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D1.1: Online resources for pilots, first release

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Abstract	This document includes the content (text) to be provided for the first release of user-engagement methodology toolkit that will be published online for the use of projects of European IoT Large-Scale Pilot
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	programme. This first release of the toolkit includes a set of online resources on methodologies and tools on end-user engagement made available to LSPs,
Keywords	End-user engagement, methods, tools, toolkit

Document Revision History

Version	Date	Description of change	List of contributor(s)
V0.1	14/06/2017	1 st version of the template for comments The first version contains the tools to be included in the toolkit – reviewers are also asked to recommend tools to be added. It also contains the text that is suggested to explain each of the tools. It doesn't yet include the wireframe of the website or the filter functionality – which is explained at this moment but not yet applied in the tools.	Ines Vaittinen (ENoLL), Katariina Malmberg (ENoLL)
V0.2	22/06/2017	With comments/changes from reviewers and ENoLL responses	Nathalie Stembert, Kai Zhang, Ines Vaittinen, Katariina Malmberg
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V0.4	23/06/2017	Cleaned version with the few remaining comments cleared, edited for the website implementation team with special instructions	Katariina Malmberg, Ines Vaittinen
V0.5	27/06/2017	Final version still missing the screenshots as annexes	Katariina Malmberg, Ines Vaittinen
V1.0	30/06/2017	Final version with annex (screenshots)	Katariina Malmberg, Ines Vaittinen

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CL	Classified, information as referred to in Commission Decision 2001/844/EC	
CO	Confidential to FLAME project and Commission Services	





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INTRODUCTION

In the following chapters, the content of the user-engagement methodology toolkit's first release is presented. This toolkit is published on the www.u4iot.eu website, which is part of the European IoT Large-scale pilots programme's portal (www.european-iot-pilots.eu). This deliverable is of format "other", thus no official deliverable report has been produced, but the efforts are focused on making a user-friendly toolkit on the website that will serve the needs of the Large-scale pilot projects.

The screenshots of the toolkit are included as annexes of this deliverable. The toolkit implemented on the website follows the format of this document:

1. Welcome to the U4IoT toolkit: this is the text on the landing page of the toolkit (for example, www.u4iot.eu/toolkit)
 - a. After the introduction text, the three phases (1. Exploration, 2. Experimentation, 3. Evaluation) are represented, allowing the visitors to click on;
 - i. Each phase
 - ii. Each tool, which are arranged under different iterations (headings)
2. Phase 1: Exploration, Phase 2: Experimentation, Phase 3: Evaluation. These are all the tools that are presented in the toolkit, divided in iterations
3. Filters will be applied to navigate through the toolkit. These filters are explained in more detail in the welcome section (text on the landing page of the toolkit):
 - a. Four filters which have been identified as needs of the Large-scale Pilot projects (based on the questionnaire & interview results collected as a collaborative effort of U4IoT project)
 - i. Use cases
 - ii. Co-creation
 - iii. Prototyping & testing
 - iv. User research
 - b. A filter is also applied to indicate level of difficulty of the tool: beginner / intermediate / advanced





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4. Information bubbles: sometimes, there is a word which may be difficult to understand. For this we could provide an information bubble: a little blue bubble with the "i" from info, and when you click on it, a small text bubble appears on top explaining what it is about.
5. Internal links: sometimes, one tool explains a connection to another tool. Internal links are included in such a way that when the text says "for example like done in the persona tool", clicking on "persona tool" would bring you to that tool directly.

The toolkit is expected to face several iterations during the project lifetime. The project attempts to respond to the needs of Large-scale pilot projects and thus the toolkit will be modified according to the feedback received from them. In addition, in the upcoming releases of the toolkit, it will be completed with Crowdsourcing and survey tool as well as the Guidelines and game for privacy and personal data protection in LSPs.





WELCOME TO THE U4IoT TOOLKIT

This toolkit is to guide the Large-scale pilot (LSP) projects and especially the pilot sites through the innovation processes, with a special focus on user-engagement. It comprises methodologies and tools found across literature and online, put together in a format that follows the different phases along the innovation process. These three phases, namely: exploration, experimentation and evaluation, have been further divided in 3-5 iterations. These iterative steps within the three phases contain links to more detailed instructions, tools and methodologies for the trial sites to refer to in their quest for end-user engagement along the innovation processes.

Although organized in a manner that the phases and iterations could be followed in a step-by-step manner, from beginning until the end, the purpose of the entire process is that it is followed in an iterative manner. This means that the different phases and iterations in the innovation processes are often overlapping, repeating, and mixing in order. Throughout the journey the need to jump back and forth between the different phases is to be noticed.

