



NextGen Water in the CE re-design toolbox initial version

Technical References

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¹ PU = Public

PP = Restricted to other programme participants (including the Commission Services)

RE = Restricted to a group specified by the consortium (including the Commission Services)

CO = Confidential, only for members of the consortium (including the Commission Services)

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Summary

Executive summary

Task 2.4 attempts to develop a freeware Toolbox that will collect, improve and demonstrate all instruments and methods developed within the scope of the NextGen project. Towards this direction, the NextGen Toolbox will support decision-making through presentation of the appropriate tools for individual solution assessment and system-wide evaluation and stress testing. It will also comprise information on e.g. outputs of the models, databases, KPIs relationships based on user experience, etc. The toolbox will be developed in close cooperation with user groups from the NextGen Communities of Practices (CoPs).

Tool functionality and required level of detail was defined in a stakeholder workshop (M1), that was conducted on the 21st of February 2019, in Athens.

The purpose of the toolbox will be to interact with the user to get user profile and also to get case specific information from the user. It will choose which info, tools and recommendations or questions are adapted to the user profile. It will link and contextualize information from tools and information from users and present user centred info, tools, recommendations and questions. The functionalities of toolbox as it is described in the task2.4 were extended, thus the name of the tool is extended to “NextGen Interactive Interface”. A new functionality is the enabling of access to the NextGen Technology Evidence Base.

The NextGen Interactive Interface will be web based and will guide the user based on input data in the following categories:

- (a) Components of the physical system.
- (b) Flows of water, energy and materials.
- (c) Actors involved, including water utilities, industries, technology providers, end-users, and
- (d) Roles of the actors and their interactions.

It will have a web based interactive interface and will guide the user based on input data in the following categories:

- (a) Components of the physical system.
- (b) Flows of water, energy and materials.
- (c) Actors involved, including water utilities, industries, technology providers, end-users, and
- (d) Roles of the actors and their interactions.

The intelligence of the Interactive Interface will rely on a light-weight recommender system that will match the user profiles with their presumed preferences and interests.

Keywords: Recommender Tool, web-based application, water CE stakeholders, Technologies

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List of Abbreviations

CA: Consortium Agreement

CO: Confidential

CoPs: Communities of Practice

DoA: Description of Activities, referring to the Annex I of the Grant Agreement

EC: European Commission

GA: Grant Agreement

ICT: Information and Communication Technology

IPR: Intellectual Property Rights

KPI: Key Performance Indicators

PPR: Project Progress Reports

PSB: Project Steering Board

PU: Public

QA: Quality Assurance

QC: Quality Control

STC: Scientific and Technical Committee

TEB: Technology Evidence Base

WP: Work Package



1. Introduction

1.1 Purpose of this document

The deliverable constitutes a technical report describing the implementation aspects and functionalities of the 1st version of “NextGen Interactive Interface” developed software, as a web application. It covers the toolbox as it is described in the task2.4 with extended functionalities, thus the name of the tool is extended to “NextGen Interactive Interface”.

1.2 Intended readership

The deliverable is a public deliverable which is primarily intended for Consortium partners as well as other stakeholders that are interested in the field of ICT tools around Water Circular Economy.

1.3 Relationship with other NextGen tasks/WPs

The starting point of this deliverable is the task “Task 2.4 NextGen Toolkit development”. However, during the work of this task, it was identified the very close relationship with the WP1 and more specifically the Technology Evidence base that is developed. Furthermore, there is a work done in order to align this tool with the Marketplace described in WP5. At this moment it is under discussions whether all the functionalities of the Marketplace will be integrated under the umbrella of the “NextGen Interactive Interface” or only a subset of them. This will be fully covered in the final version of the tool, which will be described in the D2.5.

1.4 Document’s structure

Being a technical report, the document is organized in four main chapters. Chapter 2 provides an overview of the scope and objectives of “NextGen Interactive Interface”, describing also, the architecture and implementation aspects as well as the wireframe of the 1st version of the application. Chapter 3 complements the abovementioned analysis with the conclusions of the CoP meeting that took place to collect the requirements of the Tool. Finally, in chapter 4 is given an overview of the created conceptual model that links the “NextGen Interactive Interface” with the Technology Evidence Base (TEB), followed by the conclusions in Chapter 5.

2. Interactive Interface

2.1 Scope

“NextGen Interactive Interface” is a web-based application, targeted to all the stakeholders interested in Water Circular Economy. Through this, the relevant stakeholders will be able to retrieve information among others, around the NextGen technologies. This is achieved through a user-friendly web interface, enabling the users to retrieve the most relevant content related to their profile and specific search. The tool is responsible for guiding the choice and initial design of solutions or potentially used as an information retrieval tool for any other objective.

To better align with rest of the NextGen components, as well as to achieve a better understanding of the scope of the tool by its users, a more user-friendly name was adopted, and thus it was renamed to “NextGen Interactive Interface”. The positioning of the next tool is better illustrated in the Figure1.

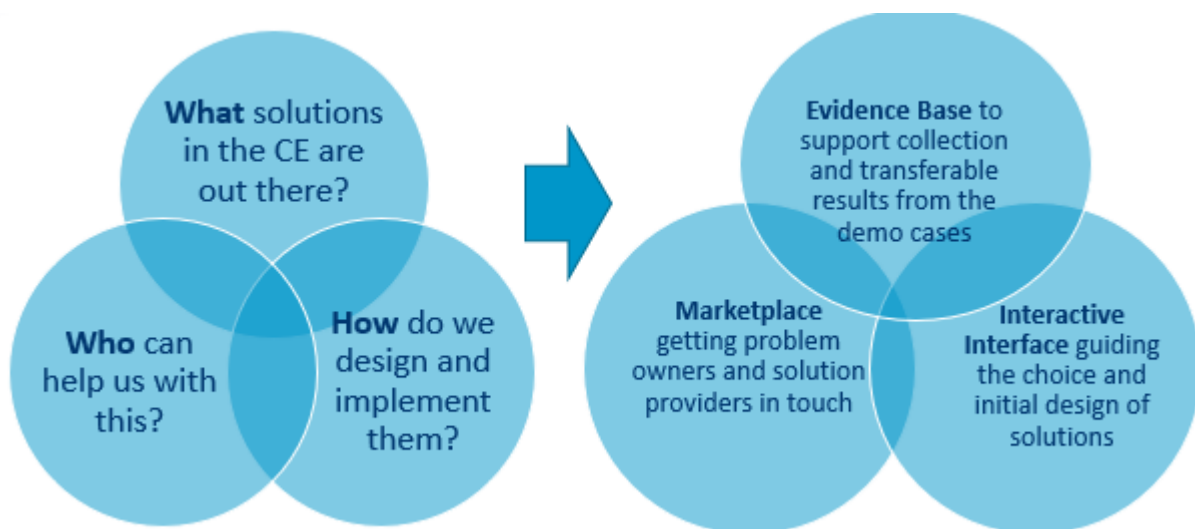


Figure 1 Three building blocks seamlessly embedded into a common online platform

2.2 Next Gen Interactive Interface Architecture

The “NextGen Interactive Interface” architecture has been designed according to the classical Content-based recommendation systems¹, i.e., systems that recommend an item to a user based upon a description of the item and a profile of the user’s interests. The basic components of such a system are:

- describing what is to be recommended
- a means for creating a profile of the user
- and a means of comparing the user with the content

¹ (2017) Content-Based Filtering. In: Sammut C., Webb G.I. (eds) Encyclopedia of Machine Learning and Data Mining. Springer, Boston, MA

The profile is often created and updated automatically in response to feedback of the users. Machine learning techniques can be used to update the profile of the users. Content Based Recommender System is based on user profiles and a content that could comprise of various information. The system can be created with a keyword-based logic of the user profiles.

