DELIVERABLE

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D3.1 Registry of Services

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Authors:

     Michał Jankowski (Poznan Supercomputing and Networking Center)
     Maciej Brzeźniak (Poznan Supercomputing and Networking Center)

Contributors:

Reviewers:
     Milena Dobreva (University of Malta)
     Tomi Ilijaš (ARCTUR d.o.o)

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0.1	10.02.2015	Michał Jankowski	PSNC	Structure
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1.0	16.03.2015	Michał Jankowski	PSNC	Final version containing conclusions from the internal review

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EXECUTIVE SUMMARY

In this document we present the structure and initial content of a Registry of Services and Tools *useful for supporting the involvement of citizens in the scientific development process[1]*. The registry collects and describes information and knowledge related to tools, services, approaches, solutions, demonstrators, etc. that can be applied for the purposes of citizen science.

The document describes the platform that was developed to maintain the registry. User requirements and used technologies are presented as well.

At the moment the registry is filled with pilot content and it is going to grow. We propose a strategy to collect the items to the registry at appropriate level of quality. Later on, expected content of the registry is sketched. The items collected in the registry are described by manageable set of attributes. The initial set consists of item category (such as service, software tool, civic science project, etc.), description, webpage, field of science. This set is subject for discussion and is going to be extended in future, especially by elements providing assessment of the items.

Finally, we discuss possible future improvements to the registry, with special respect to quantity and quality of collected knowledge (which determines usefulness of the registry) as well as sustainability beyond the timescale of the project.

The document summarizes the work of Task 3.2 of the CIVIC EPISTEMOLOGIES project done so far.

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[1] [DOW], p.9.

1 INTRODUCTION

1.1 STRUCTURE OF THE DOCUMENT

Chapter 1 is introduction to the document. It summarises the objectives of the work done in task 3.2 and described in this deliverable.

Chapter 2 describes the software platform of the registry and introduces the user level requirements and design decisions. Internet addresses of the service are provided. The user interface is illustrated with several screenshots.

Chapter 3 deals with the content of the registry. A strategy of collecting data in the registry is presented: possible sources of information are identified and the methodology is described. The current structure of the metadata is discussed. Methods for quality assessment of the items are proposed. Finally, the pilot content of the registry is summarized.

Chapter 4 proposes some actions to be performed in future in order to improve usefulness of the registry and assure its sustainability beyond the timescale of the project.

Chapter 5 contains conclusions and ideas for further work.

At the end of the document 2 annexes are found: User Manual for the registry and a snapshot of the pilot content of the registry.

1.2 OBJECTIVES

CIVIC EPISTEMOLOGIES project aims to work out a Roadmap for e-Infrastructures development to support the participation of Europe's citizens in scientific research. The special focus of the Roadmap will be put on fields of Digital Cultural Heritage and Humanities (DCHH). The citizens are especially active on these areas (e.g. collecting and describing artefacts, , cataloguing, recording stories are available for amateurs). The scale of these activities is growing thanks to e-Infrastructure and widespread access to the Internet and the social media. The aim of the Roadmap is to broaden e-Infrastructure deployment to support the participation of citizen researchers. The project analyzes needs of researchers and citizens and studies their proposals. Based on these analysis, the Roadmap may propose directions of e-Infrastructure development, that will ease participation of citizens in DCHH research. On the other hand, even the current potential of e-Infrastructure is not fully used due to lack of knowledge.

The task 3.2 *identifies tools, workflows, approaches, solutions, demonstrators, and applications useful for citizen science[2]*. This work will influence the final shape of the Roadmap. Also the Registry of Services and Tools, that collects result of this work will be an important supplement to the Roadmap. Thanks to the online availability, public and dynamic character, the registry

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[2] [DOW], p.9.

has potential to become an important source of knowledge and help for planning and conducting citizen science or crowdsourcing projects[3].

There are two kinds of knowledge necessary to start up and run such projects:

- **What can be a subject of research and what can be a role of citizens in the research**. This kind of knowledge may be gained from studying **examples** of past or ongoing projects. Analysis of such examples allows reusing successful project patterns and also helps to get inspiration for new ideas for projects. Thus, one group of items collected in the registry shall be *approaches, solutions, demonstrators* or simply saying instances of citizen science and crowdsourcing projects.

- **How to develop and implement a project.** Those starting projects should have a reliable source of information on available **technical means** necessary to setup the collaboration, communicate between professional and citizen researchers, collect, store and possibly publish or reuse results of the work. Thus, the registry also shall contain items such as software applications and frameworks, as well as available services that may be a platform for the project. This knowledge may be even more valuable, as it is often obscure: it is relatively easy to find examples of projects and description what they actually do, but usually the description of how exactly those projects had been implemented and what are the stumbling blocks when one ventures on a citizen science initiatives is missing. Another important element influencing decisions *how* the project should be organized is **standards** which define boundaries and assure required quality of work. Hence the registry shall also contain information about standards.

The knowledge described above must be supplemented with details that may be provided only by people experienced in such projects, successful stories, hot news, information about related events and sometimes personal support. The sources of this kind information are community portals and user forums. Thus, the registry shall contain also items like that.

