CATALOGUE OF REQUIREMENTS FOR THE WEB BASED DECISION SUPPORT AND INFORMATION TOOL

Deliverable: D.T1.1.2 **Final**
Project partner: PP10-GiGa **04 2017**

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Date of publishing: 20.04.2017

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Content

1. Introduction

The project related web platform www.geoplasma-ce.eu represents the major technical output of the project GeoPLASMA-CE. According to the application form of the project, it will consist of two main tools:

- The web based decision support and information tool based on 3D models addressing the 6 pilot areas (Output O.T1.1).
  "The web based tools will provide geoscientific key values which help to plan shallow geothermal use in the selected pilot areas in a sustainable way (TWP3). All needed information will be geographically referenced and displayed in terms of maps and cross sections, which are planned to be interactively extracted by users from 3D models. The web tools will give all relevant information to users in order to plan and monitor the use of shallow geothermal methods." (Taken from the AF, description of O.T1.1).
- The web based expert platform addressing also stakeholders outside the pilot areas (O.T1.2).
  "This output acts as an interface between experts from public authorities, private market (e.g. planners of geothermal use or energy suppliers), interest groups (e.g. federations) and the scientific community. It intends to address both, stakeholders from pilot areas and other regions of Central Europe and beyond. It will contain all outcomes concerning harmonized workflows and standards (TWP2), the upscaled energy planning strategies (TWP4) and general communication tools like yellow pages." (Taken from the AF, description of O.T1.2).

As the web portal will serve as an interface between the project outcomes and end-users in both, the 6 different pilot areas and the Central Europe region, a stakeholder survey has been performed (A.T1.1 & A.T1.2). The analyzed outputs of the WPT1 survey are presented in this report with respect to the user requirements for a web based decision support and information tool (output O.T1.1). The user requirements represent a ranked list of aimed features, which will then be evaluated for a possible realization within the project lifetime with regard to the available resources. The evaluation process will finally lead to a so called White Book of the web based decision support and information tool (deliverable D.T1.3.1), which represents the basis of the technical realization of output O.T1.1.

2. Stakeholder survey

2.1. Content of survey

The design of the survey is described in deliverable D.T1.2.1 ("Template of a harmonized questionnaire for the web based decision support and information tool and the web based expert platform"). The harmonized questionnaire is based on a mind-map scheme, which covers all technical aspects of the web portal, like data dissemination features (e.g. web maps, web databases or 3D models), social functionalities (e.g. yellow pages) and general aspects (mobility, data formats and data security). The first draft of the questionnaire still considered two independent surveys for the outputs O.T1.1. and O.T1.2. However, as some aspects as well as the stakeholders of the surveys were significantly overlapping, the project team decided to combine the initially two separate surveys into one single survey. The survey itself was performed online using the tool QuestionPro (www.questionpro.com). The survey was disseminated via the project related microsite, the websites of the involved project partners and via E-Mail invitation including the hyperlink to the survey. In order to reach local stakeholders in the pilot areas, the final version of the questionnaire was translated into German-, Polish-, Czech-, Slovenian and Slovak language.

2.2. Outcome of survey

The GeoPLASMA-CE platform survey, containing up to 61 questions, was open from 16th December until 17th February. During this time span it was viewed 557 times. It was started 203 times and completed 86 times,

which results in a completion rate of 42.36%. People from 10 countries completed the survey. The countries with the most participants are Germany (33%), Austria (21%) and Poland (20%). Figure 1 shows an overview about the participants of the survey grouped into country of origin, years of experience in the field of geothermal energy and professional occupation respectively.

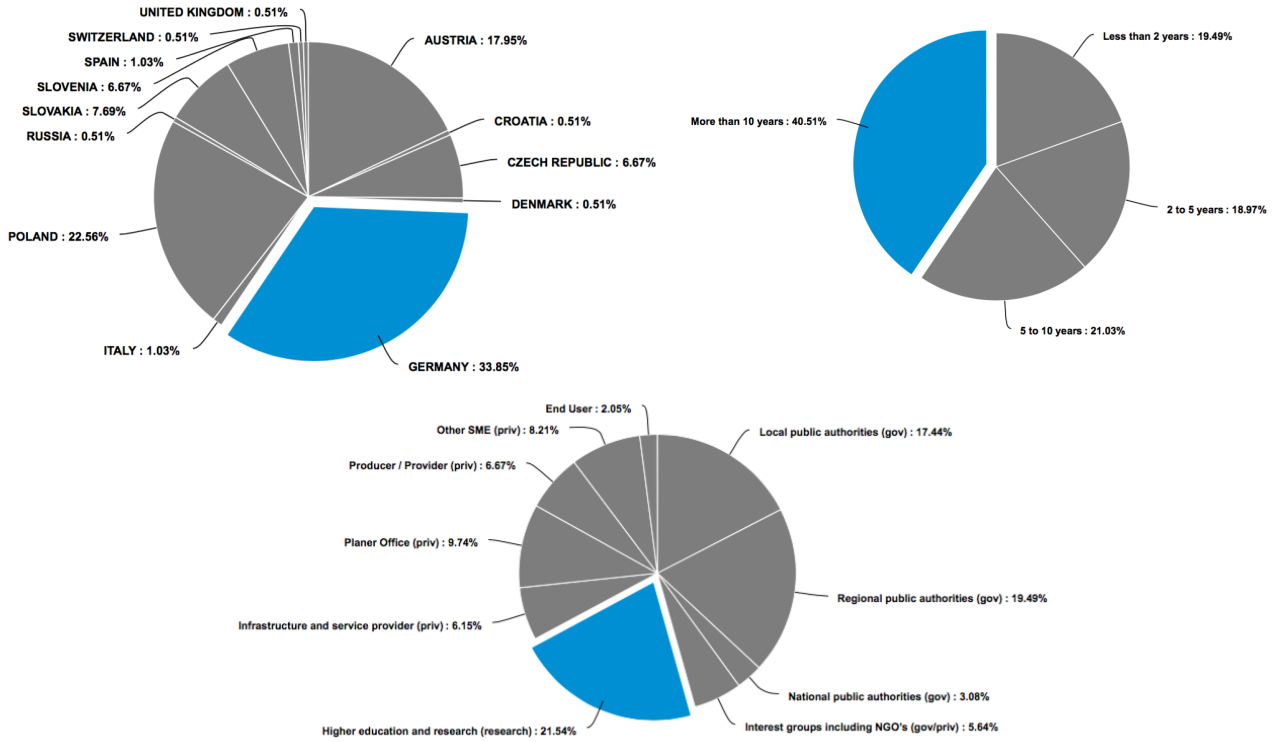


Fig. 1 – Overview of the participants of the survey grouped by country of origin (top left), years of experience in the field of geothermal energy (top right) and professional occupation (lower middle).

2.3. Statistical analysis of received feedback

To analyze the results of the survey, a combination of Excel and the programming language "R" (R Development Core Team, 2008) was used. Only the results of the 86 completed surveys were taken into account. The incomplete answers were ignored to assure that possible duplicate answers of a participant who started the survey once and completed it another time are not a factor in the analysis.

To get an overview of the results before defining specific groups of users, the first step was to analyze the answers of all participants, regardless of their experience, their profession or their location. The raw data of every question was exported from the online platform and a stacked bar chart was created with R. All charts that have been created are shown in the Annex of this report. The stacked bar charts are a good way to visualize the relevance of a single feature to the participants (see also Fig. 2).

In parallel to the creation of the bar charts, a flow chart was created to show the connection between single questions of the survey. The color scale of the bar charts was used to colorize the flow chart in a next step. The result of this was a visualization that gives a good summary about the relevance of single features for the participants. For the colorization of the flow chart the different scales of the bar charts had to be unified to a single scale of relevance with different shades of green representing a „high - low relevance" of a feature, red representing „no relevance" and gray representing "not applicable".

For the colorization of the flow chart, two methods were used which resulted in different results. In a first approach, the dominant choice of the participants at each question was used to colorize the corresponding

item in the flow chart. It turned out that for most features the dominant response was „high relevance“. The result of this was a rather undifferentiated flow chart where most features were colorized in a dark green.

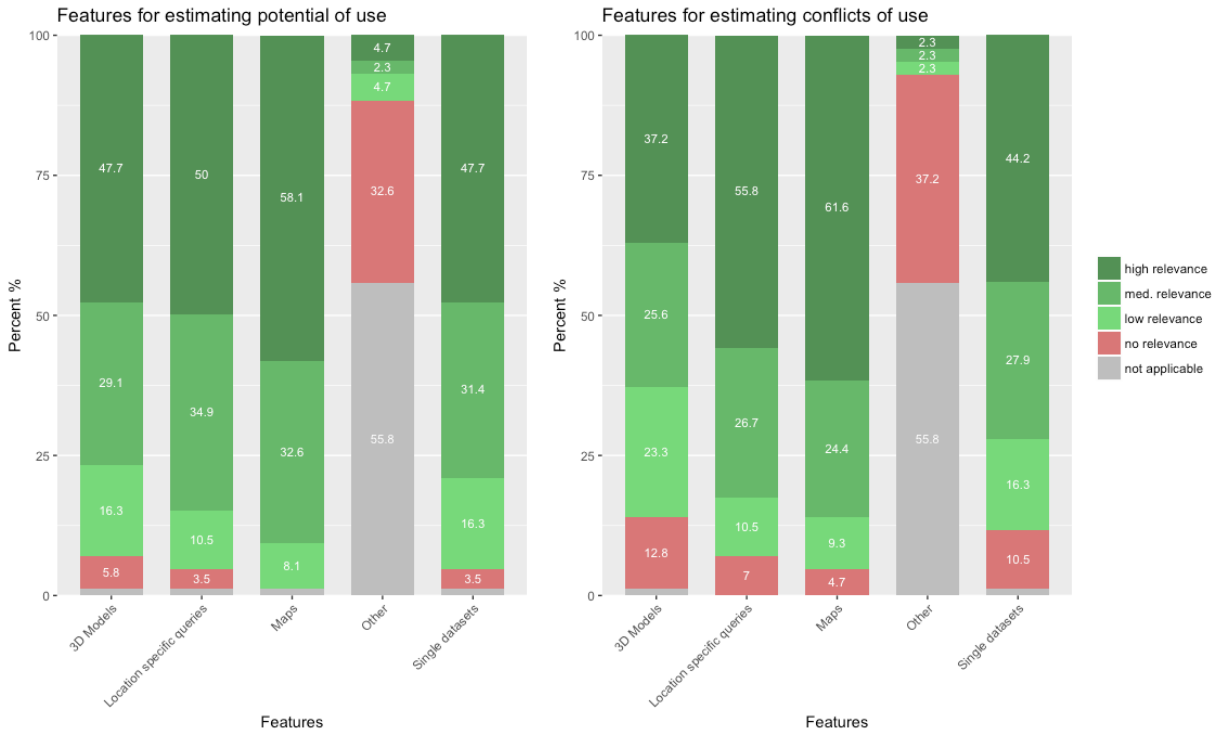


Fig. 2 - Stacked bar charts for the main features of a web based decision support tool

To get a more differentiated chart, a second approach was planned and executed. In this approach, the colorization of single items in the flow chart only depended on the relative share of “high relevance“ answers.