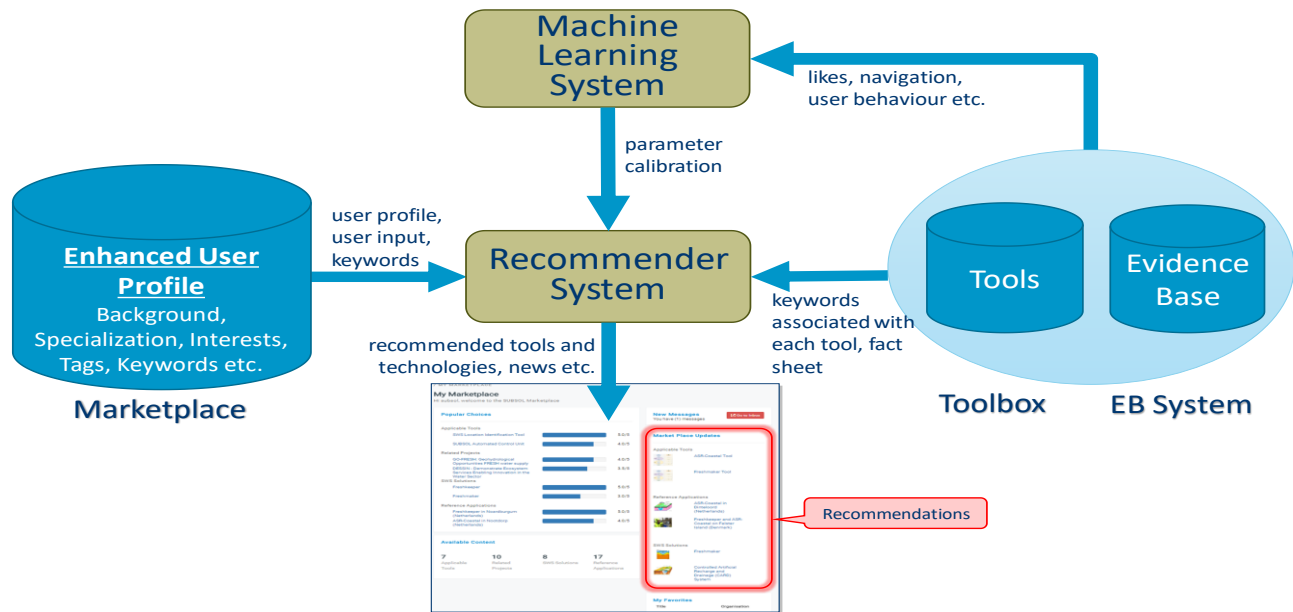


Figure 2The NextGen Interactive Interface Architecture

The content is retrieved from the NextGen Evidence Base which is developed as part of the WP1 .

2.3 Wireframe of the Interactive Interface

The “NextGen Interactive Interface” will provide a user-friendly web interface, with a series of functionalities supporting them in the decision-making process. As first step of the development the wireframe of the tool is prepared. This demonstrates the various pages of the tool and corresponds to the alpha version of the “TO BE” developed application.

Before seeing all the pages of the wireframe, the overview in a user journey format is presented.

Nextgen Interactive Interface User Journey. A user journey help reader to understand the basic navigation of the web app. At this stage it is important to understand the basic navigation of the tool for further improvement.

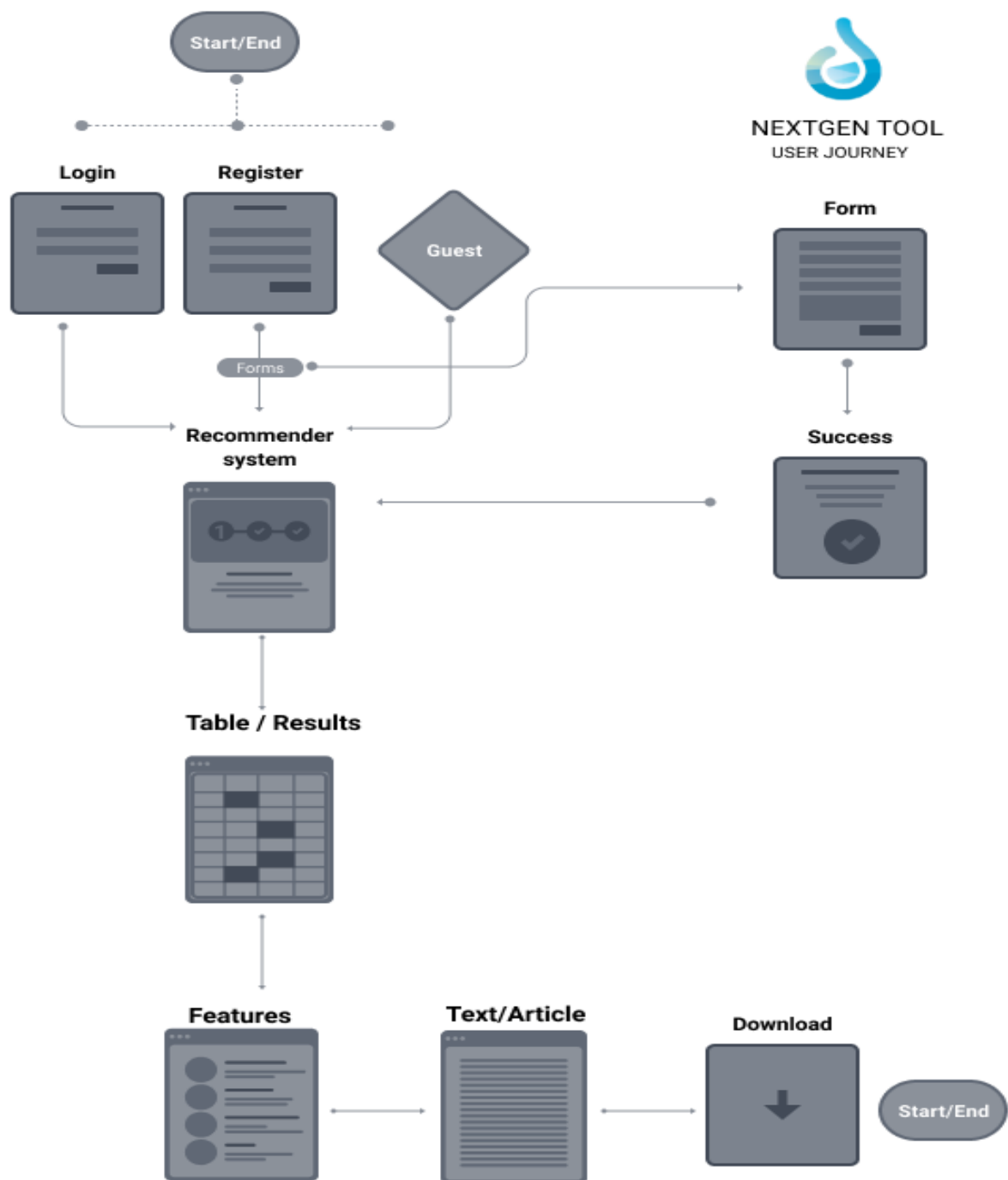


Figure 3 Nextgen Interactive Interface User Journey

The first or welcome page of the NextGen web app (Figure 4) is common for every user. Each user needs to click on the logo to continue to the Registration page (Figure 5).



