EU-CIRCLE

A pan-European framework for strengthening Critical Infrastructure resilience to climate change

D5.2 Landscape Map of analysis components, protocols, and formats

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Executive Summary

The main purpose of D5.2 is to describe the Analysis Description Wiki that will provide detailed information about the analyses within the framework. Each description will have three main components: a section to describe the inputs, a section to describe the outputs, and a section to describe the analysis type as well as the analysis as such.

The input section will contain information about input parameters, such as, unit of measurement, projection, level of measurement, license, data origin, etc. The documentation of these parameters is important to apply the algorithm to new case studies. The section that describes the analysis serves as a documentation of the implementation of the algorithm. It explains to scope of the algorithm as well as the applied methods, modules and their sequence, so that users can understand the analysis. The output section of the description will inform the user about the expected output data type. This is an important in order to allows analyses to chain together properly and provide guidance to the user as to which analyses can be connected with each other within workflows.

We will elaborate the selection criteria of software that will be used as the platform for the Analysis Description Wiki.

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1 Introduction

The main purpose of this document is to describe the Analysis Description Wiki that will provide detailed information about the available analyses within the Climate Infrastructure Resilience Platform (CIRP). Each description will have three main components: a section to describe the inputs, a section to describe the outputs, and a section to describe the analysis process as such.

The input section will contain information about input parameters, such as, unit of measurement, projection, level of measurement, license, data origin, etc. The documentation of these parameters is important to apply the algorithm to new case studies. The section that describes the analysis serves as a documentation of the implementation of the algorithm. It explains the scope of the algorithm as well as the applied methods, modules and their sequence, so that users can understand the analysis. The output section of the description will inform the user about the expected output data type. This is an important precondition in order to allow analyses to chain together properly and provide guidance to the user as to which analyses can be connected with each other within workflows.

We will also elaborate about the required features of such a Wiki that served as selection criteria to choose an appropriate platform for the Analysis Description Wiki.

2 Setup of the Analysis Description Wiki

2.1 Principles of Wiki Software

A wiki software enables visitors of a website not only to view web-pages, but also to edit the web-pages easily and instantly, and to add new web-pages [1]. This property is reflected in the term “wiki” which is derived from the Hawaiian word for “quick” [2]. The central goal of a Wiki is the collaborative documentation of knowledge. Each article within a Wiki can be easily edited by using hyperlinks next to the text, and the changes made are visible immediately. In most Wiki software implementations, a version history is available for each article along with the user name or Internet address of the respective author, so that changes can be tracked and reverted easily.

Another core feature of most Wiki systems is that registered authors can keep a watch-list to monitor changes to certain articles, usually those to which they made a contribution themselves. Similarly, normally a special page lists all recent changes to any Wiki article. These software features are designed to foster a system of continuous peer-review among contributors and even occasional readers of Wiki articles. Research suggests that such a system may in fact help to improve the quality of articles and prevent vandalism [3-5].

Wikis are often called Open Content projects to stress similarities to Free and/or Open Source Software (F/OSS) projects such as the Linux operating system, the Mozilla Firefox web browser, or the OpenOffice.org office suit. This transparency facilitates a process of peer review among Wiki contributors may lead to the most reliable documentation of content, because of the principle of the “Wisdom of the crowd” [6].

2.2 Selection Criteria for Applied Software

Today, there exists a large variety of Wiki software systems that support a varying set of Wiki features. The website Wikimatrix [7] provides a comprehensive overview on the available systems. Given the requirements of the project, we have identified a set of mandatory features for the selected system.

2.2.1 WYSIWYG Editor

Early Wiki systems implemented a specific syntax that users had to follow in order to format Wiki contributions. The advantage of this syntax is that it easy to implement in the systems and that users are forced to use a standardized way to contribute contents. However, the disadvantage of this is that it puts a considerable burden to contribute, particularly to people who could potentially provide contents, since they are experts in a specific domain, but who do not feel technically trained enough to input data following a syntax that is new to them. Even technical experts still need to learn the particular syntax that is applied within a specific Wiki system.

Therefore, many newer Wiki System provide the option to switch between Wiki syntax based editing mode and the so-called “What you see is what you get” editing mode, that is well known to many users of Office Software packages.