The experience of the participants of the project shows there is a need for such a Registry, not only as a supplement for the Roadmap, but also as an independent, sustainable and up to date source of knowledge for the wider community. Also, to the moment, according to our best knowledge there is no similar registry in the field of DCHH. So that, the implementation of the registry seems to be well-founded.

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[3] The difference between the two terms is explained in [D2.1] p.7: ***Citizen science*** *involves activities and people with a specific research focus and they are organised as a "rule" in a project which is led by a professional researcher.* ***Crowdsourcing*** *benefits instead from the time and skills investment of volunteers but does not aim necessarily to achieve research outcome and it is not coordinated by a researcher.* As the distinction between these two kinds of activities is not obvious, later on this document we use term *citizen science* in a wider sense, including *crowdsourcing* in the sake of simplicity.

2 PLATFORM FOR THE REGISTRY

2.1 USER LEVEL REQUIREMENTS

The requirements for the registry came up from project's description of work, discussions between project partners and representatives of communities that took place during the Workshop on Requirements (held in Malta, November 2014), Workshop on the Roadmap (held in Leuven, February 2015) and also the experience from putting together the DCH-RP Registry of Tools and Services[4]. They are as follows:

- **Easy, public, on-line access**. This means the registry must be available in the Internet as a standalone webpage, or embedded in any existing webpage.

- **Filtering the content of the registry** using wide set of criteria in order to easy select interested items. It is necessary to well structure the content of the registry and to describe it by useful metadata –on the backend. The filtering feature must be also available on the frontends as appropriate, intuitive and easy to use user interface elements.

- **Dynamic content.** The content of the registry is supposed to be "alive" - follow the current "state of art" civic science and grow (in terms of collected items) in time. Moreover, it is going to be a tool for the civic science stakeholders, who shall provide and maintain content of the registry. This requires user friendly, online interface to add new items or supplement/modify the existing ones. Also an interface to (re)define the metadata must be provided.

- **Access control.** The interface for data modification must be available for all project participants and later on for wider group of experts. Two models of access are considered:

  o user-password based – accounts are set up only for trusted users,

  o public or semi-public (authentication via a social networking service, e.g. Facebook, Google+ or any existing citizen science platforms) – supplemented with moderation.

  The model will depend on the strategy of collecting the items described in paragraph 3.1. Currently the first model is implemented, the second one requires some more work (interface for the moderator, means to undo or suspend actions, integration with social networking service authentication. Some operations (like metadata definition) shall be however limited to certain group of users.

- **Possibility of importing data from existing data sets**. This feature shall provide semi-automatic way to populate the registry with bulk data from any external source.

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[4] http://www.dch-rp.eu/index.php?en/137/registry-of-services-tools

Practically, any external dataset that can be exported to CSV (spreadsheet) format, shall be able to be imported then to the registry. This operation, however supported by a special tool, needs some knowledge on the registry internals, thus it is intended to be performed by IT personnel.

- **Assessment**. The registry shall provide a way to assess its items. For example, in the presentation of projects it might be interesting to indicate if the projects succeeded or failed and what were main identified factors of their success or failure. In case of software, interesting elements might be simplicity of installation and maintenance, user friendliness, efficiency and reliability. In the cases of providing information on community portals, of major importance are aspects of quantity and suitability of the publications, etc.

- **Sustainability**. The registry shall exist longer than CIVIC EPISTEMOLOGIES project. It has an ambition to be independent source of information, available and useful for wide publicity for many years. On the other hand, at the moment the registry is closely related to the project and the development of the Roadmap in particular. So that, two versions of the registry frontend are provided: standalone and embedded in the CIVIC EPISTEMOLOGIES webpage. The backend of the registry (database) is independent from and common for the both frontends. The registry shall also not be based on third party services, as future of such services is unpredictable. Especially free services give no guarantee on future availability or solving problems that may occur. Taking the above into consideration it was decided to run the registry on resources of one of the project's participants, namely PSNC.

2.2 IMPLEMENTATION AND DEPLOYMENT

Good practice of software implementation is based on a modular approach which means developing functional parts as possibly independent modules with small, well defined interfaces. The natural way of dividing software into modules is separation of the data storage and management layer (called backend later on) and data presentation layer (called frontend later on).

Backend

The backend is implemented as a relational database. The chosen technology was MariaDB which is *enhanced, drop-in replacement for MySQL*[5]. This reliable SQL server is compatible with MySQL which proves easy and reliable cooperation with other software components. It is also available in official repositories of main Linux distributions.

The database consists of a number of tables, views, functions and procedures. All the tables of the registry are created in InnoDB engine, which assures transactional consistency of the data.