Figure 4 NextGen Interactive Interface Welcome Page

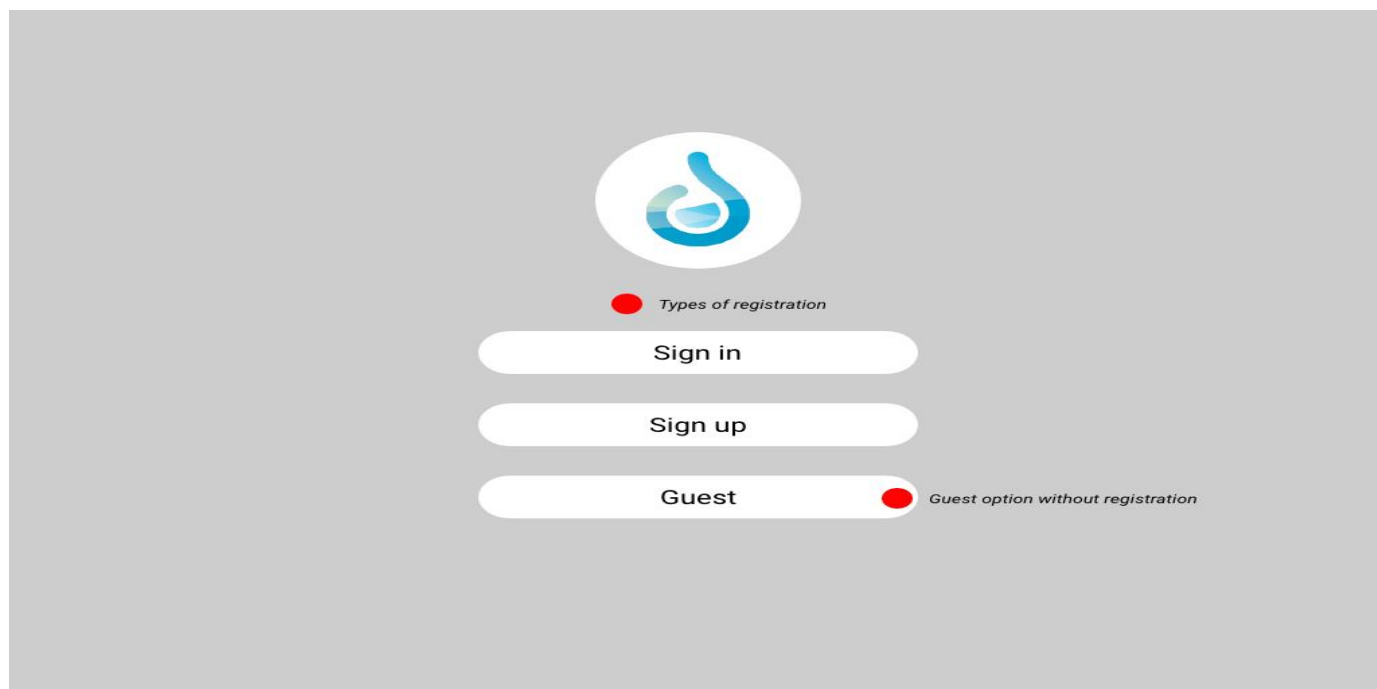


Figure 5 Registration page

In the registration page (Figure 5) there are three options for the users. The Sign in for already registered users which requires only the e-mail and password to log in. The Sign up for new users which requires to complete the registration forms to proceed and the Guest option without registration. Guest users are forwarded directly to the tool to start searching or matching solutions (Recommender system).

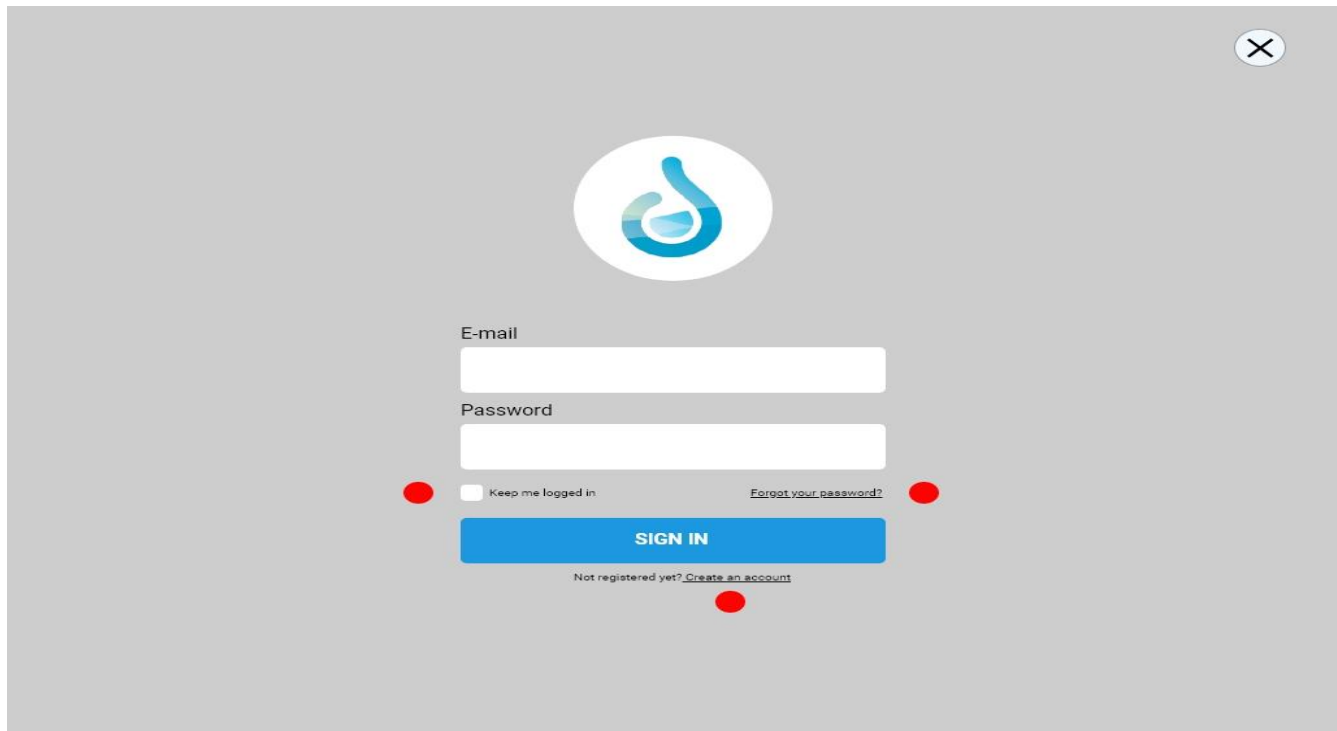
A screenshot of a web application's sign-in page. The background is a solid light gray. In the top right corner, there is a small circular button with a black 'X' icon. Centered at the top is a logo consisting of a white circle containing a stylized blue and green 'S' shape. Below the logo, the form consists of two white rectangular input fields. The first field is labeled 'E-mail' in a small, dark gray font above it. The second field is labeled 'Password' in a small, dark gray font above it. Below the password field, there is a checkbox with a small white square icon to its left, followed by the text 'Keep me logged in' in a small, dark gray font. To the right of the checkbox is a link that says 'Forgot your password?' in a small, dark gray font. Below these elements is a solid blue rectangular button with the text 'SIGN IN' in white, uppercase letters. At the bottom of the form area, there is a link that says 'Not registered yet? Create an account' in a small, dark gray font. Three red circular markers are placed on the page: one to the left of the 'Keep me logged in' checkbox, one to the right of the 'Forgot your password?' link, and one centered below the 'Create an account' link.

Figure 6 Sign in page

The sign in page is presented in (Figure 6). Users fill the chosen e-mail and password. There are also the options to “Keep me logged in”, “Forgot your password” and to “Create an account”.

The registration form is titled "Registration" in a reddish-brown font. It includes a close button (X) in the top right corner. The form fields are: "E-mail" (a single-line text input), "Password" (a single-line text input), "Confirm password" (a single-line text input), "Company name" (a single-line text input), and "Interests (Optional)" (two small text input fields). Below the fields is a blue button labeled "CONTINUE".

Figure 7 Sign Up page (1/2)

Sign up form, one of two is presented in (Figure 7). There is a soft registration form for new users which requires an active e-mail, password, verify password and optionally the name of the company of the user or to type (keywords) interests related to the Next Gen app. At the next step (Figure 8), user can select a job role and one of the basic suggested interests (Technology, Legal & Regulatory Information) to complete the registration in order to use the tool.

The second registration page is titled "Job role (select one)" in a reddish-brown font. It includes a "Back" button in the top left corner. The job role selection is presented as a grid of seven buttons: "Public administration", "Water company", "Private entity", "Universities/ Institutes", "Non-Governmental Organizations (NGO)", "Water user", "Technology provider", and "Other". Below this is the "Are you interested" section, which has three buttons: "Technology", "Legal & Regulatory Information", and "Business opportunities". At the bottom, there are two checkboxes: "Check this to turn on GDPR related features and enhancements. [Read our GDPR documentation to learn more.](#)" and "I agree to receive information and news about NextGen, eg. updates, news.". A blue "DONE" button is at the bottom center, with a progress bar below it showing 2/2 steps.

Figure 8 Registration page (2/2)

The job role and the interest section can also change from the user after registration to show different results.

Public administrator

Water company

Private entity

Universities/Institutes

Non-Governmental Organizations (NGO)

Water user

Technology provider

Other

Are you interested in:

Technology

Legal & Regulatory Information

Business opportunities

Select element

Water

Energy

Material

Choose a part of the water plant (click on image)

Water (selected)

Energy

Material

Select a keyword

Water

Energy

Material

Other

Water reclamation

Water reuse

Water recycle

+ Add keyword

Two-stage digestion

Water storage

Water temperature

+ Add keyword

Stuvite

Ammonia stripping

Membrane filtration

+ Add keyword

+ Add keyword

SHOW

Figure 9 NextGen Recommender tool

The tool (Recommender system) page for guest users starts for the Job role and includes two more options to choose or to complete than the registered users starting point (Figure 10). After five mandatory steps for guests/ three for logged users you can have the results.