- Share of high relevance >50% → high relevance
- Share of high relevance >25% → medium relevance
- Share of high relevance >10% → low relevance
- Share of high relevance <10% → no relevance

This approach resulted in a much more differentiated flow chart that made it possible to get a good summary of the most wanted features according to the survey (see also Fig. 3).

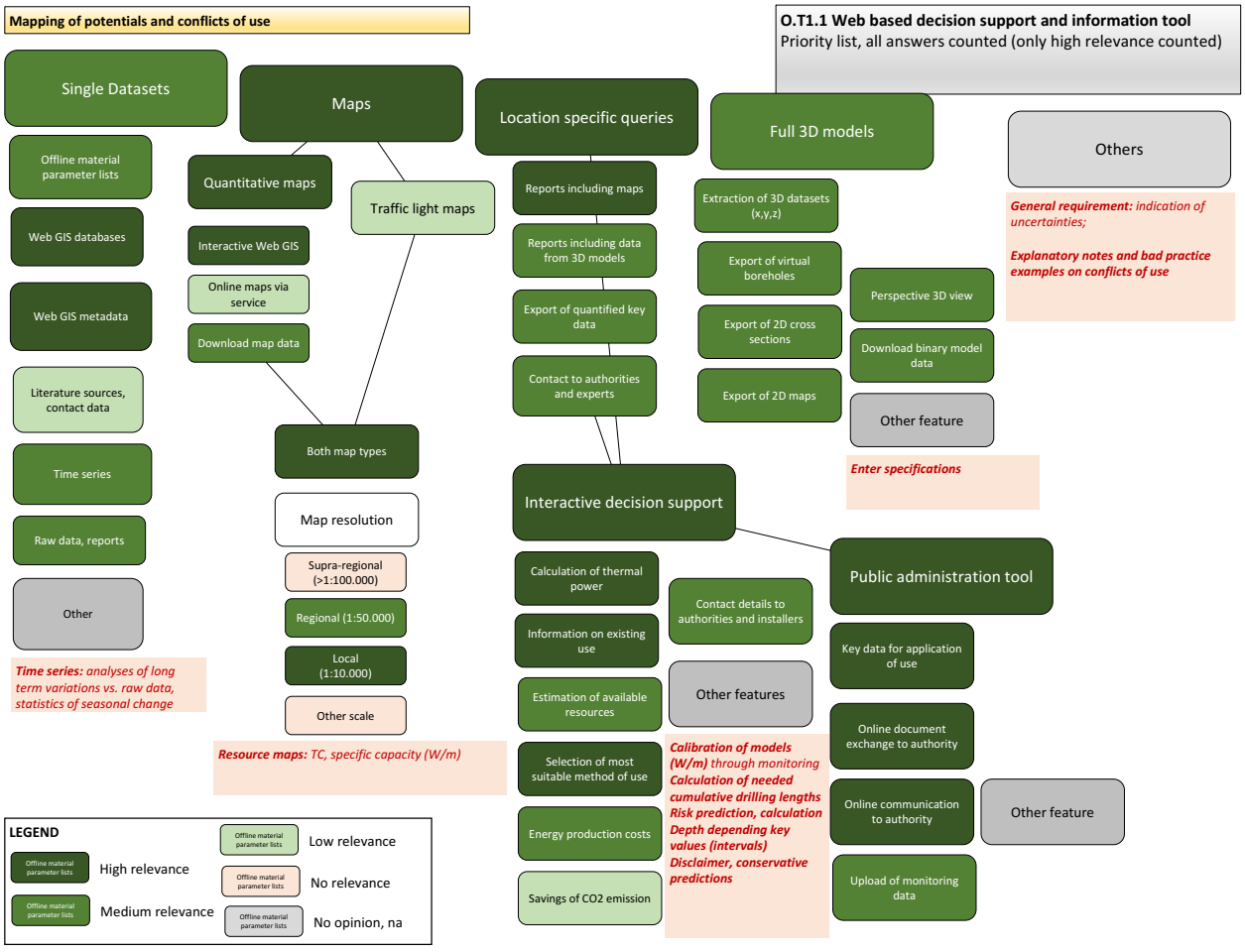


Fig. 3 - Colorized flow chart visualizing the relevance of features for a web based decision support tool based on the survey

The second step in the analysis of the survey results had the goal to get differentiated results for different groups of participants. Four pairs of groups have been defined. The goal of the detailed analyses was to investigate if the ranking of relevance of the proposed tools varies between different sample groups of participants in a significant way. The four pairs of groups that were compared within each other were:

- **Experts (53 user) vs. non-experts (33 user)** (<> 5 years of working experience)
- **Local to regional stakeholders (52 user) vs. supra-regional / international stakeholders (34 user):** Local to regional stakeholders cover the following professional groups asked in question #2 of the survey: Local public authorities, Regional public authorities, Planer Offices, Other SME, End User, Infrastructure and service provider Supra-regional / international samples cover: National public authorities, Interest groups / NGOs, Higher education and research.
- **Regional groups: Advanced countries (DE, AT, PL) (64 user) vs. follow-up countries (SI, CZ, SK) and international answers (all countries outside of GeoPLASMA-CE) (22 user)**
- **Participants who already have used web based information systems (36 user) vs. participants of the survey without experiences (50 user).**

The steps that were taken to get the results for these target groups were the same as described above. The only difference is that only the data of each specific group was used. The result of this procedure is a flow chart for each group that is colorized depending on the relevance of a feature for this group of participants.

An example for the resulting flow chart is shown in Fig. 4. All resulting flow charts are shown in the Annex 2.

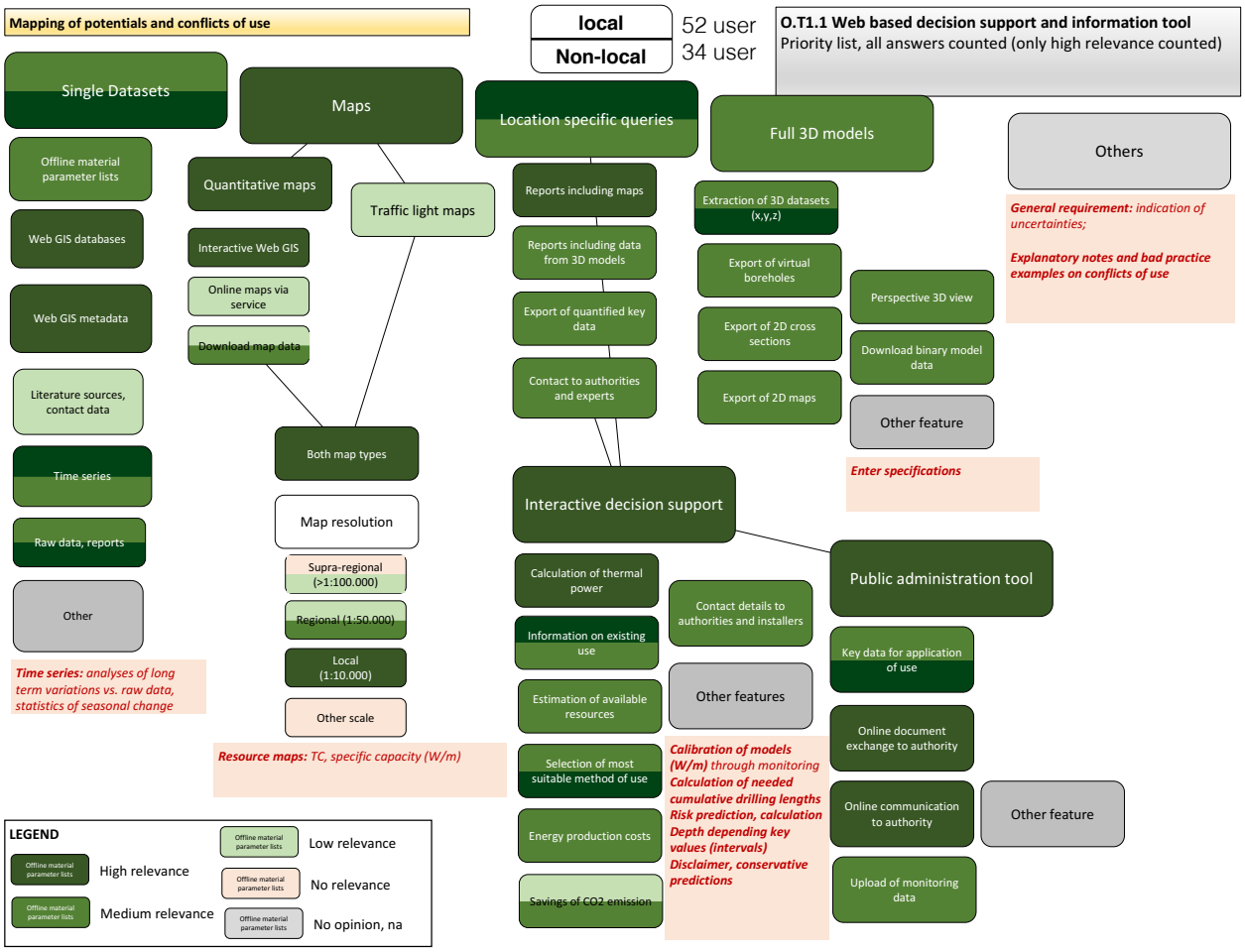


Fig. 4: Colorized flow chart for the local/non-local groups

During the technical workshop in Vienna on March 22nd 2017, it was agreed to consider a possible tailoring of some functionalities of the web based decision support tool for different pilot areas (regionalizing of the web platform). Therefore, a comparative summary statistic of the ranking given by the different sample groups was needed. In a last analyzing step, the ratings of "high-" and "low to no" relevance have been displayed for the different target groups at a summarizing table (see also Fig. 5). Based on the above mentioned approach of only accounting for the total share of high-relevance rankings (see also page 6 of this report), the high- and low to no relevance features were colorized in a matrix with respect to the different sample groups. For comparison purposes, the compiled answers of all participants of the survey was also shown. This matrix structure was separately applied for the high relevance and low to no relevance rankings. Finally, the total number of the above mentioned rankings were counted neglecting the compiled answers by all participant of the survey. The purpose of this exercise was to differ tools, which are important for all sample groups and tools which are of importance for only a few target groups. Doing so, all functionalities rated by more than 50% of all sample groups were defined as a basic requirement of the web based decision support and information tools for all pilot areas. In contrast, functionalities, which have been rated of a low- to no relevance were defined as not to be considered in the further planning of the web based decision support and information tools.

