License
- libnetcdf-dev: MIT License
- libnetcdfc++4: MIT License
- libcf0: MIT License
- libdap-dev: MIT License
- libdapserver7: MIT License
- libgdal-dev: MIT License
- libgdal1h: MIT License
- libnetcdf5: MIT License
- libopenjp2-7: MIT License
- libspatialite-dev: MIT License
- libwebp-dev: MIT License
- libwebpdemux1: MIT License
- libwebpmux1: MIT License
- libxerces-c-dev: MIT License
- uuid-dev: MIT License
- libxerces-c-dev: MIT License
- libavcodec54: GPLv3, GNU
- libavdevice53 : GPLv3, GNU
- libavfilter3: GPLv3, GNU
- libavformat54: GPLv3, GNU
- libavutil52: GPLv3, GNU
- libcdio-cdda1: GPLv3, GNU
- libcdio-paranoia1: GPLv3, GNU
- libcdio13: GPLv3, GNU
- libdc1394-22: LGPL License
- libmp3lame0: LGPL License
- libopenjpeg2: BSD License
- libopus0: BSD License
- libsamplerate0: GPLv3, GNU
- libspeex1: BSD License
- libswscale2: GPLv3, GNU
- libtheora0: MIT License
- libx264-142: GPLv3, GNU
- libxvidcore4: GPLv3, GNU

ImproveMyCity

Look at Appendix C: ImproveMyCity licensing status report

LiquidFeedback

Full List Status Quo (30.10.2016)

Items marked as “will be removed” will be removed with version 4.0.

Items marked with * are shipped as part of LiquidFeedback.

Description	Name	License
Software	LiquidFeedback	MIT/X11 (permissive)
* Icon library	Silk icon set	CC-BY (permissive) will be removed
Database	PostgreSQL	BSD-style (permissive)
Programming language	PL/pgSQL	BSD-style (permissive)
	Lua	MIT/X11 (permissive)
	Python (if markdown2 is used)	PSFL (permissive)
Web application framework	WebMCP	MIT/X11 (permissive)
Network/Web server	Moonbridge	MIT/X11 (permissive)
Operating system/s	FreeBSD	BSD (permissive)
	also runs on Linux distributions	GPL (protective)
Libraries	libbsd (only necessary on Linux)	various for different components: MIT/X11 (permissive) BSD-style (permissive) Beerware (permissive)
Utility programs	program for picture resizing, e.g. ImageMagick or Graphics Magic or any other	Apache 2.0 (permissive) MIT/X11 (permissive)
	Wiki-Formatter, e.g. markdown2	MIT/X11 (permissive)
Build dependencies	C compiler	various choices (permissive and others)
	Less (for modifying style sheet)	Apache 2.0 (permissive) will be removed

Additional components foreseen in upcoming 4.0 release

Items marked with * will be shipped as part of LiquidFeedback.

Description	Name	License
* Design library	Material Design Lite	Apache 2.0 (permissive)

* Icon library	Material icons	Apache 2.0 (permissive)
* Font	Roboto	Apache 2.0 (permissive)
* WYSIWYG editor	Voog wysihtml	MIT/X11 (permissive)
Libraries	pgLatLon (geo library)	MIT/X11 (permissive)
Utility programs	libsass, sassc (style- sheet preprocessor)	MIT/X11 (permissive)
OnToMap		
Libraries/components licenses: <u>Play Framework:</u> Apache License 2.0 <u>Parliament:</u> BSD License <u>Jena:</u> Apache License 2.0 <u>Guava:</u> Apache License 2.0 <u>Esri Geometry API:</u> Apache License 2.0 <u>MongoDB:</u> AGPL 3.0 <u>MongoDB Java Drivers:</u> Apache License 2.0 <u>Nginx:</u> 2-clause BSD License		

Appendix B: Data quality

WeGovNow – GIScience/UNIVERSITY OF HEIDELBERG



This document contains all the VGI methods, measures and indicators that have been found regarding VGI Data quality. This document can be reviewed and updated with new methods.

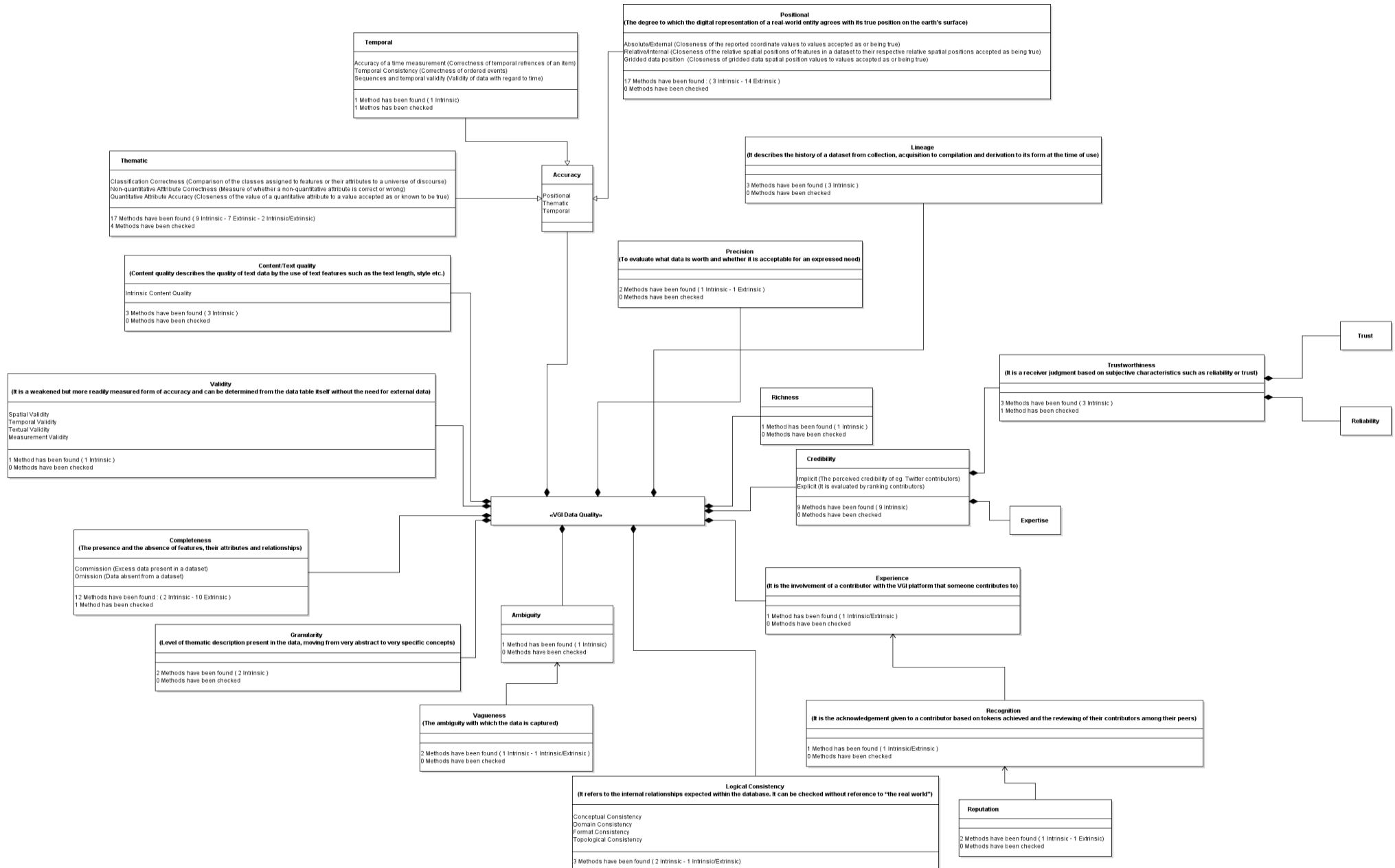
METHODS

The available VGI methods are presented in the table below.

The table is separated in 9 columns. The first one is the general Id, which counts the total amounts of the methods. The second is named Mid (Metric id). This id counts the total number of each metric separately. The third column have all the information has been found for the elements and their properties while in the fourth column is dedicated to the specific element's properties each method uses. The sixth column is referred to the most important data sets and attributes of the specific method. That does not mean that this method is not applicable for other kind of data or attributes. Simple it needs a check for its availability and functionality. In the next column, a briefly description of the VGI methods is presented. The main objectives, frameworks and algorithms are referred. The source column refers to the title of the paper that presents the exact method. There is already a database in UniHei having a complete list of all the papers that have been used for this research. Thus, the citations can easily take the position of the title in this column. The penultimate column informs about one significant property of each method for this project. This column refers to the kind of analysis each method uses. The best known

and documented is the extrinsic one. For this one there is a need for reference data (authoritative data). In other words, for data that can be characterized as the representation of the “real world”. Intrinsic analysis is based on internal analysis between the same data set without the need of additional data. A potential comparison here could be for instance between different areas of the same data set or between different times of the same place. Specifically, for WeGovNow, there is more interest for intrinsic analysis and especially for VGI analysis. That information affects the last column. The prioritization is subjective. For other kind of projects, with different interests such as remote sensing or social media the prioritization would be different.

Furthermore, the four last columns are painted with a specific color. Light green means that the method is intrinsic and the needed data sets are relevant to WeGovNow project (VGI geospatial data – OSM data). Light yellow means either that the method is extrinsic or that the needed data sets are not so relevant. Sometimes it also means that the proposed methodology might be complicated or time-consuming. Finally, the light red color means that the field of use is not so relevant with the WeGovNow project. The methods that have been underlined means that has been already examined and potential scripts have been created. In the next page, a UML structure of VGI Data quality elements is attached. This is nothing more than a summary of the table presented in a more comprehensive way.



