

Deliverable 1.1

**Guidelines for the creation and updating of the digital CI tools  
database**

**Version:** 2.0

**Date:** June 30, 2023

**Authors:** Siri Mariane Holen, Jacqueline Floch, Asbjørn Lein Aalberg, Matthieu Branlat, Mikko Rask, Joel Linqvist, Bok-Yong Shin, Oli Whittington

**Project number:** 100855



## Info Page

Table 1 Version history

<b>Version</b>	<b>Date</b>	<b>Status</b>	<b>Review/comments</b>
1.0	April 6, 2021	First draft presented to all partners	Presented for comments
1.1	April 22, 2021	Reviewed after written comments from all partners	Edited based on comments
1.2	May 7, 2021	Reviewed after feedback in meeting with working groups WP1	Edited based on comments
1.3	August 10, 2021	Structure edited	Edited as deliverable structure
1.4	September 13, 2021	Version sent for review	
1.5	October 12, 2021	Version after review	Edited based on comments from review and discussions with WP1 partners
1.6	October 25, 2021	Accepted by Management Committee in COLDIGIT	
2.0	June 20, 2023	Descriptive factor Process revised to better cover the three streams of co-creation.	

## Summary

This document describes the guidelines for the creation and updating of the digital CI-tools database in the COLDIGIT project.

Central concepts, including Collective Intelligence (CI), Digital CI-tools, Programmes and Cases of implementation have been defined. In addition, the concepts of the three streams of COLDIGIT (i) co-funding and co-innovation, (ii) co-production of knowledge and (iii) co-construction of policies have been further elaborated, based on the input from all project partners.

The main steps of the process for developing the content for the digital tools database are as follows:

- The first step is to **identify** CI-tools

In this step, six sources of information about CI-tools are identified. For two of these sources, participation databases and academic sources, keywords for searches are identified from the partners' descriptions of the three streams. The sources are also divided into first and secondary sources, where secondary sources should be explored after the gap analysis in step four.

- The second step is to **select** CI-tools

The selection of CI-tools is based on the two main objectives of the repository, which are epistemic (research) and pragmatic (serving the knowledge needs of the primary target group of this project, i.e. municipalities, and other COLDIGIT work packages). As for the epistemic objectives, a list of functions and technologies is identified, whereas for the pragmatic objectives, a list of needs and requirements is identified.

- The third step is to **describe the selected CI-tools**

The main categories—*CI-tools*, *Programmes* and *Cases* in the COLDIGIT repository will be characterised according to different descriptive factors which have been identified as relevant. The three groups of descriptive factors are (i) general characteristics, (ii) collective intelligence factors and (iii) evaluative factors. The CI-tools that are identified will be stored in [AirTable](#), which is an online collaborative tool.

- The fourth step is to **close the gaps** in the repository

When about 70 tools are identified, a gap analysis will be performed. The gap analysis aims to identify 80 additional CI-tools so that the repository contains 150 CI-tools. Based on the gap analysis, under-represented CI-tools will be identified, and targeted searches for these types of tools will be done to complete the repository. The main focus of the gap analysis is on the Collective Intelligence descriptive factors.

The repository will also be updated three more times in the project lifetime, in months 26, 32 and 36.

The final presentation of the repository will be further refined in Task 1.2 and Task 1.3 of the COLDIGIT project. During the course of the project, it has become clear that it is beneficial to define the added value of the repository (related to the pragmatic objectives) due to the vast amount of already existing databases with similar objectives. Initial talks with municipalities give some indications as to how the CI-tools could be presented. For example, the tools should not only be described, but examples of real implementations and lessons learned are also useful.

## Table of content

<b>Info Page</b> .....	<b>2</b>
<b>Summary</b> .....	<b>3</b>
<b>1 Introduction</b> .....	<b>6</b>
1.1 Purpose of the document .....	6
1.2 Guide to the reader .....	6
<b>2 Central concepts related to the repository</b> .....	<b>8</b>
2.1 Collective intelligence (CI) .....	8
2.2 Digital CI-tools.....	8
2.3 Programmes and Cases of implementation of CI-tools.....	8
2.4 Three streams of COLDIGIT.....	9
2.4.1 Stream 1 - Co-funding and co-innovation .....	9
2.4.2 Stream 2 - Co-production of knowledge .....	10
2.4.3 Stream 3 - Co-construction of policies and decisions .....	10
<b>3 Identification – Where and how to find CI-tools</b> .....	<b>11</b>
3.1 Partners previous knowledge .....	11
3.2 Participation databases .....	11
3.2.1 Searching in participation databases .....	12
3.3 Reports and evaluations.....	12
3.4 Internet searches/snowballing webpages.....	12
3.5 Digital democracy networks .....	12
3.6 Academic sources .....	12
<b>4 Selection – What we are looking for</b> .....	<b>13</b>
4.1 Overall objectives of the database and criteria for selection.....	13
4.1.1 Pragmatic objectives .....	13
4.1.2 Epistemic objectives.....	13
<b>5 Describing the CI-tools – what are we interested in</b> .....	<b>15</b>
5.1 General characteristics .....	15
5.2 Collective Intelligence factors .....	15
5.2.1 Streams .....	15
5.2.2 Co-creation methods.....	16
5.2.3 Function/Technology .....	18
5.2.4 Process .....	19
5.2.5 Domain.....	21
5.3 Evaluative factors .....	21
5.3.1 Technological maturity.....	21
5.3.2 Level of participation .....	22
5.3.3 Maturity of implementation .....	22
5.4 Quality Assurance .....	22
<b>6 Closing gaps in the repository</b> .....	<b>24</b>

<b>6.1</b>	<b>Gap analysis .....</b>	<b>24</b>
6.1.1	Identifying under-represented CI-tools.....	24
<b>7</b>	<b><i>Lessons learned &amp; further work.....</i></b>	<b>25</b>
7.1	Updating the repository .....	25
<b>8</b>	<b>References .....</b>	<b>27</b>
	<b><i>ANNEX I Stepwise guide for describing CI-tools in AirTable.....</i></b>	<b>29</b>
	<b><i>ANNEX II Forms about CI and CI-tools filled in by partners .....</i></b>	<b>30</b>
	<b><i>ANNEX III List of existing repositories assessed in COLDIGIT.....</i></b>	<b>48</b>
	<b><i>ANNEX IV Descriptions considered, but not included .....</i></b>	<b>51</b>
	Needs/Requirement.....	51
	<b><i>ANNEX V Descriptors of Co-creation methods and descriptions of these .....</i></b>	<b>52</b>
	Figure 1 Structure of the document.....	7
	Figure 2 Relationship between CI-tool, Programme and Case .....	9

# 1 Introduction

## 1.1 Purpose of the document

This report documents the guidelines for creating and updating the digital CI tools database in the COLDIGIT project. The document should be used as a resource document when searching for CI-tools and adding information to the COLDIGIT repository. As the project progresses, the document might be updated due to new knowledge about the needs of repository users.

The main intended readers are the partners in the project, who has a role in searching and analysing CI tools. Secondly, the document describes transparently the process of data collection and classification, and as such is an informational document for any potential external user of the repository.

## 1.2 Guide to the reader

The process of identifying the digital tools envisioned for COLDIGIT includes the following four steps (Chapters 3–6 in Figure 1):

- The first step is to **identify** CI-tools in accordance with the three streams of co-creation defined in COLDIGIT, and the sources as agreed upon in the project (Chapter 3)
- The second step is to **select** CI-tools based on the objectives of the repository in the project (Chapter 4)
- The third step is to **describe the CI-tools** according to given descriptive factors (Chapter 5)
- The fourth step is to **close the gaps** in the repository, doing a gap analysis of about 60 CI-tools, and through this identify under-represented tools (Chapter 6)

The process for development of the guideline has been an iterative process, where also the structure of the database has been developed. The descriptive factors presented in this document are based on the knowledge the project has at this time.

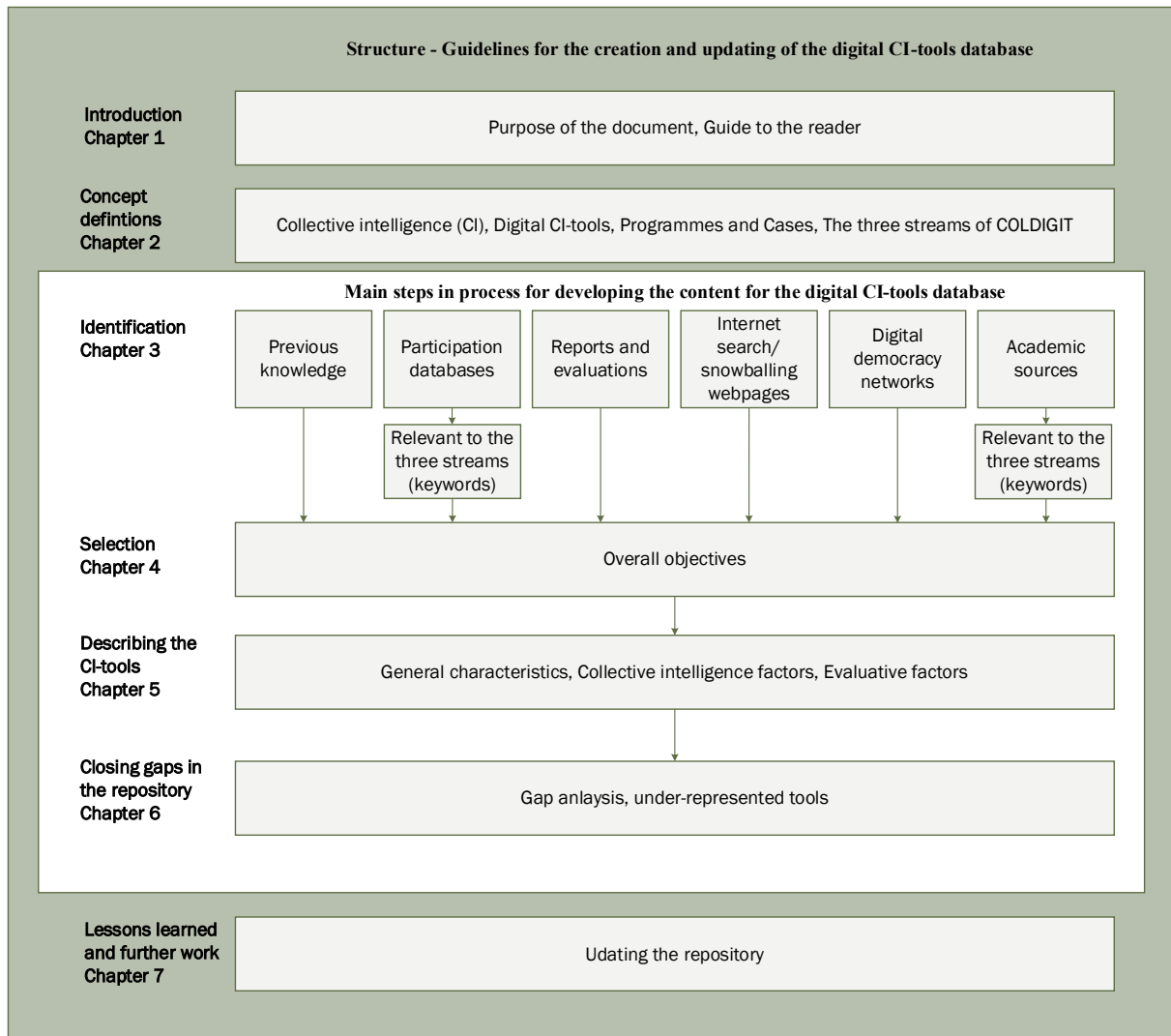


Figure 1 Structure of the document

## 2 Central concepts related to the repository

### 2.1 Collective intelligence (CI)

The tools that we collect will be related to Collective Intelligence, or CI. CI may be seen as the enhanced capacity that is developed when people work together and with the help of technology. The definition of Geoff Mulgan (2018) is highly relevant for how CI is seen in COLDIGIT: “*Collective intelligence is the capacity of groups to make good decisions – to choose what to do, who to do it with – through a combination of human and machine capabilities.*”<sup>1</sup>

In COLDIGIT, the focus is thus on how technology can increase CI, specifically in the public sector. There are different ways technology can influence the way CI is created, and in the Collective intelligence Playbook by Nesta (Peach, 2020), three main areas are listed;

- 1) Networks: Technology may connect people in new ways and bring more brains together.
- 2) Data: New sources of data are created, e.g., through mobile phone data.
- 3) Methods: Analysis of a large amount of data is enabled through technology such as AI.