Highly priority functionalities of a web based decision support and information tool										
Functionality (Main/detailed)	***Total counts***	***Sample Group***								
		All participants	*Local stakeholder*	*Non-local stakeholder*	*>5 year working experience*	*<5 year working experience*	*DE, AT, PL*	*Other countries*	*Experienced in web systems*	*Non experienced*
Single Datasets	**3**									
Offline parameter lists	**1**									
Web GIS databases	**5**									
Web GIS metadata	**8**									
Time series	**3**									
Raw data, reports	**4**									
Maps	**8**									
Quantitative maps	**8**									
Interactive Web GIS	**8**									
Both map types	**8**									
Local scale maps	**8**									
Location specific queries	**5**									
Reports including maps	**8**									
Export of key data	**1**									
Interactive decision support tool	**8**									
Calculation of thermal power	**7**									
Information on existing use	**7**									
Selection of most suitable method	**5**									
Public administration tool	**8**									
Key data for application	**4**									
Online document exchange	**8**									
Online communication to authority	**5**									
Upload of monitoring data	**2**									
Full 3D models	**2**									
Extraction of 3D datasets	**3**									

Fig. 5: Matrix based comparison of high relevance ranking of functionalities by the different sample groups.

Besides the analysis through visualization, statistical tests were also carried out. These tests are done to check if the difference between values is significant. For example for a question where the participants decide whether a feature has a high, medium, low or no relevance for them, these tests were used to see if the difference in responses between „high“ and „medium relevance“ for a single feature were significant. The tests that were carried out were the t-test and the chi-squared test. Neither of these tests showed a significant difference between compared values for any case they were used on.

2.4. Results of the survey

In the following chapter, we would like to give a short summary about the outcomes of the survey and the conclusions to be derived on the user requirements, presented in chapter 3. For that purpose, we will briefly discuss the aspects significance of the survey, clustering of the relevance ratings with respect to the target groups and specific comments given by participants of the survey.

Significance and scope of the survey

The survey comprised 61 questions and had 86 participants from 10 countries. As the ratio of answers to questions of 1:1,4 is quite low, we were limiting the analysis of the survey to qualitative conclusions, which are limited to the scope of the project GeoPLASMA-CE. The survey is not valid and never intended to derive general conclusions on stakeholder needs of a web based decision support and information tool. The outcomes of the survey led to a priority list of tools based on a user feedback, which will be considered in the planning of the web based decision support and information tools to a certain extend (for more information see chapter 3).

Clustering of answers given by the different sample groups

In the introduction of the survey, we were asking about the overall relevance of main functionalities of a web based decision support and information tool. At a later stage of the survey, we were asking about the relevance of detailed functionalities associated to a main tool. By doing so, the participants were asked to give a ranking of main tools without knowing a proposed overview of detailed functionalities associated to them. If we compare the a-priori overall ranking of the main tools with the individual rankings of their detailed features, homogenous answers were given for the "Full 3D models" main tool (medium relevance), the Public administration tool and the Interactive decision support tool (both predominately ranked as high relevance). Maps and location specific queries received a high a-priori relevance ranking, while a significant number of detailed features were ranked at a lower level. Especially for the location specific queries main tool, only one detailed functionality ("Reports including maps") was ranked as high relevant, while all other proposed features were ranked as medium relevant. In contrast, the "Single datasets" web tool was ranked as medium relevant, while two of its detailed features were acknowledged as highly relevant ("Web GIS datasets" and "Web GIS metadata"). We conclude, that many participants of the survey did not have a clear idea on the detailed features of the proposed main tools and therefore give a first, quite intuitive rating. Therefore, we decided to predominately consider the rating of the detailed features in establishing the priority list of the web based decision support and information tools features.

Concerning the different sample groups, we see a high conformity of relevant rated features in map tools, interactive decision support tools and public administration tools. Looking at the different ratings given by the defined sample groups in a qualitative way, we recognize the following clusters with respect to high relevance rankings:

- *Expert in the field of shallow geothermal use – working in Germany, Austria or Poland, a slight further differentiation is also given by local- and non-local stakeholders.*
- *Non-expert (less than 5 years of working experience) - working in other countries than the 3 mentioned above.*
- Erroneous rankings (only given by one or two sample groups).

Other clusters are not significantly visible. The preferences of single sample groups will not be discussed.

Expert in the field of shallow geothermal use – working in Germany, Austria or Poland: If participants of this cluster are not experienced in the use of web based information systems (these systems do not or only recently exist in Poland and Austria) they are not so interested in web based single datasets (e.g. web GIS databases). If they are experienced in the use of web tools, they are in turn interested in raw- and source data as well. This cluster group is generally more interested in location specific queries than the contrasting cluster group (less than 5 years of working experience in shallow geothermal use and form another country than the 3 above mentioned). Local stakeholders of this cluster are not so much interested in the selection of the most suitable geothermal method of use, while all other sample groups are interested in such functionality. This may lead to the conclusion, that local experts (local authorities, planners and installers) might not be the target group of a selection tool of the most suitable method in the pilot areas in Germany, Austria and Poland. We can also derive, that participants of this cluster, who are local stakeholders, are

furthermore not so much interested in getting standardized key data by a web based public administration system for preparing submission reports for the licensing of new shallow geothermal utilizations.

Cluster group Non-expert (less than 5 years of working experience) - working in other countries than the 3 mentioned above: Concerning the main tool "Single datasets", this group is especially interested in Web GIS databases (while the contrast cluster group represented by experts from Germany, Poland and Austria is not) and on time series, in case they are a local stakeholder and experienced in the field of shallow geothermal use. This group is not so interested in raw data themselves in case of non-local stakeholders. In contrast to experts from Germany, Poland and Austria, the cluster group is not so interested in "Location specific queries", although the automatic report function of such a tool was highly appreciated by all participants of the survey. Concerning "Interactive decision support tools", this cluster group is interested in the selection of the most suitable method of shallow geothermal use in case of non-local stakeholders. The same group is also interested in the extraction of key data from such a tool for the application of a planned shallow geothermal use at the licensing authority. Stakeholders from other countries than Germany, Poland or Austria are also more interested in a tool which provides online communication to authorities.

Overview of erroneous rankings: This cluster covers tools, which have been only ranked by one or two sample groups as highly relevant or, in contrast, was not highly prioritized by one or two sample groups. Concerning "Single datasets", offline parameter lists, which represent material parameter lists published as a document were only highly appreciated by participants from Germany, Poland or Austria. The same sample group was the only group, which did not highly prioritize a tool for calculating the thermal power (capacity) of a shallow geothermal installation at a web based decision support tool. Concerning Location specific queries", only participants with less than 5 years working experience highly appreciated the export of key data. Interestingly, the same tool was also highly appreciated by non-local stakeholders from other countries than Germany, Poland or Austria with respect to the "Public administration tool". The survey also revealed, that all sample groups except for non-local stakeholders are interested in a feature showing the existing shallow geothermal use at an interactive decision support tool, which seems quite logic, as spatial information on existing use is only relevant for local planning and management of shallow geothermal use.

In a second step, we also analyzed the low to no relevance ranking behavior of the different sample groups. We observed again a slightly different ranking behavior between participants from Germany, Poland or Austria and participants from all other countries. Participants from other countries than Germany, Poland or Austria showed clearly less interest in links to literature data linked to web GIS applications, download of web maps (print on demand), estimation of saving of CO_2 emissions and download of 3D model binary data. A low interest on the estimation of CO_2 saving was also observed at local stakeholders, irrespective of their working experience. We can conclude, that the calculation of CO_2 saving is rather a policy instrument on a regional or supra-regional scale and therefore not demanded by stakeholders in the pilot areas.

Text input by participants of the survey

We also offered free text input dialog boxes for each main tool of the planned web platform at the survey. The feedback received from the participants can be summarized to the following main messages, which should be considered in planning the web portal:

- Suitability and conflict maps are an important issue to be included at the web platform
- Users also expressed their needs for estimating the range of uncertainties of data displayed at the web platform. Also, no data areas should be marked in produced maps. Datasets should also avoid a high accuracy for layers, which are not covered by sound input data.
- Participants of the survey are also interested in the presentation of good practice examples on the web platform.
- Participants also expressed their interest on information given for distinctive either pre-selected or interactively selected depth sections of the underground.

Summary

The answers received at the survey led to the conclusion that there are some basic features, which are uniformly of high or no importance for all participants. One clear fact that can already be taken from the pure survey results is that the users desire a system with a local scale. In addition, we can see slightly different rankings by participants from Germany, Poland or Austria and other countries as well as between local- and non-local stakeholders. The interests are also slightly depending on the professional experience of the participants. Therefore, we will consider a certain regionalization of the web based information and decision support tools at the 6 pilot areas, although some basic features should be considered for all areas.

Concerning the platform of a web based decision support tool, the main platform is the Desktop-PC. A second priority should be given to tablet users. Smartphones are not a relevant platform based on the outcome of the survey.

3. Catalogue of requirements

3.1. Introduction

The catalogue of requirements covers the interests and needs expressed by external stakeholders, who took part at the WPT1 survey. It will be considered to a certain extend in planning the web based decision support and information tools with respect to the resources available in GeoPLASMA-CE. The catalogue of requirements also considers the outcomes of a discussion that took place during the technical workshop of the GeoPLASMA-CE project in Vienna on the 22nd March 2017, which led to the creation of a three – level priority list of features. The priority list was later extended by the results of the sample group related analyses leading to the following 5 categories:

1*	**Highly relevant tools which should be available for all pilot areas**	More than 50% of the analyzed sample groups identified the tool as highly relevant.	Partners have to give an explanation in case they don't want to implement this feature in the tailored web tools in their pilot area.
1	**Highly relevant tools**	Less than 50% of the analyzed sample groups identified the tool as highly relevant.	Partners can decide to implement the tools in their pilot area.
2	**Medium relevant tools**	Tools ranked as medium relevant in the survey.	Partners can decide to implement the tools in their pilot area.
3	**Low to not relevant tools.**	Tools with a low ranking (low relevance or no relevance) in the survey.	Partners can decide to implement the tools in their pilot area.
3*	**Low relevance tools which should not be considered**	Tools, given a low rating by more than 50% of the analyzed target groups.	Partners have to give an explanation in case they want to implement this feature in the tailored

			web tools in their pilot area.