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[5] https://mariadb.org

Frontend

The frontend is a web application run on Apache web server and implemented with PHP, HTML and styled with CSS. The database access is realized via PHP Data Objects (PDO) extension. On the web browser's side Javascript with jQuery and AJAX technology is used.
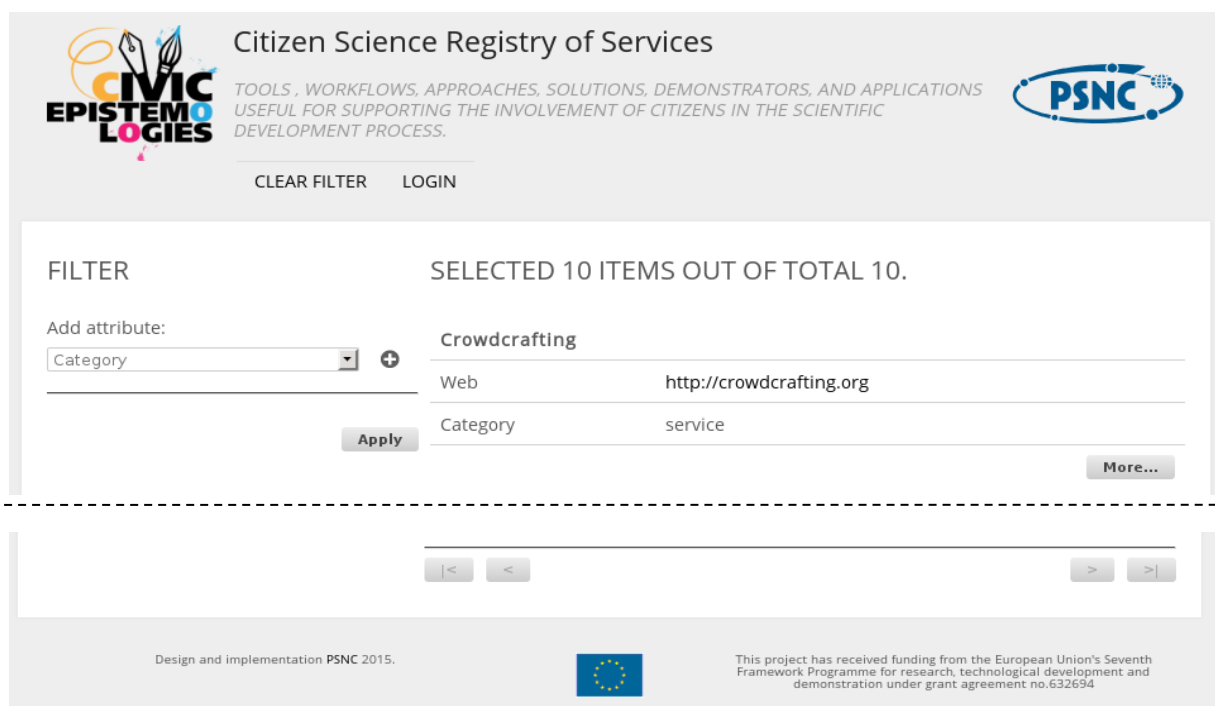
There are two versions of the application: profiled for the embedding and standalone. The embedded version works always in http protocol (the protocols of the hosting webpage –which runs on http and the embedded element must be the same) and allows for read-only access. The standalone version offers read-only access without logging in http protocol and secured (https) access after logging in for the editors.

Deployment

The service is available at:

- http://registry.civic.psnc.pl – standalone version
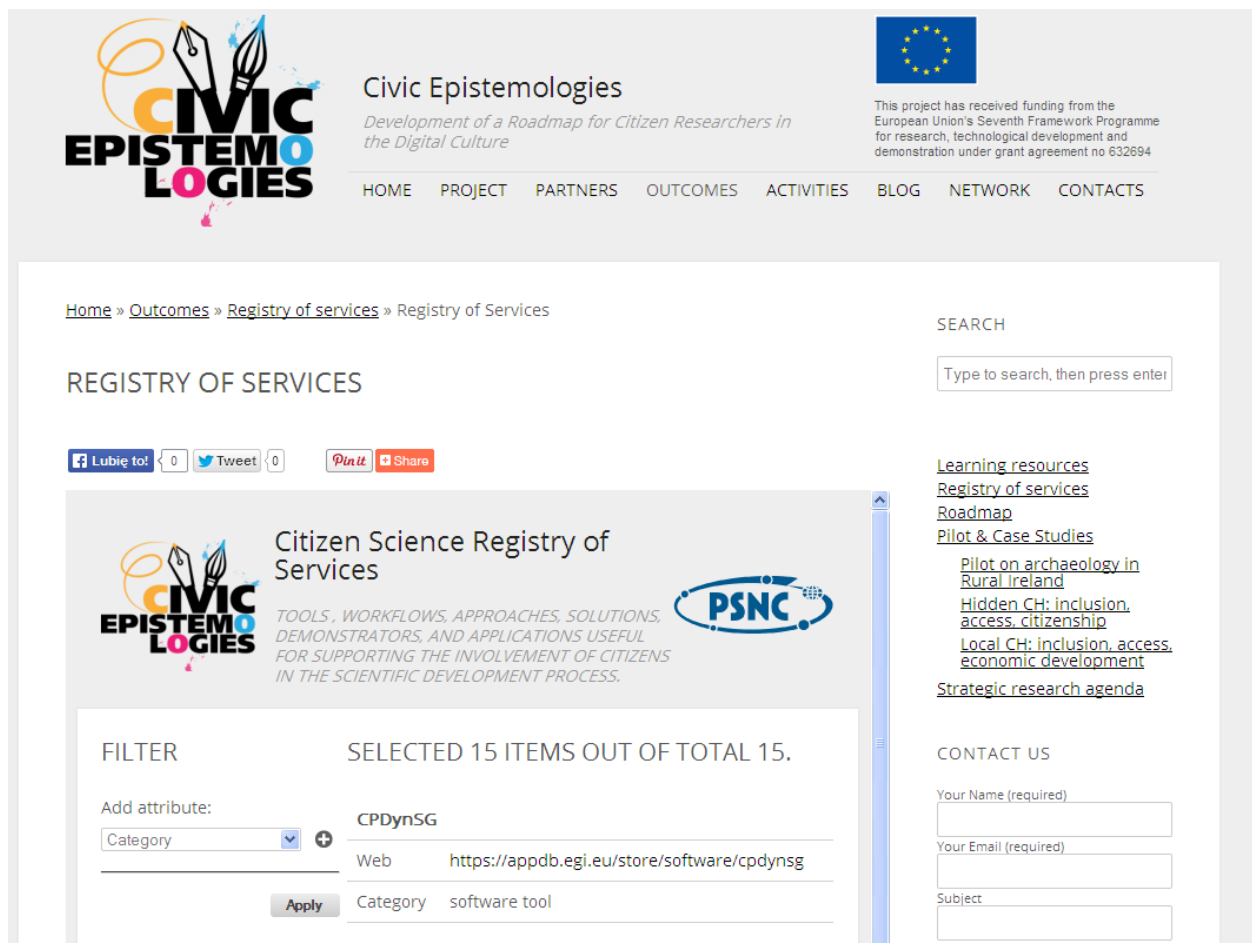
- https://registry.civic.psnc.pl – secured standalone version