Id	Mid	Element	Evaluator	Primary Data/Attributes	Method	Source	Intrinsic/Extrinsic	Priority
1	CI1	Completeness It is the presence and the absence of features, their attributes and relationships. Commission (Excess data present in a dataset) Omission (data absent from a dataset)	Commission/Omission	-Geographic coordinates of features -Road data sets	Road length comparison of OSM data with authoritative data in cell grids.	How good is volunteered geographical information? A comparative study of OpenStreetMap and Ordnance Survey datasets.	Extrinsic	2
2	CI2		Commission/Omission	-Geographic coordinates of features -Area data sets	Visual inspection of urban areas for incompleteness in OSM in comparison with authoritative data. The examination of the raster tiles could show the percentage of completeness.	How good is volunteered geographical information? A comparative study of OpenStreetMap and Ordnance Survey datasets.	Extrinsic	2
3	CI3		Commission/Omission	-Geographic coordinates of features -Road, lake and river data sets	OSM data was compared with authoritative data for the number of objects, the total length and the area of objects. Roads zones, lakes and rivers was compared in two datasets and the	Quality assessment of the French OpenStreetMap dataset	Extrinsic	2

					percentage of OSM completeness comes out.			
4	CI4		Commission/Omission	-Geographic coordinates of features -Road data sets	Assess how complete are the OSM data -separated in different feature categories- in comparison with Google and Bing data. Google and Bing datasets need conversions and transportations before being comparable.	Comparison of the accuracy of OpenStreetMap for Ireland with Google Maps and Bing Maps	Extrinsic	3
5	CI5		Commission/Omission	-Geographic coordinates of features -POI data sets	Checking the completeness of OSM point school data, compared with two other authoritative data sets. Its measure is assessed by comparing the matched and unmatched records. The total amount of points is compared.	Assessing Completeness and Spatial Error of Features in Volunteered Geographic Information	Extrinsic	2
6	CI6		Commission/Omission	-Geographic coordinates of features -Building data sets	OSM data completeness of area covered by buildings compared with authoritative data. A cell-based analysis has been implemented to visualize the results. The area of each cell is calculated as the sum of area of all buildings areas in both	Quality assessment for building footprints data on OpenStreetMap	Extrinsic	2

					data sets. By that it can be understood the areas that are covered by buildings. Moreover informational completeness give additional information about the completeness of the building attributes.			
7	CI7		Information Completeness	-History dump of a specific area or VGI data set in a specific area in total or a list of tags	<p>OSM POIs has been used for this method. The needed method to derive information completeness of the OSM tags of the features is based on the term (frequency-inverse distance frequency measure). That measures how characteristic a specific term is for a given document. Inverse feature type frequency measures the general importance of a tag by dividing the total number of features in the dataset by the numbers of features with which this tag is associated. The closer the result to zero is, the higher the</p>	Trust as a Proxy Measure for the Quality of Volunteered Geographic Information in the Case of OpenStreetMap	Intrinsic	1

					<u>relevance of the tag. This method is problematic for tags such as name.</u>			
8	CI8		Length Completeness	-Geographic coordinates of features - Street data sets	It is a comparison method between OSM and authoritative data set. After data preparation the selected area has been separated into grids. To assess length completeness, the total length of the street data sets is found for each grid and calculated.	Assessing the quality of OpenStreetMap data	Extrinsic	2
9	CI9		Name Completeness	-Geographic coordinates of features - Street data sets	It is a comparison method between OSM and authoritative data set. After data preparation the selected area is separated into grids. To assess name completeness, the number of OSM street names compare with authoritative data set. The same technique like CI8 follows.	Assessing the quality of OpenStreetMap data	Extrinsic	2
10	CI10		Commission/Omission	-Geographic coordinates of features - Street data sets	OSM linear data are compared with authoritative data set to assess data completeness. This article	Assessing Data Completeness of VGI through an Automated Matching Procedure for Linear Data	Extrinsic	2

					proposes an automated feature-based matching method based on a multi-stage approach that combines geometric and attribute constraints. It is a 7 steps method available to be examined.			
11	CI11		Commission/Omission	<ul style="list-style-type: none"> -Geographic coordinates of features -Building data sets -Date information 	Methods to analyze building completeness are presented between OSM building data and two authoritative data sets. After the data preprocessing the methods to evaluate the level of building completeness can be evaluated. The first one is a simple method of comparison of quantities based on reference areas by using building footprints. The second is an object-based method. In this method homologous objects are investigated in both datasets and the last one is an overlap method by comparing the percentage of buildings	Measuring Completeness of Building Footprints in OpenStreetMap over Space and Time	Extrinsic	2

					that overlap. The algorithms are available. The completeness is calculating and presented through statistical tables and visualization.			
12	CI12		Conceptual completeness	-Number of classes -Number of attributes -OSM tags	This paper is focused on interpretation of the data. The conceptual quality in VGI is examined. As a case study a European sample of VGI's Open Street Map is used and is focused specifically on conceptual compliance. Conceptual completeness in OSM expresses the salient information of the tags as well as the coverage of them.	A conceptual quality framework for volunteered geographic information	Intrinsic	1
13	Pa1	Positional accuracy The degree to which the digital representation of a real-world entity agrees with its true position on the earth's surface. Absolute/External Accuracy (Closeness of	Absolute/External Accuracy	-Geographic coordinates of features -Classification of street data sets (A-roads, B-roads)	Buffer-zone method. High accurate authoritative data are needed. The method is: Evaluation the positional accuracy of motorway objects across the two datasets by using buffers to determine the percentage of a line from one dataset that is within a certain distance of the	How good is volunteered geographical information? A comparative study of OpenStreetMap and Ordnance Survey datasets.	Extrinsic	2

		reported coordinate values to values accepted as or being true) Relative/Internal Accuracy (closeness of the relative spatial positions of features in a dataset to their respective relative spatial positions accepted as or being true)			same feature in another dataset of higher accuracy. A buffer of width x is created around a high-quality object and the percentage of the tested object that falls within the buffer is evaluated.			
14	Pa2	Gridded data position Accuracy (closeness of gridded data spatial position values to values accepted as or being true)	Absolute/External Accuracy	-Geographic coordinates of features -Area data sets	Positional accuracy of urban areas. A more statistical comparison within raster tiles.	How good is volunteered geographical information? A comparative study of OpenStreetMap and Ordnance Survey datasets.	Extrinsic	2
15	Pa3		Absolute/External Accuracy	-Geographic coordinates of features -Road data sets -Homologous point objects	Comparison of points on road intersections from road layers between OSM and authoritative data sets. Euclidean distance is used to generate a distance distribution and be presented. It uses same technique like in Pa1.	Quality assessment of the French OpenStreetMap dataset	Extrinsic	2
16	Pa4		Absolute/External Accuracy	-Geographic coordinates of features -Road data sets	Comparison of linear OSM and authoritative data. Hausdorff and average distance measures are used to	Quality assessment of the French OpenStreetMap dataset	Extrinsic	2

					characterize the differences of linear objects.			
17	Pa5		Absolute/External Accuracy	-Geographic coordinates of features -Lakes data sets	Comparison of polygonal OSM and authoritative data by using a surface distance method. If the distance is equal to 0, the two polygons are equal, if the distance is equal to 1 the two polygons are disjoint. Granularity and compactness need also to be measured.	Quality assessment of the French OpenStreetMap dataset	Extrinsic	2
18	Pa6		Absolute/External Accuracy	-Geographic coordinates of features -Road data sets	OSM linear data are compared with Google and Bing data sets to evaluate how accurate are. The results can be visually examined. Google and Bing datasets need conversions and transportations before being compared.	Comparison of the accuracy of OpenStreetMap for Ireland with Google Maps and Bing Maps	Extrinsic	3
19	Pa7		Absolute/External Accuracy	-Geographic coordinates of features -POI data sets	Checking the positional accuracy of OSM point school data, compared with two other authoritative data sets. "MatchMethod" is added to the attribute table. It is a script which checks the	Assessing Completeness and Spatial Error of Features in Volunteered Geographic Information	Extrinsic	2

					records and looks for spatial matches between the authoritative and the OSM dataset with values from 0 to 11. This method is improved also with a manual one. Statistical results also provided.			
20	Pa8		Absolute/External Accuracy	-Geographic coordinates of features -Building data sets	To assess positional accuracy between OSM and authoritative building data, the average distance between the corresponding points of footprints pair is calculating. The calculations of the average offset and of standard deviation improve the results taking into consideration that the GPS precision is very good in both data sets.	Quality assessment for building footprints data on OpenStreetMap	Extrinsic	2
21	Pa9		Absolute/External Accuracy	-Static images with geographic coordinates information	Two localization methods are presented taking into consideration three different scenarios for camera localization. The first is based on correlations of camera images to geo-registered satellite images and the	Geolocating static cameras	Intrinsic	2

					other based on correlations with cameras with known location. Natural temporal variations make methods more accurate. One database has been used with more than 17 million images for one year.			
22	Pa10		Absolute/External Accuracy	-Geographic coordinates of features - Street data sets	It is a comparison method between OSM and authoritative data set. After data preparation the selected area is separated into grids. The first step is a buffer analysis for street network. The desired road types are then selected and exported. MapInfo and MapBasic are used for the buffer analysis. Thus, the lines on both datasets based on their identical name are identified and the percentage of the tested line that overlaps are calculated. To calculate the overlaps, the lines, need to be converted to polygons. When buffer	Assessing the quality of OpenStreetMap data	Extrinsic	2

					analysis is ready, MapBasic runs. Then the tables of the results are exported.			
23	Pa11		Relative/Internal Accuracy	-Flickr photos with geographic coordinates information	This method assesses the location correctness of visually generated VGI as a quality reference measure. It is determined by checking the visibility of the POI from the position of the visually generated VGI. As example Flickr photographs are used. First the photos that conform to a point of interest were collected and then a reverse viewshed analysis for the point of interest was conducted to determine if it lies within the area of visibility of the observer points. Thus, the geotagged images checked about their correctness.	Using Reverse Viewshed Analysis to Assess the Location Correctness of Visually Generated VGI	Intrinsic	2
24	Pa12		Absolute/External Accuracy	-Image Geographic coordinates -Street data sets	This research takes a photogrammetric approach to determining the positional accuracy of	A photogrammetric approach for assessing positional accuracy of OpenStreetMap roads	Extrinsic/Intrinsic	3

					OSM road features using stereo imagery and a vector adjustment model. The method applies rigorous analytical measurement principles to compute accurate real world geolocations of OSM road vectors. The proposed approach is tested on several urban gridded city streets from the OSM. To demonstrate a practical application, a head-to-head positional accuracy assessment between OSM and authoritative roads data sets is conducted.			
25	Pa13		Absolute/External Accuracy	-Flickr photos with geographic coordinates information	Exploration of Flickr data to check the accuracy of geotagged images in the center of the cities. The results can be statistics and visualization too.	Exploring place through user-generated content : Using Flickr tags to describe city cores	Intrinsic	2
26	Pa14		Absolute/External Accuracy	-Image Geographic coordinates -Street data sets	OSM data is compared with authoritative data. Linestrings are of road segments from all the three sources are used for this method. A preprocessing step is	Comparative Spatial Analysis of Positional Accuracy of OpenStreetMap and Proprietary Geodata	Extrinsic	2

					used to merge the separate road segments which share the same name. The road junctions then extracted and compared. A preprocessing algorithm extracted within the three datasets. The result is also visualized. The error, standard and absolute deviation are calculated and compared and the true position of the road junctions is founded. The positional accuracy is presented by a final comparison between the three data sets.			
27	Pa15		Absolute/External Accuracy	-Image Geographic coordinates -Street data sets	This is a polygon-based method by comparing OSM road data with authoritative data. After finishing data preprocessing (check for overlapping areas of urban blocks), with the help of trust an algorithm the urban blocks are extracted and represented by polygons	A polygon-based approach for matching OpenStreetMap road networks with regional transit authority data road networks with regional transit authority data	Extrinsic	2