NextGen

Select element

Water

Energy

Material

Choose a part of the water plant (click on image)

Water (selected)

Energy

Material

Select a keyword

Water

Energy

Material

Other

Water reclamation

Water reuse

Water recycle

+ Add keyword

Two-stage digestion

Water storage

Water temperature

+ Add keyword

Stuvite

Ammonia stripping

Membrane filtration

+ Add keyword

+ Add keyword

SHOW

Figure 10 Tool for logged users

The last three and most important steps are common to all the users. They can choose one of the three elements, then a part of the water plant at the graph- map and at the last step they can also type a new keyword to enrich the data base or improve the results.

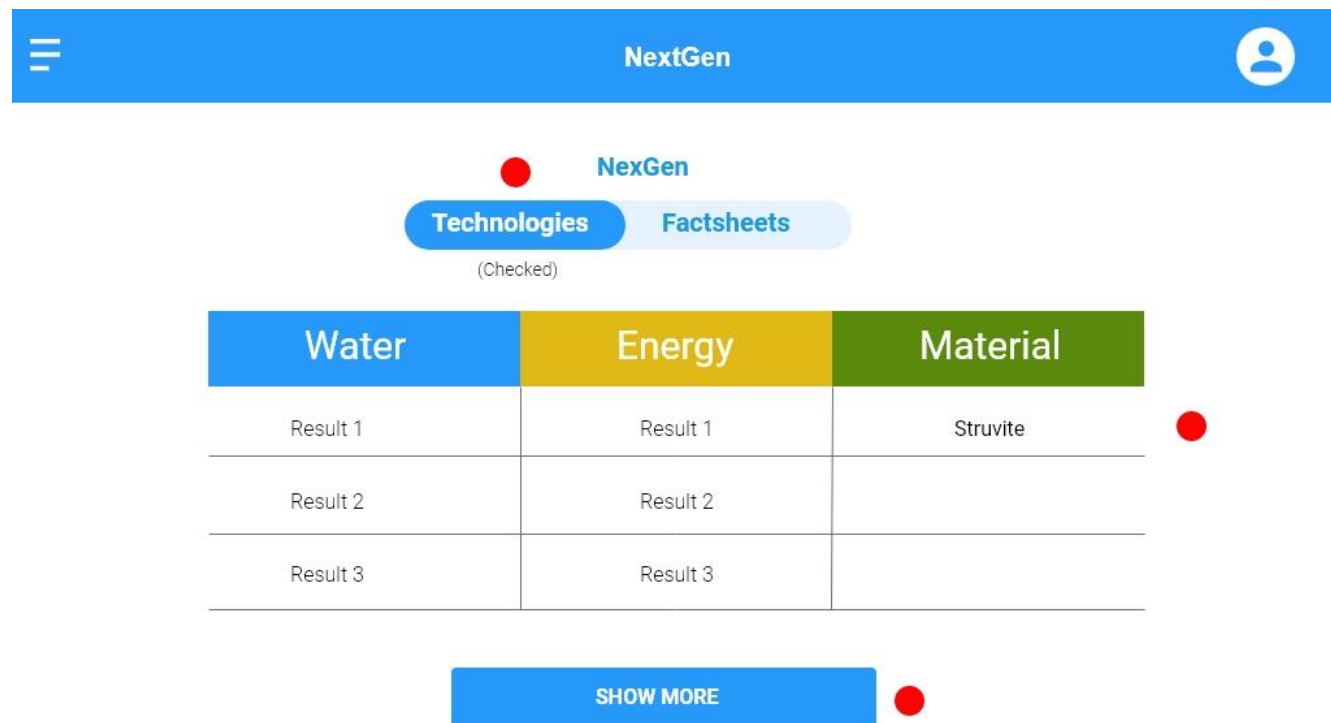


Figure 11 Results page 1

The results page. Users can select to show Technologies or Factsheets results. For each element below (Water, Energy, Material) the results are ordered from the most to the least relevant one (Figure 11).

The default view shows 3 results and by clicking the “Show more” users can see the full list if it’s possible.

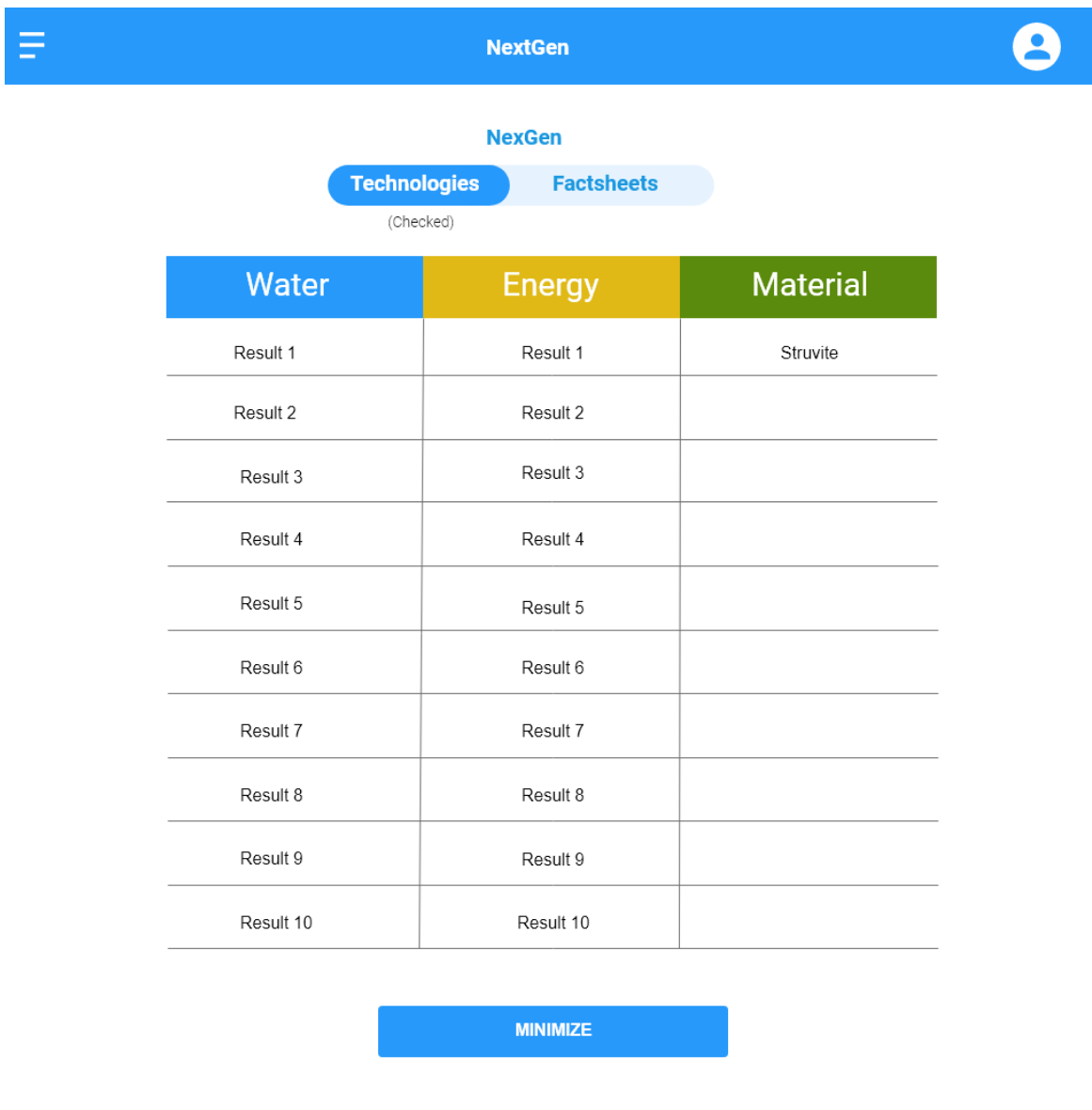


Figure 12 Results page 2


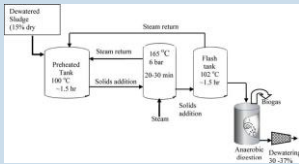


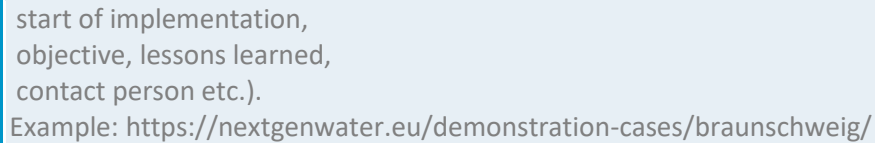
Figure 13 Overview page

By selecting the finding(s) in the results table, user forward to the Overview page (Figure 13) which includes Basic Information, Benefits, Requirements and examples such as Next Gen case studies.