### 2.2 Digital CI-tools

One definition of a tool is *something that helps you to do a particular activity* (Cambridge Dictionary, n.d.). The particular activity we focus on in COLDIGIT is the activities related to creating Collective Intelligence; as referenced in the prior section, this includes focusing on digital tools. These could be apps, online platforms and other ICT-based solutions developed and/or used for promoting citizen participation. Tools that are developed to be used in guiding a democratic process or is part of the process are of particular interest. The tools may have been developed in collaboration with governmental authorities by private companies and NGOs. In addition, tools that are developed for more general social interaction and connection but used in the context of democratic processes will be added to the database.

### 2.3 Programmes and Cases of implementation of CI-tools

Cases of implementation of particular CI-tools that are used to solve a specific challenge will be added as part of the database. As one CI-tool may be used for solving different types of problems/issues with different goals, a goal will be to add a representative selection of cases to the database. Often, the tools that are implemented in a particular city or region will be applied for several cases, and the overall regional implementation will be listed as a "Programme" in the database. In other cases, a CI-tool is specifically developed for one case, and in this case, there will only be a listing of the CI-tool and the case. See Figure 2 for the relationship between CI-tools, Programmes and Cases.

---

<sup>1</sup> A related term which is extensively used in relation to Collective Intelligence in COLDIGIT is Co-creation, see more in section 2.4.



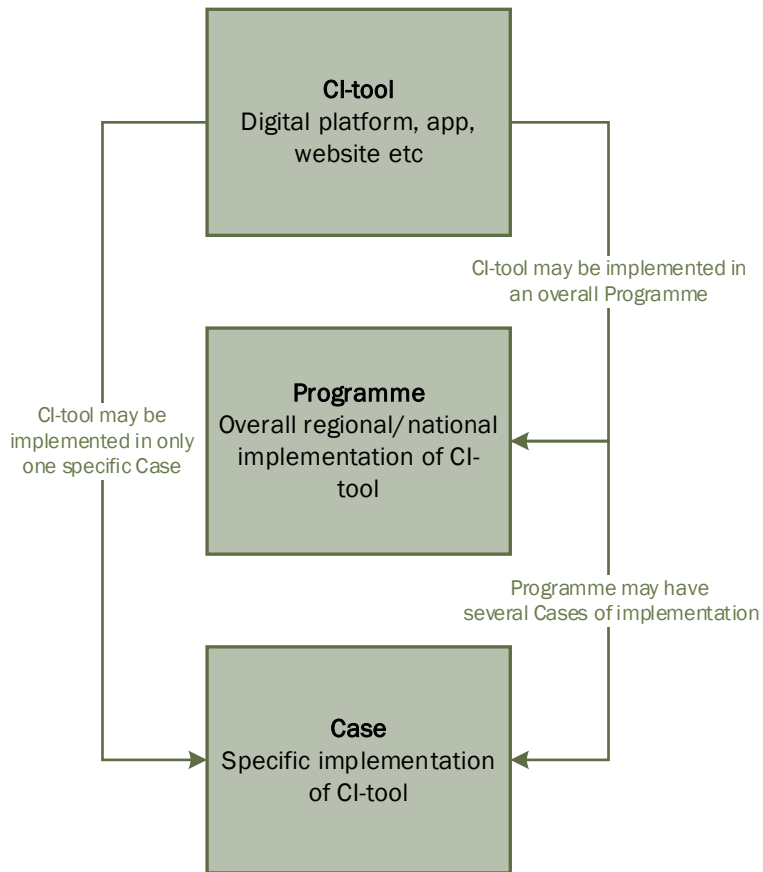


Figure 2 Relationship between CI-tool, Programme and Case

## 2.4 Three streams of COLDIGIT

In the project proposal, it was envisioned that the project would structure the knowledge and findings of CI-tools around three main streams of co-creation relevant for the public sector. Co-creation is in this project seen as a method of solution-finding within Collective Intelligence.

- i) Co-funding and co-innovation,
- ii) Co-production of knowledge and
- iii) Co-construction of policies and decisions.

Partners' descriptions of these three streams have been used to identify keywords, which have been used when searching for CI-tools. In the next section, descriptions of the three streams are given, based on the project proposal and partners' further understating of the three streams.

Based on the descriptions provided by COLDIGIT partners through a form, we propose an initial list of search words for methods and concepts related to the different streams. ANNEX II contains forms about CI and CI-tools filled in by partners about the three streams. The search words are listed in

Table 4, and the search words are also used as a descriptive factor "Co-creation methods". The definition of these search words methods and concepts listed are provided in ANNEX V.

### 2.4.1 Stream 1 - Co-funding and co-innovation

This stream includes processes that aim at co-creating and co-funding to develop innovative solutions through collaborative, user-driven, and transdisciplinary approaches. Co-funding, such as crowdfunding or hybrid funding, is a means to complement mainstream funding activities and enables new types of research, innovations, projects and developments within the public sector. Co-innovation

is aimed at generating new product or service innovations by using CI-tools and approaches. Both customers and users may be involved in such a process, and the process is linked to service design and user-driven innovation, which are traditions with established methodologies for supporting co-innovation.

#### **2.4.2 Stream 2 - Co-production of knowledge**

This stream includes processes that aim to open knowledge-building processes by involving actors that are not traditionally included in such processes. For the public sector, all societal stakeholders, such as citizens, different level government agencies, NGOs, and businesses, are relevant to involve. The citizens are of particular interest in COLDIGIT, and with this, aspects such as empowerment and inclusion of vulnerable groups with the aim of enabling the forming of opinions and making informed decisions are central to this stream (cf. Arnstein, 1969). In co-production of knowledge an aim should also be to include knowledge from different actors on an equal level, and that knowledge is produced together throughout a knowledge cycle.

#### **2.4.3 Stream 3 - Co-construction of policies and decisions**

The co-construction of policies and decisions stream includes decision processes that aim to address wicked problems through co-creative and knowledge-based strategies. In the public sector, this is closely linked to the theories of deliberative democracy, in which a direct link between citizen participation and decision making is among the key characteristics. The different steps of the policy cycle described by Crowdlaw are central (CrowdLaw, n.d.).

### 3 Identification – Where and how to find CI-tools

The project has identified several sources of information about relevant CI-tool. The approach for the identification of tools is described for each of the different sources where digital CI-tools are found. The sources are prioritized according to the importance and where we anticipate finding the most relevant tools. Table 2 lists the sources that will be explored first: partners' previous knowledge, existing participation databases, and existing reports and evaluations. After initial searches, a gap analysis will be performed to identify types of tools that are not sufficiently represented in the repository (see Chapter 6). The under-represented CI-tools will be identified by identifying which descriptive factors are not or little used, and CI-tools which fall under these missing descriptive factors will be searched for. In this round, secondary sources will also be explored, and these will be decided based on where it is expected to need, such as completeness and representativeness of the CI-tools in the repository. However, the sources explored in the first phases should also be revisited after the gap-analysis in cases where only a selection of relevant CI-tools from these sources have been added.

Table 2 Sources for where to find CI-tools

First sources to be explored	
Source	Comment
<b>Partners previous knowledge (see Section 3.1)</b>	All partners contribute
<b>Participation databases (see Section 3.2)</b>	SINTEF, Nesta, UH main contributors
<b>Reports and evaluations (see Section 3.3)</b>	SINTEF, Nesta, UH main contributors
Secondary sources to be explored	
Source	Comment
<b>Internet searches/snowballing webpages (see Section 3.4)</b>	To be decided after gap analysis
<b>Digital democracy networks (see Section 3.5)</b>	To be decided after gap analysis
<b>Academic sources (see Section 3.6)</b>	To be decided after gap analysis

#### 3.1 Partners previous knowledge

The tools that the partners already have knowledge of and are relevant for the pragmatic and epistemic objectives of the database listed in Section 4.1 should be added to the database. For further guidance, the keywords in

Table 4 may also be used.

#### 3.2 Participation databases

All databases identified and considered as relevant for COLDIGIT are listed in ANNEX III. Initial searches have been started in these databases, and the most relevant databases are indicated in column four of this table.

Most databases have either filters and/or open search possibilities, the already identified filters are described in column three in ANNEX III. To find the tools that are relevant for COLDIGIT, filters that are related to digital or online tools or platforms should be applied, also searches related to terms such as "digital tools", "digital platforms", "digital participatory tools", "online platforms", "online tools" will narrow the scope to identify the relevant tools.

Search words based on the three streams of COLDIGIT, that may be used in open searches where applicable, are listed in

Table 4. In addition, the objectives of the target audience in section 4.1.1, and section 4.1.2 should be used as a guide when selecting tools.

### 3.2.1 Searching in participation databases

Keywords that were identified based on the descriptions of the three streams (Section 2.4) have been used when identifying tools in the participation databases. These keywords are also used to describe CI-tools, as they are examples of Co-creation methods, and are thus listed in Section 5.2.2. In addition to these keywords, more generic keywords based on these, such as *funding*, *innovation*, *design* and *knowledge*, may be used.

### 3.3 Reports and evaluations

Several reports, evaluations and other resources describing CI-tools have been mentioned in the project. Links to these are listed below, most of these are resources developed by Nesta.

- [Is AI causing collective intelligence research to become less diverse?](#)
- [Using collective intelligence to solve public problems](#)
- [The Tools Transforming Political Engagement](#)
- [The Democracy Pioneers](#)
  - [Blogpost](#) on experiences of some of the grantees with online tools.
- [Smarter select committees](#)
- [CI and the Smart City feature](#)
- [Rethinking the Smart City from the Ground up](#)
- [Future democracies](#)

### 3.4 Internet searches/snowballing webpages

Targeted searches for CI-tools that are not represented in the repository will be made by searching for these directly on the Internet, and snowballing webpages related to CI-tools.

### 3.5 Digital democracy networks

Digital democracy networks may be contacted for knowledge about CI-tools and cases. *Medialab Prado* in Madrid, where they had the program "Collective intelligence for democracy" between 2016-2018 could be contacted. Other potential organisations and networks are *Democracy R&D*, *People Powered* and *Open Government Partnership (OGP)*.

### 3.6 Academic sources

The search words based on the three streams in

Table 4 may be used when searching in academic sources such as Google scholar, SCOPUS, and others.

## 4 Selection – What we are looking for

The CI-tools that are selected should be aligned with the objectives of the COLDIGIT repository, which in the project description is described as follows *"to establish a database that will be both a usable result of the project and a resource for other WPs"*.

### 4.1 Overall objectives of the database and criteria for selection

The two main target groups envisioned for the repository are municipalities and the other COLDIGIT work packages. These two target groups may be divided coarsely in two groups having different needs, linked to pragmatic objectives for municipalities and epistemic objectives for the COLDIGIT project. The objectives of these are, however, not mutually exclusive, as also municipalities may have epistemic objectives that must be considered for the tools that are added to the repository. Based on the knowledge of partners, different needs or requirements, technologies and functions that help obtain these objectives were identified.

#### 4.1.1 Pragmatic objectives

Municipalities, which should be considered the primary target group for the repository, are foreseen to have a need for mature digital tools and approaches that are thoroughly described. In addition, exemplary cases that demonstrate implementations and descriptions of the methods used are useful for municipalities and will be added as the project progresses. See also Chapter 7 for information gathered from municipalities about their needs with regards to CI-tools.

Needs and requirements that apply to the pragmatic objectives (municipalities):

- Low threshold for participation
- Easy to learn for municipalities
- Single platform for participation
- Collaboration between citizens
- Rich description
- Have been evaluated
- Linking to municipal policy and plans
- Interfacing
- Maturity
- Easily implemented
- Combined with face-to-face meetings
- Fit procedural and legal aspects

#### 4.1.2 Epistemic objectives

In addition to pragmatic objectives, the municipalities could have interests in CI-tools that apply new/emerging technology or tools that apply existing technology in new and innovative ways. This is also an objective of the COLDIGIT project as mentioned in the project description about the CI-repository: *"an international sample of cutting-edge digital tools and approaches"*. The tools that are added to the repository should have value for WP2-4 and give input to identify trends and broad categories of tools, and possibly to identify gaps.