					surrounded by the road data. Polygonal and linear data are then compared for their positional accuracy and presented through statistical and visualization processes.			
28	Pa16		Relative/Internal Accuracy	-Geographic coordinates of features -Soil data sets	Positional accuracy algorithms are presented for point, line and area spatial data sets. An application is presented and used soil data.	The Impact of Positional Accuracy on the Computation of Cost Functions	Intrinsic	2
29	Pa17		Relative/Internal Accuracy	-OSM history dump	A framework is presented for the intrinsic analysis assessment of OSM building footprints data. A spatiotemporal data model for OSM history data is created and the positional accuracy of building footprints is assessed.	The intrinsic quality assessment of building footprints data on OpenStreetMap in Baden-Wurttemberg	Intrinsic	2
30	Pr1	Precision To evaluate what data is worth and whether it is acceptable for an expressed need (semantic, temporal, and spatial precision of		-Flickr photos with geographic coordinates information	Precision can be applied to check geotagged Flickr photos. By checking the Flickr data, the cumulative frequency of geotag precision levels can be found.	Exploring place through user-generated content : Using Flickr tags to describe city cores	Intrinsic	2
31	Pr2			-Image Geographic coordinates	This is a polygon-based method by comparing	A polygon-based approach for matching	Extrinsic	2

		the object and its attributes)		-Street data sets	OSM road data with authoritative data. After finishing the preprocessing analysis which is described in Pa15, the polygonal and linear data are analyzed and checked for their positional accuracy. Moreover, another process can then calculate precision.	OpenStreetMap road networks with regional transit authority data road networks with regional transit authority data		
32	Tha1	Thematic accuracy Classification Correctness (comparison of the classes assigned to features or their attributes to a universe of discourse)	Attribute Accuracy	-Geometry type -Needed Attributes	<u>Quantitative method of attribute accuracy by checking the tag of each type of the objects. This method confronts issues.</u>	<u>Quality assessment of the French OpenStreetMap dataset</u>	<u>Intrinsic</u>	1
33	Tha2	Non-quantitative Attribute Correctness (measure of whether a non-quantitative attribute is correct or wrong)	Attribute Accuracy	-Geometry type -Needed Attributes	Qualitative method uses Levenstein distance to compare strings. Authoritative data set needs for comparison. This method confronts issues.	Quality assessment of the French OpenStreetMap dataset	Extrinsic	2
34	Tha3	Quantitative Attribute Accuracy (closeness of the	Semantic Accuracy	-Street data sets	Correcting the error made by OSM contributors on the road importance tags by comparing it with authoritative data. This method confronts issues.	Quality assessment of the French OpenStreetMap dataset	Extrinsic	2
35	Tha4		Semantic Accuracy	-Building data sets	By assuming that the authoritative data are	Quality assessment for building footprints data	Extrinsic	2

		value of a quantitative attribute to a value accepted as or known to be true)			fully correct, are going to be compared with the OSM building data. If a building in OSM is matched with one building in the reference data set are semantically correct mapped. Otherwise not semantically accurate. Visual inspection is implemented to check the level of semantic accuracy and the relations among the building footprints in the two datasets is presented statistically.	on OpenStreetMap		
36	Tha5		Classification Correctness	-History dump of a specific area or VGI data set in a specific area in total	<u>OSM POIs has been used for this method. Three general criteria are defined regarding their influence on the quality of the thematic accuracy. Those are: The correctness of the main tag, the correctness of other tags and the confusions may exist for the feature correctness which described in the data. Those criteria</u>	<u>Trust as a Proxy Measure for the Quality of Volunteered Geographic Information in the Case of OpenStreetMap</u>	<u>Intrinsic/Extrinsic</u>	1

					<u>divided in four classes and show the main tags that are not related to the correct information, other tags that are incorrect, the features that have a shortcoming and the feature that are fully correct.</u>			
37	Tha6		Classification accuracy	<ul style="list-style-type: none"> -Geographic coordinates of features - Street data sets 	<p>It is a comparison method between OSM and authoritative data set. After data preparation the selected area is separated into grids. A logical new field needs to be created by taking the values yes or no for each feature. Visual comparison is then used. The length of the street of both data sets is calculated and the percentage of the road length with correct type attribute to the total road length and the new created field is edited. This result can be presented with visualization methods as well as with statistics.</p>	Assessing the quality of OpenStreetMap data	Extrinsic	2

38	Tha7		Name accuracy	<ul style="list-style-type: none"> -Geographic coordinates of features - Street data sets 	It is a comparison method between OSM and authoritative data set. After data preparation the selected area is separated into grids. It follows the same process with Ca4.	Assessing the quality of OpenStreetMap data	Extrinsic	2
39	Tha8			<ul style="list-style-type: none"> -Points of interest with description attribute 	It is a technique to maintain a comprehensive list of points of interest (POIs) for digital maps. This method is an algorithm searches through a large collection of POIs and returns only those parts that are consistently repeated. In other words, it finds new POIs to add to a map based on user annotations.	Discovering points of interest from users	Intrinsic	1
40	Tha9			<ul style="list-style-type: none"> -Data produces from telephone interviews - Digital elevation model with 25 m. resolution - Inundation data -Estimation damage data -Street data with 	Disaster management requires up-to-date and accurate information. Except information about challenges and opportunities of using VGI for disaster management an assessment is presented for rapid flood damage modelling.	Volunteered Geographic Information for Disaster Management with Application to Rapid Flood Damage Estimation	Intrinsic/Extrinsic	3

				geographic coordinates	Estimation before using the methods is important. Thus, empirical models are used. The methods are analyzed and presented with statistical analysis and visualization.			
41	Tha10			-OSM points, lines, polygons	OSMonto is an ontology for OSM tags and is analyzed detailed about its usability. It could be useful to collect thematic accuracy of the tags.	OSMonto - An Ontology of OpenStreetMap Tags	Intrinsic	1
42	Tha11			-OSM data sets	<u>Heavily edited OSM objects are analyzed. "Name" and "highway" attributes are analyzed. Issues are analyzed and the thematic accuracy of tags is presented through a comparison between the OSM data of four countries.</u>	<u>The annotation process in OpenStreetMap</u>	<u>Intrinsic</u>	1
43	Tha12			-OSM data sets	<u>This paper investigates the use of semantic similarity to enhance the quality of VGI data by reducing semantic heterogeneity in a given neighborhood. To test the approach, a plugin integrates into the JOSM</u>	<u>Improving Volunteer geographic data quality using semantic similarity measurements</u>	<u>Intrinsic</u>	1

					<u>editor which is developed and three examples of its use are presented. These examples illustrate potential situations where the use of semantic similarity measurements could reduce the semantic heterogeneity.</u>			
44	Tha13			-OSM data sets	The developed classifiers of TBM to check the integrity of the target entities of Germany and the UK is applied. According to the results, the comparison between the classifiers of LBM and TBM shows that the AUC measures are nearly the same in both models. However, the accuracy measures indicate a higher performance of TBM classifiers.	Ambiguity and Plausibility : Managing Classification Quality in Volunteered Geographic Information Categories and Subject Descriptors	Intrinsic	1
45	Tha14			-OSM data sets	Methods to assess thematic accuracy are presented and compared between OSM and authoritative data. The GMESUA dataset is	Quality Assessment of the Contributed Land Use Information from OpenStreetMap Versus Authoritative Datasets	Extrinsic	2

					considered as the reference dataset and it is cross compared with the OSM-LU dataset. In addition to calculate the Kappa index, the overall accuracy of the OSM-LU features, as well as user's and producer's accuracies, are calculated in order to discuss how LU types in each city are contributed			
46	Tha15		Semantic accuracy	-TagInfo Database OpenStreetMap Semantic Network	This paper proposes an approach for both improving the semantic quality and reducing the semantic heterogeneity of VGI datasets. The improvement of the semantic quality is achieved by using a tag recommender system, called OSMantic, which automatically suggests relevant tags to contributors during the editing process. Data-Centric, user-centric and context-centric approaches are analyzed as well as the semantic	Improving Volunteered Geographic Information Quality Using a Tag Recommender System : The Case of OpenStreetMap Semantic similarity	Intrinsic	1

					heterogeneity of OSM dataset. OSM Semantic Network is used which is created by using the OSM Wiki Crawler that extracts OSM tags and their relationships from the OSM Wiki website and then computes the semantic similarity score of each pair of tags. P-Rank co-citation algorithm is chosen to compute the semantic similarity score between sets of tags.			
47	Tha16		Semantic accuracy	-OSM tags	This paper is focused on interpretation of the data. The conceptual quality in VGI is examined. As a case study a European sample of VGI's Open Street Map is used and is focused specifically on conceptual compliance. Semantic accuracy in VGI mostly cares for tags. The tags are checked about how accurate are expressed. It can be seen as the degree of correctness in the	A conceptual quality framework for volunteered geographic information	Intrinsic	1

					classification of features τ into classes C . Indicators: Number of features with multiple classifications; number of contributors.			
48	Tha17		Semantic accuracy	-OSM tags	The most frequent OSM tags of Contributors from 40 cities around the world are examined and the tagging structures of OSM Map Features Wiki website are checked for verification. The results and the process that has been followed are available to the document.	Tagging in Volunteered Geographic Information – An analysis of tagging practices for Cities and Urban Regions in OpenStreetMap	Intrinsic	1
49	Cq1	Content/Text quality Content quality describes the quality of text data by the use of text features such as the text length, structure, style, readability, revision history, topical similarity, the use of technical terminology etc.	Intrinsic quality	-Yahoo data	Methods for exploiting such community feedback to automatically identify high quality content are proposed. A general classification framework for combining the evidence from different sources of information, that can be tuned automatically for a given social media type and quality definition is introduced.	Finding High-Quality Content in Social Media	Intrinsic	1
50	Cq2			-Wikipedia articles	Many indicators and	Automatic Quality	Intrinsic	1

					algorithms are presented through this research and assess different aspects of content quality.	Assessment of Content Created Collaboratively by Web Communities : A Case Study of Wikipedia		
51	Cq3			-Twitter data	Approaches for finding representative messages among a set of Twitter messages that correspond to the same event are explored. The objective is to assess high-quality relevant messages that provide event information	Selecting Quality Twitter Content for Events	Intrinsic	1
52	Ta1	Temporal accuracy Temporal accuracy is indicated by accuracy of a time measurement : correctness of temporal references of an item, temporal consistency : correctness of ordered events or sequences and temporal validity : validity of data with regard to time.	Sequences and temporal validity	-Date information	<u>The correlation between the number of contributors and the mean version of the captured object are analyzed. It shows a clear linear increase of the mean date in relation to the number of contributors in the area: the more contributors, the more recent the objects were.</u>	<u>Quality assessment of the French OpenStreetMap dataset</u>	<u>Intrinsic</u>	1
53	Ln1	Lineage		-History dump or	Checking how many of	Quality assessment of	Intrinsic	1