2.4 Technology Evidence Base

All the information about the NextGen technologies, use cases, and business opportunities will be stored in the Technology Evidence Base. This is a database which will serve as the pool of data for the “NextGen Interactive Interface”. The exact content of the evidence base is currently under definition as part of the work in WP1; however, an initial content is agreed in order to base the development of the first version of the “NextGen Interactive Interface”.

CATEGORY	INFORMATION (i.e. example)
Name of Technology/Tool	Thermal hydrolysis
Background	<p>Thermal hydrolysis is a two-stage process combining high-pressure boiling of waste or sludge followed by a rapid decompression etc.</p> 
Flow chart	<p>This is just another illustration having a special meaning (flow chart)</p> 
Informative tags	<p>Sludge treatment; Energy recovery; biogas yield; sludge dewatering; return load. <i>The strength of relationship will also be provided, 0-100 strength</i></p>
KPIs and technical parameters	<p>Electricity demand: 3 kWh/t sludge Heat demand: 180 kg steam/t TS Increase in N return load: +50% <i><Name of the KPI>: <Mean/Typical value (one real number) or value range (two real numbers)> <Unit (optional)>, <Additional comments (optional)></i></p>
Requirements for favourable operation	Excess heat should be available on-site etc...
Legal and regulatory requirements	<p>https://www.cambi.com/what-we-do/thermal-hydrolysis/ Enhanced safety requirements for operators are needed for managing steam production unit. https://www.cambi.com/what-we-do/services/optimisation/</p>
Business opportunities	A list of business opportunities.
Case studies	URL, description,



start of implementation,
objective, lessons learned,
contact person etc.).
Example: <https://nextgenwater.eu/demonstration-cases/braunschweig/>

Figure 14 Content categories of the TEB

Whereas some more categories are currently under discussion:

- *Taxonomy of the Technologies*
- *Legislation*
- *Publications*
- *Scales*
- *Application period*
- *Cost*
- *Related Tools*

2.5 Weights and Matchmaking

The matchmaking logic of the tool will be based on a content-based matching using keywords. The matching is done, based on the User Profile and Item Profile that is found in the TEB.

At first the user profile is created based on the profile of signed in users and the selections that are made during the search. Each keyword can represent a topic of interest, or keywords can be grouped in categories to reflect a more standard representation of user's interests². An example of a keyword-based user profile is shown below in Figure 15. More specifically, the keywords are predefined in the system, and their association is updated during the profile creation and the selections of the user. The user has the possibility to enter keywords also manually at the search page. There will be potentially used also techniques of semantic data association³, based on a taxonomy that will be created for each of the technologies, this feature is optional. This can be done either with the matching of the keywords or by using machine learning techniques for further improvement of the matching logic.

² Gauch, Susan & Speretta, Mirco & Chandramouli, Aravind & Micarelli, Alessandro. (2007). User Profiles for Personalized Information Access. 4321. 54-89. 10.1007/978-3-540-72079-9_2.

³ Ruiz-Montiel M., Aldana-Montes J.F. (2009) Semantically Enhanced Recommender Systems. In: Meersman R., Herrero P., Dillon T. (eds) On the Move to Meaningful Internet Systems: OTM 2009 Workshops. OTM 2009. Lecture Notes in Computer Science, vol 5872. Springer, Berlin, Heidelberg

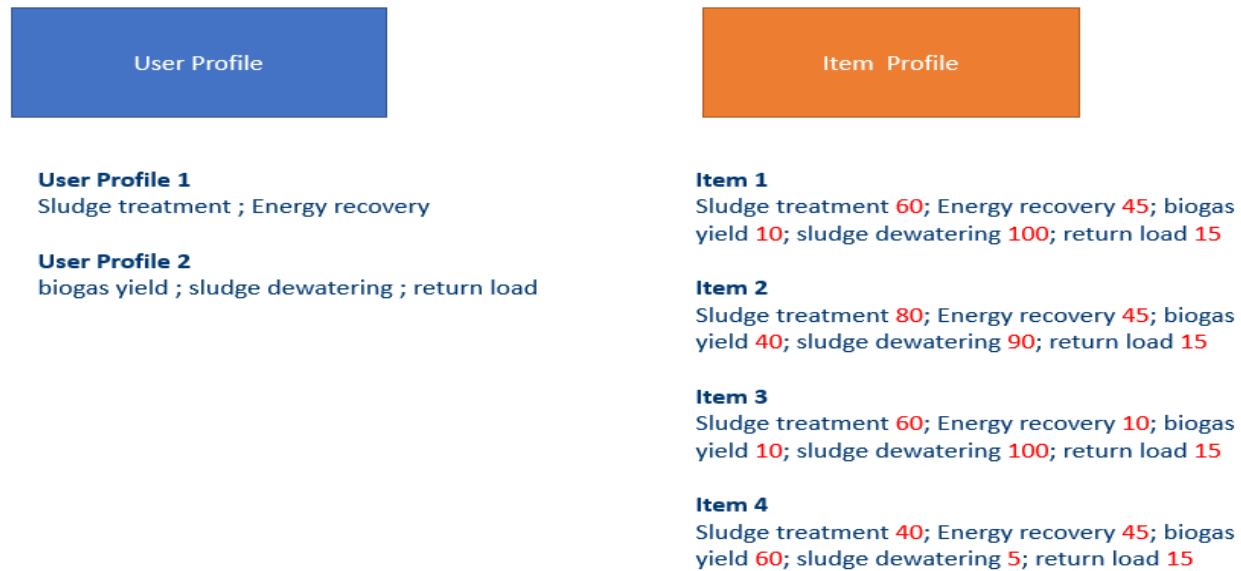


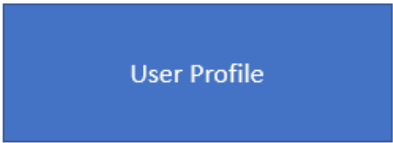
Figure 15 User and Item Profiles

In our case, the initial set up of the keyword's strength in the TEB (Item Profile) will be done by the NextGen experts rather than the rating of users⁴ or other techniques that are used for web applications. This will help to better initial set up of the system and ensure the results have the categorization given to them by the experts of the field.

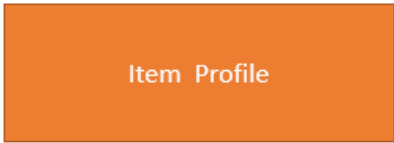
The total strengths between the User Profile and the Item Profile are compared, in order to present the most relevant results in the format of a list, as shown in the wireframe.

Example 1: The User profile is searching; the results are returned in the corresponding order as shown in Figure 16

⁴ Pazzani, M., Billsus, D.: Content-based recommendation systems. In Brusilovsky, P., Kobsa, A., Nejdl, W. (eds.): The Adaptive Web: Methods and Strategies of Web Personalization, Lecture Notes in Computer Science, Vol. 4321. Springer-Verlag, Berlin Heidelberg New York (2007) this volume



User Profile 1
Sludge treatment ; Energy recovery



Item 2
Sludge treatment 80; Energy recovery 45; biogas yield 40; sludge dewatering 90; return load 15
Total relevance:125

Item 1
Sludge treatment 60; Energy recovery 45; biogas yield 10; sludge dewatering 100; return load 15
Total relevance:105

Item 4
Sludge treatment 40; Energy recovery 45; biogas yield 60; sludge dewatering 5; return load 15
Total relevance:85

Item 3
Sludge treatment 60; Energy recovery 10; biogas yield 10; sludge dewatering 100; return load 15
Total relevance:70

Figure 16 Example of User Profile, Item Profile Matching

3. CoP for the toolbox

According to the DoA, the toolbox is developed in close cooperation with user groups for the NextGen CoPs. For this purpose, a particular session for presenting the scope and overview of the Interactive Interface was conducted within the local CoP for the Athens demo case in the 21st of February 2019, in the Urban Tree Nursery of the Municipality of Athens in Goudi Park, Athens, Attica, Greece.

This CoP was organized by the NTUA and the ICCS, and the language that was used was Greek to attract the stakeholders and be more efficient with the feedback and comments that they would provide.