Functions and technologies that apply to the epistemic objectives (*"cutting edge digital tools and approaches"* for COLDIGIT):

- Gamification
- Geographic information system (GIS)
- Survey
- Voting
- Video
- Collaboration support

- Open suggestions
- 3D-modelling
- Natural Language Processing
- Classification
- AR/Augmented Reality
- VR/Virtual Reality
- AI/Artificial Intelligence
- AI agents /Intelligent agents
- Swarm AI
- Smart contracts
- Urban sensing

## 5 Describing the CI-tools – *What we are interested in*

Table 3 gives an overview over which descriptive factors have been chosen for the main categories *CI-tools*, *Programmes* and *Cases* in the COLDIGIT repository. The tools that are identified will be stored in [AirTable](#), which is an online collaborative tool. The knowledge structure visualising the relationship between the main categories and descriptive factors in the AirTable can be found in this [Miro-board](#). See also ANNEX I for a stepwise description for how to add tools to the repository.

The difference and relationship between the main categories are described in Chapter 2. There are three main categories of *descriptive factors*, (i) general characteristics, (ii) CI-factors and (iii) evaluative factors. General characteristics are mainly open text descriptions related to identifying factors for each of the entries in the main categories. CI-factors are predefined lists that should be chosen from a list in AirTable and may be seen as a "tagging" of each of the entries. Evaluative factors are placing each of the entries on a three or two-level list related to the maturity of the tools, maturity of implementation and level of participation.

Some of the descriptive factors are relevant to add for all of the main categories because these will not be the same for all main categories. For example, a CI-tool may have the possibility to support several parts of a democracy cycle (Process); however, a Programme may only implement a selection of these, and a Case may implement a selection of these again. Other factors again are only relevant for one or two of the main categories, for example "Open Source" is only relevant for CI-tools. In Table 3, the X's marks which of the descriptive factors are applied for each of the category.

Based on the experience from the first rounds of describing CI-tools, it has been necessary to search for additional information about the tools online as not all sources have the information about the descriptive factors. However, there might not be possible to identify information on all descriptions used, so it is expected that not all all categories is filled in AirTable.

### 5.1 General characteristics

General characteristics provide basic information, including name, location, stakeholders, etc. for CI-tools, Programmes and Cases. Also, additional information for Programmes and Cases related to lessons learned and attachments – such as documentation about these may be provided. The general characteristics are mostly self-explanatory and are somewhat more described in the info-section in each of the columns in AirTable.

### 5.2 Collective Intelligence factors

Collective intelligence factors provide information about the CI-tools, Programmes and Cases that are related to different aspects of CI. Included are the three *Streams* of COLDIGIT and the keywords describing the three streams (In *Co-creation methods*) and the objectives of the repository (in *Needs* and *Functions*). In addition, *Process* and *Domain* are seen as aspects relevant to Collective Intelligence. For each of these descriptive factors there is a range of *descriptors* that are listed and described in the tables in this chapter. These descriptions should be used as guidance when filling in information in the AirTable.

Common to all these factors is that the descriptors in AirTable are created as links. This enables a sorting of CI-tools, Programmes and Cases that have been “tagged” with a certain descriptor in each of the descriptive categories.

#### 5.2.1 Streams

The descriptions of the three streams i) Co-funding and co-innovation, ii) Co-production of knowledge and iii) Co-construction of policies and decision is found in Section 2.4. In the AirTable repository, there is additionally an General characteristics – Explanation of link to stream – which is an open text description of how the tool is relevant to the stream.

## 5.2.2 Co-creation methods

Co-creation methods in

Table 4 are those concepts, approaches, processes, and methods that are used in co-creation processes. These are the same as the keywords used for searches in participatory databases as described in section 3.2.1. The definition of these concepts are given in ANNEX V.

Table 3 Overview over the descriptive factors for each of the main categories CI-tool, Programme and Case.

Type of descriptive factor	Descriptive factor	CI-tool	Programme	Case
General characteristics	Name	X	X	X
	Description	X	X	X
	Year launched	X	X	
	Link	X	X	X
	Where found	X		
	Owner/stakeholder	X	X	
	Explanation of link to stream	X		
	Open Source	X		
	Language	X		
	City/Region		X	
	Country		X	
	No. of participants		X	
	Lessons Learned		X	
	Combined with face-to-face activities		X	
	Status		X	X
	Attachments		X	
	Contact information		X	
Collective Intelligence factors	Streams	X	X	
	Co-creation-method	X	X	
	Process	X	X	
	Functions	X	X	
	Domain		X	
Evaluative factors	Maturity of tool	X		
	Level of participation		X	
	Maturity of implementation		X	



Table 4 Descriptors of Co-creation methods and keywords used for searches in participatory databases

Stream	Keywords
<b>Co-funding and co-innovation</b>	Co-funding Crowdfunding Civic crowdfunding Matched crowdfunding Hybrid funding Co-innovation Co-design Open innovation Innovation platform Challenge competitions
<b>Co-production of knowledge</b>	Co-production of knowledge Citizen science Citizens' observatories Participant-driven research Peer production Crowdsourcing Collaborative knowledge commons Open source Fact checking
<b>Co-construction of policies and decisions</b>	Co-construction of decisions Co-construction of policies Collaborative decision making Collaborative governance processes Collaborative policy making Crowd forecasting Crowdsourcing law Deliberative citizens panels Deliberative democracy Participatory budgeting Public deliberation Public engagement Public participation Stakeholder based negotiations Citizen assembly Citizen participation

### 5.2.3 Function/Technology

This descriptive category in Table 5 reflects those functions that are enabled by the CI-tool and the technology that is applied by the CI-tool. These are the same as the functions and technologies that apply to the epistemic objectives as described in Section 4.1.2.

Table 5 Descriptors of Functions/Technology and descriptions of these

Function	Description
<b>Gamification</b>	Gamification refers to the strategic attempt in using game-like elements to make engagement in collective intelligence projects more fun (Peach et al. 2020).
<b>Geographic information system (GIS)</b>	GIS refers to a system for collecting, managing, displaying geographic data from the real world (Scholten and Stillwell, 1990).
<b>Survey</b>	(Social) survey is a method of social research for collecting systematic data (often in the form of a variable-by-case grid) of social elements (e.g., behaviour, knowledge, attributes, beliefs, and attitudes) from a sample of the population. A survey often relies on questionnaires via papers, emails, online tools, phone calls, to collect data from respondents (Jupp, 2006).
<b>Voting</b>	Voting is the action of choosing somebody/something in an election or at a meeting (The Oxford Dictionary).
<b>Video</b>	Video is a system of recording moving pictures and sound, either using a digital method of storing data or (in the past) using videotape (The Oxford Dictionary).
<b>Open suggestions</b>	Open suggestions refer to a form or technique to openly gather ideas from the mass population.
<b>3D-modelling</b>	3D-modelling is the process of developing a mathematical coordinate-based representation of any surface of an object in three dimensions (Wikipedia).
<b>Natural Language Processing</b>	NLP allows computers to understand, interpret and extract key information from human language. NLP techniques can be used to carry out automated analysis of user-generated text from sources like social media, to better understand what issues matter to people, translate languages or simulate language (Peach et al., 2021).
<b>Classification</b>	Classification is one of the essential supervised machine learning techniques to solve diverse problems of classifying images, texts, videos, information and so on (Knox, 2018).
<b>AR/Augmented Reality</b>	Augmented Reality (AR) is a real-time direct or indirect view of a physical real-world environment that has been enhanced / augmented by adding virtual computer-generation information to it (Carmigniani et al., 2011).
<b>VR/Virtual Reality</b>	While AR augments the sense of reality by mixing virtual objects with real-world objects in real time, Virtual Reality (VR) completely immerses users in a synthetic world without seeing the real world (Carmigniani et al., 2011).
<b>AI/Artificial Intelligence</b>	Artificial Intelligence (AI) is a broad field that aims to understand and build intelligent entities, particularly machines that can compute how to act and think humanly and rationally. 1) Acting humanly: a

	machine can communicate in a human language (natural language processing), gather and represent knowledge (knowledge representation), answer questions and draw new conclusions (automated reasoning), adapt to new circumstances and improve algorithms automatically through learning processes (machine learning); 2) Thinking humanly: a machine can learn about human thought to think like a human (e.g., introspection, psychological experiments, brain imaging); 3) Thinking rationally: a machine can conduct deduction, inference, predict, and make decisions autonomously under diverse circumstances; 4) Acting rationally: A rational agent is not merely programmed to do something but to achieve the best (expected) outcome under uncertain situations (Russell and Norvig, 2002).
<b>AI agents /Intelligent agents</b>	AI focuses on constructing agents (machines) that do the right things under the circumstances, meaning that agents generate effective behaviours by making algorithmic decisions (Russell and Norvig, 2002).
<b>Swarm Intelligence</b>	Swarm Intelligence is a type of AI that aims to solve problems by creating teams of simple agents (e.g., ants and bees in nature) guided by collective rules. Swarm Intelligence involves self-organizing processes based on feedbacks and interactions between multiple agents (Tan et al., 2014).
<b>Smart contracts</b>	A smart contract is a transition protocol that automatically executes the contractual terms of an agreement (e.g., vending machine and blockchain, and e-voting) (Zheng et al., 2020).
<b>Urban sensing</b>	Urban sensing is the foundation of urban computing, collecting data generated in urban spaces using different kinds of sensors (Ji et al., 2016).

## 5.2.4 Process

The process describes a series of collaborative stages leading to the achievement of the goal of a co-creation activity. Each stage produces a result, e.g., concept, design, or product, that is further developed in a next step. The process may be iterative, i.e., a step or a series of steps can be repeated in order to improve the results.

Several processes have been defined for different types of co-creation activities. For example, the Open book of social innovation (Murray et al., 2010) defines six stages for the social innovation process, describing the support that innovators and innovations need in order to grow:

- Prompts, inspirations and diagnoses: This step involves diagnosing the problem and its causes.
- Proposals and ideas: This is the stage of idea generation.
- Prototyping and pilots: This is where ideas get tested in practice.
- Sustaining. This is when the idea becomes everyday practice. It involves sharpening ideas and identifying income streams or other resources such as legislation to ensure carrying the innovation forward.
- Scaling and diffusion: This is about growing and spreading an innovation.
- Systemic change. This is the ultimate goal of social innovation that involves societal changes.

Another example is the the Crowdlaw taxonomy (Crowdlaw, n.d.) that describes the steps of a democratic process, providing understanding the different levels of a law and policy cycle:

- Problem Identification: The first stage of the law and policymaking cycle dedicated to setting up topics to address, developing clear, straightforward problem statements.

- Solution identification: The second stage of the law and policymaking cycle is dedicated to finding diverse ideas to tackle a problem.
- Drafting: The third stage of the law and policymaking cycle is dedicated to reaching the final text of a law or policy.
- Decision Making: The fourth stage of the law and policymaking cycle is dedicated to following the established procedure to approve a law or policy.
- Implementation: The fifth stage of the law and policymaking cycle is dedicated to putting a law or policy into action.
- Assessment: The final stage of the law and policymaking cycle is dedicated to conducting evaluations to determine if a law or policy was effective in achieving its goals.

Rather than introducing a process for each stream, the project has considered the main overall tasks or steps common in these different co-creation processes. While assessment and decision making are not defined as stages in the process defined in the Open book of social innovation, they are tasks that are being performed as part of the stages. For instance, assessment can be done as part of the scaling stage. Further, when defining a common process for the three streams we focus on the co-creation activities that can be supported by CI-tools. The systemic change defined in the Open book of social innovation is not covered in our definition. In order to cover the three streams of co-creation, the project has therefore defined the process as an adaption of the Crowdlaw taxonomy (See Table 6).