- http://www.civic-epistemologies.eu/outcomes/registry-of-services/v1/ - embedded on CIVIC EPISTEMOLOGIES webpage

Fig.1 illustrates the online Registry. Fig. 2 shows how it is currently embedded on the Civic Epistemologies project website. Figures 3 -6 illustrate the most popular query and results within the registry.

Fig. 1The Standalone Version of the registry.

Fig. 2 The registry Embedded in CIVIC EPISTEMOLOGIES webpage

Fig. 3 Details of the Item

Fig. 4 Filtering in action

Fig. 5.Login form

Fig. 6. Tool Editor

3 CONTENT OF THE REGISTRY

3.1 FOCUS

The planned focus of the Registry of Services was *projects and initiatives as well as standards, tools, workflows, approaches, solutions, demonstrators and applications[6].* However the name of the registry suggests focus on services and tools, the mentioned citation allows much wider spectrum of items in the content. The platform is capable to store any categories of items and have flexible enough possibility to define metadata.

The participants of the Workshop on the Roadmap (held in Leuven, February 2015) had opportunity to play with the registry and give us constructive and interesting feedback. One particularly interesting observation was, that work on structuring and collecting knowledge is on its early stage, thus at the moment, it is easier and probably more useful to collect information about projects and their good and bad practices rather than tools and services.

The final content of the registry will depend on the contribution of the stakeholders, but it seems that the final focus might be as suggested during the workshop.

3.2 STRATEGY TO COLLECT ITEMS IN THE REGISTRY

3.2.1 Sources of the Information

The registry aims collecting knowledge that will be useful both for preparing the Roadmap and for wide public interested in running civic science or crowdsourcing projects. At the moment, there is no good structured, universal source of knowledge, that could be reused for that purpose. Some information on current and past projects may be collected by searching Internet resources. Especially, some services – general purpose platforms for running civic projects can be found (e.g. http://crowdcrafting.org). Also, the websites of these services usually provide lists of hosted projects with short descriptions. This answers the question *what?* asked in paragraph 1.2. Objectives. The missing information is answer on the second question: *how?*, as the descriptions usually don't provide details on software used, success or failure of the project and reasons for that. Moreover, it is more difficult to find projects, that are not based on such platforms. Summarising, the pure Internet research is not sufficient.

The real source of knowledge is experience of people who have organized and have taken part in citizen science projects. Note, that this source is highly distributed. So that, the strategy of collecting the data for the registry must involve many people, representatives of citizen science stakeholders. Namely, taking into account that CIVIC EPISTEMOLOGIES targets at DCHH sector, they are:

- cultural heritage institutions (museums, archives, libraries, etc.),

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[6] [DOW, p. 11]

- universities,

- e-Infrastructure providers,

- enterprises active in DCCH area.

The CIVIC EPISTEMOLOGIES consortium consists of the mentioned above types of entities. Also the stakeholders' community, that is being built around the project include such entities. So that, we expect contributions to the registry from (in order of appearance):

- project participants,

- associated stakeholders,

- any volunteers.

3.2.2 Methodology

The data will be collected in two ways:

- **Via the website of the registry**. This it the preferred way. It needs creating account in the registry at the moment. The interface was designed to be user friendly, short manual was prepared and support from the service administrator is available.