The objectives of this CoP meeting in Athens were:

- 1.) To inform key stakeholders on the necessity of circular water interventions and the goals of NextGen as a whole, as well as the pilot of Athens as a demo case in it.
- 2.) To inform and engage stakeholders in specific tasks of NextGen related to the pilot of Athens and the participation of end users in it, such as the Interactive Interface (T2.4) and a potential Serious Gaming/Augmented Reality application (T3.2).
- 3.) To inform key stakeholders on the technological aspects of the pilot and the needs of the end user.
- 4.) To engage the participants on integrated circular water frameworks, in order for them to be able to: (a.) identify their role in the circular water value chain, (b.) reflect on their part in the general picture of integrated circular water management, (c.) identify, in collaboration with other stakeholders, limiting factors for the applications of said frameworks.
- 5.) To promote the idea of circular water interventions as part of a broader water-aware policy to key authorities and legislation bodies to ensure efficient and long-term solutions for all users.

The table below shows the number of participants, the respective sector of activity and the level of governance each stakeholder is active in.

Table: Overview of stakeholders

	In total	Male	Female
Water industry	4	3	1
Authorities	6	2	4
Engineering companies	3	2	1
Representatives of other sectors			
Research institute	9	7	2
End-users	2	2	
Total	24	16	8

A number of selected stakeholders that represented the municipality, public policy-makers, Athens water company, research institutes, relevant technology providers and end users, shared their perspective, views and ideas on circular water and how Interactive Interface could comprise a decision-making toolbox for individual solution assessment and system-wide evaluation and stress testing.

Through these sessions, stakeholders had the chance to discuss the circular technologies along with potential boundaries, reflect on their role in the larger circular picture, but also were able to understand the perspective and requirements of stakeholders that have a different function in the urban water cycle. In particular, they discussed their role and activities in CE solutions, provided their insight on possible upscaling of pilots, mentioned their intention of integrating such technological solutions in the measures of the RBMPs as well as of suggesting potential necessary framework modifications, etc.

The first part of the CoP meeting, aimed at equipping the participants with the information they need in order to obtain insight and form an opinion about the scope and objectives of the NextGen Interactive Interface. The rest of the workshop is then organized as sessions of interactive discussion.

Finally, the need of having open and reliable data with regard to the CE technologies and tools (even though a lot of progress have been made on this field) was explicitly expressed. There is an attempt to develop a platform to harmonize the data needs and to create a uniform collection system also represented spatially.

With regard to the Interactive Interface, the main outcome was that in its preliminary form, it seemed quite straightforward and useful. The comments focused more on the possibility of having it translated in the national languages of the pilots, in order to motivate users and address to all the stakeholders, e.g. public administration.

4. Technology Evidence Base conceptual model

The Interactive Interface comprises three elements: the Technology Evidence Base (TEB), the NextGen Interactive Interface and the Marketplace. In Figure 17 the TEB conceptual model is illustrated below.

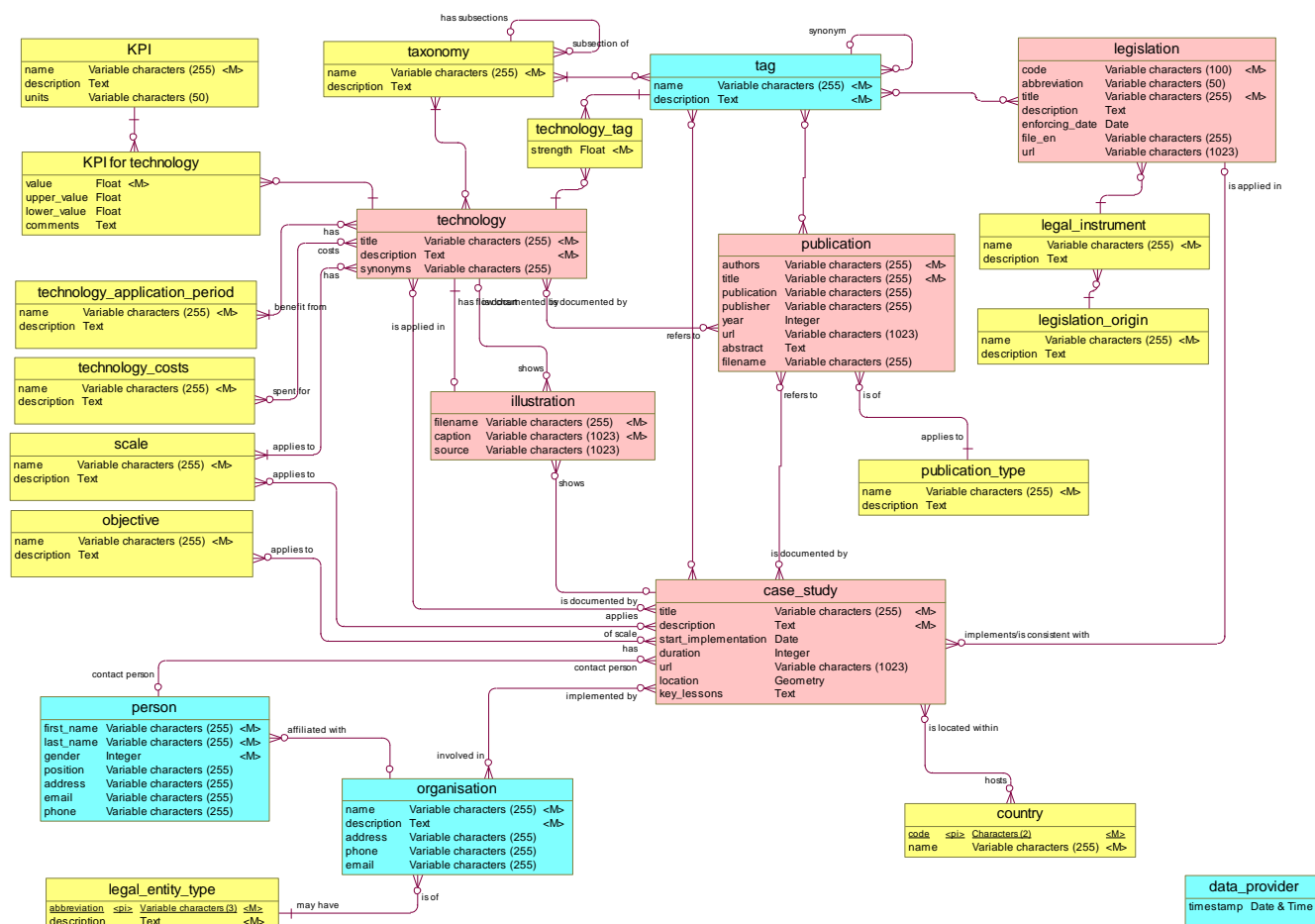


Figure 17 The TEB conceptual model

The details of the NextGen data model are presented in annex I.

5. Conclusions

NextGen Interactive Interface is fully designed according to the DoA and the CoP that took place in Athens. At this step the tool is not functional, but the Wireframe is ready as well as all the expected functionalities. The goal of this web application implementation is to create a lightweight, user friendly and reliable recommender system. It is still a work on progress, aiming to find the exact position among the whole NextGen applications and then initiate the development.

For the future releases of the tool further implementations and improvements are foreseen. This includes the implementation of functionalities as described in the document. Further changes might be implemented depending on the feedback received from the end users.

NextGen Interactive Interface is also expected to have changes regarding the UI/UX. These changes must be decided after an evaluation of the tool by the consortium and other interested parties. This evaluation, will take place in the coming months in collaboration with the NextGen consortium and will be aligned with the foreseen demonstrations and uptake of the application. During the evaluation, users will be able to test live the tool's functionalities simultaneously with the interfaces used for them and provide their feedback. This will lead to further enhancement and improvement of the tool based on their experience and needs.