Although the final decision about the tools and features to be implemented in the web based decision support and information tools at the 6 pilot areas is given to the responsible partners, the priority list should be considered in designing the features

3.2. General requirements on the web based decision support and information tool.

- Regionalization of the web based decision support and information tool for the 6 pilot areas

  Based on the outcomes of the WPT1 survey, a regionalization of the different tools and features should be considered for the 6 pilot areas. The selection of tools to be realized depends on the priority list and the final decision of the project partners responsible for the different pilot areas. Furthermore, the availability of data as well as data privacy rules will have to be considered for the selection of tools. Though it must be possible to deactivate single features for specific pilot areas. It will also be considered to eventually launch individual features of the web based decision support and information tool at different periods in time in order to extend the testing phase for users and stakeholders in the pilot areas. However, the launch of tools is scheduled to be accomplished until autumn 2018 as it was stated in the application form of the project.

- **Access to the web based decision support and information tool**

  The access to the web based decision support and information tool will be free of charge. All data provided to be public will not be affected by data privacy policies. However, optionally, a general user and expert user access will be implemented to fulfill the different needs of the local stakeholders (e.g. investors, who are not interested in specific key data but rather prefer traffic light maps versus an expert access level to specific key data). For entering the expert level, users may register themselves at the web platform. The final decision on the implementation of different access levels will be made during the preparation of the White Book (D.T1.3.1) based on the evaluation of the programming effort versus the benefit for users.

3.3. High priority features that should be available in all pilot areas

The features that are listed in this category should be available in all pilot areas. If a feature is not able to be realized in a pilot area the responsible partner has to give a reason why this is not possible.

- **Maps:**

  The main data interface of the decision support and information tool should be realized by web maps in terms of:

  - Quantitative maps that show the interpolated key data, which have to be interpreted by the user.
  - Qualitative maps that only show the interpretation of key values based on simplified schemes - e.g. traffic light maps.
  - Interactive web GIS that allows the user to select the extent and scale of a map as well as the contents shown. They may also provide features like changing the transparency of layers. They can be printed

on demand. Predefined online maps (GIS layer) only allow zooming and defining the extent of the map. They can be printed on demand.

- The maps should be presented in a local scale (up to 1:50.000).

- **Location specific queries:**
  The users should have the opportunity to get **information based on a specific location**. By clicking on a position in the displayed map a report should be generated for this specific location. This report should include local scale maps of the nearby surrounding of the location queried (proposed scale 1:10.000 if applicable).

- **Interactive decision support:**

  Interactive decision support features cover the calculation of thermal capacities and the selection of appropriate methods based on input of operational parameters by the user via a web interface. The following features for an interactive decision support tool were ranked by the participants of the survey for the highest relevance:

  - Calculation of thermal capacities (e.g. heat transfer rate per borehole length) based on the input of operational parameters.
  - Location and meta-information of existing installations in the close vicinity, if applicable.
  - Recommendations on the most suitable method of shallow geothermal use at the selected location.

- **Public administration tool:**

  A web based decision support and information system can also be extended to a web based full administration (E-Government) system for applying and monitoring shallow geothermal use. Special interest was given to the following detailed features:

  - Online communication with authority: announcement of accomplishment of installation, application of changes in the installation etc.
  - Performance of online application of new installations and upload of documents which have to be transferred to the authority.

- **Single datasets (databases, raw data or web feature services):**

  Single datasets may be transferred in terms of tables or data lists (e.g. thermal conductivity list for different materials) or web GIS linked datum points (e.g. groundwater observation wells). They may also include raw data, literature sources or time series. Of course, key data provided by GeoPLASMA-CE are limited to publishable or published data!

  - Web-GIS linked databases (geodatabase)
  - Metadata (e.g. location of observation wells, location of a thermal response test made) via web GIS

3.4. High priority features that partners can choose for pilot areas

The priority of the features is the same as in the part before. The different to the features in 3.3. is that these are features that do not necessarily have to be available in all pilot areas. The partners responsible for a specific pilot area can choose which of the following features should be available at the web based decision support and information tool at their pilot area:

- **Location specific queries:**
  - Export of key data and potentials in terms of specific values (instead of classes) also indicating the range of uncertainty or the quality of the data.
- **Public administration tool:**
  - Providing key data from the web based information system for the application of licenses.
  - Upload or direct entering of operational monitoring data (e.g. temperatures, energy extractions) for delivering to the relevant authority.
- **Single datasets:**
  - Compiled material parameter lists (e.g. thermal conductivity of rocks), not linked to any web GIS.
  - Time series (e.g. groundwater level).
  - Links to unprocessed raw data and reports, if applicable (e.g. report of a thermal response test measurement, published geological maps).
- **Full 3D Models:**

  3D subsurface models cover aspects like the geological setup, the hydrogeological settings (groundwater level and temperature) or the energy available in the subsurface for heat extraction / injection. Models can be static (no processes), steady-state or transient (e.g. showing the annual change of a parameter). From 3D models, relevant data or information on shallow geothermal potential and conflict of use can be extracted in various ways (e.g. synthetic cross-sections or borehole profiles). Participants of the WPT1 survey have identified the following feature of a 3D model to be highly relevant:

  - Extraction of 3D datasets (x,y,z) in terms of datasets representing the specific values stored in a 3D model.

3.5. Medium priority features

Features in this category have a lower priority than those mentioned in chapter 3.3. and 3.4. The realization of these features will only be achieved in case of sufficient resources. As for the highly ranked tools and features, described in chapter 3.4., the partners can choose the implementation of these features for their pilot areas in case they will be realized.

- **Location specific queries:**
  - Reports that are generated for a specific location include data extracted from 3D models (e.g. virtual boreholes, hydrogeological cross-sections).
  - Reports provide contact details of responsible authorities for permission / licensing of use and close-by experts and installers. This feature may possibly linked to the local expert platform tools for the 6 pilot areas.
- **Interactive decision support:**
  - Estimation of energy available at a location with respect to existing use (conflict of interference between users)
  - Information on energy production cost and payback times
  - Contact to relevant actors (licensing, authority, installers)

Full 3D models:

- Export of virtual boreholes
- Export of virtual 2D cross sections
- Export of 2D isoline / structural maps
- Perspective 3D model interactive visualization

3.6. Low priority features partners can choose from

Features in this category have a low priority for implementation. If features of this category are implemented, the partners can choose from the available ones for their pilot area.

- **Maps:**
  - Download of map data
  - Regional scale of maps
- **Full 3D models:**
  - Download binary model data for individual simulation of a planned geothermal use (e.g. underground geometry, boundary and start-up conditions, material parameters)

3.7. Low priority features partners have to argue for

Features in this category also have a low priority. They will only be implemented if a partner gives a reason why this feature is needed in a specific pilot area.

- **Maps:**
  - Online maps via service
  - Supra-regional scale of available maps
- **Interactive decision support:**
  - Estimate the saving of CO2 emissions
- **Single datasets:**
  - Literature sources and contact details of data owners linked to web GIS based metadata

4. Outlook on upcoming activities

The next milestone in preparing the web based decision support and information tools is given by the accomplishment of a so called White Book (D.T1.3.1). The White Book summarizes the tools and detailed features, which will be realized for the web based decision support and information tools at the 6 pilot areas (O.T1.1.). It will also include a general concept of the associated web site interfaces and a time plan for the launch of individual tools. It will not yet include detailed pseudo web programming codes for the realization of the planned tools. The following information will feed into the preparation of the White Book:

- Feedback from the WPT1 survey (D.T1.1.2 Catalogue of requirements) leading to a priority list from the stakeholder‘s point of view.
- Feedback from screening of existing web based decision support and information tools regarding the resources needed to develop features and tools. This will lead to additional information linked to the priority list of tools and an eventual adapted ranking with regard to the balance of resource investment and benefit of tools.
- Feedback from the project partners responsible for the pilot areas, who will make the final decision which outputs will be displayed by which tool or feature at the individual web based decision support and information tools for the 6 pilot areas.
- Optional: Final feedback from local stakeholders in the pilot areas for final amendments.

5. References

R Development Core Team (2008); R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org.

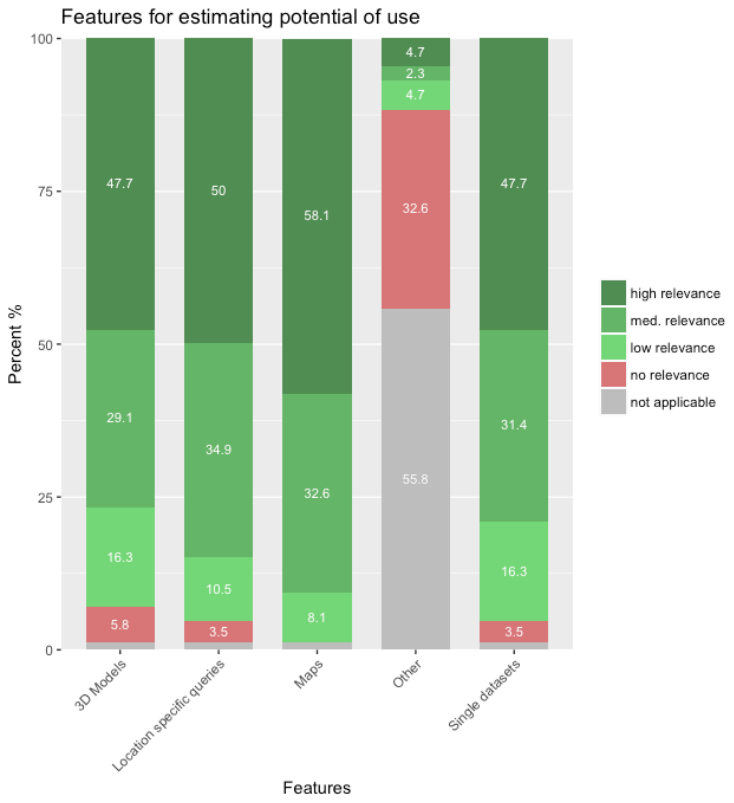
6. Annex: Catalogue of requirements

- Annex 1 – Stacked bar charts displaying the results from the user survey
- Annex 2 – Flow charts displaying the relevance of features for the participants of the survey