*Table 6 Process – Extending the law and policy cycle as described on Crowdlaw <https://catalog.crowd.law/>*

Process	Description
<b>Problem Identification</b>	This stage is dedicated to developing clear, straightforward problem statements. The goal might be to setting up topics to be addressed by the law, or to defining requirements for developing an innovative solution or producing knowledge. Citizen engagement opportunities are linked to identify issues of concern and prioritizing them.
<b>Solution identification</b>	This stage cycle is dedicated to finding diverse ideas to tackle a problem. Citizen engagement opportunities are linked to formulate, deliberate upon, and propose innovative approaches to solving a given problem.
<b>Drafting</b>	This stage is dedicated to drafting a solution. The goal might be reaching the final text of a law or policy, or it might be prototyping and testing an innovative solution. Citizen engagement opportunities are linked to collaboratively writing, commenting on, and documenting draft legislations, policies or innovative solutions.
<b>Decision Making</b>	This stage is dedicated to approving a proposed text of a law or policy, or a prototype solution. Citizen engagement opportunities are linked to support initiatives and vote between options.
<b>Implementation</b>	This stage is dedicated to putting a law or policy into action or to bringing a solution into practice. Citizen engagement opportunities are linked to refine the action plan for the delivery of a legislation, policy or innovative solution.
<b>Assessment</b>	This stage is dedicated to conducting evaluations to determine if a law, policy or innovative solution was effective in achieving its goals. Citizen engagement opportunities are linked to monitor the outcomes and evaluate the impact on the overall well-being of the community.

## 5.2.5 Domain

The domains listed in Table 7 are areas where the CI-tool has been used to solve a challenge. These are loosely based on examples of how public sectors are organized in municipalities in UK, Norway and Finland.

*Table 7 Descriptors of Domains and descriptions of these*

<b>Domain</b>	<b>Description</b>
<b>Childhood and education</b>	Including activities such as childcare, schools, youth engagement, higher education etc.
<b>Healthcare, social services and integration</b>	Including healthcare, health promoting work, abortion rights, social services, inclusion, immigrations, integration, etc.
<b>Environment, climate and energy</b>	Including environmental issues, cleaning littering, climate change, sustainable energy use, etc.
<b>Culture, tourism, leisure and sport</b>	Including cultural activities, music, cultural heritage, tourism, leisure activities, sports etc.
<b>Housing, planning and urban renewal</b>	Including housing, planning, urban renewal, infrastructure outside transport, such as roadwork.
<b>Transport and mobility</b>	Including all transportation, trains, car pooling, etc.
<b>Economic growth and employment</b>	Including economic growth, employment, start-ups, etc.
<b>Community safety and emergency preparedness</b>	Including community safety, neighbourhood watch, emergency preparedness, first-responders, etc.
<b>Other societal issues</b>	All other activities, e.g. political activism, etc.

## 5.3 Evaluative factors

Evaluative factors are descriptions where the CI-tools and Cases are described according to the three or two-level scale related to maturity of the CI-tool, the level of participation and the maturity of the application. It is not the intent of this repository to conduct full-scale evaluation of the CI-tools, Programmes and Cases reported. Rather, the purpose is to provide an estimation of some core aspects of the CI tools analysed, including technological maturity, level or participation and the maturity of implementation of the CI-tools.

### 5.3.1 Technological maturity

Three levels of technological maturity are described in Table 8. This descriptive factor will reflect how mature the tools are in use with regards to use, how long they have been used, and whether the tools have been evaluated.

Table 8 Levels of maturity of CI-tool and descriptions of these

Levels	Description
<b>High</b>	Tools that have been used for >5 years in several different cases or have been evaluated.
<b>Medium</b>	Tools that have been applied in a few cases, are used <5 years, have not been evaluated.
<b>Low</b>	Tools that are novel or using new technology in an experimental way.

### 5.3.2 Level of participation

Level of participation is a descriptive factors of Cases, and is directly based on the five levels in the IAP2 Spectrum of Public Participation, collaborate, empower, involve, inform and consult (IAP2, 2018). The different levels are listed in Table 9.

Table 9 Three levels of participation (based on the IAP2 categories)

Levels	Description
<b>High</b>	Collaborate and empower – partnering with the public in each aspect of the decision, including the development of alternatives and the identification of the preferred solution, and to place final decision making in the hands of the public.
<b>Medium</b>	Involve –working directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.
<b>Low</b>	Inform and consult - providing the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions, and to obtain public feedback on analysis, alternatives and/or decisions.

### 5.3.3 Maturity of implementation

Maturity of implementation is a descriptive factor of Cases and is describing whether the implementation is a real application or a pilot, see Table 10 for description.

Table 10 Levels of maturity of maturity of implementaion and descriptions of these

Levels	Description
<b>Real Application</b>	The objective of the implementation is to exploit the CI-tool with the goal of producing some type of Co-creation.
<b>Pilot</b>	The objective of the implementation is to test the CI-tool in a new context.

## 5.4 Quality Assurance

Quality assurance (QA) is needed to check that the information that is added to the repository is relevant to the project and correctly described. This means that all entries to CI-tools, Programmes and Cases should be checked by another person than the one making the first entry. All entries will be assigned to a controller for QA.

Check points for the quality assurance includes:

- Check whether the entry match the definition of CI-tools, Programmes and Cases as described in Section 2.

- Confirm that the information for the descriptive factors that are of an objective nature – e.g. most of the General characteristics are correct by checking links or other available sources.
- For the Collective Intelligence- and Evaluative factors, check that the chosen descriptors and levels are within the descriptions in the tables in Section 5.2 and 5.3.
- If there is information that is not correct, this should be corrected. If there are doubts, a comment is to be added to the entry, and the issue should be discussed and agreed upon with the person originally adding the entry, when feasible.

## 6 Closing gaps in the repository

### 6.1 Gap analysis

When 70 tools are identified based on the instructions in Chapters 1-5 and added to the AirTable, a gap analysis will be performed. The gap analysis will check which of the descriptions that are not used, and thus show which tools are not sufficiently represented in the repository. The purpose of the gap analysis is to complete the repository with the CI-tool that represents the different aspects that have been identified as relevant to the two main target groups of the repository – municipalities and the other work packages of the project. The gap analysis should identify 80 additional CI-tools so that the repository contains 150 CI-tools.

#### 6.1.1 Identifying under-represented CI-tools

The main focus of the gap-analysis will be the Collective Intelligence factors (see Section 5.2.). For each of these descriptive factors, an overall analysis of the numbers of tools that are collected for each of the descriptors will be made, see examples in Table 11. Descriptors that are not used or used for few CI-tools indicates the type of CI-tools that are under represented. This means that for the descriptive factor Process, an analysis will be made to see if there are tools representing all descriptors, e.g. Problem identification, Solution identification, Drafting, etc. This analysis should be performed for all the main categories in the repository, CI-tools, Programmes and Cases. Those categories that are under-represented in the repository will be followed up with additional and more targeted searches to identify relevant tools, see Chapter 3 for sources to be used in these searches.

Additional to the Collective Intelligence factors, other descriptive factors may be analysed with regards to under representativeness. E.g., based on the scope of the project (i.e. focus on the Nordic countries) the geographical location represented could be analysed. Especially location of implementation of CI-tools in Programmes and Cases is interesting.

Table 11 Example of descriptive factors used for the gap analysis

Descriptive factors	Examples of descriptors	Gap analysis questions
<b>Functions/technology</b>	Gamification, VR/Virtual Reality, 3D-modelling, etc.	What type of descriptors are not used for the tools, i.e. what type of tools are we missing?
<b>Co-creation methods</b>	Crowdsourcing, participatory budgeting, crowd forecasting, etc.	
<b>Process</b>	Problem identification, drafting, implementation, etc.	
<b>Others (e.g. technological maturity, geographical location)</b>		



## 7 Lessons learned & further work

The purpose of establishing the repository, as explained in the project description, is to establish a database that will be both a usable result of the project and a resource for other WPs. Based on this twofold purpose, the objectives of the repository were identified as pragmatic and epistemic. The main users linked to these two objectives are identified as municipalities interested in using digital CI-tools and the projects other WPs respectively. How to reach these objectives were investigated by both doing searches for already existing repositories and consulting other WPs and municipalities.

The searches for already existing repositories (in ANNEX III) made it clear that there are several other repositories with similar objectives available, especially with regards to the pragmatic objectives. There is thus a need to make the repository of COLDIGIT a useful addition to the already established databases. This may be done by presenting the tools in a new way compared to the existing repositories. Another option is to establish a cooperation with a database where the tools collected through COLDIGIT can add information through e.g., the type of descriptions developed. The final presentation of CI-tools, Programmes and Cases for the repository is to be decided in Task 1.3.

As an effort to gain more knowledge about the needs of the municipalities which are seen as the main users of the repository in the "pragmatic perspective" initial talks were done. One municipality in Norway and municipality in Finland was consulted. The two municipalities have very different levels of experience with digital CI-tools. The Norwegian municipality had not initiated efforts to use specific digital CI-tools, while in Finland, according to the municipal strategy all solutions need to be primarily digital and several digital CI-tools had been tested. In Finland, an important experience is that the tools implemented must comply with certain set of criteria related to the tendering process, and other limiting factors for which tools to choose, e.g. language. This was not a focus in Norway as the municipality had not implemented any tools. Though the municipalities have different experiences with digitalization of participatory processes there were some issues that were similar:

- There are many CI-tools out there, and it can be a challenge to navigate through different tools, e.g. because of the lack of resources.
- An important factor is that the citizens should be updated and engaged, and that "participation is a battle over citizens' spare time".
- The tools should be able to support the municipalities in the processes that they have to do.
- Municipalities are eager to learn from other municipalities, especially from their successful applications of CI-tools.

These initial points give some indications to how the tools in the COLDIGIT repository could be presented

- The tools should be presented in a guided manner, based on the needs of the municipalities, such as the processes they work within.
- The repository could also be a resource for citizens, as a source of motivation for engagement.
- It should be recognizable how the CI-tools can give additional support in the processes the municipalities normally work within.
- Examples of real implementations and lessons learned are useful.

In addition to the objective of having a usable repository, the repository is also important input to WP3, who will both analyse the entries in the database and go in-depth in a selection of the CI-tools. This relationship between WP1 and WP3 will give more information about important contextual factors and additional information about the selection of the tools which should also be part of the database.

### 7.1 Updating the repository

In addition to the gap analysis, the repository should be updated three more times as described in project proposal. These updates are planned in month 26, 32 and 36.

SINTEF will lead the updates and these will be done through the same sources as identified in Chapter 3, and by identifying new tools that may have been published through these, through the same methods as described in this document.