- **Via e-mail**. The e-mails with requests to add/modify items in the registry may be sent to the project's mailing list or directly to the administrator.

Quality and safety of the collected data is a crucial issue to be addressed. There are two possible approaches to assure the quality:

- **Limit the write access to trusted users**. This is achieved by account-password model of authentication and manual setting up accounts for trusted users. This approach is implemented at the moment. Users recruiting from the project partners and associated will get accounts on e-mail request.

- **Moderate the input**. In this approach we allow anonymous (no authentication) or public non-anonymous (authentication via a social networking service, would need integration work) access to edit the data, supplemented by moderation of the input. The advantage of this approach is easy access for all who like to contribute to the registry, that potentially may lead to quicker growth of the collected data. The disadvantage is that it requires role (person) who will do the job of moderation. The moderation requires also technical means to delay editions before acceptation of the moderator or to undo unwanted editions (either not implemented so far in the platform of the registry).

3.3 THE METADATA

Metadata describes other data. It provides information about a certain item's content[7]. The metadata used in the registry is formed as a set of pairs attribute-value connected to the registry

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[7] http://techterms.com/definition/metadata

item. The attributes have well defined meaning, possible values (e.g. time, number, any text or value from list –so called enumerated value). Some attributes may have only single value (e.g. the item may have only one name) and some may be multivalued (e.g. a solution may use multiple technologies). Following to the requirement, that the registry must be dynamic, also the set of attributes may be extended in the future. The attributes currently defined in the registry are given in Tab. 1.

Attribute	M[8]	Meaning	Comments
Name	N	Name of the item.	Text.
Web	N	Website of the item.	Text.
Description	N	Short (up to several statements) description of the item.	Text.
Category	Y	Category of the item.	Enumerated value: • software tool • service • community portal • software framework • civic science project • source of information • crowdsourcing project
Field	Y	Field of science according to OECD 2006 classification[9].	Enumerated value: • natural sciences • engineering & technology • medical & health sciences • agricultural sciences • social sciences • humanities

[8] If the attribute may have multiple values: Y, else: N.

[9] [OECD 2006]

Technology	Y	Key word describing technology used to implement and/or deploy and offer the tool/service.	Text. The technology may belong to groups: • Programming language used for implementation • Run-time environments: e.g. tomcat, relational DB etc. • Deployment environment: cloud, hosted service etc.
Status	N	Status of the project, service or software.	Enumerated value: • maintained • not maintained • in progress • unknown
Status comment	N	Some details on the status.	Text. For example: • time of last / recent updates • maturity information (e.g. alpha version, proof of concept, etc.)
Licence	Y	General licensing model	Enumerated value: ● open source ● free (but not open) ● paid
Licence details	Y	Detailed type of the license applied to the solution	Text. FreeBSD, (L)GPL etc.
Owner	Y	Project, institution or initiative responsible for the tools or service	Text.
Phase	Y	Relevance to a phase of a citizen science project	Enumerated value: • recruiting volunteers • data input • data correction/moderation • presentation of results

Tab. 1 Set of attributes defined in the registry

3.4 QUALITY ASESSMENT

There are different possible approaches to assess quality of any kind of object. In this special case of type of content of the registry we deal with quite different categories of items like software, services, projects, portals etc., so that the approach must be elastic enough to fit all of them. Moreover, the assessment process shall be easy and intuitive for the evaluators and the result of the assessment –understandable for the publicity. The chosen approach is based on collecting opinions on objects from logged users similar to specialised web portals (e.g. opinions on hotels in a booking portal or opinions on products on an online shop). Such an assessment is a vector of elements:

- rank in a predefined scale
- advantages (good practices) of the item
- disadvantages (bad practices) of the item
- identity of the evaluator (might be name or nickname, might be public or hidden)

This approach seems to be intuitive enough and fits any category of items. The special type of assessment attributes following this pattern are provided in the registry. They are described in the Tab. 2.

Attribute	Meaning	Comments
Rank	Rank of the item. In case of project may be measure of project's success or failure.	A number from range 0 (very poor) to 10 (excellent). This attribute is presented as average value of all assessments of the item.
Advantage	Advantage of the item	Text.
Disadvantage	Disadvantage of the item	Text.
Good practice	Good practice used.	Text.
Difficulties	Problems, obstacles, important bugs or other difficulties that occurred while development of the project, using tool/service, etc.	Text.
Evaluator	Id of the evaluator.	Number. The real identity of the evaluator is not public.

Tab. 2. Vector of assessment attributes

3.5 SUMMARY OF THE CURRENT CONTENT

The participants of the project proposed 15 items for the registry's pilot. The detailed list of the items is included in Annex I. Tab. 1 contains some statistical information on the collected items.

Although it is only the pilot content, it may illustrate the trends on focus of the registry. 46% of items are projects (both citizen science and crowdsourcing ones) and 53% of items is related to humanities.