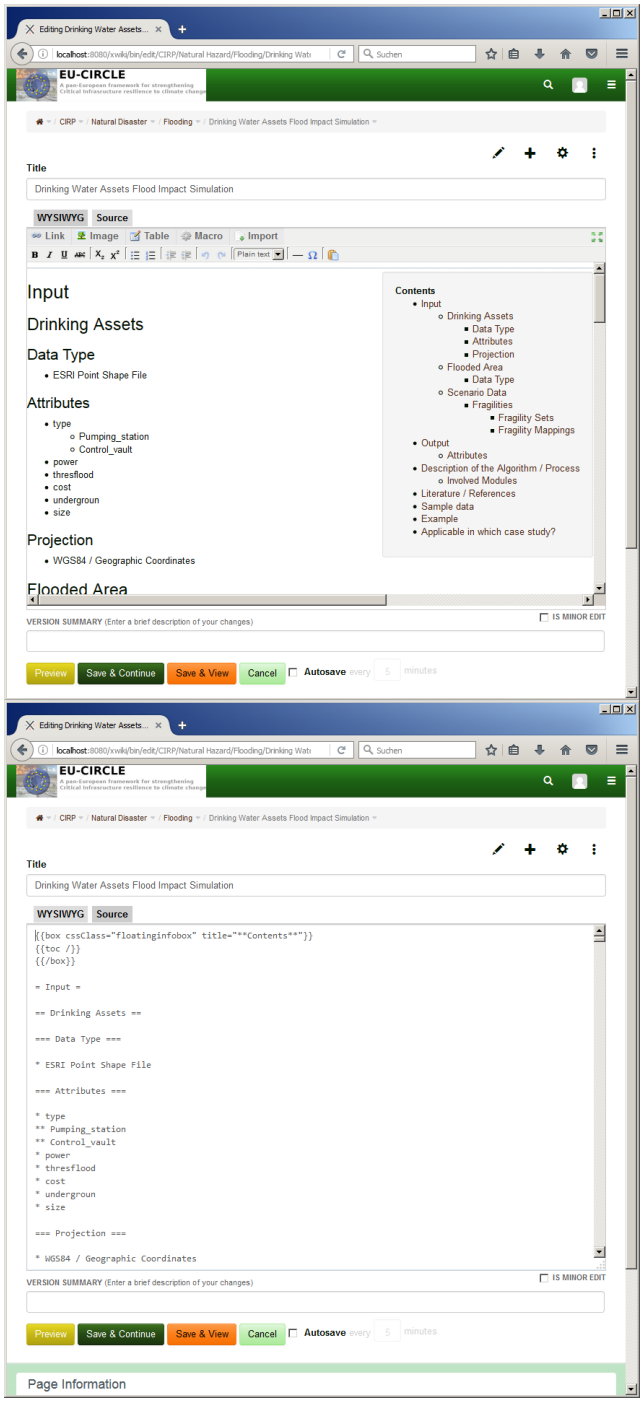

Figure 1: Example of (left side) WYSIWIG editor and (right side) Wiki syntax editor.

2.2.2 Page Templates

The function to create page templates is an important pre-condition to foster the content of contents in a highly structured way. Many newer Wiki systems support this feature. We consider it important to have this feature, since we expect to have contributors from all five EU-Circle case studies. If all of them use a common template to insert relevant documentations for the applied algorithms, chances increase that the Wiki will be as consistent and homogenous as possible.