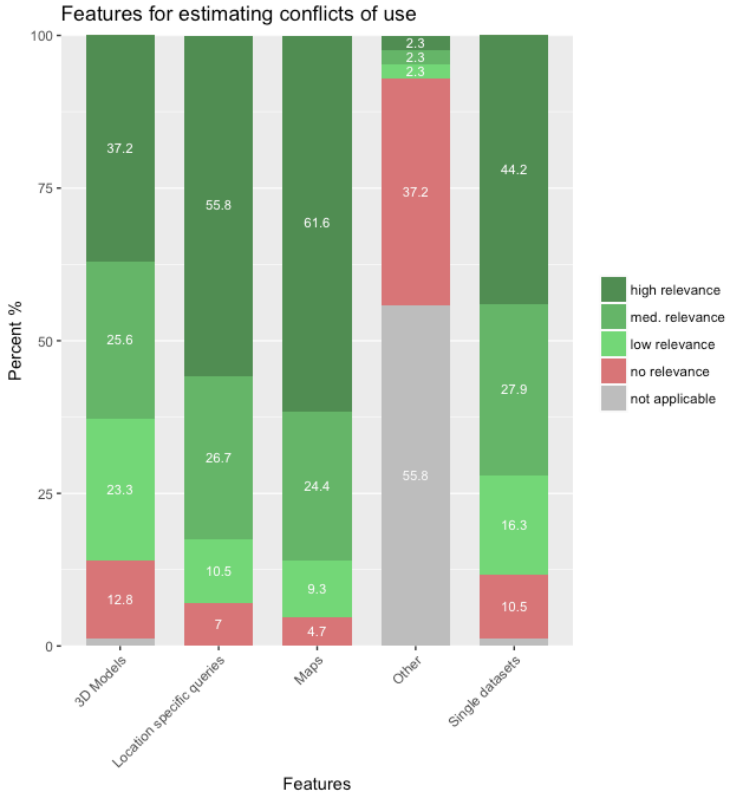
CATALOGUE OF REQUIREMENTS FOR THE WEB BASED DECISION SUPPORT AND INFORMATION TOOL

Annex 1 – Bar charts web based decision support system

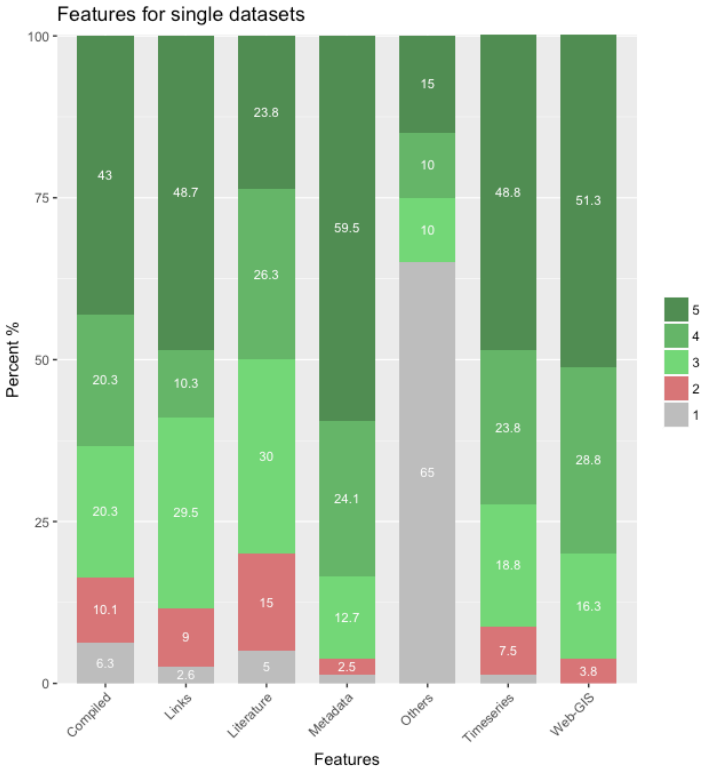
Deliverable: D.T1.1.2	Final
Project partner: PP10-GiGa	04 2017



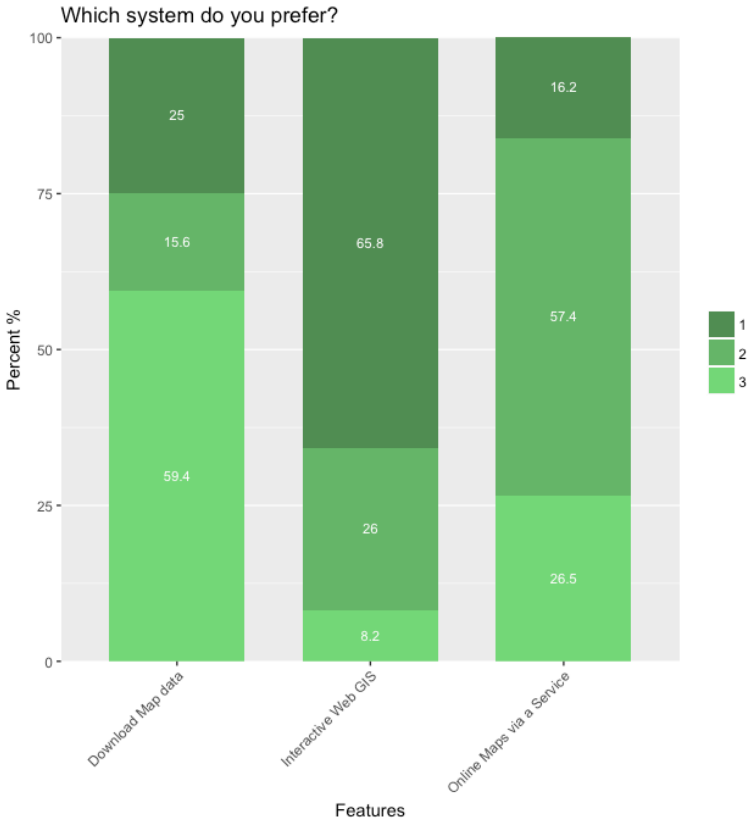
A.1.1 Stacked bar chart for features that could be useful for estimating potential of use



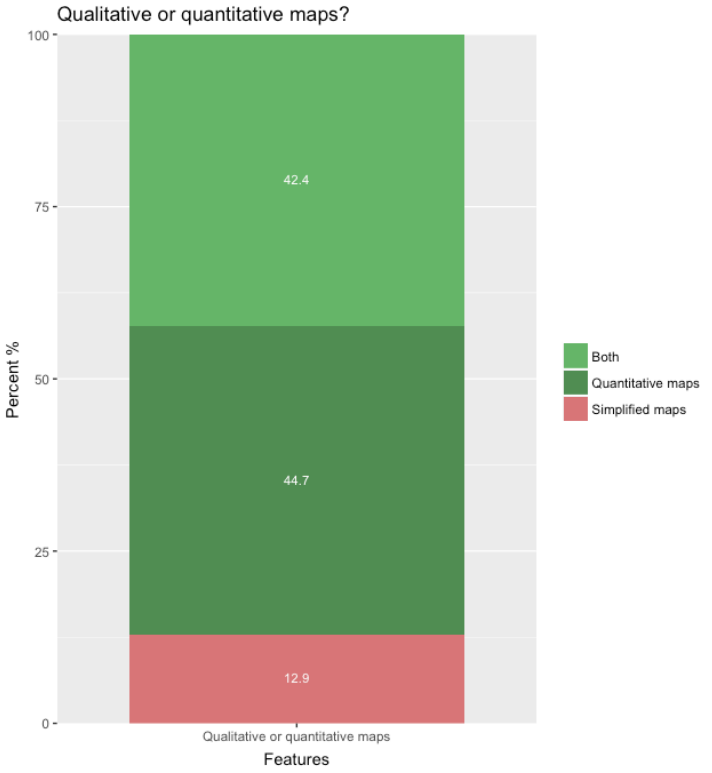
A.1.2 Stacked bar chart for features that could be useful for estimating conflicts of use



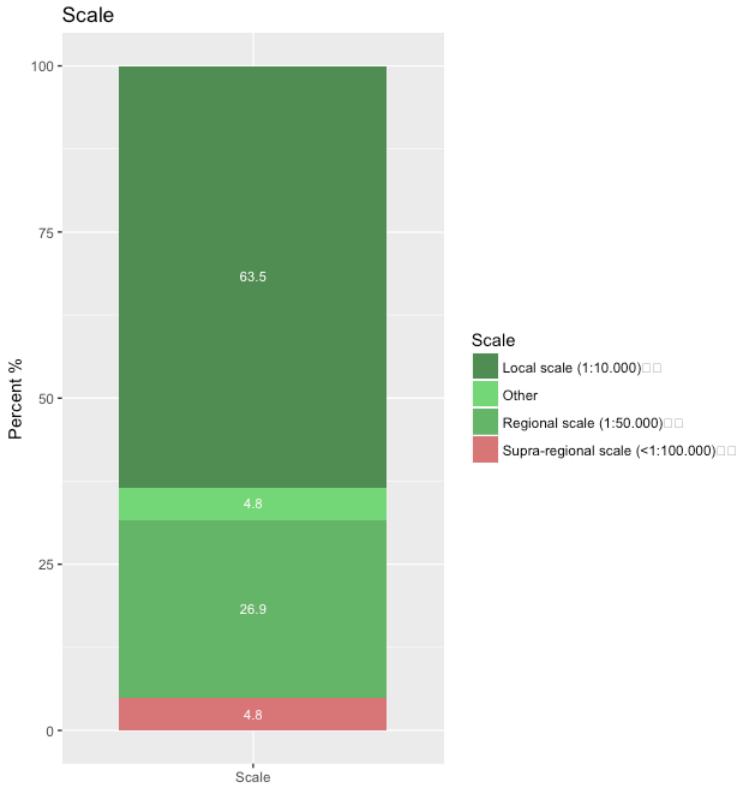
A.1.3. Stacked bar chart for features of single datasets



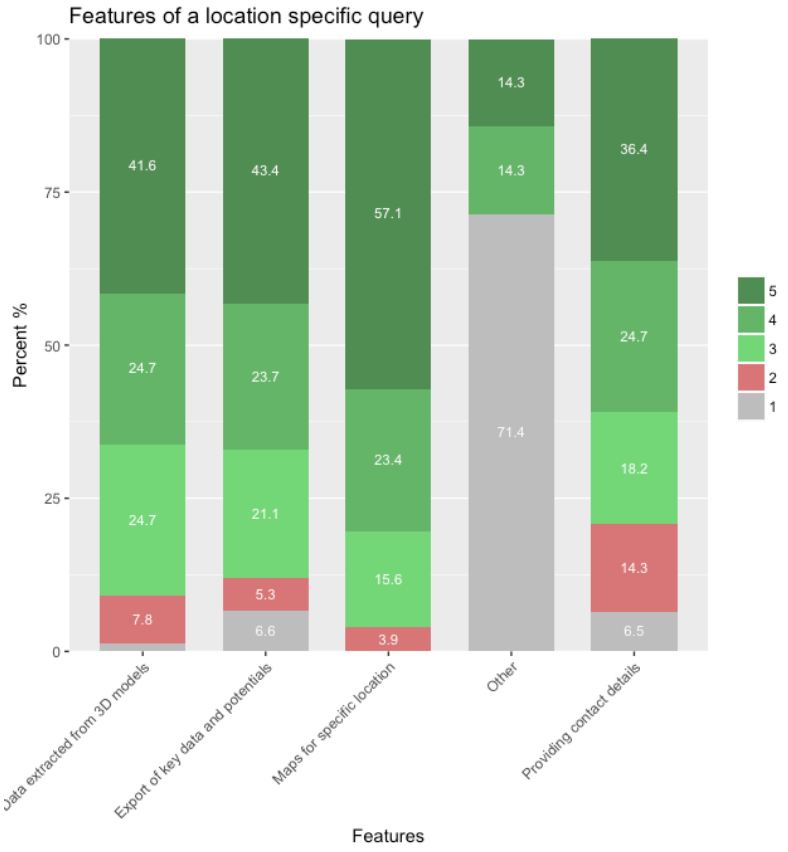
A.1.4. Stacked bar chart for type of maps