Attribute	Value	No of items	Share
Category	civic science project	5	33%
	software tool	2	13%
	software framework	2	13%
	source of information	2	13%
	crowdsourcing project	2	13%
	service	1	7%
	community portal	1	7%
Field	humanities	8	53%
	natural sciences	4	27%
	social sciences	1	7%

Tab. 3 Statistics on the pilot content of the registry

4 NEXT STEPS

4.1 GROWING THE CONTENT AND DISEMINATION

The Description of Work expects the registry to be *piloted and implemented online*[10] in task 3.2. The current status is that the structure of the registry is defined, the registry is implemented and deployed online with pilot content of initial 15 items. However, this is not sufficient to fulfil its aims: supplementing the Roadmap and playing important role as a source of knowledge for citizen science stakeholders. The key is quantity and quality of its content. As discussed in section 3.1, the high quality content might be provided by experienced stakeholders.

In the first step, the project participants will get access to edition of the registry and they will be encouraged via project's mailing list to contribute.

In the second step project's associates will be invited to contribute. The invitation will be announced via CIVIC EPISTEMOLOGIES webpage and other dissemination channels (the actions will be discussed with task 5 representatives, that will be responsible for performing the actions.

Once the registry reaches some critical mass (i.e. contains useful amount of knowledge) it will be disseminated to a wide publicity (task 5). Accounts to edit the registry will be set up for external volunteers in well-founded cases. The public access to the edition will be implemented and deployed in case there will be appreciable interest in contributing to the registry (technical and organizational means must be provided).

4.2 SUSTAINABILITY

One of the important decisions concerning implementation and deployment of the registry was to prepare two points of access to the registry: one embedded in CIVIC EPISTEMOLOGIES webpage (closely related to the project and its life time) and one standalone (more open to wide public and without time boundaries). In order to meet requirements of the second case, PSNC declares to maintain the online Registry on its own resources, beyond the time scale of the project, as long as the registry is used.

4.3 IMPROVEMENTS

The following improvements are considered to be implemented in future:

- Adding **assessment functionality**, described in paragraph 3.4.

- Enable **contributing the registry on anonymous or public mode**. As already noted in paragraph 3.2.2, such approach may have important impact on the amount of data collected in the registry, but due to quality and safety reasons, it have special

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[10] [DOW] p. 9.

requirements. From the organizational point of view a special role (moderator) is necessary to guard quality and safety. There are two possible modes of moderation:

- o pre-moderation – the moderator must accept any editions before they are applied,
- o post-moderation – the editions are applied immediately, but the moderator is able to track and undo editions.

From the technical point of view both modes require technical means (tools) that must be implemented.

This feature will be considered if there is significant interest in public contributing due to necessary work for implementation (the tools) and maintenance (the moderator).

- Using a **social networking service** (e.g. Facebook) **for authentication**. Instead of using anonymous mode of the contribution to the registry (anyone anonymously may do it), the access may require authentication by the social networking service (public mode). This may supplement the described above moderation (probability of malicious editions would be smaller).

5 CONCLUSIONS

In this document we presented structure and initial content of a Registry of Services and Tools . The registry is the main practical result of Task 3.2 "Tools, services and established standards" of CIVIC EPISTEMOLOGIES project. The aim of the task is identification of items (tools, workflows, approaches, solutions, demonstrators, applications) that might be useful in citizen science and crowdsourcing projects, with special focus on DCHH domain. These items will be collected and published in the registry, which is operable at the moment and available world-wide online.

We described the platform that was developed to maintain the registry, paying particular attention to user requirements. The registry is filled with pilot content of 15 items, which enabled testing the implementation by the end users.

We also described the current and the expected content of the registry. The most important conclusion is that the content, in order to become an useful source of knowledge, must grow, must be of good quality and must be appropriately focused. A strategy for this process is the key and this strategy relies upon experience and expertise of project participants and associates. Also elements of assessment of collected items are proposed, which may improve the quality of the collected data.

Regarding the focus of the registry, as we see from the user's feedback, it is slightly moving from services and tools towards projects and their practices.

The document proposed also next steps to be performed within the task 3.2 to improve quantity and quality of collected knowledge. As the registry gains its critical mass, it must be disseminated properly it in order to make popular. The third element of success is sustainability of the service beyond the timescale of the project. We believe that the registry has a potential to become an important source of knowledge for all stakeholders: cultural heritage community, researchers, citizens associations, creative enterprises, e-Infrastructure providers and policy makers.

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DCH-RP Project website http://www.dch-rp.eu

DOW: Annex I – "Description of Work" of 7'th Framework Programme, Grant agreement no: 632694, project Civic *Epistemologies: Development of a Roadmap for Citizen Researchers in the age of Digital Culture*.