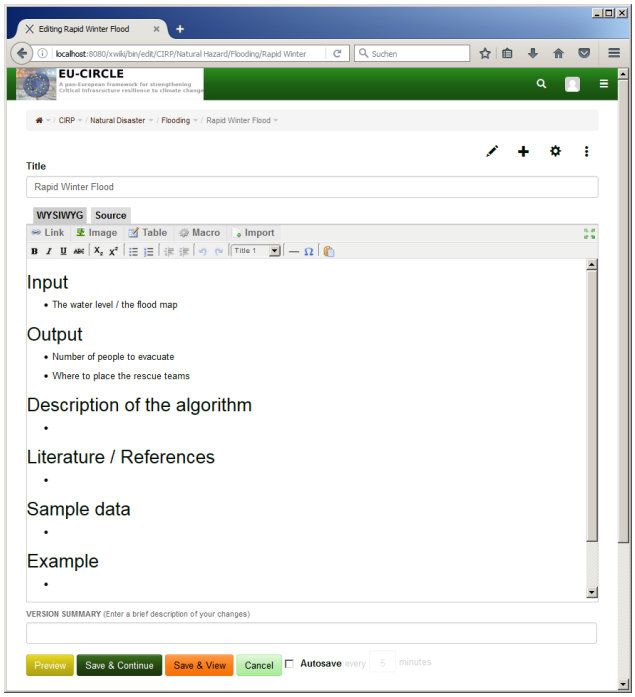

Figure 2: Example of an template with predefined contents.

2.2.3 Open License

An open software license is important to ensure that the Wiki system may be maintained after the end of the project, when no particular funding for software licenses is available anymore. The is a variety of open software licenses that fit the purpose of the project, including GNU General Public License (GPL), Berkeley Software Distribution (BSD), Mozilla License, GNU Lesser General Public License (LGPL). LGPL in particular is well suited, since it has low burdens for re-use with proprietary systems, which will facilitate the intended commercial exploitation of the project results after the end of the project.

2.2.4 Database for efficient searches

The support of efficient searches within the Wiki system is crucial for the usage phase of the system. Systems that rely on a database as a backend provide better performance for search queries on the full-text of all contributed contents.

2.2.5 Support for Categories / Tags

Traditional ways to structure information follow a strictly hierarchical approach. There is a top level, and subcategories roll up under that. Subcategories contain pieces of information or further subcategories etc., which results in pure tree structure of information, which is both a powerful tool and a powerful metaphor, and many users are used to it, since it seems natural.

More elaborated ways to structure information is to add links between the leafs of the tree structure, which create shortcuts to get form one piece of information to a related one [8].

In order to overcome the strict tree structure of information newer Wiki systems introduced the concepts of tags / categories, where a particular piece of information may not only belong to one specific branch within the hierarchical information structure, but can be polymorphic and as such belong to different categories at the same time. Many modern Wiki systems implement this concept by allowing to annotate pages of the wiki with certain tags.

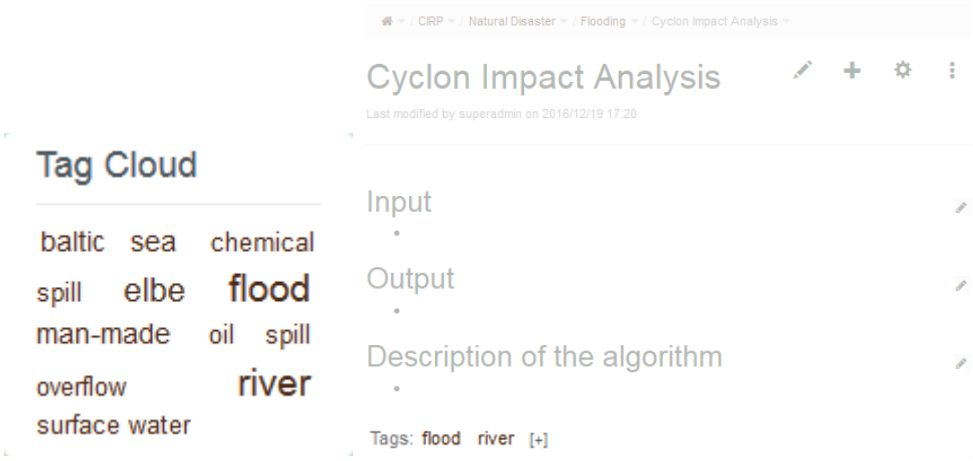

Figure 3: Example of (left side) a visualisation of frequently used tags that can be used for navigation within the Wiki and (right side) tags put under an article of the Wiki.

2.2.6 Discussion, Forum, Comments

Blogs and also Wikis, Wikipedia as the most popular among them, usually provide the possibility to the user to discuss about the content of pages, posts or entries. This functionality facilitates the informal exchange of opinions, which can provide valuable feedback to improve the content of the actual entry.