Annex: NextGen Conceptual Data Model

I List of entities

Name	Comment
case_study	Case studies of applied technologies
country	Optional selection of countries within which the case study is located. More than one country can be selected for transboundary case studies. If one or more countries are selected, then the location of the case study must lie within one of the selected countries. In case of no country selection, the related country will be determined from the given location.
data_provider	User who has provided and/or has last updated a related piece of information.
illustration	Image or schematic representation of a technology or a case study configuration. All known formats up to a certain size which are supported by web browsers are accepted (e.g. jpeg, png)
KPI	KPI to be used in the project
KPI for technology	Describes the performance of the related technology for the related KPI. At least one value is mandatory giving the typical or mean value. Additionally, a range can be provided specifying the upper and lower limits for the technology.
legal_entity_type	Legal entity types, such as GOV: Government Organisation NGO: Non Governmental Organisation NPO: Non Profit Organisation RTO: Research and Technology Organisation SME: Small and Medium Enterprise (up to 250 employees) COM: Enterprise and Large Enterprise (from 250 employees)
legal_instrument	Categories of legal instruments such as Directive, Regulation, National law etc.
legislation	Legislations and regulations which are relevant for NextGen objectives
legislation_origin	The origin of the related legal instrument in terms of international legislation, EU legislation, national legislation and regional legislation
objective	One or several predefined objectives related with case studies.
organisation	A legal entity (authority, company, organisation etc.) that either is involved in projects applying technologies in specific case studies or owns specific tools relevant for the circular economy.
person	Person related to a case study or an organization. Usually the contact person for the aforementioned entities.
publication	Issued publications that refer to a technology, its application in a case study or a tool.
publication_type	Types of publications, such as Journal, Book, Project Report, Scientific Article, Grey Literature, Website, Guideline, Learning material, Tutorial, Guide.
scale	Typical operational scales of technologies or operational scale of a case study
tag	Any user-defined index term that captures knowledge about an entity such as technology, case study, publication and legislation. It can be used to search information related to a certain keyword or to relate two different entities with each other through a tag. Tags may have synonyms.

taxonomy	A taxonomy of the circular economy on water systems and services, starting from the three main sectors: Water, Energy and Material. The taxonomy has a hierarchical structure in terms of sector-subsector.
technology	Technologies capable to support the circular economy
technology_application_period	The approximate time period needed from the start of a project applying the related technology until the technology goes into operation. Possible options may be: a) short term, b) medium term and c) long term
technology_costs	Approximate costs for the purchase, installation application and maintenance of the related technology that would affect a region. Possible options may be: a) low cost, b) medium cost and c) high cost
technology_tag	Intermediate entity that gives the strength of the relationship between the related technology and tag

II Entity details

II.1 Case Study

II.1.1 Description

Case studies of applied technologies

II.1.2 Attributes

Name	Comment	Data Type	Mandatory
title	Title of the entity	Variable characters (255)	X
description		Text	X
start_implementation	Begin date of the application (case study) implementation	Date	
duration	Days required for the installation and commissioning of the tool(s) and/or measure(s).	Integer	
url	URL providing further information about this entity	Variable characters (1023)	
location	Geometry of the location (area or single point giving the approximate location of the case study). OGC WKB/WKT format is to be used.	Geometry	
key_lessons	Brief textual description of the key lessons learned from the case study	Text	

II.1.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardin ality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardin ality	Entity 1 -> Entity 2 Role Mand atory	Entity 2 -> Entity 1 Role Mand atory
technology	case_study	is applied in	0,n	applies	0,n		
case_study	publication	is documented by	0,n	refers to	0,n		
legislation	case_study	is applied in	0,n	implements/is consistent with	0,1		
illustration	case_study	shows	0,1	is documented by	0,n		
organisatio n	case_study	involved in	0,n	implemented by	0,n		
case_study	country	is located within	0,n	hosts	0,n		
person	case_study	contact person	0,n	contact person	0,1		
tag	case_study		0,n		0,n		
scale	case_study	applies to	0,n	of scale	0,n		
objective	case_study	applies to	0,n	has	0,n		

II.2 Country

II.2.1 Description

Optional selection of countries within which the case study is located. More than one country can be selected for transboundary case studies. If one or more countries are selected, then the location of the case study must lie within one of the selected countries. In case of no country selection, the related country will be determined from the given location.

II.2.2 Attributes

Name	Comment	Data Type	Mandatory
code	ISO 3166 two letter country code	Characters (2)	X
name		Variable characters (255)	X

II.2.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory
case_study	country	is located within	0,n	hosts	0,n		

II.3 data_provider

II.3.1 Description

User who has provided and/or has last updated a related piece of information.

II.3.2 Attributes

Name	Comment	Data Type	Mandatory
timestamp	Date in which this record has been updated. This is read-only information and will be automatically set by the DB.	Date & Time	

II.4 Illustration

II.4.1 Description

Image or schematic representation of a technology or a case study configuration. All known formats up to a certain size which are supported by web browsers are accepted (e.g. jpeg, png)

II.4.2 Attributes

Name	Comment	Data Type	Mandatory
filename	Filename of the illustration. Valid file formats are all formats supported by web browsers, such as png, jpeg, gif etc.	Variable characters (255)	X
caption	Caption of the illustration of the measure	Variable characters (1023)	X
source	Reference of the image source	Variable characters (1023)	

II.4.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardin ality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardin ality	Entity 1 -> Entity 2 Role Mand atory	Entity 2 -> Entity 1 Role Mand atory
illustration	technology	shows	0,1	is documented by	0,n		
illustration	case_study	shows	0,1	is documented by	0,n		
illustration	technology		1,1	has flow chart	0,1	X	

II.5 kpi

II.5.1 Attributes

Name	Comment	Data Type	Mandatory
name		Variable characters (255)	X
description		Text	
units		Variable characters (50)	

II.5.2 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardin ality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardin ality	Entity 1 -> Entity 2 Role Mand atory	Entity 2 -> Entity 1 Role Mand atory
KPI	KPI for technology		0,n		1,1		X

II.6 KPI for technology

II.6.1 Attributes

Name	Comment	Data Type	Mandatory
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value		Float	X
upper_value		Float	
lower_value		Float	
comments		Text	

II.6.2 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory
KPI	KPI for technology		0,n		1,1		X
technology	KPI for technology		0,n		1,1		X

II.7 Legal Entity Type

II.7.1 Description

Legal entity types, such as GOV: Government Organisation NGO: Non Governmental Organisation NPO: Non Profit Organisation RTO: Research and Technology Organisation SME: Small and Medium Enterprise (up to 250 employees) COM: Enterprise and Large Enterprise (from 250 employees)

II.7.2 Attributes

Name	Comment	Data Type	Mandatory
abbreviation		Variable characters (3)	X
description		Text	X

II.7.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory
legal_entity_type	organisation	may have	0,n	is of	1,1		X

II.8 Legal Instrument

II.8.1 Description

Several legal instruments are defined by the EU such as the following

Community pillars

- Regulations
- Directives
- Decisions
- Conventions
- Recommendations
- Opinions

CFSP

- Principles and general guidelines
- Common strategies
- Joint actions
- Common positions
- Decisions
- Recommendations
- Opinions

Police/judicial cooperation

- Common positions
- Framework decisions
- Decisions
- Conventions
- Recommendations
- Opinions

See also: <https://web.archive.org/web/20100612213147/http://w4mp.org/html/library/standardnotes/snua-03689.pdf>

II.8.2 Attributes

Name	Comment	Data Type	Mandatory
name		Variable characters (255)	X
description		Text	

II.8.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 ->	Entity 2 -> Entity 1 Role	Entity 2 ->	Entity 1 ->	Entity 2 ->
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			Entity 2 Role Cardin ality		Entity 1 Role Cardin ality	Entity 2 Role Mand atory	Entity 1 Role Mand atory
legislation_ origin	legal_instru ment		0,n		1,1		X
legal_instru ment	legislation		0,n		1,1		X

II.9 Legislation or Regulation

II.9.1 Description

Legislations and regulations which are relevant for NextGen objectives

II.9.2 Attributes

Name	Comment	Data Type	Mandatory
code		Variable characters (100)	X
abbreviation		Variable characters (50)	
title	Title of the entity	Variable characters (255)	X
description		Text	
enforcing_date	Date on which the legislation went into power	Date	
file_en		Variable characters (255)	
url	URL providing further information about this entity	Variable characters (1023)	

II.9.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardin ality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardin ality	Entity 1 -> Entity 2 Role Mand atory	Entity 2 -> Entity 1 Role Mand atory
legal_instru ment	legislation		0,n		1,1		X

legislation	case_study	is applied in	0,n	implements/is consistent with	0,1		
tag	legislation		0,n		0,n		

II.10 Legislation Origin

II.10.1 Description

The origin of the related legal instrument in terms of international legislation, EU legislation, national legislation and regional legislation

II.10.2 Attributes

Name	Comment	Data Type	Mandatory
name		Variable characters (255)	X
description		Text	

II.10.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory
legislation_origin	legal_instrument		0,n		1,1		X

II.11 Objective

II.11.1 Description

One or several predefined objectives related with technologies or case studies.

II.11.2 Attributes

Name	Comment	Data Type	Mandatory
name		Variable characters (255)	X
description		Text	

II.11.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory
objective	case_study	applies to	0,n	has	0,n		

II.12 Organization

II.12.1 Description

A legal entity (authority, company, organisation etc.) that either is involved in projects applying technologies in specific case studies or owns specific tools relevant for the circular economy.