## 8 References

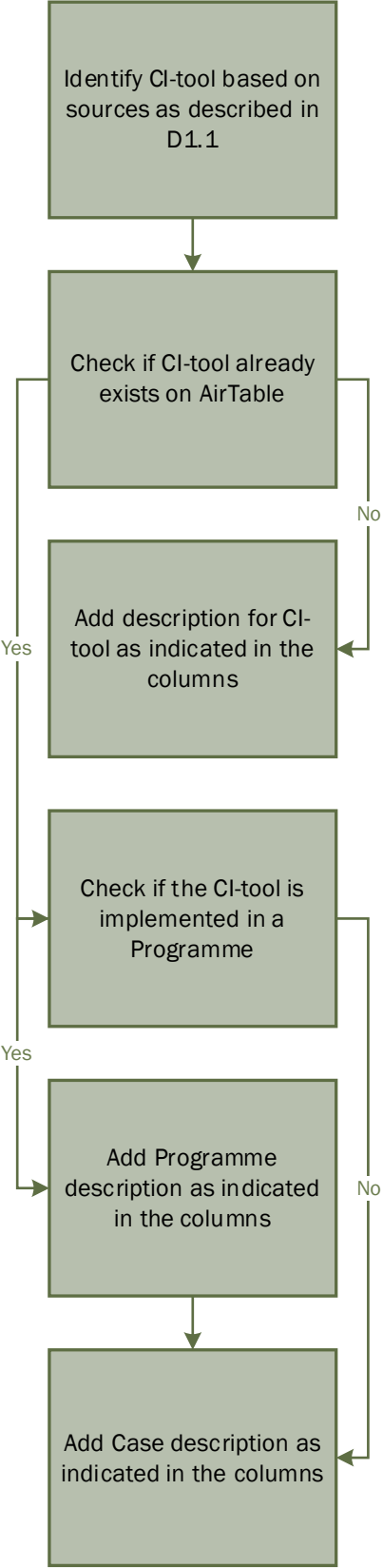
- Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of planners*, 35(4), 216-224.
- Baeck, P., Bone J., & Mitchell S. (2017). *Matching the crowd. Combining crowdfunding and institutional funding to get great ideas off the ground*. Nesta.  
[https://media.nesta.org.uk/documents/matching\\_the\\_crowd\\_main\\_report\\_0.pdf](https://media.nesta.org.uk/documents/matching_the_crowd_main_report_0.pdf)
- Cambridge Dictionary (n.d.). Tool. In *Dictionary.cambridge.org*. Retrieved 05.08.2021, from <https://dictionary.cambridge.org/dictionary/english/tool>
- Carmigniani J, Furht B, Anisetti M, et al. (2011) Augmented reality technologies, systems and applications. *Multimedia tools and applications* 51(1): 341–377.
- CrowdLaw (n.d.) *The CrowdLaw Taxonomy* <https://catalog.crowd.law/about.html#catalog> (13.09.2021)
- Dahlander, L., & Wallin, M. (2020, June 5). Why Now Is the Time for “Open Innovation”. *Harvard Business Review*. <https://hbr.org/2020/06/why-now-is-the-time-for-open-innovation>
- De Crescenzo, V., Botella-Carrubi, D., & Rodríguez García, M. (2021). Civic crowdfunding: A new opportunity for local governments. *Journal of Business Research*, 123, 580–587.
- Homann-Kee Tui, S., Adekunle A., Lundy M., Tucker J., Birachi E., Schut M., Klerkx L., Ballantyne P., Duncan A., Cadilhon J. & Mundy P (2013). *Innovation platforms practice brief I*. ILRI - International Livestock Research Institute.  
<https://assets.publishing.service.gov.uk/media/57a08a2840f0b652dd0005bc/Brief1.pdf>
- IAP2 (2018). IAP2 Spectrum of Public Participation. From [https://iap2.org.au/wpcontent/uploads/2020/01/2018\\_IAP2\\_Spectrum.pdf](https://iap2.org.au/wpcontent/uploads/2020/01/2018_IAP2_Spectrum.pdf) (13.09.2021)
- Ji S, Zheng Y & Li T (2016) Urban sensing based on human mobility. In: *Proceedings of the 2016 ACM International Joint Conference on Pervasive and Ubiquitous Computing*, 2016, pp. 1040–1051.
- Jupp, V. (2006). *The Sage Dictionary of Social Research Methods*. Sage.
- Knox SW (2018). *Machine Learning: A Concise Introduction*. Wiley.
- Merriam-Webster. (n.d.). Cofinance. In *Merriam-Webster.com dictionary*. Retrieved October 7, 2021, from <https://www.merriam-webster.com/dictionary/cofinance>
- Mulgan, G. (2018). *Big Mind. How Collective Intelligence Can Change Our World*. Princeton University Press, Princeton and Oxford.
- Robin Murray, R., Caulier-Grice, J., Mulgan, G. (2010). *The Open Book of Social Innovation*. <https://youngfoundation.org/wp-content/uploads/2012/10/The-Open-Book-of-Social-Innovation.pdf>
- Peach, K., Berditchevskaia, A., Bass, T. (2020) Collective intelligence Playbook  
<https://www.nesta.org.uk/toolkit/collective-intelligence-design-playbook/>
- Peach, K., Berditchevskaia, A., Mulgan, G., Lucarelli, G., Ebelshaeuser, M. (2021). *Collective Intelligence for Sustainable Development: Getting Smarter Together*.
- Russell, S. and Norvig, P. (2002). *Artificial Intelligence: A Modern Approach*. Prentice Hall.
- Scholten HJ and Stillwell JCH (eds) (1990). Geographical information systems: the emerging requirements. In: *Geographical Information Systems for Urban and Regional Planning*. Springer.
- Smith, T. (2021). *Investopedia Crowdfunding*.  
<https://www.investopedia.com/terms/c/crowdfunding.asp> (15.09.2021)
- Stratos Innovation Group (2016). Co-design: A Powerful Force for Creativity and Collaboration  
<https://medium.com/@thestratosgroup/co-design-a-powerful-force-for-creativity-and-collaboration-bed1e0f13d46> (07.10.2021)

Trebon K. (2014). Six Tips for Measuring Success in Challenge Competitions. *Digital.gov*.  
<https://digital.gov/2014/03/20/six-tips-for-measuring-success-in-challenge-competitions/>

Tan Y, Shi Y and Coello Coello CA (eds) (2014) *Advances in Swarm Intelligence: 5th International Conference ICSI 2014, Hefei, China, October 17-20, 2014 Proceedings, Part II*. Springer.

Zheng Z, Xie S, Dai H-N, et al. (2020) An overview on smart contracts: Challenges, advances and platforms. *Future Generation Computer Systems* 105: 475–491.

**ANNEX I Stepwise guide for describing CI-tools in AirTable**



**ANNEX II Forms about CI and CI-tools filled in by partners**

<b>WP1 – Inventory of digital CI tools supporting co-creation</b>	
Initial collection of partners experiences	
<p><b>What does “collective intelligence” mean for you?</b></p> <p>At its simplest we understand, ‘collective intelligence’ as the enhanced capacity that is created when people work together, often with the help of technology, to mobilise a wider range of information, ideas and insights. Collective intelligence (CI) emerges when these contributions are combined to become more than the sum of their parts for purposes ranging from learning and innovation to decision-making.</p> <p>Making deliberate choices that optimise the collective power of groups is known as collective intelligence design</p> <p>Within our work we have a particular interest in the relationship between AI and CI. By considering AI in the context of large-scale participatory projects across areas such as citizen science, crowdsourcing and participatory digital democracy, we can both amplify what it is possible to achieve through collective effort and shape the future trajectory of machine intelligence. We call this 21st-century collective intelligence (CI). In <a href="#">The Future of Minds and Machines</a> we introduce an emerging framework for thinking about how groups of people interface with AI and map out the different ways that AI can add value to collective human intelligence and vice versa.</p>	
<p><b>Do you have any experience from creating repositories of CI tools and/or activities? If so, in what field?</b></p> <p>We have created number of repositories as part of our work on mapping CI practice.</p> <p>We’ve tried to catalogue tools for CI on this Trello board <a href="https://trello.com/b/vf3cXUVG/collective-intelligence-tools">https://trello.com/b/vf3cXUVG/collective-intelligence-tools</a></p> <p><b>Collective Intelligence Playbook</b></p> <p>Organises tools and methods for CI based on their role in the project cycle (identifying problems, developing solutions, decision making and learning)  <a href="https://www.nesta.org.uk/toolkit/collective-intelligence-design-playbook/">https://www.nesta.org.uk/toolkit/collective-intelligence-design-playbook/</a></p> <p><b>govlab research</b> - our work with govlab looked at how to <a href="#">use CI within public institutions</a>.</p>	<p><b>What methodology did you apply?</b></p> <p>horizon scan / qual</p> <p><b>Data science (see detail on methods in blog)</b></p>

Based on this govlab created an online archive of all their case studies. <https://collective-intelligence.thegovlab.org/>

### **kostas aleks research on methods**

While not limited to tools, we used a data science approach to analyse almost 40,000 research articles published in the last 20 years on collective intelligence. This created an overview of how different tools and research fields for CI have evolved and the current status of the field. <https://www.nesta.org.uk/project-updates/ai-ci-researchmapping/>

### **Where do you think we should search for CI tools?**

<https://www.oecd.org/gov/innovative-citizen-participation-and-new-democratic-institutions-339306da-en.htm>

<https://catalog.crowd.law/>

<https://participedia.net/>

**citizen science tool archives**

### **How do you understand the three streams identified in the project proposal?**

#### **1. Co-innovation and co-funding:**

Rather than 'co-innovation' my preference would be to focus this on 'open innovation'.

co-funding primarily refers to civic crowdfunding / matched crowdfunding and participatory budgeting

#### **2. Co-production of knowledge:**

There are a wealth of subtopics to explore under coproduction of knowledge. Some of the main areas we focus on within CCID are

crowdsourcing

citizen science

peer production

collaborative knowledge commons e.g. Wikipedia

Open source development

**3. Co-construction of policies and decisions:**

The [Crowdlaw taxonomy](#) provides a good approach to understanding the different levels and approaches to co-coconstruction of policies and decisions.

Looking beyond some of these, we also have an interest in more unusual methods such as crowd forecasting, more frontier tech methods e.g. AI agents within groups and swarm AI (we explore some of these through our CCID grants) and smart contracts (e.g. Regen network system),

**Can you provide 3 characteristic examples of use of CI tools?**

**Tool 1 name:**

**Matched crowdfunding (for arts and culture)**

<https://www.nesta.org.uk/report/matching-the-crowd-combining-crowdfunding-and-institutional-funding-to-get-great-ideas-off-the-ground/>

<b>Tool objective:</b>	<b>Users:</b>	<b>Stakeholders:</b>	<b>Corresponding to stream 1, 2, or 3: Why?</b>	<b>Where did you learn about the tool:</b>
To match public funds with crowdfunding to leverage more money, increase participating in funding decision and fund more diverse initiatives	Traditional funders such as local authorities and other public funders (in our experiment DCMS, ACE and HLF).  And end users typically small civic projects fundraising for <75k	Public funders, local fundraisers, end users in communities  Potential need to involve regulators to enable new financial instruments	1 Enables innovative ways of allocating public funds  2 & 3 taps in to the CI of a community to provides new insight about local needs.  Long term opportunity to involve crowd in governance of projects.	

**How, in your mind, is the tool a representative example of CI?**



**Tool 2 name:**

**Peta Bencana**

<https://petabencana.id/>

**Tool objective:**

To enable residents of Jakarta to make informed decisions about how to navigate around the city.

**Users:**

Residents of Jakarta and other Indonesian cities

**Stakeholders:**

UN Global Pulse, city authorities and residents

**Corresponding to stream 1, 2, or 3: Why?**

2 the crowdsourcing of knowledge from citizens help create better intelligence about mobility decisions

**Where did you learn about the tool:**

**How, in your mind, is the tool a representative example of CI?**

PetaBencana.id, is a project that combines data from hydraulic sensors with citizen reports over social media including via Twitter, to produce a flood map for cities in Indonesia. The system is programmed to react when someone in Jakarta tweets the word 'banjir' (flood) and tags @PetaJkt. PetaBencana.id automatically replies, and asks them to confirm the tweet with geotagged photos. The platform then combines all incoming reports with official data from the city government to build up-to-the-minute, online flood maps, which are then made publicly available. Through producing real-time maps of urban flooding, PetaBencana.id represents a major advance on previous static PDF maps.

**Tool 3 name:**

**Zooniverse - Using deep learning to personalise and improve training of volunteers on citizen science projects**

(including this one as i think it is a great example of how AI can enhance / support CI)

Tool objective:	Users:	Stakeholders:	Corresponding to stream 1, 2, or 3: Why?	Where did you learn about the tool:
<p>Improve the quality of citizen science through introducing AI in the Gravity Spy project - one of the most popular Zooniverse citizen science projects,</p>	<p>Citizen Scientists Citizen Science Platform</p>	<p>Citizen Scientists Citizen Science Platform AI developers Scientists (users of research data)</p>	<p>2: Example of production of knowledge through citsci and the role AI can pla in his.</p>	

**How, in your mind, is the tool a representative example of CI?**

*\*While this example is not directly related to the digitisation of public services the use of AI within citizen science is highly relevant to our work on the use of citsci as a key tool for CI.*

Online citizen science relies on the contributions of hundreds, sometimes thousands, of amateur researchers to a shared project. Two of the main challenges in citizen science are ensuring consistent quality of contributions and sustaining engagement. These challenges require sufficient training of citizen scientists on project-specific tasks and understanding participants’ motivations, respectively.

Gravity Spy is one of the most popular projects on the Zooniverse citizen science platform, where 12,000 registered citizen scientists help astronomers label known and novel categories of ‘glitches’ in the images generated by LIGO , an observatory that measures cosmic gravitational waves.

The human eye is still the best tool for distinguishing between sources of noise and novel features on images, which makes volunteer contributions vital to the research. The project has recently introduced AI into its volunteer training pipeline to improve the performance of tasks and the overall experience of volunteers. It uses a convolutional neural network (deep learning) algorithm to assess each volunteer’s ability to make classifications of different types of ‘glitches’ according to five levels of difficulty. The AI model uses this information to adapt to each individual volunteer and create a personalised training experience. This means that citizen scientists progress through different levels of the project’s workflow based on their individual ability.