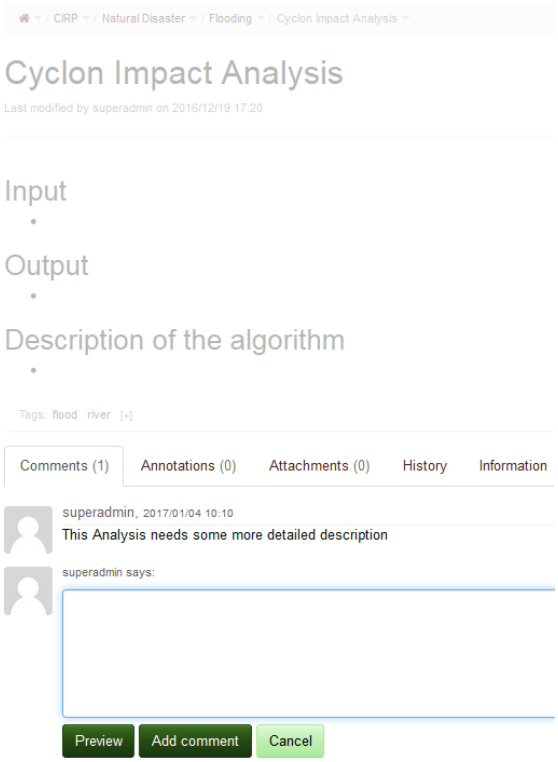

Figure 4: Example of comment / discussions about the contents of an article.

2.2.7 Authentication / Page Permissions

During the development phase of the CIRP, the Analyses Description Wiki will need to be publicly available to all partners via the World Wide Web. However, during this period the contributed contents will need to be protected from unauthorized access. Thus a necessary criterion for the selected Wiki system to be fulfilled, is to offer basic user authentication. Additionally, it useful to enable user specific permissions for individual pages, which would allow that participators within the EU-Circle project can protect their contributions from accidental changes from other project partners.

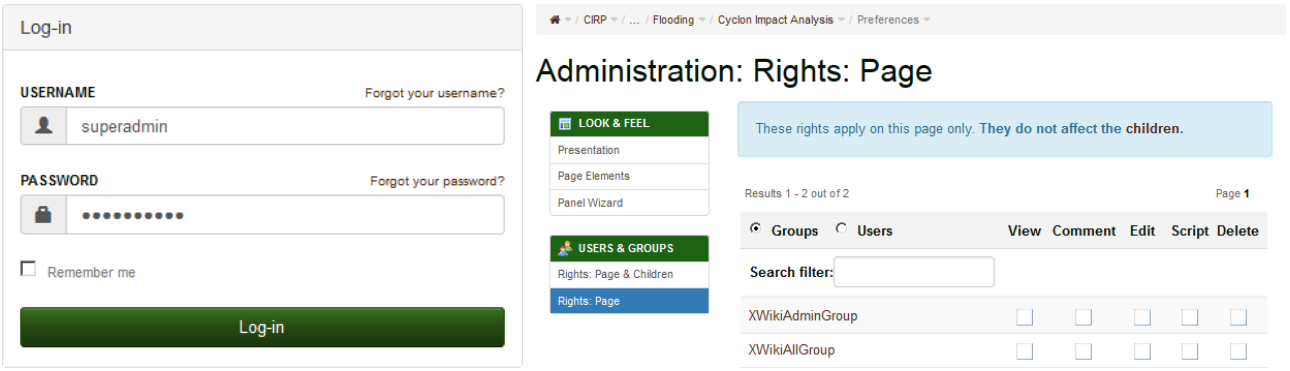

Figure 5: Left side: User Authentication; Right side: Example of access rights for an individual Wiki page.

2.2.8 Multiple Interface Languages

Since the EU-Circle consortium contains partners and also end users with more than 8 different native languages, it is preferable that the interface of the Wiki system can be set to different languages, since this makes the usage of the system more user friendly. Beside the graphical user interface the system should also provide the possibility to translate individual pages so that case study owners could present and discuss them with their local stakeholders.