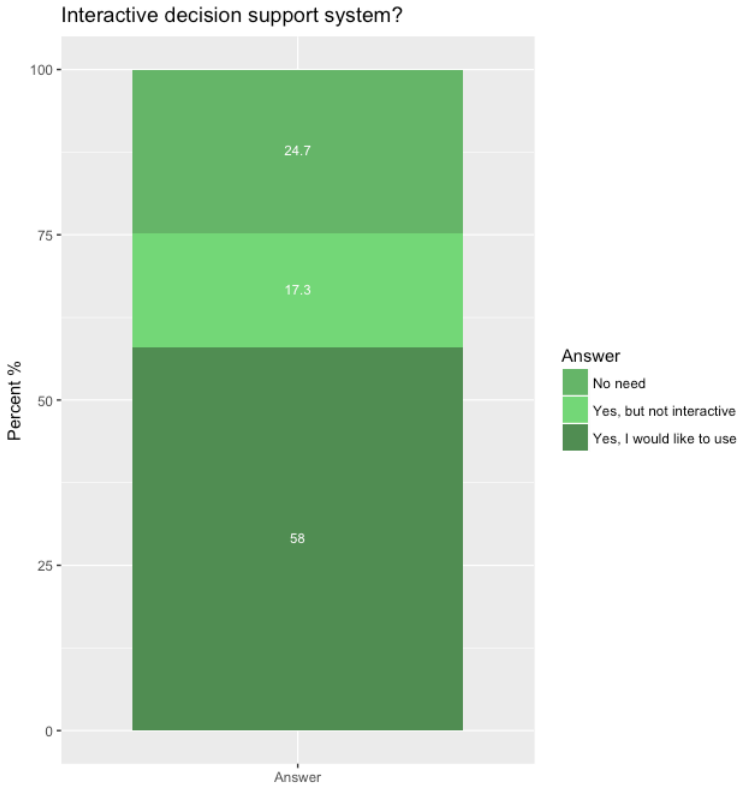
A.1.5. Stacked bar chart for qualitative or quantitative maps



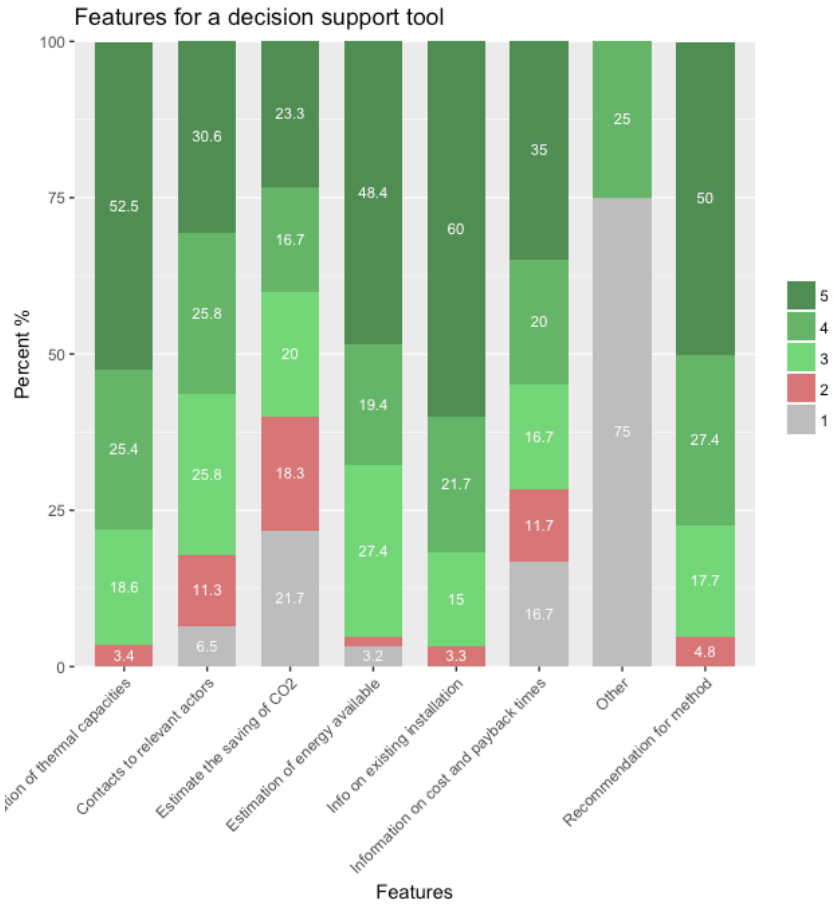
A.1.6. Stacked bar chart for scale of maps



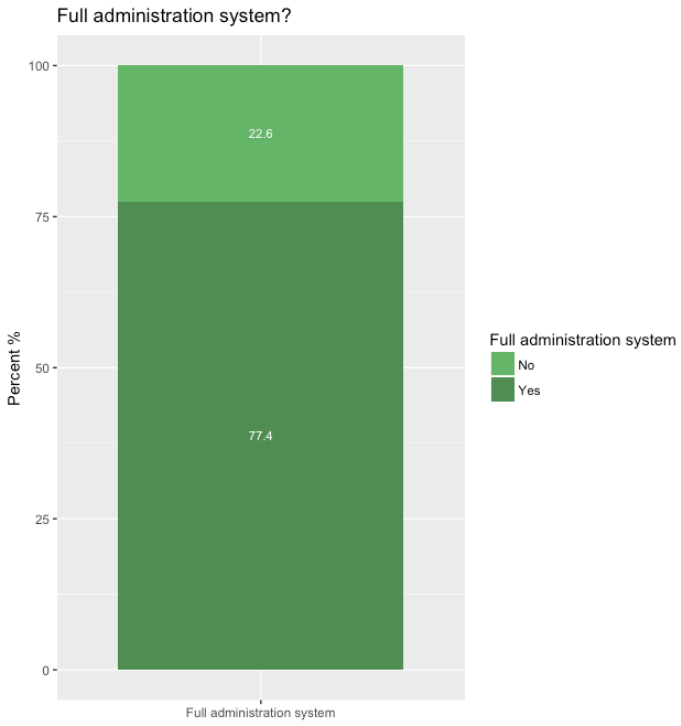
A.1.7. Stacked bar chart for features of location specific queries



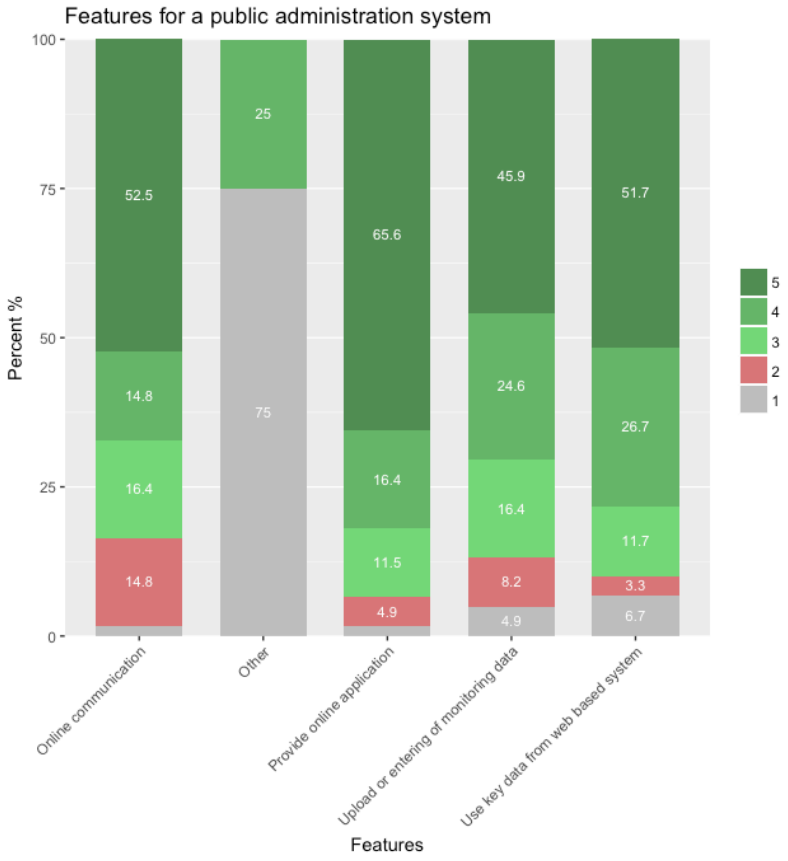
A.1.8. Stacked bar chart for interactive decision support system