<b>WP1 – Inventory of digital CI tools supporting co-creation</b>
Initial collection of partners experiences

**What does “collective intelligence” mean for you?**

We find the definition of @Geoff Mulgan (2018) highly relevant: “Collective intelligence is the capacity of groups to make good decisions – to choose what to do, who to do it with – through a combination of human and machine capabilities.”

In its most basic form, CI is the result of people working together. “Working” can be done through several mechanisms, both co-creation and competition as well as selection mechanisms for solution finding. When operationalizing CI, mechanisms such as crowdsourcing (completing small tasks) or democratic deliberation (problem solving at large scale) can be employed.

@Mulgan, G. (2018). *Big Mind. How Collective Intelligence Can Change Our World*. Princeton University Press, Princeton and Oxford.

**Do you have any experience from creating repositories of CI tools and/or activities? If so, in what field?**

Yes, for mobile citizen participation as well as for public engagement innovation in the field of research and innovation activity.

**What methodology did you apply?**

We have used mapping tools, typology formation and qualitative surveys.

**Where do you think we should search for CI tools?**

Most innovative approaches found in industry & startup scene, also NGOs and hybrid organizations. For more established CI examples with longer lifespan academic literature. Having said that, and with the COLDIGIT **public sector dimension** in mind, ministries, municipalities and public sector agencies.

**How do you understand the three streams identified in the project proposal?**

**1) Co-innovation and co-funding:**

Co-innovation is aimed at generating new product or service innovations by using CI tools and approaches. Different forms of co-creation processes represent co-innovation; conceptually this is linked to service design and user driven innovation, which are traditions full of established methodologies for supporting co-innovation. Co-funding is a way to collaborate in funding. For example, crowdfunding can be used to develop urban infrastructure, many times based on hybrid funding models (part funded by individuals/ part by municipality).

**2) Co-production of knowledge:**

Co-production of knowledge refers either to science production or generation of other type of information or evidence. Citizen science is a prominent example of the first, even though there are different levels / intensities in contributing to actual knowledge production (ranging from data collection to more active modes of analysing and making conclusions). “Citizen science” type of activities can also contribute to e.g. information and evidence on environmental matters, thus helping solve some risk or environmental issues.

**3) Co-construction of policies and decisions:**

As the name here suggests, the intention is to contribute to decision making either in the context of public policy making or elsewhere. Conceptually, deliberative democracy is closely linked to this ideal, in which direct link of participation with decision making is among the key characteristics. Crowdsourcing law & public hearings mediated by technology are examples in this category.

**Can you provide 3 characteristic examples of use of CI tools?**

**Tool 1 name:**

Hybrid funding in the municipalities of Tampere and Tuusula <https://mesenaatti.me/en/mun-tampere/> (try Google Translate, we haven't found any English description).

<b>Tool objective:</b>	<b>Users:</b>	<b>Stakeholders:</b>	<b>Corresponding to stream 1, 2, or 3: Why?</b>	<b>Where did you learn about the tool:</b>
Pilot new form of PB using hybrid funding	Citizens, local NGOs, municipalities	Same as users	Co-funding (city 40% and citizens 60%)	I sparred with them as part of Sitra's democracy experimentation

**How, in your mind, is the tool a representative example of CI?**

It uses online tools (Decidim and Mesenaatti) to crowdsource ideas from citizens as well as help fund projects who received most support in the community.

**Tool 2 name:**

Corona apps, mostly national

<b>Tool objective:</b>	<b>Users:</b>	<b>Stakeholders:</b>	<b>Corresponding to stream 1, 2, or 3: Why?</b>	<b>Where did you learn about the tool:</b>
Produce knowledge about cases and case-tracking		Public agencies concerned with health care, citizens	Co-production of knowledge about tracking cases	Offered by public officials

**How, in your mind, is the tool a representative example of CI?**

While cases are known after testing, tracking exposure happens with the help of users in the apps, thereby contributing to new datapoints/ knowledge

**Tool 3 name:**

<https://www.kansalaisaloite.fi/sv> Finnish National Petition service where citizens can propose pieces of legislation

Tool objective:	Users:	Stakeholders:	Corresponding to stream 1, 2, or 3: Why?	Where did you learn about the tool:
Address citizen law needs which are not proposed otherwise	Citizens, ministries		Co- decision-making: citizens propose laws, show support, and are involved in drafting the legislative proposals	Own networks

**How, in your mind, is the tool a representative example of CI?**

The goal is to produce new laws which reflect the needs of citizens. By involvement in all stages –need identification, support=signing the petition (min of 50 000), drafting the legislative text if the Parliament approves the petition, citizens co-create pieces of legislation.

The Icelanding constitution is another famous example

**WP1 – Inventory of digital CI tools supporting co-creation**

Initial collection of partners experiences

**What does “collective intelligence” mean for you?**

In academia, CI is often used for when people together become smarter than each one alone. Academics in our field are therefore often looking for tools that easily can gather a lot of people’s habits, knowledge and opinions. In our research, however, we focus a lot on the quality of the collected or developed material but also on the process of how this material was collected or developed. It seems important to distinguish between (for example) *collected intelligence* (‘a mere sum of all our individual smarts’, Atlee & Zubizarreta 2003); *superminds* (Malone 2018) as an emergent aggregate of

individual and separate actions; and *collective intelligence* ('a coherent integration of our diversity that is greater than any or all of us could generate separately', Atlee & Zubizarreta 2003) developed through collaborative or communicative processes oriented towards consensus (e.g. Healey; Innes & Booher) or evolving from disagreement, contest, diversity and independence (*wisdom of crowd*, Surowiecki 2004).

We have often used CI tools in combination with face-to-face situations of various kinds. Our background as architects / planners has also meant that we seek knowledge about how tools can contribute to co-design of the city, thus permit inhabitants to participate actively in urban transformation.

We have applied the map-based survey tool Maptionnaire in several research projects: Two compact cities projects with cases in Barcelona, Rotterdam, Buenos Aires, Cape Town and Kisumu ([compactcities.se](http://compactcities.se)); One childrens participation project in Hammarkullen ([codesigncities.se](http://codesigncities.se)); and one neighbourhood mapping project with the Union of Tenants also in Hammarkullen.

Through a PhD student, and now post doc (Hyekyung Imottesjo), we have applied the AR tool Urban CoBuilder at a prototyping stage, now being combined with VR for a multi-tool platform for remote codesign.

**Do you have any experience from creating repositories of CI tools and/or activities? If so, in what field?**

No. Only cloud-based repositories of data, e.g. through Maptionnaire and Urban Cobuilder.

**What methodology did you apply?**

**Where do you think we should search for CI tools?**

Academic articles through data base searches (e.g. Scopus). Snowballing web pages. CI tools communities.

**How do you understand the three streams identified in the project proposal?**

**4) Co-innovation and co-funding:**

Transdisciplinary research and innovation are important because they are an important response to the challenges society is facing at the moment. Academics can not alone come up with responses that meet the challenges, they needs to be designed together with different actors. Residents are one of them. Vulnerable residents are a group that is often shut out and neglected, so we are particularly interested in how they can be included with the help of CI tools.

Co-funding is interesting because those who manage research and innovation funding sometimes have outdated ideas about how research and innovation should be carried out and with what focus. For effective innovation to take place co-funding, such as crowd-funding, is necessary, at least as a complement to more mainstream funding activities.

**5) Co-production of knowledge:**

Transdisciplinary research imply that all actors are recognized as knowledge producers and that there is no difference of power or difference in position between them. The knowledge of all actors is thus equally important. The knowledge also needs to be produced *together*, through the whole knowledge cycle (i.e. definition of problems, design of methods, collection of data, analysis of data, conclusions, prototyping, implementation, evaluations, etc). It is not possible to achieve results meeting the challenges, by putting knowledge from different actors in different layers and leaving it to someone else (e.g. politicians) to interpret how the layers should be integrated.

**6) Co-construction of policies and decisions:**

Transdisciplinary research imply that knowledge is produced collaborately, in learning processes that are facilitated to be carried out in a democratic way. In this way transdisciplinary research can be considered to be “implementation research”; thus the implementation process itself is also included in the research process. Then it becomes important that those with clout (in different types of contexts) to take decisions, shape policies or implement things are part of the collaborative process. Otherwise there might be a gap between innovation and knowledge production, on the one hand, and policy-making and decision-making, on the other.

**Can you provide 3 characteristic examples of use of CI tools?**

**Tool 1 name:**

Maptionnaire

<p><b>Tool objective:</b></p> <p>To gather knowledge related to location. As we have used it, the purposes of empowerment has been reinforced through participatory surveys, workshops etc.</p>	<p><b>Users:</b></p> <p>Residents, but all actors can be included.</p>	<p><b>Stakeholders:</b></p> <p>Municipalites, inhabitants, local business, researchers,</p>	<p><b>Corresponding to stream 1, 2, or 3: Why?</b></p> <p>Focus at 2 (gathering people’s knowledge regarding specific sites or routes)</p> <p>but it can be used related to all 3 (e.g. collecting proposals for innovative place use or new local policies).</p>	<p><b>Where did you learn about the tool:</b></p> <p>Internet, and later we visited the producer in Finland.</p>
---	--	---	---	--

**How, in your mind, is the tool a representative example of CI?**

Maptionnaire facilitates for a lot of people to present their knowledge and opinion about a neighbourhood or city. The more the better, i.e. the tool is made to be able to handle many answers without losing in clarity (=collected intelligence). The visualization functions are very useful, for example you can get heat maps that visualize that many people have an opinion about a particular place. Such a place, regardless if it is considered good or bad, is of course highly interesting for politicians and officials to focus on, when making investments that aim to improve a neighbourhood.

In addition, as we have used the tool, it has led to residents being able to increase their power in transformation processes (=collective intelligence). This has been done by residents being trained to carry out the surveys themselves and do so in a way that they felt could benefit their own organization. It has included face-to-face meetings when filling in the answers which has increased the quality considerably compared to just sending a link to people. It has also led to them using paper instead of tablets in slum areas, so as not to jeopardize the safety of the interviewers.

In addition, in one of the projects, the involved resident organization had great power to decide which questions to ask. This led to their interest in continuing to use the tool. They now have their own license and their own power over how they use the tool, without without being dependent on us academics.

**Tool 2 name:**

Urban CoBuilder 1.0, a mobile augmented reality app (prototype)

<b>Tool objective:</b>	<b>Users:</b>	<b>Stakeholders:</b>	<b>Corresponding to stream 1, 2, or 3: Why?</b>	<b>Where did you learn about the tool:</b>
To gather input from diverse regarding future 3D transformation of urban space, guided by a set of planning rules, by letting players build with 3D elements in augmented reality on site	Could be anyone depending on purpose, but you need to have an android phone and the app.	Municipalities (planning, urban development)	2, since it is about aggregating input from diverse users regarding their views on e.g. densification of urban space.	PhD student research project.

**How, in your mind, is the tool a representative example of CI?**

The app contains elements of gamification linked to 3D modelling of urban space. It can be used for *collected intelligence* by just gathering separate input from the users. There is also a possibility for *wisdom of crowd* by letting the users interact in one and the same model, thus influencing each others decisions. If a chat function is added, it would have potential for *collective intelligence*, by letting users make collective decisions.

**Tool 3 name:**

Urban Co-creation Lab (InPlan VR + Urban Cobuilder 2.0 AR)



<p><b>Tool objective:</b></p> <p>To bring different types of virtual reality (VR) and augmented reality (AR) tools together into a co-creation platform for remote interaction in (present+future) urban environments</p>	<p><b>Users:</b></p> <p>Could be anyone depending on purpose, but you need to have access to hardware and software: VR goggles, desktop PC, android phone and the app, etc</p>	<p><b>Stakeholders:</b></p> <p>Anyone: municipalities, developers, research, residents, etc</p>	<p><b>Corresponding to stream 1, 2, or 3: Why?</b></p> <p>2 in the form of aggregating input from diverse users regarding their views on e.g. densification of urban space. However, compared to tool 2 above, the platform is more oriented towards being used by key stakeholders, thus being more directly linked to policy and decisions.</p>	<p><b>Where did you learn about the tool:</b></p> <p>Own research project (ongoing)</p>
---	--	---	---	---

**How, in your mind, is the tool a representative example of CI?**

As the platform encourages remote interaction and co-creation between users (chat, voice, simultaneous presence in virtual space) it has a potential for both *collective intelligence* and *wisdom of crowd* in relation to spatial design and urban transformation.