Figure 6: Left side: XWiki can be administered to support multiple languages. If multilingual support is activated, the user interface is automatically translated to the language detected by the browser. Furthermore (right side), users can choose to provide translations for pages.

2.2.9 E-Mail notification about changes

Many modern Wiki software systems support the possibility to keep track of changes on pages that have been edited by a particular user. Since the nature of the analysis description Wiki is intended to be highly collaborative with input from many different partners, this functionality would be a highly important feature.

2.2.10 Section Editing

Instead of only being able to edit a page as a whole, it should also be possible, to edit individual sections in order to make smaller edits more efficient.

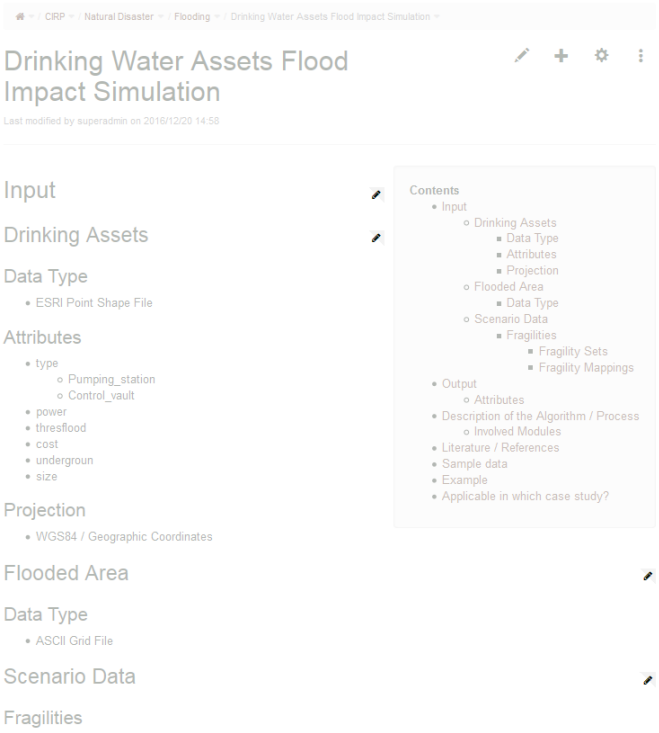

Figure 7: XWiki supports editing individual sections.

2.3 Selected System

In order to find a Wiki system that fulfils all requirements mentioned in section 2.2, we have made a query to WikiMarix.org [7]. The result contained the following systems (cf. Figure 8):

- BlueSpace for MediaWiki
- Foswiki
- MediaWiki (the system that runs Wikipedia)
- Tiki Wiki
- XWiki

Since, at Fraunhofer IVI the Wiki system XWiki is in use for internal purposes, there is some experience available about the details of the installation and configuration of this particular system. Thus, XWiki has been selected platform for the analysis description Wiki.