To serve the specific needs of the LSPs in engaging the end-users, this toolkit has been organized in a manner that it can be revisited and specific tools can be taken out at any point in time, when needed. It also provides a guide to answer to the four “tracks” identified from analyzing the specific needs of the LSP projects:

- A. Use cases: Defining use cases and specifying requirements, as well as validating them
- B. Co-creation: of user needs and solutions, specific tools & methodologies for co-creation
- C. Prototyping & Testing: First tests and MVPs, assessments and evaluations, user acceptance
- D. User research: Methodologies for user research

All the different phases of the process have more detailed explanations and instructions on the different iterations of the phase. As more general advice on the end-user engagement and usage of the toolkit, below some useful tips collected from several sources before diving into the process:

1. Iterative process – going back and forth in different phases - this can't be highlighted too much





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2. Role of the user: factor or actor? - consider the role of the users in the process, how much you would like to engage them in the different phases of the process and which tools offer the most possibilities for this
3. Consider the usage of resources - plan the engagement carefully in terms of the level of input (time, costs, expertise) and the expected output
4. Before choosing the tool that you are going to use, first dig into the root of the problem you are trying to solve: why are you doing this activity, what are you looking to achieve, and only then – how, using which tool?
5. This also applied to prototyping! The idea behind a prototype is to test – so before starting to build, consider what it is that you are trying to test and what functionality will be required from the prototype in order to achieve this?

Many of these considerations are taken into account in the design of the toolkit. Additionally, each tool has an indication of the level of expertise needed. The first level tools (beginner) include the most basic tools that are widely known and used, and easy to start with. The second level (intermediate) can be followed after this introduction and help to advance to slightly more complex tools. The third level tools (advanced) are for more experienced practitioners.





PHASE 1: EXPLORATION

The first phase of the toolkit is “exploration”. This phase begins with the iteration “understand”, and forms the basis for understanding the context, problem, and users. Followed by the second iteration “discover” that is characterized by immersion in the situation, empathizing with the users and observing them, leading to discoveries of new ideas and insights. Having reached a level of understanding, combined with discoveries of ideas and insights, the third iteration “define” consists of framing these insights into well-defined opportunities and needs, pain points and positive experiences of the users. The entire process is iterative, and all these different processes overlap and repeat throughout, and that is especially true for the “think” iteration. Here this toolkit provides you with concrete ideation techniques and brainstorming tools which are helpful throughout the entire journey. Finally, in the “conceptualize” iteration all the insights are gathered and ideas are examined, combined, visualized and framed into a complete concept.

ITERATION 1: UNDERSTAND

All the tools that have to do with: understand / research / know user

Design Thinking Crash Course [filters: user research, beginner]

Ideo and d.school are the most commonly known names in the field of Design Thinking, so this is a good place to start. One way in which you can begin is by going through the entire process once, in a crash-course like manner, compressed in a very short amount of time. This Design Thinking Crash Course will help you do just that, so gather your participants and begin the journey! Take a look at this [website](#) for everything you need, and this [playbook](#), that serves as an instruction manual to guide you, the facilitator, through the process. However, it is worth to remember that such a short session can only work as an introduction to Design Thinking, since in reality it is important to work “in the field”. Design thinking is not limited to the boundaries of the four walls in which you are conducting workshops. Instead, you need to really get out there, interact and empathize with your users to understand them. For many ideas on how to follow the process in the real world, take a look at the [Bootcamp Bootleg](#) cards by dschool, or follow the instructions on the [field guide to human-centered design](#). The latter may be downloaded free of charge, but requires a registration on the website - however, the website is full of useful material so registration is recommended! In the search for even more tools, browse around ideo’s [toolkit](#).





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Website: <https://dschool.stanford.edu/resources/gear-up-how-to-kick-off-a-crash-course>

playbook for running a crash-course:

<https://static1.squarespace.com/static/57c6b79629687fde090a0fdd/t/5899326a86e6c0878c6e63f1/1486434929824/crashcourseplaybookfinal3-1-120302015105-phpapp02.pdf>

Bootcamp Bootleg:

<https://static1.squarespace.com/static/57c6b79629687fde090a0fdd/t/58890239db29d6cc6c3338f7/1485374014340/METHODCARDS-v3-slim.pdf>

The field guide to human-centered design:

<http://www.designkit.org/resources/1>

Ideo toolkit: <https://www.ideo.com/tools>

Living Lab Methodology Handbook [filters: co-creation, intermediate]