<b>WP1 – Inventory of digital CI tools supporting co-creation</b>	
Initial collection of partners experiences	
<p><b>What does “collective intelligence” mean for you?</b></p> <p>The process and facilitation of connecting people and groups in society to support learning, create knowledge and find solutions to societal challenges.</p> <p>In the context of COLDIGIT, ICT-tools (machines) provides capabilities to amplify the processes underlying collective intelligence:</p> <p>(1) data collection: data can be collected over larger scales, engagement can reach citizens usually not involved, connect groups not previously connected;</p> <p>(2) data analysis: big data, identification of trends over larger scale;</p> <p>(3) information sharing over larger scales and diverse medium.</p>	
<p><b>Do you have any experience from creating repositories of CI tools and/or activities? If so, in what field?</b></p> <p>H2020 Project DARWIN:  <a href="https://h2020darwin.eu/wiki/page/Main_Page">https://h2020darwin.eu/wiki/page/Main_Page</a></p> <p>A wiki-based repository of structured information was developed to support the collaborative construction and review of guidelines, and to give access to this repository in different formats.</p>	<p><b>What methodology did you apply?</b></p> <ul style="list-style-type: none"> <li>• Requirements for content and for the repository were developed in early phases of the project (based on lit. survey)</li> <li>• The repository was developed using Semantic Mediawiki, an extension of wiki</li> <li>• Page structures were developed</li> <li>• Guidance/process was developed for edition and revision of content</li> </ul>
<p><b>Where do you think we should search for CI tools?</b></p> <p>Public databases for CI-tools, academic databases, partners experiences, reports and evaluations of CI-tools etc.</p>	
<p><b>How do you understand the three streams identified in the project proposal?</b></p> <p><b>1) Co-innovation and co-funding:</b></p> <p>Creating new and improved solutions through shared effort and facilitating shared funding of efforts. Enabling identification of needs for new innovation. In the context of this project through the use of CI-tools through concepts such as crowdsourcing.</p> <p>Collecting new ideas, making the ideas useful.</p>	

**2) Co-production of knowledge:**

Facilitating knowledge production and identifying needs for information through connecting people with different types of knowledge about a societal challenge, such as researchers, policymakers, and citizens. Enabling collection of data from the broader public - examples Citizen science.

**3) Co-construction of policies and decisions:**

Facilitate the identification of needs for new policies, or change in existing policies. A process which facilitates interaction, communication and understanding between citizens and policymakers is enabled and made better. Should facilitate real and valuable change. Example participatory budgeting.

**Can you provide 3 characteristic examples of use of CI tools?**

**Tool 1 name:** Decidim - Borgerkraft – "Citizen power"  
<https://borgerkraft.trondheim.kommune.no/>

<b>Tool objective:</b>	<b>Users:</b>	<b>Stakeholders:</b>	<b>Corresponding to stream 1, 2, or 3: Why?</b>	<b>Where did you learn about the tool:</b>
The Trondheim municipality is working to establish solutions for how citizens can digitally participate in the development of the city, through processes, assemblies and citizen initiatives.	All citizens in Trondheim	Policymakers in Trondheim municipality and citizens	Stream 3 – connects citizens with the municipality Stream 2 – Creates a platform for new ideas	Contact with Trondheim kommune

**How, in your mind, is the tool a representative example of CI?**

Trondheim municipality is using Decidim to facilitate citizen participation in different development projects, and to invite citizens to make suggestions for improvements on any matter.

**Tool 2 name:**

Sharing neighbourhoods  
<https://www.sintef.no/en/projects/sharing-neighbourhoods/>

<b>Tool objective:</b> The project will investigate the effects of digital collaborative sharing platforms on the social interactions in neighbourhoods.	<b>Users:</b> Citizens and volunteering organisations	<b>Stakeholders:</b> Citizens and volunteering organisations	<b>Corresponding to stream 1, 2, or 3:</b> <b>Why?</b> Stream 1, creating new solutions for social inclusivity	<b>Where did you learn about the tool:</b>  SINTEF research project (Norwegian Research Council)
<b>How, in your mind, is the tool a representative example of CI?</b>				
The project aims to seeing the city and the digital platform in relation to each other which is crucial in order to address a number of existing societal challenges threatening future cities. A proactive approach to promote social inclusion is important because many modern societal developments, such as increased people mobility and changes in family structures, tend to result in social isolation.				
<b>Tool 3 name:</b> TAG CLOUD <a href="https://www.sintef.no/en/projects/tag-cloud/">https://www.sintef.no/en/projects/tag-cloud/</a>				
<b>Tool objective:</b> TAG CLOUD develops digital services with the aim to increase interest in cultural heritage.	<b>Users:</b> Citizens, Cultural heritage organizations	<b>Stakeholders:</b> EU, museums, citizens (users)	<b>Corresponding to stream 1, 2, or 3:</b> <b>Why?</b> Stream 2 - The project develops digital services to attract a wider audience in cultural heritage and contributes to knowledge sharing	<b>Where did you learn about the tool:</b>  SINTEF research project (EU/FP7 ICT)
<b>How, in your mind, is the tool a representative example of CI?</b>				
The project aims to personalize the experience of cultural heritage and includes: Social computing – the goal is to raise awareness through network effects. Virtual environments – the goal is to engage users through augmented reality games Digital storytelling – supporting dissemination of stories and engage people to tell and share				

## WP1 - Inventory of digital CI tools supporting co-creation

Initial collection of partners experiences

What does “collective intelligence” mean for you?

When people from many different fields and experiences come together and combine their expertise to co-create broader solutions that meet the needs of the community.

Do you have any experience from creating repositories of CI tools and/or activities? If so, in what field?  
<https://dinriksdag.ushahidi.io/views/map>  
Civic tech and participatory democracy in the Nordics (we stopped paying for the tool so it is now limited to 25 results but about 100 were registered).

<https://democat.me/>  
A space we created to gather different decision-making tools

What methodology did you apply?

No strict methodology, the categorisation grew organically to adapt to the items added.

First listing common need amongst organization through interviews and surveys. Then listing tools and matching them to meet those needs.

Where do you think we should search for CI tools?

<https://participedia.net/>  
<https://ogptoolbox.org/en/>  
<https://civictech.guide/>

How do you understand the three streams identified in the project proposal?

**1) Co-innovation and co-funding:**

How are CI-tools created from the beginning and what supports the creation of such tools(sometimes bottom-up, from communities, others top-down, from the government)? For example the city of Madrid has a lab called Medialab Prado where they had the program “Collective intelligence for democracy” between 2016-2018, every year over 70 people from diverse backgrounds participated in projects to co-create solutions using different digital democracy tools(I recommend that you reach out to Yago Bermejo Abati who was coordinating that program). Looking at civic-tech communities, funders such as Nesta (Vinnova in Sweden) and how they create environments where CI tools can be created (specially community-led tools).

**2) Co-production of knowledge:**

The development of tools where for example-open-source tools often have a community, either thorough an association (like Metadecidim), a foundation (like Consul) that makes decisions on funding and developments together and share the code with others over the world. Basically that the organization of the tool itself is democratically run and improved and that the tool has built-in knowledge. Looking at how that knowledge is shared between the community.

**3) Co-construction of policies and decisions:**  
 How does the tool support its users in decision-making processes and shaping policies? For example submitting proposals, voting, designing landscapes, giving ideas to action plans. How does the tools allow users to interact and collaborate with each-other? For example connecting similar proposals together, linking communities with similar ideas, allowing deliberation. How does the tools combine offline and online participation? What solutions does it offer in terms of transparency and contact between decision-makers and users?

Can you provide 3 characteristic examples of use of CI tools?

Tool 1 name:  
 Decidim

<p>Tool objective:          Increase citizen participation and make it more transparent</p>	<p>Users:          hundreds of cities worldwide (as well as the EU, some regions and companies), millions of citizens</p>	<p>Stakeholders:          The Decidim community (<a href="https://meta.decidim.org/">https://meta.decidim.org/</a>) that co-develop the tool, cities using it and investing in its development, city of Barcelona</p>	<p>Corresponding to stream 1, 2, or 3: Why?          Democratically run and open source, developments are co-decided and co-funded, tool is adaptable to tailor participation processes</p>	<p>Where did you learn about the tool:          Working with it ourselves, installing and co-designing it for cities</p>
---	---	---	---	--

How, in your mind, is the tool a representative example of CI?

The tool itself was co-created (and is still developed) together with programmers, activists, cities and organizations. Within the tool you can build processes from the bottom up as well as top down. Anyone with access to a space can tailor their own decision-making process. All functions are meant to be used for co-construction of proposals and policies.

Tool 2 name:  
 Consul



<b>Tool objective:</b> Increase citizen participation and make it more transparent	<b>Users:</b> hundreds of cities and regions worldwide, millions of citizens	<b>Stakeholders:</b> The Consul Foundation ( <a href="https://consulfoundation.org/">https://consulfoundation.org/</a> ), city of Madrid	<b>Corresponding to stream 1, 2, or 3: Why?</b> Has many participation channels meant to scale participation and meet different types of decision-making	<b>Where did you learn about the tool:</b> We were working with it ourselves and ran a project in Madrid to make the community more accessible and are part of the Consul Foundation
---	---	---	---	---

How, in your mind, is the tool a representative example of CI?

Similar to the answer about Decidim, the difference is that Consul is not modular but has its set processes one for Debates, PB, Citizen Proposals, Processes (mainly to co-create or get feedback on plans).

Tool 3 name: Pol.is

<b>Tool objective:</b> Map out different opinion groups around divisive or complicated topics within a larger population	<b>Users:</b> Biggest example is Taiwan who used for new legislation around for example ride-sharing	<b>Stakeholders:</b>	<b>Corresponding to stream 1, 2, or 3: Why?</b> Open-source and co-built tool meant to give guidance in shaping policies, understanding the diversity of opinions amongst different people	<b>Where did you learn about the tool:</b> From our work with digital democracy, we have experimented with the tool in our work with NYC youth PB (here are some results): <a href="https://pol.is/report/r5xj7phdmbp4cmb832nwz">https://pol.is/report/r5xj7phdmbp4cmb832nwz</a>
---	---	----------------------	---	---

How, in your mind, is the tool a representative example of CI?

Beside the tool itself being built and developed collectively the use of it is CI as it takes all opinion groups into account, not only the majority. It provides data to shape policies and decisions based on the collective statements connected to a certain topic.