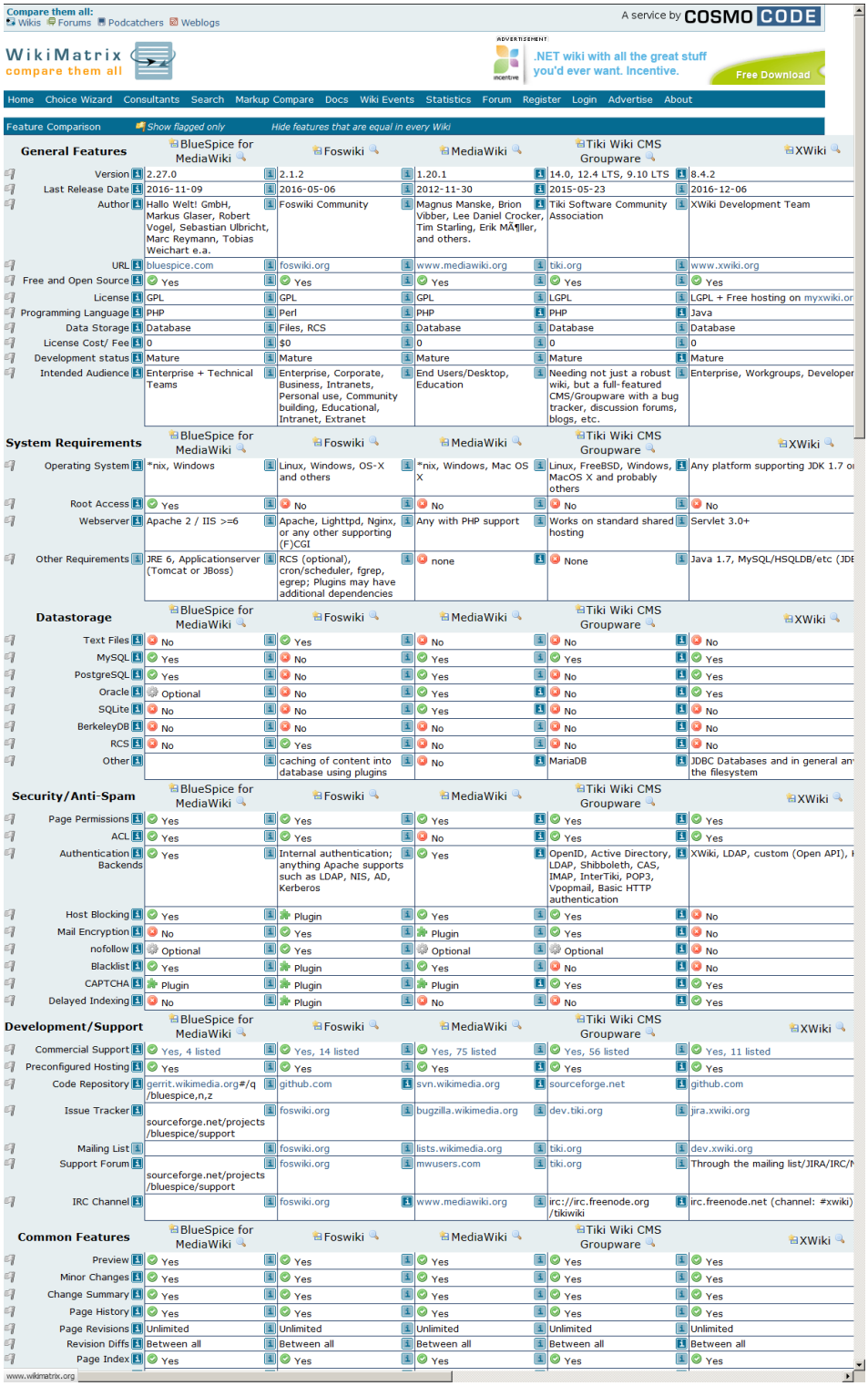

Figure 8: WikiMatrix.org result of the

2.3.1 About XWiki

First generation wikis are used to collaborate on content. Second generation wikis (a.k.a Structured and Applications Wikis) can be used to create collaborative web applications. XWiki can be used either as a first generation wiki or a second generation one.

XWiki contains the following functions for content creation:

- Page Editing
- Version Control
- Rights
- Search
- Imports & Exports

XWiki contains the following functions for structure and application creation:

- Blog
- File Manager
- Meetings
- Forums
- Tasks

2.3.2 Installation Requirements

- Java 8 or greater installed
- A Servlet Container supporting Servlet 3.0.1, e.g. Tomcat
- A JDBC 4 Driver for the installed database
- Small and medium installs: A minimum of 1024MB (-Xmx1024m), Large installs: 2048MB or beyond (-Xmx2048m).

2.3.3 Web URL of the Wiki system

The Web URL of the installed XWiki system is: https://eu-circle.ivi.fraunhofer.de The URL is publicly accessible.

3 Contents of the Analysis Description Wiki

3.1 Structure of the Wiki

The Wiki will mainly consist of the individual analysis descriptions provided by the case studies. Additionally, it will contain a tutorial section that guides new users of CIRP through an example in order to get used to the platform. Moreover, we foresee a section “Get Started” that will describe the first steps, such as installation and configuration of the CIRP platform.

We suggest that the actual analyses will be structured by hazard type (e.g. flood, wind, fire, spills, etc.). Possible alternatives are categorization by case study (i.e. the five case studies of the EU-CIRCLE project), categorization by infrastructure type (e.g. power network, traffic network, public transport, etc.) and structure by impact (e.g. casualties, environment, Critical Infrastructure performance, economic and finance, casualties).