Similarly, to the Design Thinking Crash Course, this handbook is providing the framework for an entire innovation journey from start to finish, as well as key principles of Living Labs. Developed by Botnia Living Lab in Sweden, the handbook is based upon results from the Nordic cross-border Living Lab project SmartIES on energy savings. The two ENoLL members: Botnia Living Lab and Wireless Trondheim as well as Living Lab partners from Denmark, Iceland and Lithuania were involved. This handbook includes evaluation of the FormIT Living Lab methodology as well as Living Lab key-principles for Living Lab operations. The resource also includes detailed guidelines for applying the methodology in each phase of the Living Lab operation. Target-users of the handbook are Living Lab practitioners and Living Lab stakeholders. Download the [Living Lab methodology handbook](#) and take a look at their [website](#), where more materials (checklists) are provided to guide you through your journey!

Website: <https://www.ltu.se/centres/cdt/Resultat/2.59039/Metoder-och-handbocker/Living-Labs-1.101555?!=en>

Living Lab methodology handbook:

https://www.ltu.se/cms_fs/1.101555!/file/LivingLabsMethodologyBook_web.pdf

Interview: The five why's or Laddering [filters: user research, beginner]

The five why's (or sometimes also called "Laddering") is an interview technique leading the researcher and participant to a deeper level of





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explanation and therefore understanding in their interview. It's simple: in order to get to the core of the problem, you should ask "why" to every answer provided by the interviewee, five times in a row. The designkit [website](#) offers a comprehensive explanation and step-by-step instructions to the methodology.

Website: <http://www.designkit.org/methods/66>

Collage [filters: user research, intermediate]

User research often consists of interviews and surveys where we are relying on words. However, in many cases, an image is worth a thousand words - and images help us in understanding, especially when we are coming from different backgrounds. Collages can be used by the participants in an exercise as described in the website below, or in the form of Visual Surveys, where questions consist of a selection of images rather than words. Take a look at the designkit [website](#) for more information and the 3-step instructions.

Website: <http://www.designkit.org/methods/25>

Photo Journal [filters: user research, intermediate]

Get a glimpse into the life of your participants by providing them with a camera and instructions to take photographs of their everyday moments. Collecting these photographs in a Photo Journal and follow-up with an interview to discuss photographs further. The designkit [website](#) offers a clear explanation and steps to be followed for this methodology.

Website: <http://www.designkit.org/methods/65>

ITERATION 2: DISCOVER

All the tools that have to do with: discover / immersion / empathize / observation

Game Jams [filters: co-creation, advanced]

A Game Jam is a gathering of people for the purpose of planning, designing, and creating one or more games within a short span of time, usually ranging between 24 and 72 hours. Participants are generally made up of





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programmers, game designers, artists, writers, and others in game development-related fields. A Game Jam may be centered on a theme, which all games developed within the jam must adhere to. The theme is usually announced shortly before the event begins, in order to discourage participants from planning for the event beforehand and from using previously-developed material. In addition, themes are meant to place restrictions on developers, which encourages creativity. Take a look at the [Game Jam toolkit](#) for more information on how to organize your own Jam.

Jams are also common practice in other fields as well: think of [service jams](#), [design jams](#) or [sustainability jams](#) for example!

Game Jam toolkit: <http://www.jamtoday.eu/toolkit-introduction/>

Service Jam: <http://planet.globalservicejam.org/>

Design Jam: <http://designjam.ocadu.ca/>

Sustainability Jam: <http://planet.globalsustainabilityjam.org/>

Observation & Shadowing [filters: user research, intermediate]

Observation and Shadowing are common techniques used by designers to form an understanding of their users. When interviewing people, you hear what they think, say, do and even how they feel at times - but all this does not always match up with what they actually do. When observing your participants, you are able to see what people actually do, without imposing an impact on those actions. Observation can take many forms: the researcher may observe from a distance, separating themselves of the situation, or set boundaries or a task to be performed by the subject, or even participate themselves together while observing the participants. In shadowing, researchers are following the participants around for a set period of time, for example, an entire day. In doing so, you may or may not interfere at times by asking some questions as an ad-hoc interview throughout the process. Explore the [methodology on this website](#), and also take a look at the collection of [other methodologies provided by designingwithpeople](#).

Observation & shadowing website:

<http://designingwithpeople.rca.ac.uk/methods/observation-shadowing>

Designingwithpeople methods:

<http://designingwithpeople.rca.ac.uk/methods>





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Guided Tour [filters: user research, beginner]

Whereas the observation and shadowing techniques often involve researchers trying to seem as “invisible” to the participants, the guided tour methodology allows for close interactions between the researcher and the participant. When conducting a guided tour, the participant is also explaining out loud what they are doing, how they are feeling etc., therefore providing insight to aspects which would not always come across in an observation or shadowing. However, in doing so, watch out for alterations in their actions, as sometimes we are doing things as routine or otherwise semi-unconsciously, in which case these aspects are more likely observed through observation and shadowing!