		Lineage describes the history of a dataset from collection, acquisition to compilation and derivation to its form at the time of use.		changeset or simply source information	the OSM data are tagged with source information or other kind of information.	the French OpenStreetMap dataset		
54	Ln2			-History dump or changeset	This is a method used to assess data provenance by using OSM data. A detailed analysis of the editing history and the corresponding contributors is needed. A vocabulary is created to make implicit provenance information about the lineage of features in OSM explicit. This vocabulary facilitates explicit statements about the lineage of features in OSM too. It classifies them according to recurring editing and co-editing patterns.	Tracking Editing Processes in Volunteered Geographic Information : The Case of OpenStreetMap	Intrinsic	1
55	Ln3			- History dump	By examining an OSM history dump of a specific period, a number of populated cities are examined for their socio-economic and population factors. Moreover, the time of the last object processing could be	Comparison of Volunteered Geographic Information Data Contributions and Community Development for Selected World Regions	Intrinsic	1

					learnt as well as the number that an object has been modified since its creation.			
56	Tw1	Trustworthiness Trustworthiness is a receiver judgment based on subjective characteristics such as reliability or trust.		-History dump of a specific area or VGI data set in a specific area in total or information about the users and the sources	OSM POIs are used for this method. The objective is to achieve parameters for trustworthiness. User reputation cannot be applied in this method because global knowledge of OSM data of user's experience is needed. This use case is small-scale. Therefore, versions, users, confirmations, tag corrections and rollbacks are checked for trustworthiness. A classification into five equal intervals is created for each of the parameters. Some of the parameters have positive influence and some negative. Assumptions need to be done in this method too.	Trust as a Proxy Measure for the Quality of Volunteered Geographic Information in the Case of OpenStreetMap	Intrinsic	1
57	Tw2			-VGI data	A novel reputation system that employs the	Are You Contributing Trustworthy Data ? The	Intrinsic	1

					Gompertz function for computing device reputation score as a reflection of the trustworthiness of the contributed data is presented.	Case for a Reputation System in Participatory Sensing		
58	Tw3			-VGI history dump	A model which evaluates the VGI's level of trustworthiness –with a view to evaluate the credibility of VGI - is proposed by assessing the reputation of its user and his/her social group. The output of this method is the degree of trust for each of the features which consists of the version quality of a feature, the user's performance history and related reputation and the reputation of the editor's social group.	A VGI Quality Assessment Method for VGI based on Trustworthiness	Intrinsic	1
59	Cr1	Credibility Credibility is divided into implicit and explicit credibility. Implicit credibility is the perceived		History dump or changeset or simply source information	This is a method used to assess data provenance by using OSM data. A detailed analysis of the editing history and the corresponding contributors is needed.	Tracking Editing Processes in Volunteered Geographic Information : The Case of OpenStreetMap	Intrinsic	1

		credibility of eg. Twitter contributors. Explicit credibility is evaluated by ranking contributors.			To make this data provenance explicit a vocabulary for OSM is created. Through this vocabulary the credibility of the contributors can be partially achieved.			
60	Cr2			-Flickr photos with metadata attributes	This method assesses the location correctness of visually generated VGI as a quality reference measure. It is determined by checking the visibility of the POI from the position of the visually generated VGI. As example Flickr photographs are used. Pa11 method can serve additional analysis of credibility measuring too.	Using Reverse Viewshed Analysis to Assess the Location Correctness of Visually Generated VGI	Intrinsic	1
61	Cr3			-History dump or changeset	By examining an OSM history dump of a specific period, a number of populated cities are examined for the ranking of the contributors.	Comparison of Volunteered Geographic Information Data Contributions and Community Development for Selected World Regions	Intrinsic	1
62	Cr4			- Twitter data	The information of news	Information Credibility on Twitter	Intrinsic	2

					propagated through Twitter is analyzed. Automatic methods for assessing the credibility of a given set of tweets are proposed.			
63	Cr5		Implicit/Explicit Credibility	- Twitter data	A novel method of automatically identifying and ranking social network users according to their relevance and expertise for a given topic is designed.	Finding Credible Information Sources in Social Networks Based on Content and Social Structure	Intrinsic	2
64	Cr6			-VGI data	A complete conceptual work flow for the assessment of user generated geographic content, or volunteered geographic information (VGI) is presented.	A Conceptual Workflow For Automatically Assessing The Quality Of Volunteered Geographic Information For Crisis Management	Intrinsic	2
65	Cr7			-Twitter data	It presents and evaluates three computational models for recommending credible topic-specific information in Twitter.	Modeling Topic Specific Credibility in Twitter	Intrinsic	2
66	Cr8			-Twitter data	The credibility of information in tweets corresponding to fourteen high impact news events of 2011	Credibility Ranking of Tweets during High Impact Events	Intrinsic	2

					around the globe is analyzed. Regression analysis is used and the important content and source based features are defined. That is how Twitter credibility can be assessed.			
67	Cr9			-Twitter data	This survey presents useful analysis for Tweet credibility. A disparity between features users which is considered relevant to credibility assessment is found.	Tweeting is Believing ? Understanding Microblog Credibility Perceptions	Intrinsic	2
68	Gr1	Granularity Level of thematic description present in the data, moving from very abstract to very specific concepts. Indicators: Depth of classes in the class hierarchy (if applicable).		-Flickr photos with geographic coordinates information and additional attributes	The level of tag granularity is checked in Flickr geotagged photos for a better understanding how toponyms and generic city center concepts were used. The cities are analyzed in bounding boxes.	Exploring place through user-generated content : Using Flickr tags to describe city cores	Intrinsic	2
69	Gr2			-OSM values	This paper is focused on interpretation of the data. The conceptual quality in VGI is examined. As a case study a European sample of VGI's Open Street Map is	A conceptual quality framework for volunteered geographic information	Intrinsic	1

					used and is focused specifically on conceptual compliance. Granularity shows the thematic description moving from the very abstract to the very specific concepts. For instance, a polygon can be characterized as a building but can be characterized more specific as a hospital too.			
70	Ab1	Ambiguity		-OSM data sets	The developed classifiers of TBM to check the integrity of the target entities of Germany and the UK is applied. According to the results, the comparison between the classifiers of LBM and TBM shows that the AUC measures are nearly the same in both models. However, the accuracy measures indicate a higher performance of TBM classifiers.	Ambiguity and Plausibility : Managing Classification Quality in Volunteered Geographic Information Categories and Subject Descriptors	Intrinsic	1
71	Vg1	Vagueness Vagueness is the ambiguity with which the data is		-Geographic coordinates of data sets -VGI data	A hybrid strategy is proposed to reconcile vagueness of stakeholder's perception	Addressing vagueness in Volunteered Geographic Information (VGI)– A	Intrinsic	1

		captured.			of environmental phenomenon with the 'crisp objects' vision of current VGI. This approach is combined with Open Gazetteer approach and the concept of Degree of truth. The case study is vulnerability to climate change in north Sweden.	case study		
72	Vg2			-VGI data set	An original model based on linguistic decision making for assessing the quality of a database of VGI created in citizen science projects is proposed. During this approach intrinsic and extrinsic assessments are analyzed for vagueness, experience, recognition, reputation and validity metrics.	A linguistic decision making approach to assess the quality of volunteer geographic information for citizen science	Extrinsic/Intrinsic	2
73	Ex1	Experience Experience is the involvement of a contributor with the VGI platform that someone contributes to.		-VGI data set	An original model based on linguistic decision making for assessing the quality of a database of VGI created in citizen science projects is proposed. During this approach intrinsic and	A linguistic decision making approach to assess the quality of volunteer geographic information for citizen science	Extrinsic/Intrinsic	2

					extrinsic assessments are analyzed for vagueness, experience, recognition, reputation and validity metrics.			
74	Re1	Recognition Recognition is the acknowledgement given to a contributor based on tokens achieved and the reviewing of their contributors among their peers.		-VGI data set	An original model based on linguistic decision making for assessing the quality of a database of VGI created in citizen science projects is proposed. During this approach intrinsic and extrinsic assessments are analyzed for vagueness, experience, recognition, reputation and validity metrics.	A linguistic decision making approach to assess the quality of volunteer geographic information for citizen science	Extrinsic/Intrinsic	2
75	Rp1	Reputation It can be described as a tool to ensure the validity of VGI.		-VGI data set	An original model based on linguistic decision making for assessing the quality of a database of VGI created in citizen science projects is proposed. During this approach intrinsic and extrinsic assessments are analyzed for vagueness, experience, recognition, reputation and validity metrics.	A linguistic decision making approach to assess the quality of volunteer geographic information for citizen science	Extrinsic	2
76	Rp2			-VGI history dump	A model which evaluates	A VGI Quality	Intrinsic	1

					<p>the VGI's level of trustworthiness –with a view to evaluate the credibility of VGI - is proposed by assessing the reputation of its user and his/her social group. Trustworthiness is strictly related to the concept of reputation. Reputation is calculated and the parameters are available. The output of this method is the degree is the degree of trust for each of the features which consists of the version quality of a feature, the user's performance history and related reputation and the reputation of the editor's social group.</p>	Assessment Method for VGI based on Trustworthiness		
77	VI1	<p>Validity is a weakened but more readily measured form of accuracy and can be determined from the data table itself without the</p>	<p>Spatial Validity, Temporal Validity, Textual Validity, Measurement Validity</p>	-VGI data set	<p>An original model based on linguistic decision making for assessing the quality of a database of VGI created in citizen science projects is proposed. During this approach intrinsic and extrinsic assessments are</p>	<p>A linguistic decision making approach to assess the quality of volunteer geographic information for citizen science</p>	Intrinsic	1

		need for external data. It is categorized to Spatial Validity, Temporal Validity, Textual Validity and Measurement Validity.			analyzed for vagueness, experience, recognition, reputation and validity metrics.			
78	Lc1	Logical Consistency It refers to the internal relationships expected within the database. It can be checked without reference to “the real world”. Conceptual Consistency (adherence to rules of the conceptual schema) Domain Consistency (adherence of values to the value domains)	Topological Consistency The topological consistency in OSM data is assessed mainly on intrinsic data checks to detect and alleviate problems occurring through for example overlapping features or overshoots and undershoots in the data.	-Geographic coordinates of datasets	Logical consistency is studied from a different point of view. The idea is to import the features and qualitative relationships of objects with spatial positions to evaluate quality. It was demonstrated that the parameters such as direction, distance, and topological relationships between objects could directly affect human comprehension and analysis results.	Assessment of Logical Consistency in OpenStreetMap Based on the Spatial Similarity Concept Logical consistency	Intrinsic	1
79	Lc2	Format Consistency (degree to which data is stored in accordance with	Conceptual Consistency	- Attribute semantic VGI data	Measures of consistency can focus on the use of classes and attributes in the data, with the advantage that no knowledge about the conceptual schema	A Conceptual Quality Framework for Volunteered Geographic Information	Intrinsic	

		the physical structure of the dataset) Topological Consistency			is needed.			
80	Lc3	(correctness of the explicitly encoded topological characteristics of a dataset)	Domain Consistency	- Attribute semantic VGI data - OSM wiki data	Conceptual compliance answers questions about the degree of adherence of an attribute, a feature, or a set of features to a given source S, ranging from non-compliance to full compliance. In VGI, contributors rely on a combination of sources to produce the data, intrinsically (using resources defined within the same project), and extrinsically (adopting external sources).	Trust as a Proxy Measure for the Quality of Volunteered Geographic Information in the Case of OpenStreetMap and A Conceptual Quality Framework for Volunteered Geographic Information	Intrinsic/Extrinsic	2
81	R1	Richness		-VGI (OSM) Data set	This paper is focused on interpretation of the data. The conceptual quality in VGI is examined. As a case study a European sample of VGI's Open Street Map is used and is focused	A conceptual quality framework for volunteered geographic information.	Intrinsic	1

					specifically on conceptual compliance. Richness shows the amount and variety of dimensions that are included in the description of the real-world entity			
Others								
82	Un1	Uncertainty It is a complex and multifaceted issue, and can be introduced by numerous factors, accumulated throughout the collection, creation, and analysis of spatial data, and can encompass one or several concepts related to accuracy, error, ambiguity, precision, consistency,		-VGI data set	This paper investigates the causes of the observations and uncertainty of the authors who create VGI having as a use case the Space4Agri Project that is a smart app to create data on extensive crops in Lombardy region – Italy and a classic domain ontology and its limitations is examined too.	“Contextualized VGI” Creation and Management to Cope with Uncertainty and Imprecision	Intrinsic	2

		quality, reliability, and others, which can influence how uncertainty is defined and characterized.						
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Appendix C: ImproveMyCity licensing status report



ImproveMyCity Licensing Schema

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1. What is Improve My City (IMC)

ImproveMyCity (IMC) is a software platform that promotes direct citizen-government communication and collaboration.