### ANNEX III List of existing repositories assessed in COLDIGIT

Name	Description	Comment	Prioritize
<b>Participedia</b>	A global network and crowdsourcing platform for researchers, educators, practitioners, policymakers, activists, and anyone interested in public participation and democratic innovations.	A very extensive database with thousands of entries. Selected search words are used.	Yes
<b>OECD</b>	OECD database of representative deliberative processes and institutions.	Filter by "Was a dedicated online platform/tool used..." (41 results).	Yes
<b>Democat</b>	Democat's aim is to bring democracy into everyday life. We bring the best digital tools available into one space, so you can find the right one for your needs. We do the hard work so you don't have to!	Only five tools, all these are added to the COLDIGIT repository.	No
<b>Din Riksdag</b>	A crowdsourced map to show all the Scandinavian initiatives in Civic Tech and OpenGov as well as in citizen participation.	Filtering by "Tool" (25 results). Not updated since 2019.	No
<b>European Digital</b>	This evolving project is designed to identify and analyse cases of digital democracy aspiring to consolidate global democracy by discovering and sharing good practices of open participatory governance worldwide. It is intended as a source of data for scholars, policy analysts, civic activists, politicians, and other interested parties.	Searching for "tool" or "platform" in columns Website, Link, Description, Comments (164 results).	Yes
<b>DialogGuiden</b>	Swedish municipalities and regions have developed this website for support in planning of participation processes - <i>In Swedish</i> .	Searching for "digital" (7 results)	No
<b>DemocracyLab</b>	"DemocracyLab has gathered some civic tech projects and uses a simple categorisation system to find them. DemocracyLab is a social innovation platform that connect volunteers and companies to tech-for-good projects."	This is a "job-site" for volunteers, outside main scope of COLDIGIT.	No



<b>CrowdLaw</b>	The CrowdLaw Catalog is a growing repository of 100 CrowdLaw cases from around the world. The goal of the catalog is to help those wishing to start new or improve existing CrowdLaw projects to learn from one another.		Yes
<b>OGDP toolbox</b>	The OGP Toolbox is a free software initially developed by Etalab, the Prime Minister taskforce in charge of open data and open government French policy, on behalf of the Open Government Partnership community. Co-created by the open government and the civic tech international community throughout 2016, the OGP Toolbox is one of the main deliverables of the OGP Global Summit hackathon (7, 8 and 9 December 2016)		TBD
<b>People Powered</b>	Compiles methods, tools, case studies, research and practical materials on participatory democracy		TBD
<b>TransparenCEE</b>	Gathers examples of tools and digital democracy organizations that support transparency, accountability, and governance in the CEE countries. (E.g. Bulgaria, Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Slovenia, Slovakia)		TBD
<b>IDB Code for development</b>	Inter-American Development Bank is an initiative that supports social innovation projects targeting Latin America and the Caribbean.		TBD
<b>Nesta Collection CI-projects</b>	This board is used by Nesta's Centre for Collective Intelligence Design to document examples of collective intelligence projects.		TBD
<b>CivicTech</b>	We collect, curate, and produce information to help grow the field of civic tech in productive directions. For this reason, the entire collection is Creative Commons licensed.	Very comprehensive for a repository, over 4000 cases. Not easily searchable. Categories used for identifying relevant cases.	Yes
<b>Involve</b>	Involve is the UK's leading public participation charity. We develop, support and campaign for new ways to involve	Not very big – about 60 cases. But very relevant considering COLDIGIT. Relevant cases identified with the help of keywords on the website.	Yes

	people in decisions that affect their lives. Have e.g. tools database and knowledge base.		
<b>Civic Tech Index</b>	Coming soon - A worldwide movement to catalog every open source civic tech project	Looks very promising and has a bold promise – to catalogue “every open-source civic tech project”. But is not running yet, so can’t be used.	No
<b>Public Good App House</b>	A wiki list of digital tools connected to the SDGs.	A comprehensive list of tools linked to SDGs. Goal 11 cases were gone through for identifying relevant tools for COLDIGIT.	Yes
<b>Digital refugee projects [betterplace lab]</b>	Google Form listing civic tech tools related to helping refugees.	Many Google Docs Sheets including a lot of interesting cases. But most of them are German / not necessarily using CI / not active anymore. Relevant tools were identified with the help of the repository’s own categories.	No
<b>Data-smart City Solutions</b>	This searchable database indexes visual and geospatial solutions to critical urban problems.	A rather comprehensive repository of about 250 tools. Many were potentially relevant for COLDIGIT, but many of them were not functioning anymore or the links did not work. Website’s own filters were used to identify relevant tools.	No
<b>Engage2020 Action catalogue</b>	The Action catalogue is an online decision support tool that is intended to enable researchers, policy-makers and others wanting to conduct inclusive research, to find the method best suited for their specific project needs.	Consists of about 60 cases but were not rather tools than more like generic methods for facilitating CI. Not relevant for COLDIGIT. The search/filter functions of the website for identifying methods were very practical though.	No

## ANNEX IV Descriptions considered, but not included

### Needs/Requirement

Table 12 which identifies the needs/requirements that *from the perspectives of the municipalities* was considered as a descriptor to be used for the CI-tools. These are based on the needs and requirements that apply to the pragmatic objective as described in Section 4.1.1. However, they were decided as left out as they focus in a too large extent on technical factors linked to the CI-tool, and were not seen as intuitive with regards to relevance in the database.

Table 12 Descriptors of Needs/Requirements and descriptions of these

Needs	Description
<b>Low threshold for participation</b>	Digital tools with a lowered threshold for citizens in terms of registration (e.g., not needing an e-mail address, linking it to other national/local databases for registration).
<b>Easy to learn for municipalities</b>	Digital tools with an easy learning environment for civil servants, allowing them to collaborate amongst departments and integrate the tool with internal systems/models already used to improve workflow.
<b>Single platform for participation</b>	Digital tools that can gather several processes in the same place (for example one city being able to host hundreds of participation processes in different districts or departments).
<b>Collaboration between citizens</b>	Digital tools that allow collaboration and discussion between participants/citizens, not necessarily initiated by authorities.
<b>Serves multiple participation processes</b>	Digital tools with support for multiple participation activity types (for example a tool for only mapping vs. a tool that allows both idea collection, surveys, voting etc.).
<b>Rich description</b>	Digital tools that are thoroughly described in guidelines, reports or other documented sources.
<b>Evaluation</b>	Tools that have documented evaluation related to implementation of cases
<b>Linking to municipal policy and plans</b>	Digital tools that support the municipality in implementing municipal policies and plans.
<b>Interfacing</b>	Digital tools that have interfaces that make them easy to integrate with existing municipal systems.
<b>Easily implemented</b>	Digital tools that can easily be implemented by municipalities.
<b>Fit procedural and legal aspects</b>	Digital tools that fit with the procedural and legal aspects of diverse municipal activities. For example, the process for detailed planning.

## ANNEX V Descriptors of Co-creation methods and descriptions of these

Table 12 gives the description of the Co-creation methods given in Table 4.

Table 13 Descriptors of Co-creation methods and descriptions of these

Co-creation method	Description
<b>Co-funding</b>	A funding arrangement through which two or more actors share in the funding of a project (Merriam-Webster, n.d.)
<b>Crowdfunding</b>	Crowdfunding is the practice of funding a project by raising small amounts of money from many people, typically via the Internet (Smith, T., 2021).
<b>Civic crowdfunding</b>	Civic crowdfunding means local communities raise funds for projects and campaigns publicly or with a common social goal, to create semi-public goods. (De Crescenzo et al., 2021)
<b>Matched crowdfunding</b>	The process by which public, institutional or corporate funding is combined with smaller donations raised from the public on online platforms (Baeck et al., 2017)
<b>Hybrid funding</b>	Hybrid funding combines aspects from the different crowdfunding methods described above.
<b>Co-innovation</b>	Innovation that happens in collaboration of two or more actors / funding for the collaboration of academia and business actors.
<b>Co-design</b>	Co-Design is a process of involving all relevant stakeholders in a design process to ensure the outcome meets the needs of all the stakeholders. (Stratos Innovation Group, 2016).
<b>Open innovation</b>	Open innovation is a model for innovation that promotes collaboration with people and organizations external to the actor facilitating the innovation process. (Dahlander & Wallin, 2020)
<b>Innovation platform</b>	An innovation platform is used to build and grow ideas. It is meant to bring together different stakeholders to identify solutions to problems and achieve goals. It can also refer to a more technical platform meant to prototype tools and build things fast. (Homann-Kee Tui, S. et al., 2013)
<b>Challenge competitions</b>	An open challenge competition refers to searching for solutions to address common problems through a competitive mindset. They help spur novel ideas. (Trebon, 2014)
<b>Co-production of knowledge</b>	A process of discussion and information sharing in which multiple actors try to develop collective wisdom, rules, agenda, or create new shared knowledge.
<b>Citizen science</b>	Citizen science is collaborative scientific research conducted at least partly by amateur scientists. It can also be seen as “public participation in scientific research”. Citizen science increases the capacity of scientific communities by helping them answer

	questions scientists cannot answer alone and increases public understanding about science.
<b>Citizens' observatories</b>	Citizen observatories are community-based monitoring and information platforms where a diverse range of tools are developed. They invite citizens to share relevant observations, typically via a mobile phone or the web. They also support citizen science projects, especially ones aiming for large-scale participation, covering large areas or lasting for long periods of time.
<b>Participant-driven research</b>	Participant-driven research (PDR) refers to an approach that focuses on participants' roles, skillsets, and abilities in facilitating diverse forms of collective action.
<b>Peer production</b>	Peer production is a new model of socio-economic production based on self-organizing communities. In these communities, the participating citizens cooperate to achieve a shared goal, commonly via the Internet. Such projects are usually relatively non-hierarchical. Peer production is not usually based on financial compensation for participants.
<b>Crowdsourcing</b>	Crowdsourcing (crowd + outsourcing) is a sourcing model where actors seek goods, services, work, information, knowledge, opinions, ideas, micro-tasks and/or finances by engaging contributions from a large and open group of people, typically via the Internet, to achieve complex, common goals. Crowdsourcing is usually based on voluntary participation.
<b>Collaborative knowledge commons</b>	(Collaborative) Knowledge commons mean information, data and/or content that is collaboratively owned and managed by a community, usually via the Internet. Knowledge commons can be accessed by multiple users simultaneously without effect on their quality or quantity.
<b>Open source</b>	Open source is a publicly accessible source code made available for free for modification and redistribution by anyone.
<b>Fact checking</b>	Fact-checking is a process aimed at investigating the factuality of some content, claim, statement or story. Fact-checking tries to promote the veracity and correctness of reporting. It can be done before or after a text is published and can be made internally by the publisher or externally.
<b>Co-construction of decisions</b>	A decision-making process which engages relevant stakeholders to contribute to it.
<b>Collaborative decision making</b>	Collaborative decision-making tries to involve the input from all relevant stakeholders into a decision-making process, and therefore trying to make the best possible decision with relatively objective criteria. Reaching a consensus can also be seen as a goal of such a process. Collaborative decision-making can be affected by group behaviour, the chemistry between members, role distributions and other psychological factors.
<b>Participatory budgeting</b>	Participatory budgeting (PB) is a democratic and deliberative decision-making method where citizens decide how to spend part of the budget of a public entity. Participatory Budgeting enables

	citizens to prioritize money allocation and gives them real power to make decisions about public money spending. The process usually involves idea suggestions and voting. Such processes may also include citizen monitoring in the implementation phase.
<b>Citizen assembly</b>	A citizen's assembly deliberates, gives recommendations and might make collective decisions on public issues. Citizen's assemblies are meant to complement representative democracy. They consist of a representative group of randomly selected citizens and gives an emphasis on the views of underrepresented people.
<b>Deliberative citizens panels</b>	Panel discussions which gather citizens to have deliberative discussions on common issues.
<b>Stakeholder based negotiations</b>	A negotiation process which engages all the relevant stakeholders to take part in the negotiations.
<b>Deliberative democracy</b>	Deliberative democracy is a political theory which sees deliberation as central to decision-making, which is also seen as the core source of legitimacy over voting. Deliberative democracy highlights fair and reasonable debate between citizens. It has elements both from consensus decision-making and majority rule.
<b>Co-construction of policies</b>	Co-construction of policies involves the participation of citizens and commercial actors in defining and the implementation of public policies. Such policies help in democratising the economy and public policies in common. They empower civil society actors to take a more active role in the society.
<b>Collaborative governance processes</b>	Collaborative governance processes aim at involving public, private and civil society actors to a collective joint effort for discussing and implementing public policies.
<b>Public deliberation</b>	Public deliberation is a method that can be used to solve policy problems that require both values and evidence to be considered. Public deliberation includes diverse citizen discussions and decision-making. These discussions are backed with balanced information about the context and recommendations considering the issue at hand. Public deliberation can be however conducted by expert facilitators who may use various deliberative techniques.
<b>Crowdsourcing law</b>	A process where the wisdom of crowds is harnessed in traditional law-making processes to improve both the process and the outcome of the lawmaking process.
<b>Collaborative policy making</b>	Collaborative policy making offers tools that enable citizens to participate in policy-making processes, usually taking advantage of collaborative online platforms.
<b>Public engagement</b>	Public engagement describes a process where experts from various fields listen to, develop their understanding and interact with citizens. Public engagement strives to share the benefits of higher education and research with citizens for public benefit.
<b>Public participation</b>	Public participation is a collaborative, deliberative, inclusive and interactive method that engages affected or interested citizens in policy processes by taking public feedback as a basis for making decisions.

**Crowd forecasting**

Crowd forecasting utilises the wisdom of crowds to forecast future events. By engaging a large group of people, the forecast data will be relatively accurate and diverse. Predictions are aggregated with statistical methods into a consensus forecast.