Crowdcrafting portal http://crowdcrafting.org

MariaDB website https://mariadb.org

OECD *Revised Field of Science and Technology (FOS) Classification in the Frascati Manual,* EAS/STP/NESTI(2006)19/FINAL.
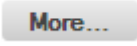
The Tech Terms Computer Dictionary http://techterms.com

ANNEX 1. USER MANUAL

Navigating the list of items

The list of items is available at the page load or after clicking *LIST* menu item. For the sake of efficiency, only 10 items per page are displayed. The navigation buttons are located at the bottom of the list and their meaning is as follow:
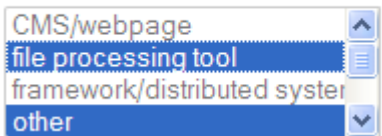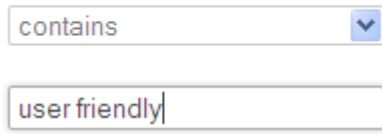
|<	go to first page
<	go to previous page
>	go to next page
>|	go to last page

Only the first 3 attributes of each item are displayed initially on the list. All attributes will be displayed after click on More... . The later attributes may be hidden again by clicking Less... .

Using filter

The filter is located on the left column.

1. Select an attribute for filtering in *Add attribute* combo box and press ⊕ .
2. Define the filter element depending on the type of element as described in below table:

Category — CMS/webpage / file processing tool / framework/distributed system / other ⊖	**Enumerated** Select one or more values by clicking them. Tip: multiple choice requires pressing Ctrl. e.g. *Category is "file processing tool" or "other"*
Description — contains — user friendly ⊖	**Text** Select operation from the combo box and write some text in the edit. e.g. *Description contains "user friendly"*
Rank — < — 5 ⊖	**Number** Select operation from the combo box and write some number in the edit. e.g. *Rank < 5*

Date inserted is before ▾ 2015-01-01 ⊖	**Date and time** Select operation from the combo box and write date and time in format: *yyyy-mm-dd hh:mm:ss*. The date/time may be shortened (e.g. *2015*, *2010-02*, *2014-11-11 21:22*). e.g. *Date inserted is before 2015-01-01*.

3. Add as many filter elements as required. Only the items fitting ALL filter elements will be selected.

4. Press ⊖ to remove unwanted filter element.

5. Press **Apply** to run the filter and select items.

NOTE: Any modifications of the filter affect the selected items only after pressing button Apply.

Logging

1. Select *LOGIN* from the main menu.

2. Provide username and password

3. Press Login.
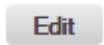
NOTE: The user must be logged in to edit content of the registry. While the read-only access is available both in non-secured (http protocol) and secured (https protocol) mode, while the logging in the service is switched to secured mode. In case of embedded version of the registry it is switched to a standalone one.

Inserting new item

1. Select *INSERT* from the main menu.

2. The Editor form is opened. The form contains all mandatory attributes with empty values.

3. Fill the form and press **OK**.

NOTE: The Editor is described later on.

Editing existing item

1. Press **Edit** below the item to be edited.

2. The Editor form is opened. The form contains all current attributes of the item with their values.

4. Fill the form and press **OK**.

NOTE: The Editor is described later on.

Editor

The example Editor form is shown on the picture below:

The names of attributes are located on the left side and the values of attributes are located next to them. The last row contains combo box with optional attributes, that may be added to the item.

- To modify a value edit the corresponding control.

- To add an attribute, select it from the "Add attribute" combo box and press ⊕ . The given attribute is available in the combo if it is multivalued or the item doesn't have this attribute.

- To remove an attribute, press ⊖ . The given attribute may be removed if it is not mandatory or there are more than one values of this attribute.

- To cancel the modifications and close the form press Cancel .

- To apply the modifications without closing the form press Apply .

- To apply the modifications and close the form press OK .

NOTE: none field may be left empty or unselected while applying the changes. The missing fields will be marked with red border after pressing Apply or OK. The user must fill or remove (if allowed) the empty fields.

ANNEX 2. THE CURRENT CONTENT OF THE REGISTRY

CPDynSG

Web   https://appdb.egi.eu/store/software/cpdynsg

Category   software tool

Field   natural sciences, social sciences

Description Full name: City Population Dynamics and Sustainable Growth. An important feature of application is comparison of available theories, comparison with observations, and prediction of scenarios of population dynamics and sustainable growth for different national and international regions. CPDynSG will allow to investigate connections between vast volume of experimental data on and found a qualitative correspondence between model predictions and available long time historical data. It will be useful for planning predictable population distribution and sustainable development.

Crowdcrafting

Web   http://crowdcrafting.org

Category   service

Description Crowdcrafting is a web-based service that invites volunteers to contribute to scientific projects developed by citizens, professionals or institutions that need help to solve problems, analyze data or complete challenging tasks that can't be done by machines alone, but require human intelligence.

DCH-RP Tools Registry

Web   http://registry.dch-rp.psnc.pl/

Category   source of information

Field   humanities

Description The registry collects the information and knowledge related to tools, technologies and systems that can be used for the purposes of digital cultural heritage preservation. It also reviews existing and emerging services developed and offered by R&D projects, and e-Infrastructures including commercial solution vendors. Tools and services are categorized by purpose, technologies required, resource formats supported and domain-specific application, among others. The registry provides assessment of relevance and the popularity of the tools.