II.12.2 Attributes

Name	Comment	Data Type	Mandatory
name		Variable characters (255)	X
description		Text	X
address	Postal address of the contact person of the entity	Variable characters (255)	
phone	Phone of the contact person of the entity	Variable characters (255)	
email	Email of the contact person of the entity	Variable characters (255)	

II.12.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory
organisation	case_study	involved in	0,n	implemented by	0,n		
organisation	person		0,n	affiliated with	0,1		

legal_entity_type	organisation	may have	0,n	is of	1,1		X
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II.13 Person

II.13.1 Description

Person related to a case study or an organization. Usually the contact person for the aforementioned entities.

II.13.2 Attributes

Name	Comment	Data Type	Mandatory
first_name		Variable characters (255)	X
last_name		Variable characters (255)	X
gender		Integer	X
position		Variable characters (255)	
address	Postal address of the contact person of the entity	Variable characters (255)	
email	Email of the contact person of the entity	Variable characters (255)	
phone	Phone of the contact person of the entity	Variable characters (255)	

II.13.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory
person	case_study	contact person	0,n	contact person	0,1		
organisation	person		0,n	affiliated with	0,1		

II.14 Publication

II.14.1 Description

Issued publications that refer to a technology, its application in a case study or a tool.

II.14.2 Attributes

Name	Comment	Data Type	Mandatory
authors	Authors/owner of the publication	Variable characters (255)	X
title	Title of the entity	Variable characters (255)	X
publication		Variable characters (255)	
publisher	Name of the publisher	Variable characters (255)	
year	Year of the publication	Integer	
url	URL providing further information about this entity	Variable characters (1023)	
abstract	Abstract of the publication	Text	
filename	Filename of the illustration. Valid file formats are all formats supported by web browsers, such as png, jpeg, gif etc.	Variable characters (255)	

II.14.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory
case_study	publication	is documented by	0,n	refers to	0,n		
technology	publication	is documented by	0,n	refers to	0,n		
publication_type	publication	applies to	0,n	is of	1,1		X
tag	publication		0,n		0,n		

II.15 Publication Type

II.15.1 Description

Types of publications, such as Journal, Book, Project Report, Scientific Article, Grey Literature, Website, Guideline, Tutorial, Guide.

II.15.2 Attributes

Name	Comment	Data Type	Mandatory
name		Variable characters (255)	X
description		Text	

II.15.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory
publication_type	publication	applies to	0,n	is of	1,1		X

II.16 Scale

II.16.1 Description

Typical operational scales of technologies or operational scale of a case study

II.16.2 Attributes

Name	Comment	Data Type	Mandatory
name		Variable characters (255)	X
description		Text	

II.16.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory

			2 Role Cardin ality		1 Role Cardin ality	2 Role Mand atory	1 Role Mand atory
scale	technology	applies to	0,n	has	1,n		X
scale	case_study	applies to	0,n	of scale	0,n		

II.17 Tag

II.17.1 Description

Any user-defined index term that captures knowledge about an entity such as technology, case study, publication and legislation.

It can be used to search information related to a certain keyword or to relate two different entities with each other through a tag. Tags may have synonyms.

II.17.2 Attributes

Name	Comment	Data Type	Mandatory
name		Variable characters (255)	X
description		Text	X

II.17.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardin ality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardin ality	Entity 1 -> Entity 2 Role Mand atory	Entity 2 -> Entity 1 Role Mand atory
taxonomy	tag		0,n		1,n		X
tag	case_study		0,n		0,n		
tag	publication		0,n		0,n		
technology _tag	tag		1,1		0,n	X	
tag	tag	synonym	0,n		0,1		
tag	tag	synonym	0,n		0,1		
tag	legislation		0,n		0,n		

II.18 Taxonomy

II.18.1 Description

A taxonomy of the circular economy on water systems and services, starting from the three main sectors, Water, Energy and Material. The taxonomy has a hierarchical structure in terms of sector-subsector.

II.18.2 Attributes

Name	Comment	Data Type	Mandatory
name		Variable characters (255)	X
description		Text	

II.18.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory
taxonomy	tag		0,n		1,n		X
taxonomy	technology		0,n		1,n		X
taxonomy	taxonomy	has subsections	0,n	subsection of	0,1		
taxonomy	taxonomy	has subsections	0,n	subsection of	0,1		

II.19 Technology

II.19.1 Description

Technologies capable to support the circular economy.

II.19.2 Attributes

Name	Comment	Data Type	Mandatory
title	Title of the entity	Variable characters (255)	X
description		Text	X
synonyms	Comma separated synonyms of the term	Variable characters (255)	

II.19.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory
technology	case_study	is applied in	0,n	applies	0,n		
technology	publication	is documented by	0,n	refers to	0,n		
taxonomy	technology		0,n		1,n		X
illustration	technology	shows	0,1	is documented by	0,n		
scale	technology	applies to	0,n	has	1,n		X
technology_application_period	technology	benefit from	0,n	has	1,n		X
technology_costs	technology	spent for	0,n	costs	0,n		
technology	technology_tag		0,n		1,1		X
illustration	technology		1,1	has flow chart	0,1	X	
technology	KPI for technology		0,n		1,1		X

II.20 Technology Application Period

II.20.1 Description

The approximate time period needed from the start of a project applying the related technology until the technology goes into operation. Possible options may be:

- short term
- medium term
- long term

II.20.2 Attributes

Name	Comment	Data Type	Mandatory
name		Variable characters (255)	X

description		Text	
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II.20.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory
technology_application_period	technology	benefit from	0,n	has	1,n		X

II.21 Technology Costs

II.21.1 Description

Approximate costs for the purchase, installation application and maintenance of the related technology that would affect a region. Possible options may be:

- low cost
- medium cost
- high cost

II.21.2 Attributes

Name	Comment	Data Type	Mandatory
name		Variable characters (255)	X
description		Text	

II.21.3 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardinality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardinality	Entity 1 -> Entity 2 Role Mandatory	Entity 2 -> Entity 1 Role Mandatory
technology_costs	technology	spent for	0,n	costs	0,n		

II.22 technology_tag

II.22.1 Attributes

Name	Comment	Data Type	Mandatory
strength		Float	X

II.22.2 Relationships

Entity 1	Entity 2	Entity 1 -> Entity 2 Role	Entity 1 -> Entity 2 Role Cardin ality	Entity 2 -> Entity 1 Role	Entity 2 -> Entity 1 Role Cardin ality	Entity 1 -> Entity 2 Role Mand atory	Entity 2 -> Entity 1 Role Mand atory
technology_tag	tag		1,1		0,n	X	
technology	technology_tag		0,n		1,1		X

Privacy Policy

NextGen Interactive Interface Privacy Policy

By accepting to use NextGen Interactive Interface you declare that:

I consent to the processing of:

- My email address
- My company name
- My Job Role

so that I can use the NextGen Interactive Interface.

I consent to the maintenance of my personal data until August 31, 2019:

- My email address
 - My company name
 - My Job Role
-

Purpose of data collection

NextGen Interactive Interface is a web-based application, targeted to all the stakeholders around the water Circular Economy.

During your registration to the NextGen Interactive Interface, you will be requested to provide your email, your company name and your job role. This information is needed so as to allow you to use the application and propose better and more relevant results to the search.). The personal data will not be transferred to third parties or external actors or projects.

Types of data collected

If you consent to the processing of your personal data for the above-mentioned purposes, the categories of personal data that will be collected and stored in the NextGen Interactive Interface are:

- My email address
- My company name
- My Job Role

The Consortium will process the personal data of subjects according to the present statement and for the purposes declared herein.

Exercise of your rights

It is noted that according to the General Data Protection Regulation (Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016), you may exercise the following rights that derive from the Regulation:

- Right of access and right to rectification for inaccurate personal data
- Right to erasure of personal data if they are not necessary for service provision
- Right to restrict processing of your data
- Right to object to the processing of your data
- Right to withdraw your consent to processing of your data
- Right to data portability, namely right to receive your data in a structured, commonly used and machine-readable form so that they can be transferred to another data processor.
- Additionally, you have the right to submit a written complaint to the responsible supervisory body for personal data protection in each country.

The General Data Protection Regulation also gives you right to lodge a complaint with a supervisory authority, in particular in the European Union (or European Economic Area) state where you work, normally live or where any alleged infringement of data protection laws occurred.



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