Since the implemented XWiki system supports tags, it will be possible to even use all suggested structuring types in parallel.

3.2 Structure of Individual Analysis Descriptions

The structure of the individual analysis descriptions has been discussed with experts from all project partners during the mid-term meeting. We will follow the structure that has been used in a similar previous project [9]. For each individual analysis description, we propose the follow this structure:

- Description of input data including all necessary attributes
- Description of output data including all resulting attributes
- Description of applied algorithm and possibly involved modules used for processing
- Related literature references
- Sample Data
- Example
- Applicability for which of the 5 case studies
- License – Open License vs. Commercial License
- Status – Implementation available, Implementation on demand, Customisation required

In order to foster the use of this structure a page template (cf. requirement described in section 2.2.2) that contains this structure is provided.

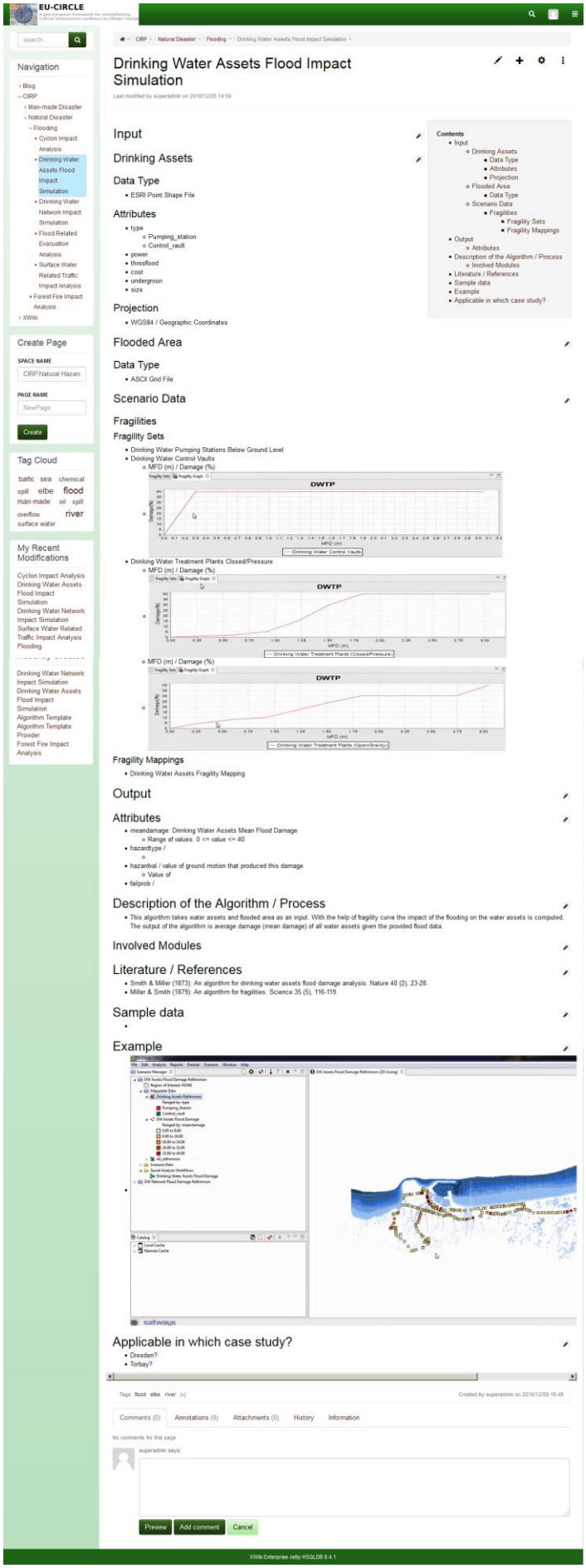

Figure 9: Full example of an analysis description, the case of drinking water assets flood impact simulation.

3.3 Update of the Wiki

All partners are invited to contribute continuously to the Wiki throughout the remainder of the project. This particularly includes the input provided by the five Case Studies.

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