Digital Meets Culture

Web   http://www.digitalmeetsculture.net

Category   community portal

Field   humanities

Description DIGITAL MEETS CULTURE is intended as a portal for gathering information about the digital culture in the world, taking into account the different approaches that science, cultural heritage and arts have to the digital age. This portal aims to act as a reference point and as a valuable mean of information and communication for different users in a global dimension. It is conceived as a meeting place between technologies and arts & humanities. DIGITAL MEETS CULTURE aims to promote and to foster the spread of the digital culture for its considerable innovative impact on the society, for its positive effects on the circulation of information and on the communication of ideas among and across different fields, and for its contribution to creative thinking. DIGITAL MEETS CULTURE represents a very useful tool that allows different types of users to contribute to the research outcomes of National and International projects, particularly in the field of cultural heritage, social science and humanities. It provides in

ForestWatchers

Web   http://forestwatchers.net

Category   civic science project

Field   natural sciences

Description The concepts of volunteer computing and volunteer thinking can be easily applied to the goals of the ForestWatchers project. The original screensaver of SETI@home is replaced by the latest remote sensing image of a forested area. It might be an indigenous reserve in the Amazon, a national forest in Borneo or a park in Queensland. Images are then classified into forest or non-forest with a suitable automated classification algorithm and the accuracy of the resulting map can be further improved by volunteer observation on the Web, or even by addition information provided by volunteers in the field.

Fortepan

Web   http://www.fortepan.hu

Category   civic science project

Field   humanities

Description It is a Hungarian photo-archive with at around 44 000 pictures, and all of these pictures are under the Creative Commons CC-BY-SA-3.0 license. The whole archive based on the work of voluntary editors and assistant. Volunteers can upload images, or give other's pictures descriptions, keywords; and it also has a wiki too, where additional information to the pictures can be given.

Hagyomány és múltidéző

Web   https://sites.google.com/site/hagyomanyesmultidezo

Category   civic science project

Field   humanities

Description Historical knowledge base founded by a bunch of enthusiastic volunteers, and based on the common knowledge sharing and knowledge building. Its main goal is to help the creation of authentic historical reconstructions based on findings and resources by volunteers.

iNaturalist

Web   http://www.inaturalist.org

Category   civic science project

Field   natural sciences

Description iNaturalist is an online social network of people sharing biodiversity information to help each other learn about nature. It's also a crowdsourced species identification system and an organism occurrence recording tool. You can use it to record your own observations, get help with identifications, collaborate with others to collect this kind of information for a common purpose, or access the observational data collected by iNaturalist users.

Omeka

Web   http://omeka.org

Category   software framework

Field   humanities

Description This platform allows you to create complex narratives and share rich collections, adhering to Dublin Core standards with Omeka on your server, designed for scholars, museums, libraries, archives, and enthusiasts. The platform provides a number of open source plug-ins that focus specifically on collaboration with guest users. These plug-ins allow guest users to add, edit, share, print, or delete their own collections of public content from your Omeka site. A transcription plug-in allows guest users to transcribe old manuscripts and archival documents. The workflow allows the site manager to manage and validate these contributions. Contributors can earn credits based on the number of contributions. All contributions can be searched on for research purposes. A commenting plug-in allows guest users to comment and contribute information on the collections and items published on the website. These community contributions can again be managed by the community manager. And many more.

Project Noah

Web   http://www.projectnoah.org

Category   civic science project

Field   natural sciences

Description Project Noah is an award-winning software platform designed to help people reconnect with the natural world. Launched out of NYU's Interactive Telecommunications Program in early 2010, the project began as an experiment to mobilize citizen scientists and build a digital butterfly net for the 21st century. Backed by National Geographic, Project Noah is mobilizing a new generation of nature explorers and helping people from around the world appreciate their local wildlife. Our community is harnessing the power and popularity of new mobile technologies to collect important ecological data and help preserve global biodiversity.

PyBossa

Web   http://pybossa.com

Category   software framework

Description PyBossa is a free, 100% open-source framework for crowdsourcing. It enables you to create and run projects where volunteers help you with image classification, transcription, geocoding and more. PyBossa lets researchers, civic hackers and developers connect with people all around the world to solve problems faster and more efficiently.

Socientize

Web   http://www.socientize.eu/?q=eu/content/socientize-0

Category   source of information

Description SOCIENTIZE aims at creating a common forum for cooperation between e-Infrastructure providers and citizen science infrastructures providers, including any end-user with interest in contributing to the scientific process. This framework can be seen as a thematic network where all partners will contribute with knowledge and resources, expanding beyond structural borders into society at large.

Trove

Web   http://trove.nla.gov.au

Category   crowdsourcing project

Field   humanities

Description Trove (National Library of Australia) gives access to over 404,913,415 Australian and online resources: books, images, historic newspapers, maps, music, archives and more. A big community is organizing and improving this information resources by adding newspapers text corrections, images from users, item tagging for improved search and retrieval, commenting etc.

VeleHanden

Web   https://velehanden.nl

Category   crowdsourcing project

Field   humanities

Description Community project for transcribing archival documents and making the content available online.

Veridian

Web   http://www.veridiansoftware.com

Category   software tool

Field   humanities

Description Veridian is a software which focus mainly on the tasks of newspaper digitisation projects with the possibility to involve citizens.