IMC is an open source, scalable platform that enables residents to directly report, to their public administration, local issues about their neighbourhood such as; discarded trash bins, faulty street lights, and broken tiles on sidewalks, illegal advertising boards, but also ideas and suggestions

The reported issues are automatically transmitted to the appropriate department in public administration to schedule their settlement. Reporting is feasible both through a **web-** and a **smartphone-based** frontend that adopt a map-based visualisation, which makes reporting a user-friendly and intriguing process.

The management and routing of incoming issues is performed through a backend administration infrastructure that serves as an integrated management system with easy to use interfaces. For more information check, also: <http://www.improve-my-city.com>

1.1. Available versions

ImproveMyCity (IMC) comes as **Joomla!** package extension with an easy to install process, through the Joomla! native installation mechanism of the famous CMS. It follows the guidelines and best practices of the latest Joomla! version 3.x (currently version 3.6.4)

There is also a version for **WordPress** CMS, available as WP plugin. Taking advantage of the friendly user interface of WP, IMC is seamlessly embedded in the most widespread CMS globally.

Both versions support their complete functionality with a REST-based API that serves as the gateway for third party applications to interact with IMC including the closed source IMC native mobile applications (**Android** and **iPhone**) that are common for both versions (WP or Joomla!).

The web-based software packages (based on WordPress or Joomla!) including the web-based administration backend along with the two native mobile applications and the optional web-based analytics tool are composing the IMC ecosystem.

1.2. IMC for WeGovNow

For WeGovNow, only IMC for Joomla! will be used since this version is the most technically mature and provides more features than the WordPress version (WP version will not be used in WeGovNow) such as complete ACL functionality in the backend administration among others. Moreover, parts of the analytics tool might be used during the project. Finally, the native mobile applications **will not be used** for WeGovNow.

*From this point on, **IMC** refers to the Joomla! version only.
This applies both to frontend (citizens, end-users) and backend
(administration, municipality officers)*

Changes, additions and enhancements in business logic, functionality and look n' feel based on WeGovNow needs, will be maintained separately in different repositories (as modular as possible) than the prototype IMC under the Infalia organisation that can be found at <https://github.com/infalia>. If these changes could be applied to the production IMC, then these will be merged to the original repository as well and hence will be made freely available to the open source community and consequently to all existing IMC installations worldwide via the automatic update mechanism provided by the CMS itself.

2. Joomla! Licensing

IMC is strictly based on Joomla! Content Management System (<https://www.joomla.org>) and **cannot run/executed** as standalone application.

Joomla! is free, open, and available to anyone under the **GNU General Public License Version 2 or later** (<https://www.gnu.org/licenses/old-licenses/gpl-2.0.html>).

Open Source Matters (OSM) manages the trademarks and copyrights on behalf of the Joomla! Project. As part of its mission, OSM provides information about these issues to the community and ensures that the community's work is protected. That includes managing the use of the Joomla! trademarks and copyrighted materials. OSM also works to ensure that the license terms of the Joomla! software and other open source materials (such as documentation) are enforced. For more information check, also: <http://opensourcematters.org/legal.html>

ImproveMyCity is a Joomla! extension

According to Joomla! License FAQ (<https://tm.joomla.org/joomla-license-faq>):

CAN I RELEASE AN EXTENSION UNDER A NON-GPL LICENCE?

It is our opinion that most extensions are derivative works of Joomla! and must be licensed under the GNU GPL. It is possible that an extension could work within Joomla! and not be considered a derivative work according to copyright law but this would have to be evaluated on a case-by-case basis. If you believe your extension is

not a derivative work, we strongly recommend that you seek professional legal advice.

Based on the above and given the fact that IMC is clearly considered a derivative work of Joomla! and since the vast majority of Joomla! extensions worldwide are actually based on GPL License, IMC from the early beginning (even for the initial IMC version for Joomla v2.5.x which is now deprecated) is **licensed under AGPL v3**.

For more details on licensing Joomla! extension check, also: <https://tm.joomla.org/licensing-your-extension>

2.1. Joomla!'s Copyright Policy

The Joomla! project does not aggregate the copyrights of its code contributors. No contributor is required to transfer his/her copyright to Joomla! and each individual contribution will forever remain in the ownership of its author. This also applies to translations of the Installation language set as these alone are included in the core release of Joomla!

Open Source Matters Inc., a not-for-profit organisation, holds the Joomla! project's assets and represents Joomla!'s legal matters. Joomla! project claims copyright over the total aggregated creation which is the CMS. This copyright is held by Open Source Matters Inc. This is why each file in the release is marked "Copyright - Open Source Matters Inc.". This does not violate the copyright and ownership of the individual contributions. These always remain the authors' property.

Attributions of the copyrights of contributors and other included code elements is detailed in the main copyright file in the root directory of the Joomla! installation.

As the contributors, do not transfer copyright they instead declare that their code contributions are licensed to Open Source Matters Inc. in a limited and non-exclusive fashion. Limited means that Open Source Matters Inc. may only use their contribution if it is released under GNU/GPL. Non-exclusive meaning that the contributors are free to do whatever they wish with their own creations including using it for their own releases under any license they wish (including proprietary licenses).

2.2. Joomla Extension Directory (JED)

The Joomla! Extensions Directory (JED) is a service provided to the Joomla community for easier discovery and installation of extensions. The terms and services for JED can be found at <https://extensions.joomla.org/about-jed/terms-of-service>.

Improve My City for Joomla 3.x is NOT currently (Nov. 2016) listed in JED **but it is planned to be listed after 1/1/2017**. Also, note that earlier versions of IMC (prior to Joomla 3.x) was used to be listed in JED under AGPL3.

IMC is planned to be listed in JED from 1/1/2017

There are some strict rules concerning the license of extension that are listed in JED. In more details, the following criteria is considered while approving a listing based on the use of the GPL license.

<i>Could this extension be listed in the JED?</i>			
IMC	Item	What?	Publishable?
	1	Project site lists non-GPL Joomla! extensions	No! JED will not link to sites that promote and distribute non-GPL extensions.
	2	Project site displays other software (not Joomla! extensions) that have other licenses	Yes!
	3	Entry was submitted as GPL license	Yes!
x	4	Entry was submitted as GPL compatible license	Maybe. See Special license verification checklists. *
	5	Entry was submitted with <i>Other</i> for license	Maybe. See Special license verification checklists. *

Also, to ponderate.

<i>List C2.3 - Will it be listed in the JED? YES, but only if...</i>			
IMC	Item	What?	Publishable?
x	1	Entry includes non-GPL files	Yes, but only for standalone files that aren't coded (JavaScript, Flash, images, CSS, audio files, etc.).
	2	Entry includes non-GPL libraries	Yes, but only if the libraries are available under a GPL compatible license listed by the Free Software Foundation like LGPL.
x	3	Entry has a call home function	Yes, but only if: <ul style="list-style-type: none"> The extension can work normally without a developer server connection It's possible to install the extension without a call home The extension is allowed to phone home for version checks.
	4	Entry uses a light GPL version instead of a full non-GPL version.	Yes, but only if: <ul style="list-style-type: none"> There is no mention of the non-GPL version features in the JED entry

			<ul style="list-style-type: none"> Neither are distributed at the same time
	...10	Entry bridges to a non-GPL product	<p>Yes, but only if:</p> <ul style="list-style-type: none"> The non-GPL product works independently from Joomla The extension is GPL and was created for Joomla Clear statement that the extension requires a non-GPL product to work

IMC is using a GPL compatible license (AGPL v3) which means that:

<i>Will it be considered "GPL compatible"?</i>			
IMC	Item	What?	Publishable?
	1	Entry uses an LGPL license	Yes, but only for libraries, not extensions.
x	2	Entry uses an AGPL license	Yes, but only if you modify the source, and provide that modified code for download.
	3	Entry uses a public domain	Yes!
	4	Entry uses Creative Commons, BSD, MIT or any other free software licenses	No. Only licenses that comply with all terms of the GPL will be considered.

As stated above, IMC will be submitted to be listed in JED, and it is clearly stated that BSD, MIT or any other free software licenses are deterrent. For more details check, also: https://docs.joomla.org/JED_Entries_License_Checklist.

3. How IMC is composed

IMC is a Joomla extension package composed of the following.

Item	Type	Description
Improve My City Component Front-End	Component	The main core component for the front-end that also handles the API controller
Improve My City Component Back-End	Component	The main core component for the back-end (administration)
Improve My City Filters	Module	Includes the buttons for filtering and reordering in any given position (template based)
Improve My City Map	Module	Includes the Google Map to display markers with the geolocation of each submitted issue
Improve My City Category Fields	Content plugin	Adds relations tab in Joomla! core categories to allow relationship definition between categories and user groups
Improve My City Mail Notifier	IMC plugin	Includes the mechanism to define rules and send notification emails to users and administrators based on triggers
Improve My City Search	Search plugin	Extends core Joomla! Search to also include IMC issues in its results
Improve My City Category Timestamp	System plugin	Adds a button in Joomla! Core categories to renew their timestamp (used by the API)
*Improve My City Reports	Component	Auxiliary component to produce reports based on date and other filtering. NOT USED in WeGovNow
*Analytics	External	Is not part of Joomla installation package but uses IMC API to produce analytics, visualisation, and insights. To be partially used in WeGovNow. Will not be used as is.

The above could be installed separately but are distributed together as package (*besides reports and analytics) with the appropriate installation mechanism zipped in one file. All necessary pre- and post- installation actions are taking place during and after installation (e.g. version checking, DB schema updates, etc.) by using Joomla!'s guidelines and best practices and by using default Joomla's installation mechanism.