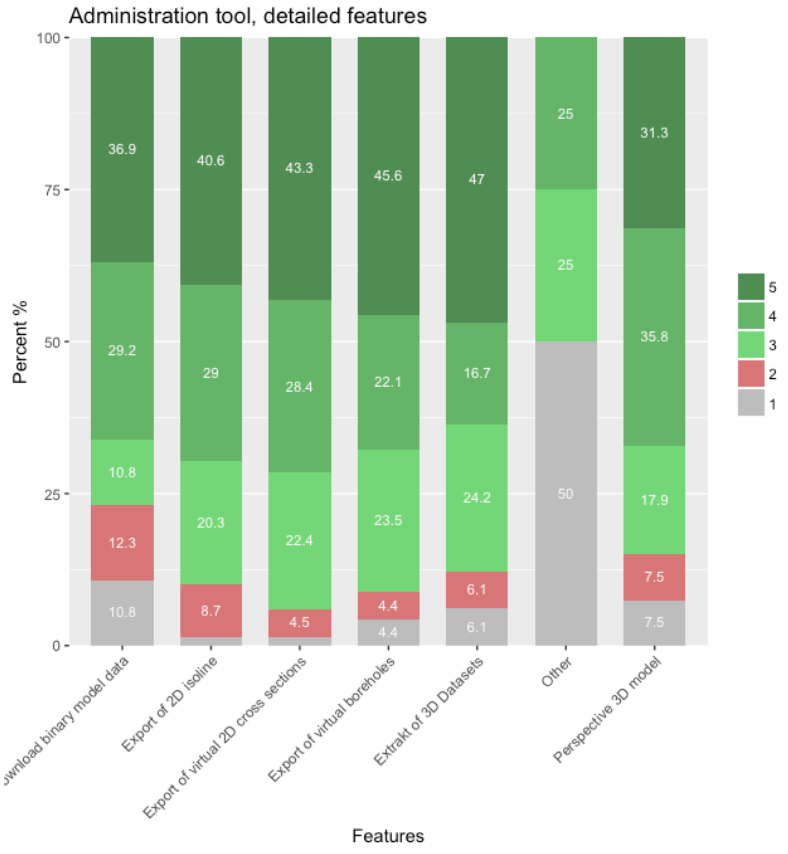
A.1.9. Stacked bar chart for features of interactive decision support system



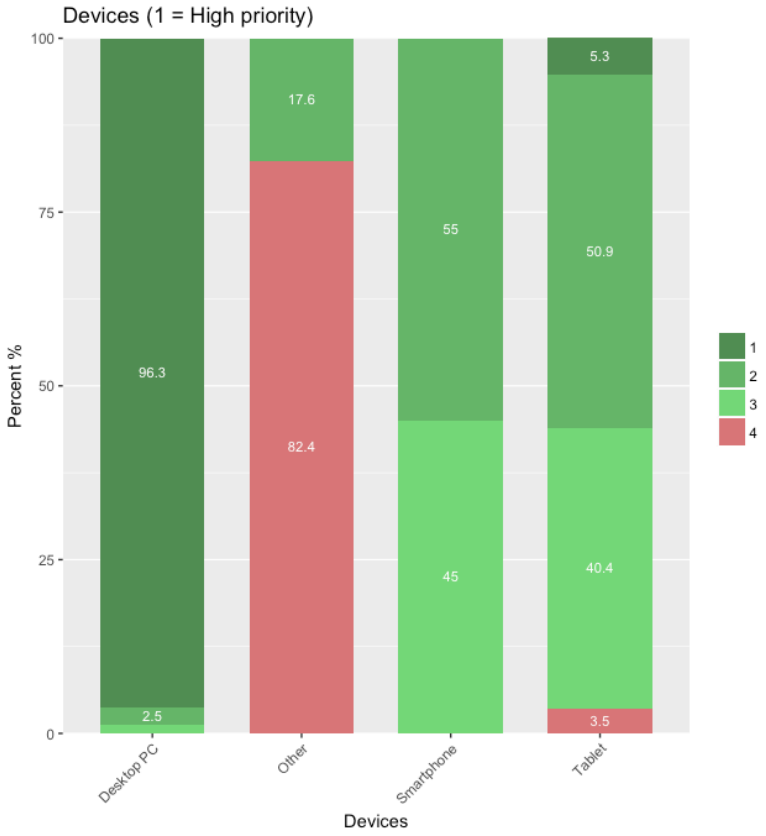
A.1.10. Stacked bar chart for full administration system



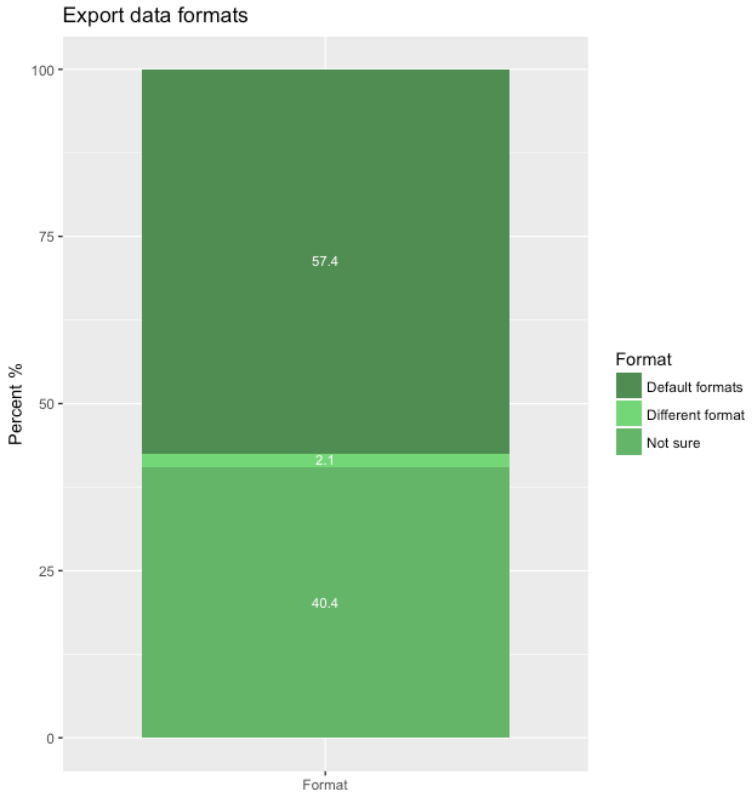
A.1.11. Stacked bar chart for features of public administration system