4. List of dependencies

IMC is based on Joomla! CMS and as such, every dependency that applies to Joomla! (as a web-based application), inherits also to IMC. Joomla! and IMC are based on PHP programming language and as such it requires a web-server to host the application and of course PHP itself to interpret the source. Also, MySQL is the default DB that is used officially by Joomla! (and IMC). It is noted that dependencies of dependencies of PHP programming language, MySQL and any supported web-server and their modules (e.g. curl) WILL NOT BE LISTED in this document. Instead only the dependencies that are used (and distributed) in the package (Joomla! extension) of IMC are listed in the following table.

<i>Improve My City for Joomla! 3.x list of dependencies</i>			
Software	Type	License / description	other information
PHP 5.3.10 and above (Magic Quotes GPC off) 5.6 or 7.0+ is recommended	Program ming Languag e	PHP3 (BSD like)	
MySQL 5.1 and above (InnoDB support required) 5.5.3+ is recommended	Database	GPLv2	
Apache 2.0 (with mod_mysql, mod_xml, and mod_zlib) 2.4+ is recommended	Web server	Apache-2.0	
Nginx 1.0 1.8+ is recommended	Web server	2-clause BSD	
Microsoft IIS 7	Web server		
jQuery (used by many other software components) appears once in this list (for convenience)	JS	GNU GPL and MIT	
SLogin 2.5.0	Joomla Package	GPLv2 or later https://github.com/Joomline/slogin	
• Amcharts	JS	Linkware license	
• EasyPhpThumbnail Class	PHP	On-the-fly image manipulation and thumbnail generation Copyright (c) 2008-2012 JF Nutbroek <jfnutbroek@gmail.com> Visit http://www.mywebmymail.com for	

		more information
Google Maps Javascript	JS	Apache-2.0
<ul style="list-style-type: none"> googlemaps/js-marker-clusterer 	JS	Apache-2.0 https://github.com/googlemaps/js-marker-clusterer
Masonry	JS	MIT https://github.com/desandro/masonry
Development Dependencies <ul style="list-style-type: none"> "chalk": "^1.1.1", "gulp": "^3.9.0", "gulp-jshint": "^2.0.0", "gulp-json-lint": "^0.1.0", "gulp-rename": "^1.2.2", "gulp-replace": "^0.5.4", "gulp-requirejs-optimize": "metafizzy/gulp-requirejs-optimize", "gulp-uglify": "^1.5.1", "gulp-util": "^3.0.7", "jquery": ">=1.4.3 <4", "jquery-bridget": "~2.0.0", "jshint": "^2.8.0", "minimist": "^1.2.0", "qunitjs": "^1.12" 		
blueimp-file-upload (jQuery File Upload)	JS	MIT https://github.com/blueimp/jQuery-File-Upload
<ul style="list-style-type: none"> blueimp-load-image 	JS	MIT
<ul style="list-style-type: none"> blueimp-tmpl 	JS	MIT
Development Dependencies <ul style="list-style-type: none"> "bower-json": "0.8.1", "jshint": "2.9.3" 		
jQuery Comments	JS	MIT https://github.com/Viima/jquery-comments
<ul style="list-style-type: none"> Font Awesome (optional) 	Font	SIL OFL 1.1
jQuery Photobox	JS	Free Software License https://github.com/yairEO/photobox

		x
Classie	JS	MIT
Modernizer	JS	MIT

Joomla! itself also includes some external libraries which are listed below:

Used by IMC	Library & version	License
	Mootools 1.4.5	MIT
	Mootools More 1.4.0.1	MIT
x	jQuery 1.12.4	GNU GPL and MIT
x	jQuery UI (Core, Widget, Mouse, Position, and Sortable) 1.9.2	GNU GPL and MIT
x	Twitter Bootstrap 2.3.2	MIT
	Simple Pie 1.3.1	BSD
x	PHP Mailer 5.2.14	GPLv2
x	PHP UTF-8 0.5	LGPLv2
	IDNA Convert 0.8.0	LGPLv2
	Rapid Application Development (RAD) Framework. Akeeba's Framework on Framework(FOF) 2.4.3	GPLv2
	password_compat 1.0.4	MIT
	Lessphp 0.5.0	MIT
	random_compat 1.4.1	MIT

4.1. Theme / Template

Improve My City DOES NOT rely on any specific theme (template) to fully work. It can be applied to any default (the ones that included in the default Joomla! Installation zip file) or any other free or commercial template. Although, we are officially suggesting **Purity III**, a GNU General Public License template designed by Joomla!Art.com which is based on **Bootstrap**, a front-end framework of Twitter, Inc. Code licensed under Apache License v2.0 and **Font Awesome** font which is licensed under SIL OFL 1.1. More details at https://github.com/t3framework/purity_iii. The official demo of IMC is based on Purity III but for **WeGovNow a new template will be created** from scratch based on Google Material Design approach. The license of the theme will be licensed under GPL as well (so as to avoid any further conflicts to the Joomla! CMS).

The Joomla template that will be developed for WeGovNow will be based on material-design-lite which is delivered under the Apache-2.0 license. The development dependencies of Material Design Lite are the following: "acorn": "^4.0.3", "babel-core": "^5.8.25", "browser-sync": "^2.2.3", "chai": "^3.3.0", "chai-


```
jquery": "^2.0.0", "del": "^2.0.2", "drool": "^0.3.1", "escodegen": "^1.6.1", "google-closure-compiler": "", "gulp": "^3.9.0", "gulp-autoprefixer": "^3.0.2", "gulp-cache": "^0.3.0", "gulp-closure-compiler": "^0.3.1", "gulp-concat": "^2.4.1", "gulp-connect": "^5.0.0", "gulp-css-inline-images": "^0.1.1", "gulp-cssso": "1.0.0", "gulp-file": "^0.2.0", "gulp-flatten": "^0.3.1", "gulp-front-matter": "^1.2.2", "gulp-header": "^1.2.2", "gulp-if": "^2.0.0", "gulp-iife": "^0.1.0", "gulp-imagemin": "^3.1.0", "gulp-jscs": "^3.0.1", "gulp-jshint": "^1.6.3", "gulp-load-plugins": "^1.3.0", "gulp-marked": "^1.0.0", "gulp-mocha-phantomjs": "^0.12.0", "gulp-open": "^1.0.0", "gulp-rename": "^1.2.0", "gulp-replace": "^0.5.3", "gulp-sass": "2.0.*", "gulp-shell": "^0.4.2", "gulp-size": "^2.0.0", "gulp-sourcemaps": "^2.0.1", "gulp-subtree": "^0.1.0", "gulp-tap": "^0.1.3", "gulp-uglify": "^2.0.0", "gulp-util": "^3.0.4", "gulp-zip": "^3.0.2", "humanize": "0.0.9", "jquery": "^3.1.1", "jshint-stylish": "^2.0.1", "merge-stream": "^1.0.0", "mocha": "^3.0.2", "prismjs": "0.0.1", "run-sequence": "^1.0.2", "swig": "^1.4.2", "through2": "^2.0.0", "vinyl-paths": "^2.0.0".
```

For more information check, also: <https://github.com/google/material-design-lite>.

Finally, the font to be used is: Google's Roboto Font that is delivered under Apache-2.0 license.

5. Alignment with the “linking document”

In this last chapter, we try to identify the case of IMC in one or more of the “linking document” section and to exclude IMC from any of those sections.

Section	Comments
Static linking (page 8)	Excluded. IMC is not even compiled, let alone static linking to include in the executable any other libraries
Dynamic linking (page 12)	Excluded, unless it is considered as dynamic linking the web server itself (probably that's not the case)
Remote Procedure Calls (page 17)	Maybe it concerns IMC. Although it is not clearly stated, IMC API is using REST to serve its functionality to third party software. Also, Google Maps use a kind of RPC to retrieve data from Google servers. Generally, IMC also uses content delivery network CDNs to load JS libraries (which in a wider concept and sense might be considered as RPC)
System calls (page 19)	Concerns IMC and Joomla! since it can read and write files to the server
Macro and template expansions (page 21)	Excluded. This is clearly a development method that is not used in IMC

Plugins (including LKMs) (page 24)	Concerns IMC. The overall IMC is considered as “plugin” (extension) to the Joomla! CMS. IMC itself also uses plugin to expand its functionality and expand Joomla!’s functionality
Interpreted languages (page 30)	Concerns IMC. PHP is the interpreter language for IMC.

Working Paper on the legal implications of certain forms of Software Interactions (a.k.a linking)”, is available online at:

<<http://www.ifosslr.org/public/LinkingDocument.odt>>

Appendix D: List of web accessibility requirements

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
Technical accessibility								
Technologies								
T1a	Use technologies that are accessibility supported Not all technologies can be made accessible. Avoid for instance Java-applets and Flash. Feel free to use HTML, CSS and JavaScript.	Critical		Developers				
T1b	The HTML code is based on a standard and follows it Define the chosen standard with !DOCTYPE, and follow it as far as it is possible. Exceptions caused by attributes that don't exist in the standard, but are used by the CMS or a specific functionality are allowed, but have to be motivated and documented. None of the exceptions specified on success criteria 4.1.1 in WCAG are allowed.	Basic	4.1.1 (1) 4.1.2 (1)	Developers				
T1c	The CSS code is based on a standard and follows it Also avoid browser-specific solutions used to achieve the same presentation in all browsers.	Basic		Developers				
T1d	Character encoding is set correctly	Basic		Developers				

Separation of content and presentation

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
T2a	CSS is used for all presentation This includes decorative images.	Basic	<u>1.3.1</u> (1) <u>1.4.8</u> (3)	Developers				
T2b	Layout tables are not used No exceptions. Complex forms may be partially table-based, but only as actual data tables with table header cells.	Basic		Developers Authors				
T2c	The content is organized so that it is readable without CSS It does not mean that the presentation has to be entirely without issues. For instance, it can be acceptable if the menu is displayed twice, if it is required for good functionality on mobile devices.	Basic	<u>1.3.2</u> (1)	Developers				

Interface flexibility

T3a	The interface works well on different screen widths The interface should be build using responsive techniques so that it adapts to the screen width automatically. The mobile version of the menu should not be visible at least until portrait mode on iPad, but preferably not until landscape mode on mobile phones. Icons for menu and search should be supplemented by visible text "Menu" and "Search".	Basic		Designers Developers				
T3b	All information and functionality is possible to access and use regardless of screen size	Basic		Developers				
T3c	The website is fully usable and readable when using zoom The zoom functionality in browsers must work on the website. Having a different setting than "Normal" selected in the Internet Explorer menu "Show > Text size" should not cause visual problems.	Basic	<u>1.4.4</u> (2) <u>1.4.8</u> (3)	Developers				
T3d	Images should be adapted on the server for different screen widths	Additional		Developers				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
Frames								
T4a	Minimize the use of frames Frames should preferably not be used at all. If they are, the use must always be motivated.	Basic		Developers				
T4b	The purpose of every frame is described in the title attribute	Basic	4.1.2 (1)	Developers				
Scripts								
T5a	Use scripts to enhance the user experience For instance, it should be possible to submit a form even though script is blocked. Scripts may be used for live validation when the form is filled out, but even if script is blocked it should be possible to post the form (without the live validation).	Additional		Developers				
T5b	Basic functionality like menus and search functions work without script This also applies to the mobile interface, meaning that the mobile menu must still function if scripts are disabled.	Additional		Developers				
T5c	There is relevant information for users whose equipment is blocking script If additional software or plugins are required, they must also be accessible, and the user must be provided with a download link. The user must also be given information why certain parts of the website may not work, and how they might access the same information/functionality in other ways.	Basic		Developers				
T5d	Scripts do not cause problems for users with assistive technology Complex technologies and systems should at a minimum be tested with the screen readers Jaws for Windows (Internet Explorer) and VoiceOver for iOS (Safari). Additional testing needs should be	Basic	4.1.2 (1)	Developers				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
	discussed from case to case.							
T5e	When new elements are inserted into the page, they are placed correctly both visually and structurally	Basic	1.3.2 (1) 2.4.3 (1)	Developers				
T5f	Use aria-expanded for areas that expand and collapse Links and buttons that expand an area without reloading the page must use the WAI-ARIA attribute aria-expanded to show whether the area is currently expanded or collapsed.	Basic	4.1.2 (1)	Developers				

Navigation

T6a	All functionality can be controlled with mouse, keyboard and touch screen The interface does not require precise timing from the user to navigate it. The user can navigate out of all functions and components regardless of which input device he/she uses.	Basic	2.1.1 (1) 2.1.2 (1) 2.1.3 (3) 3.2.1 (1) 3.2.2 (1) 3.2.5 (3)	Developers				
T6b	The tab order is logical	Basic	2.4.3 (1)	Developers				
T6c	Focus is clearly visible when the user navigates using keyboard and mouse This applies to text links, image links and form objects, and should be controlled using CSS. See www.sr.se and www.fmv.se for good examples.	Basic	2.4.7 (2)	Developers				
T6d	Clickable areas are easy to hit The exact size requirements vary from case to case, but as a base rule, the height should be at least one normal line height and the width at least three line heights, or vice versa. It is not necessarily a problem if a clickable object is comparatively small; the problem occurs when there are several clickable objects close to each other.	Basic		Developers				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
T6e	New windows and popups are not opened unless the user requested it This includes dynamic layers containing (for instance) website surveys that suddenly appear when the user has loaded a third or fourth page on the website.	Basic	3.2.1 (1)	Developers				
T6f	The user's focus is directed to new content or new areas when these are opened This must also include users with assistive technology, such as users with severe visual impairment.	Basic	2.4.3 (1)	Developers				
T6g	Related links and information areas are grouped The elements should be grouped both visually on the page and in the code structure. For example, make sure that the gap between main menu and sub menu is not too big. HTML5 elements are used for navigation <nav> and main content <main>. WAI-ARIA roles are used for search functions.	Additional		Developers				
T6h	Shortcut links for faster keyboard navigation are implemented The shortcut is visually hidden until it receives focus, either through tab navigation or through an access key, after which it becomes visible. At a minimum, there must be a shortcut from the start of the page down to the main content area, skipping navigation and other global functions in the page header.	Basic	2.4.1 (1)	Developers				
T6i	Access keys are implemented	Additional		Developers				

Automatic events

T7a	Automatically updating pages are only used under special circumstances Automatic full page reloads should not be used. However, dynamically updating content on the page is OK, as long as it does not exclude or cause problems for users with assistive technology.	Basic	2.2.3 (3) 2.2.4 (3)	Developers				
T7b	There is no client-side automatic forwarding of visitors Forwarding is acceptable if the time is set to 0.	Basic	2.2.3 (3) 2.2.4 (3)	Developers				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
T7c	Time limits are only used under special circumstances	Basic	2.2.3 (3) 2.2.4 (3)	Developers				
T7d	If automatic events or time limits are used, the user is informed in advance If it is at all possible to let the user request more time, it should be offered.	Critical	2.2.1 (1) 2.2.2 (1) 2.2.4 (3) 3.2.5 (3)	Developers				
T7e	If automatic events or time limits are used, the user can extend the time interval	Additional	2.2.1 (1) 2.2.2 (1) 2.2.4 (3)	Developers				
T7f	If automatic log off is used, user input must as far as it is possible be saved so that the user can continue at next login	Additional	2.2.5 (3)	Developers				
T7g	If an area is updated dynamically without the page reloading, it must be marked using the WAI-ARIA attribute aria-live Use the following values: <ul style="list-style-type: none"> • Off = Use for frequently updating information, such as live stock quotes. • Polite = Use for updates that can be communicated to the user when he/she is not busy. • Assertive = Use when something important happens that the user needs to be notified of immediately. 	Basic	4.1.2 (1)	Developers				

Coding of forms

T8a	Form objects are coded with the correct form code For instance, avoid creating buttons out of div or a-elements with role="button".	Basic	1.3.1 (1) 4.1.2 (1)	Developers				
T8b	Labels are connected to corresponding form objects Use the label element. If the website is coded in HTML5, the form objects must have the correct type value to ensure a	Critical	1.3.1 (1) 2.4.6 (2) 3.3.2 (1)	Developers				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
	better experience with on-screen keyboards.		4.1.2 (1)					
T8c	Form sections are grouped Use fieldset and legend when there are groups of radio buttons, check boxes or other logical groups of form objects.	Basic	1.3.1 (1)	Developers				
T8d	Error messages are coupled with corresponding form objects	Basic	1.3.1 (1)	Developers				

The use of structural elements

T9a	Heading elements are used to convey the document's information structure with the proper hierarchy The first heading of the page must be an h1, and should be the main heading of the page-specific content.	Critical	1.3.1 (1) 2.4.10 (3)	Developers Authors				
T9b	Lists are coded and used correctly	Basic	1.3.1 (1) 3.1.3 (3)	Developers Authors				
T9c	Paragraphs are created with the p element and used correctly	Basic	1.3.1 (1)	Developers Authors				
T9d	Quotes are marked with q or blockquote elements	Additional	1.3.1 (1)	Developers Authors				
T9e	Abbreviations are explained using the abbr element Ideally, abbreviations should be avoided entirely. If they absolutely must be used, they should be written out in full when they first occur in the text. The abbr element should then be used for all remaining instances. Abbreviated weekdays in a calendar should always use abbr to make them easier to understand.	Additional	1.3.1 (1) 3.1.4 (3)	Developers Authors				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
The construction of data tables								
T10a	Table headings are created using th and caption	Critical	1.3.1 (1)	Developers Authors				
T10b	Table cells are used for table data only For instance, image captions should not be placed within a table cell. This is a separate concern from the use of tables for layout purposes (see requirement T2b).	Basic		Developers Authors				
T10c	Complex tables are complemented with relevant HTML code When the table cells contain multilevel headings, each heading must be given a unique id-value, and each table cell must declare its headings using the attribute header.	Basic	1.3.1 (1)	Developers Authors				

Link implementation

T11a	Links are implemented so that they are visible regardless of how the user has set up their browser.	Critical		Developers				
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Text

T12a	Text is presented as text and not as images of text Exceptions can be made for: <ul style="list-style-type: none"> Items on the landing page promoting information further down in the structure, as long as it is possible to reach the same information through other links or menus. Illustrations	Basic	1.4.5 (2) 1.4.9 (3)	Developers Authors				
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No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
	<ul style="list-style-type: none"> Flow charts Diagrams Logotypes <p>If an image is partly made up of text, such as in the case of diagrams or flow charts, a version of that image must be made available in which the text is at least twice the website's normal text size.</p>							

Descriptions of images

T13a	A text equivalent is provided for every meaningful graphical element on the website	Critical	1.1.1 (1)	Developers Authors				
T13b	Image maps are client-side and have textual descriptions for both links and images	Basic	1.1.1 (1) 2.4.4 (1) 2.4.9 (3)	Developers Authors				

Sound management

T14a	Information that is presented through sound is also explained in text There must be a short text describing the contents of the audio file or broadcast. The corresponding information must also be available as text and clearly reachable in connection to the audio file or broadcast. Exceptions from this rule can in some cases be made for live broadcasts.	Basic	1.2.1 (1) 1.2.8 (3) 1.2.9 (3)	Authors				
T14b	Background sound is easy to turn off manually, or turns off automatically within 3 seconds	Critical	1.4.2 (1)	Developers Authors				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
Managing complex media formats (e.g. pdf and film)								
T15a	There are appropriate text descriptions for all information presented through complex media formats For film and animated illustrations, the equivalent information must be provided in text form. This satisfies all the referenced WCAG requirements. For films that are permanent or semi-permanent on the website, there must also be subtitles for all audio information. For links to files such as PDF documents, the link text must specify the file's content, format and size (if greater than 1MB).	Basic	1.1.1 (1) 1.2.1 (1)	Authors				
T15b	Information that is presented through the use of complex media formats has passed an accessibility review Film and PDF documents are also covered by WCAG 2.0. Therefore, you should make sure that such materials are also accessible. When using film, this includes captioning the video and providing an audio description if necessary.	Basic	1.2.2 (1) 1.2.3 (1) 1.2.4 (2) 1.2.5 (2)	Authors				
T15c	The user can choose between at least two different quality settings when streaming media	Additional		Developers				
T15d	Films are offered in an image quality that is relevant for their purpose	Additional		Authors				

Colors and contrasts

T16a	The website does not block the user's ability to set their own preferences regarding colors and fonts in the browser As far as it is possible, the user should be able to use the settings panel in Internet Explorer and	Additional	1.4.8 (3)	Developers				
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No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
	Firefox to override the website's colors and fonts and substitute them according to their own preferences. Note that a full substitution may not always be possible in Internet Explorer.							

Interface motion

T17a	The website is presented without annoying flickering or moving and blinking elements that cannot be turned off. All movement on the website must be possible to stop using both mouse and keyboard.	Basic	2.2.2 (1) 2.3.1 (1) 2.3.2 (3)	Developers Authors				
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Description of pages

T18a	The pages have unique and relevant page titles	Basic	2.4.2 (1)	Developers				
T18b	Metadata provides relevant information about the page and the website This requirement should be evaluated on a case-by-case basis. However, as a minimum rule, the attribute "description" should be used.	Additional		Developers Authors				
T18c	The main language of the page is defined in the source code The language is defined with the attribute <i>lang</i> within the html element.	Basic	3.1.1 (1)	Developers				
T18d	Content in languages other than the main language of the page is marked down	Basic	3.1.2 (2)	Developers Authors				
T18e	If instructions exist for how users with assistive technology should use a certain feature on the website, those instructions should be closely coupled with the feature Use the WAI-ARIA attribute aria-describedby to couple explanations to their corresponding elements. For example, use it to associate an extended description or help text to a specific form object. It should also be used to couple specific instructions for users with screen readers to the	Additional		Developers				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
	function that the instructions concern.							