A.1.12. Stacked bar chart for detailed features of public administration system



A.1.13. Stacked bar chart for desired devices

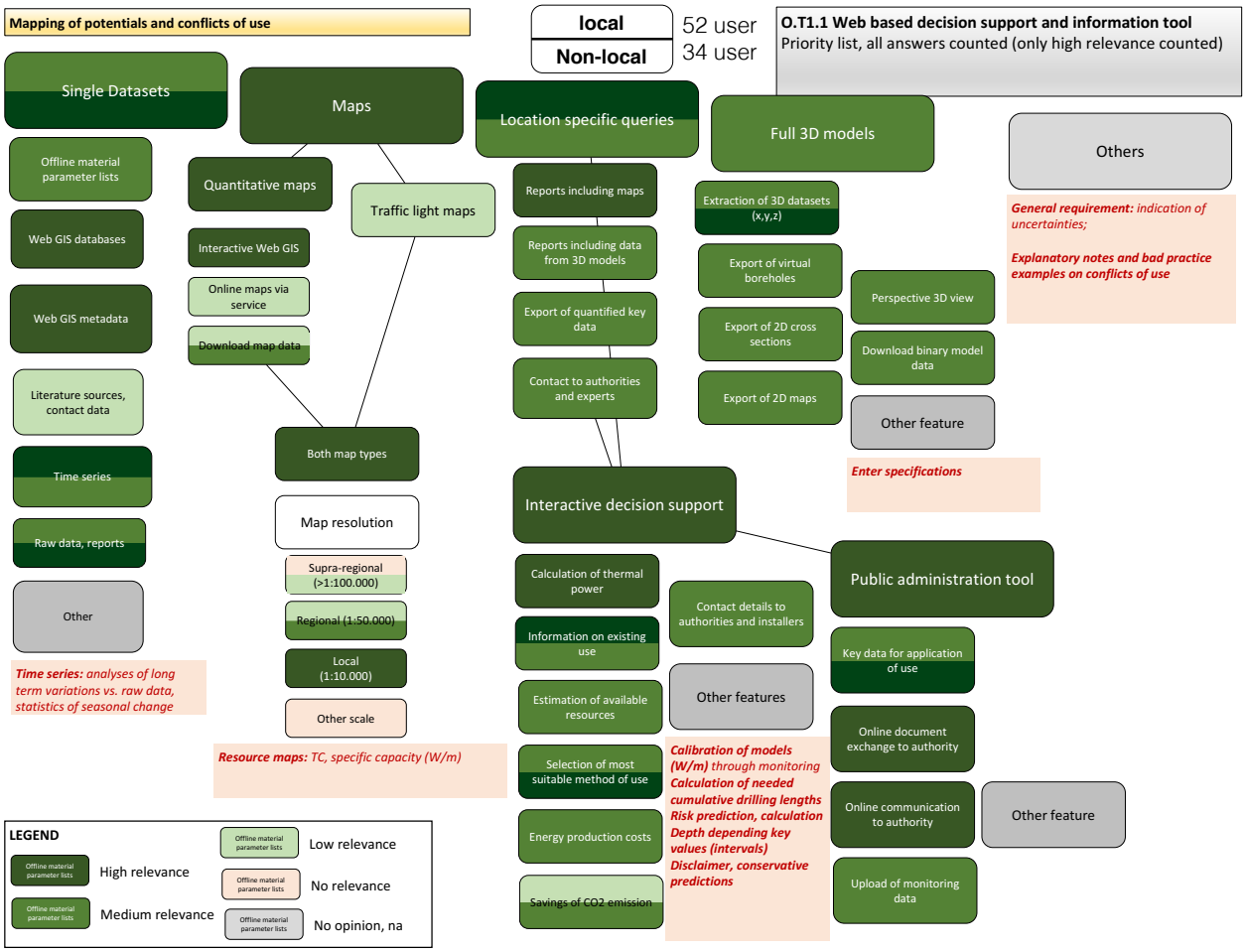


A.1.14. Stacked bar chart for export data formats

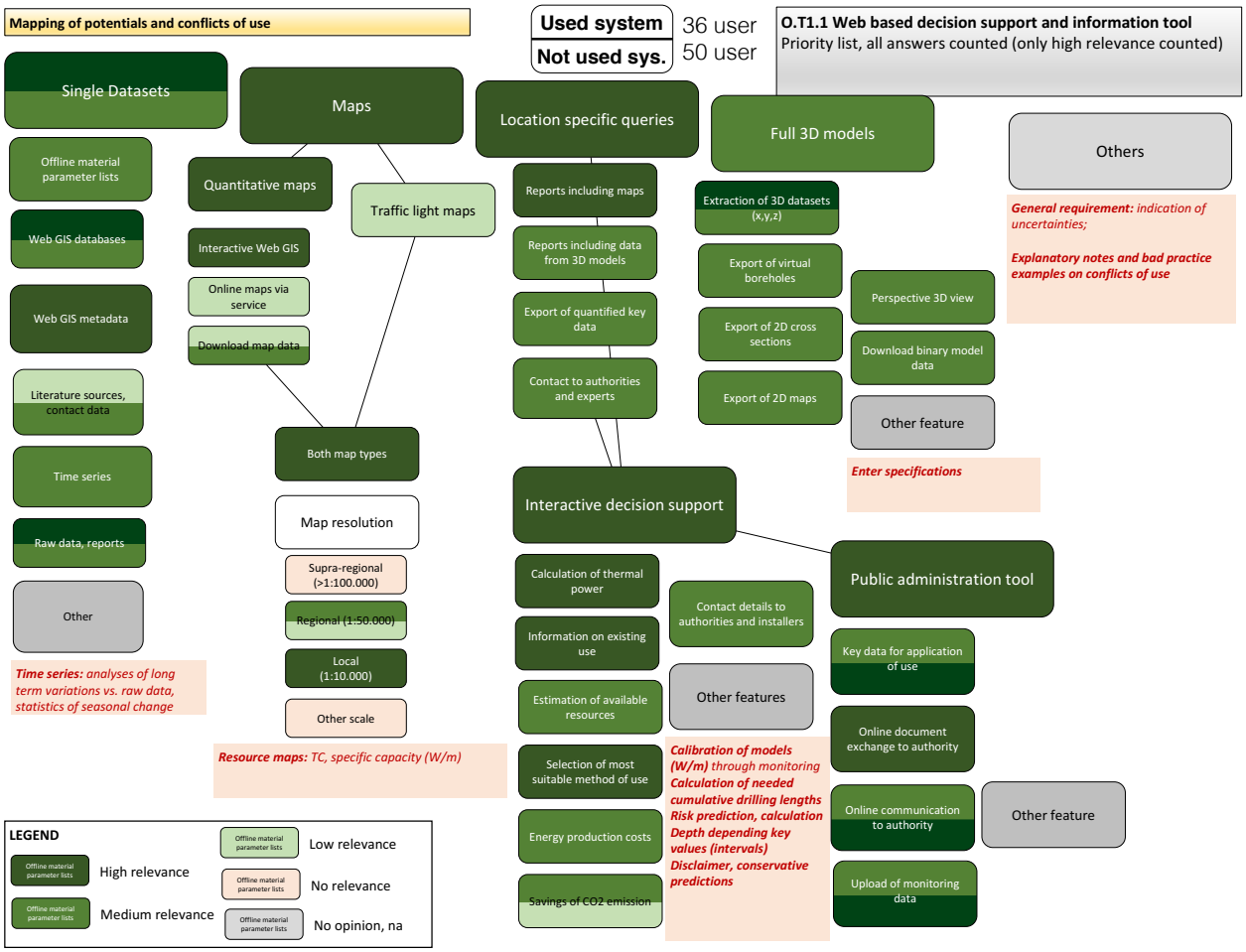
CATALOGUE OF REQUIREMENTS FOR THE WEB BASED DECISION SUPPORT AND INFORMATION TOOL

Annex 2 – Flow charts for web based decision support system

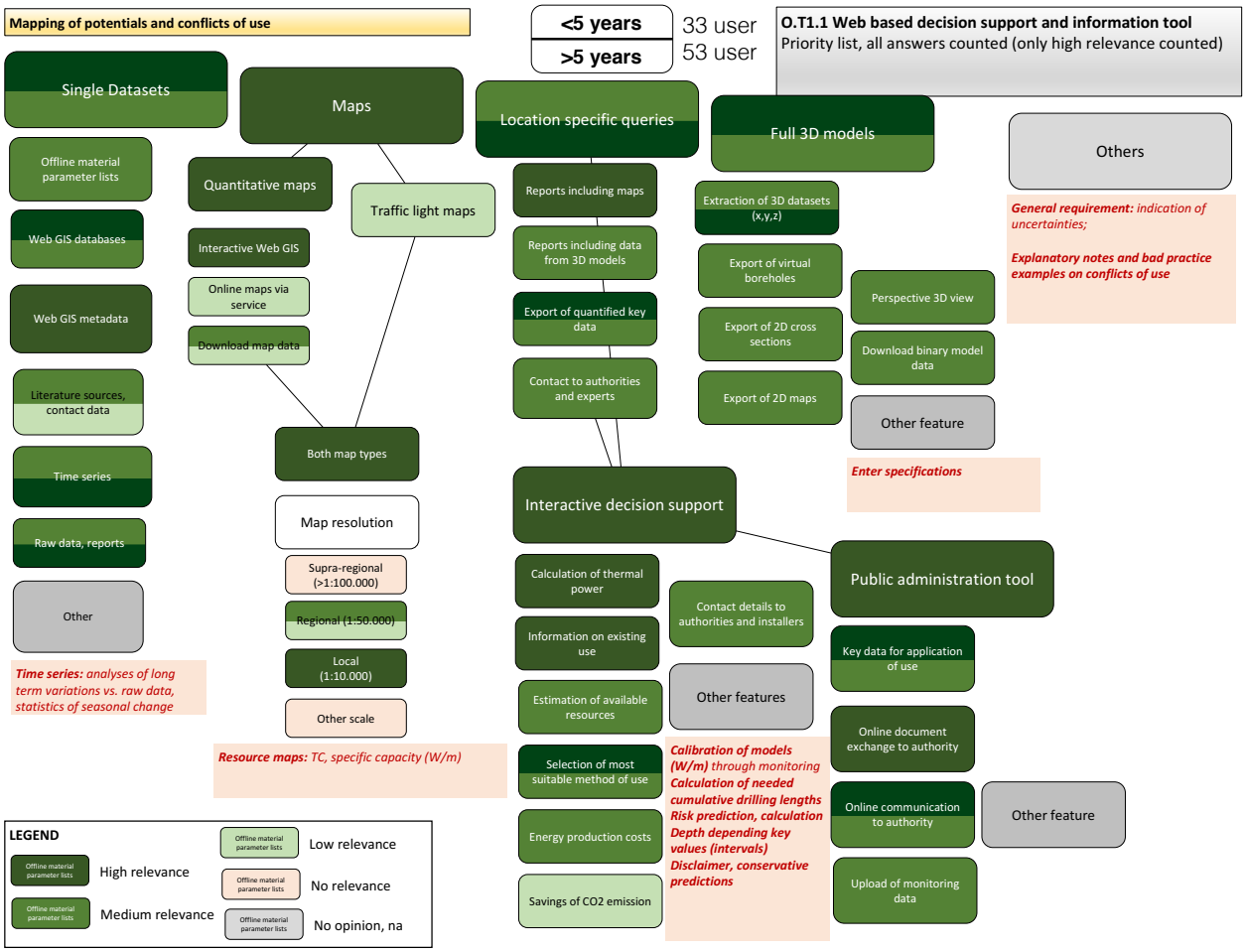
Deliverable: D.T1.1.2	Final
Project partner: PP10-GiGa	04 2017



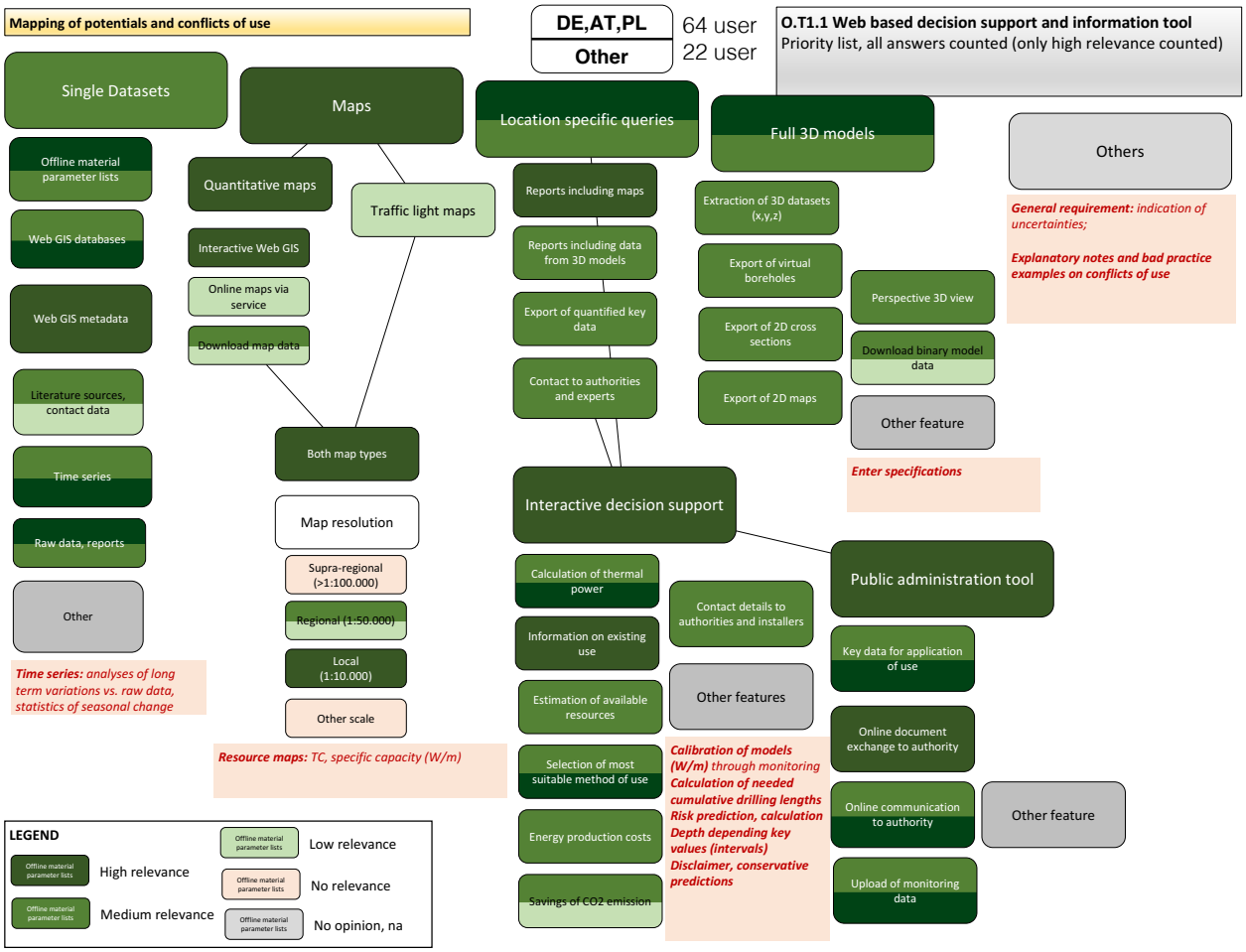
A.2.1. Flow chart of features colorized depending on the relevance for the target groups “local” vs. “non-local”



A.2.2. Flow chart of features colorized depending on the relevance for the target groups “used a web based info system” vs. “never used a web based info system”



A.2.3. Flow chart of features colorized depending on the relevance for the target groups “more than 5 years of experience in the field” vs. “less than 5 years of experience in the field”



A.2.4. Flow chart of features colorized depending on the relevance for the target groups “DE, AT, PL” vs. “Rest”