Pedagogic accessibility

Start page

P1a	It is easy to identify the originator of the interface This must be apparent through text, metadata and a logotype. In this context it is the organization using the system that must be presented, not the company developing the system.	Critical		Developers Designers				
P1b	The overall purpose of the website is easy to understand	Basic		Designers				
P1c	The start page helps the user understand what is important	Basic		Designers Authors				

General rules

P2a	The website does not feel confusing	Basic	2.4.8 (3)	Designers				
P2b	The websites design and appearance confirms the users expectations of how it should look and function	Basic		Designers				

Logic

P3a	The design and placement of objects helps the user understand the content	Basic	1.3.3 (1)	Designers				
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No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
	<p>Among other things, this means that:</p> <ul style="list-style-type: none"> The menu clearly shows the user's current location Elements and functions make it obvious what they are, i.e. it is easy to identify their purposes. The same function does not change location in different sections of the website Text that is not a link is never underlined Elements that are not links do not look as if they are links Search results are laid out in a clear and understandable way It is obvious to the user if the current page is part of a larger flow or collection of pages The page does not use Captcha 		<p>3.2.3 (2)</p> <p>3.2.4 (2)</p>	Developers				
P3b	<p>Different services and sections of the website interact with the user in a consistent way</p> <p>This means that the terminology that is used for features and links, and the order that for instance menu items are presented, is consistent throughout the site.</p>	Basic	<p>3.2.3 (2)</p> <p>3.2.4 (2)</p>	Designers Developers				
P3c	When the user believes he is doing the same thing, the result is also the same	Basic		Developers Authors				
P3d	Different links that lead to the same page share the same name	Additional	3.2.4 (2)	Developers Authors				

Understandability

P4a	The navigation is intuitive	Basic		Designers				
P4b	<p>As far as it is possible, content changes and updates take place after (below) the user's current location on the page</p> <p>As an example, search results should be presented visually below the search function, and inserted directly after the search function in the code structure.</p>	Basic	1.3.2 (1)	Designers Developers				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
P4c	The user is made aware of changes as they happen This must be done visually and, when appropriate, also with sound. The more important the event, the more obvious should the visual notification be, and its sound. Frequently updating information, such as live stock quotes, can use more discrete notifications so as not to disturb the user.	Basic		Designers Developers				
P4d	The user receives relevant feedback Examples of this include, for instance, a visual indication of the system's current state, a confirmation that a recent user action was correct, or an clearly worded error message.	Critical		Designers Developers				
P4e	The active page must never contain a link to itself This does not apply to links that change the content of the active page, or moves the user's focus within the page. The link or button must either change something on the page or the context.	Additional		Developers				
P4f	New browser windows are only created if they increase user benefits	Basic		Designers Authors				
P4g	Clickable objects are clearly visible and readable	Basic		Designers				
P4h	The understandability of instructions and directions is not dependent on the user's ability to see or hear	Critical	1.3.3 (1)	Authors				

Menu structure

P5a	The number of top-level choices in the menu is well balanced	Basic		Designers Authors				
P5b	The relationship between the depth and width of the menu structure is well balanced	Basic		Designers Authors				
P5c	The menu structure reflects only the information structure The menu must not contain direct links to other websites, disparate interfaces or global functions	Basic		Designers Authors				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
	such as, for instance, contact information.							
P5d	The menu structure reflects user expectations of how the content should be structured	Additional		Designers Authors				
P5e	Menus have been set up according to a thought-out sorting order	Additional		Designers Authors				

Search functionality

P6a	A search function exists, except for special reasons	Critical	2.4.5 (2)	Designers				
P6b	Searching yields relevant results There should also be mechanisms in place that handle spelling mistakes and synonyms.	Basic		Developers				
P6c	The search function is positioned high on the page The function must be available on, or clearly reachable from, every page on the website.	Additional		Designers				
P6d	The initial search is easy	Basic		Designers Developers				
P6e	The initial search covers all content on the website	Additional		Developers				
P6f	The user can refine his/her search through an extended search function	Additional		Developers				
P6g	The user can customize how search results are presented	Additional		Designers Developers				

Site map

P7a	A site map exists if the structure is extensive	Additional	2.4.5 (2)	Designers				
P7b	The site map reflects the entire menu structure	Additional		Developers				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
	In practice, it is rarely practical to include more than three sublevels. However, this is something that must be discussed on a case-by-case basis.							

'A to Z' functionality

P8a	'A to Z' contains concepts which are addressed to the user and make it obvious what information exists on each linked page	Additional	2.4.5 (2)	Developers Authors				
P8b	'A to Z' is used to direct the user to the correct section of the website	Additional		Authors				

Form design

P9a	Forms are designed in a clear way This includes, among other things, that: <ul style="list-style-type: none"> Form objects must be distinguishable and identifiable. Do not deviate unnecessarily from the browser's default look. Obligatory input fields must be clearly marked; both visually and in the input field description. Labels and their corresponding form objects must have an obvious visual association If different parts of the form are logically linked, they must be grouped on the page Forms should (as far as it is possible) be able to handle or correct improperly formatted data, such as dates. The size of input fields must be appropriate for the content The user should as far as it is possible be able to go back and undo previous actions. The number of fields and inputs are kept to a minimum. Functions to automatically fill in information (such as auto-completing addresses after the user gives his/her personal 	Basic	3.3.2 (1)	Designers Developers				
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No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
	identity number) should be used when appropriate.							
P9b	Forms are consistent throughout the website Different forms should use the same terminology for fields that do the same thing.	Additional		Designers Developers				
P9c	Forms have functionality to make it easier for the user to fill in information	Additional		Designers Developers				
P9d	Important forms give the user opportunity to review and confirm the information that is to be sent before it is sent	Critical	3.3.4 (2)	Designers Developers				

Button design

P10a	Buttons are clearly distinguishable and appear clickable	Basic		Designers				
P10b	It is obvious what each button does	Basic	4.1.2 (1)	Designers Developers				
P10c	The placement of buttons is consistent throughout the website	Basic	3.2.3 (2)	Designers				

Error handling

P11a	When an error occurs, it is clearly communicated to the user Errors must be clearly described in a joint error message area above the form, as well as right next to the field where they occurred. The error notification should not require the user to be able to distinguish colors. Do not, for instance, just mark fields containing errors with the color red. A designated error page should be shown whenever a page that was requested by the user cannot be found.	Critical	1.3.3 (1) 3.3.1 (1)	Designers Developers				
P11b	It is made obvious where an error can be found and how it can be fixed	Additional		Designers				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
				Developers				
P11c	If an error occurs in a form, the correct information that has already been filled in must remain intact	Additional		Developers				

The design and description of links

P12a	Links are designed in a clear way	Basic		Designers				
P12b	It is obvious where a link leads Primarily, this means that there needs to be a link text + an alt-text, if an image is part of the link. If that is not enough, the title attribute should be used to describe the link's target and its function. However, the latter should be viewed as a departure from good accessibility practice.	Basic	2.4.4 (1) 2.4.9 (3)	Developers Authors				
P12c	Links that open new browser windows are clearly distinguishable	Basic		Developers Authors				
P12d	Links that lead to external websites are clearly distinguishable	Basic		Developers Authors				
P12e	Links that lead to documents are clearly distinguishable For instance, it must be obvious that a link leads to a PDF document. It should also be made explicit in the link text if the file size of the document is large.	Basic		Developers Authors				
P12f	Links that lead to other formats are clearly distinguishable This applies to links leading to, for example, simpler language, sign language and film content.	Additional		Developers Authors				

Complex formats

P13a	Complex formats (such as PDF) are only used when appropriate to do so, and when they add to the user benefits	Additional		Designers Authors				
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No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
Links to associated content								
P14a	It is obvious to users where they can find alternatives to information that is presented in a form other than text	Basic	<u>1.1.1</u> (1)	Designers Authors				
Colors and contrasts								
P15a	Understandability does not depend on the user's ability to distinguish different colors No link or piece of information must rely on the user's ability to see colors. Therefore, links must be underlined or supplemented with an icon.	Basic	<u>1.4.1</u> (1)	Designers				
P15b	Foreground and background colors have high enough contrast against each other Use the WCAG contrast scale, where 4.5:1 is the lower limit for passing, and 21:1 is the maximum (black on white). You can use the tool Color Contrast Analyser, found at www.paciellogroup.com/resources/contrast-analyser.html	Basic	<u>1.4.3</u> (2)	Designers				
P15c	Text should not be displayed against a background that varies in color or hue	Additional		Designers				
Typography								
P16a	Headings are clearly distinguishable and readable	Basic		Designers				
P16b	Preambles are clearly distinguishable and readable	Additional		Designers				
P16c	Body text is clearly distinguishable and readable Limit line lengths to 70 characters or less, including empty spaces.	Basic	<u>1.4.8</u> (3)	Designers				
P16d	Image captions are clearly distinguishable and readable	Additional		Designers				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
P16e	Quotes are clearly distinguishable and readable	Additional		Designers Authors				

Tables

P17a	Tables are designed in such a way that they aid the understanding of the data that is presented	Basic		Designers Developers Authors				
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About the website

P18a	There is a section called "About the website"	Additional		Designers				
P18b	"About the website" contains information describing how the website works	Additional		Authors				
P18c	"About the website" contains information describing the kind of support that the website can offer to users with special needs.	Additional		Authors				
P18d	"About the website" offers information about ways that the user can customize the website's appearance by changing settings in the browser or operating system	Additional		Authors				

Help and transition to manual service

P19a	Complex functionalities and services have a help function in some form There must also be clear user instructions directly within each such function/service.	Basic	3.3.5 (3)	Developers Designers				
P19b	If there are alternative ways to achieve the same result as that of a complex function, there is clear information describing to the user how that is done.	Additional	3.3.5 (3)	Designers Developers Authors				

No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
P19c	If special knowledge is required to use the interface with an assistive aid of any sort, clear information about this is provided to the users in question	Additional	3.3.5 (3)	Developers Authors				
P19d	It is easy to identify contact information in the form of telephone numbers and e-mail addresses	Basic		Designers Authors				

Listen functionality

P20a	The website offers a way for the user to listen to text content	Additional	3.1.5 (3)	Designers				
P20b	The user may customize how the texts are read out It should be possible to change the reading speed and the way that the text is highlighted as it is read out.	Additional		Developers				
P20c	Each word is highlighted as it is read out	Additional		Developers				

Sign language

P21a	The website offers important information in sign language.	Additional	3.1.5 (3)	Authors				
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Understandable information in different formats (images, film, simple language, spoken information)

P22a	The website has material adapted specifically for users that have difficulties reading texts If a user with a reading ability that is considered normal for a 15-year old has difficulties understanding the text, it needs to be simplified or complemented with film, illustrations and/or examples.	Additional	3.1.5 (3)	Designers Authors				
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No	Description	Notation	Reference to WCAG 2.0	Affected parties	Fulfilled	Partially	Not fulfilled	Not applicable
Other languages								
P23a	Language choices are managed in a thoughtful and consistent manner throughout the website	Additional		Designers				

END OF D1.2