Website: <http://www.designkit.org/methods/46>

Empathy Prototype [filters: user research, intermediate]

Whereas most of the prototyping techniques described in this toolkit are more commonly included in the dedicated prototyping section, the empathy prototype can form part of the very first phases of your journey, as it has to do with empathizing with the user. In an empathy prototype, you are quite literally putting yourself in the shoes of the user, forming an understanding of their needs by experiencing situations from their point of view. This can mean blindfolding yourself when considering the blind, or making sure you don't forget to take your vitamins at exact hours when designing for someone who is dependent on daily medication. Start by taking a look at these [best practices when prototyping for empathy](#), and when you've gathered your insights, don't forget to involve your actual users in validating your findings!

Best Practices when Prototyping for Empathy: <https://public-media.interaction-design.org/pdf/Prototyping-for-Empathy.pdf>

ITERATION 3: DEFINE

All the tools that have to do with: define / needs & pains / opportunities & gains / framing insights

User innovation toolbox [filters: user research, beginner]

Designed by imec Living Labs, the User Innovation Toolbox is a set of methods and tools to be consulted when looking for an appropriate and inspiring way of doing user-centric innovation research. It is a collection of over 80 user-





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centric innovation research methods suited for agile innovation development environments and multidisciplinary R&D teams. Take a look at this [toolbox](#), which organizes a wide variety of approaches from different backgrounds (design studies, market research, social sciences, ...) in order to provide the right tools for the right questions. This methodology can be used at different stages of the innovation development process.

User innovation toolbox: <https://www.iminds.be/en/userinnovation>

Empathy map [filters: use cases, intermediate]

This empathy map is a useful yet simple template for creating your persona. A much cleaner version of the persona map as described below, the empathy map is a useful tool to feed in to your persona, or to work on its own as the first version of your persona in the very beginning phases of your journey - you'll have time to go more into details of your persona in the later stages, while the empathy map gathers the most essential to-knows at the initial stage of your project. For a detailed explanation into the why's and how's of empathy mapping, take a look at this [website](#), and start building your own empathy map using this [template](#).

Website: <http://thetoolkitproject.com/tool/empathy-map#sthash.Vk5lepNU.dpbs>

Template pdf: http://d2idj4ahi73bav.cloudfront.net/2-Empathy+Map/empathy_map.pdf

User persona [filters: use cases, beginner]

Personas are the most common point to start your innovation journey. They help to gather your research insights in the form of a persona, a tangible outcome of your findings thus far. Although important in the beginning of the project, personas are used throughout the whole innovation process - they are also prominent in market research, for example, when you've already got a working prototype and are working on a go-to-market strategy. In this [template](#), the 10 elements of a user persona are highlighted in a how-to guide for creating your own user persona.

Template: <http://www.ux-lady.com/diy-user-personas/>





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Validated personas [filters: user research, advanced]

Personas are often created in workshops, or closed-door team meetings, but it is important to remember that as important as it is to base your project around personas, it is equally important to validate these personas. Personas created in workshops for example are based on assumptions which do not always correspond to the real world situation. Personas should be based on your qualitative and quantitative research results. An example of this is represented by designingwithpeople, who provide on their [website](#) a set of 10 personas already backed up by research. The five categories of personas, for which both male and female personas have been created, are: vision, hearing, mobility, dexterity and cognition.

Website: <http://designingwithpeople.rca.ac.uk/people>

Design Brief [filters: use cases, intermediate]

Once you have conducted some research, formed insights, and identified the insights which are most valuable for you going forward, it's time to formulate a design brief. The design brief converges all the collected information from the discover phase and compresses it in the form of a key insight, something that you have decided, based on your experiences, that is worth exploring further. Typically, this is the brief of the client given to the design team, but can also serve as a useful tool within your own team to ensure you're all on the same page. For a step-by-step instruction to design brief writing, take a look at this [website](#), and formulate your own using this [template](#).

Website: <http://opendesignkit.org/methods/design-brief/>

Design Brief Template:

https://docs.google.com/document/d/1HWWb39_3S4PX6mxKg5u394QKrH_UtbsnDideciWMHzU/edit

Customer journey [filters: use cases, intermediate]

Customer journeys are a very common tool used in the user-centered design field and can therefore be seen as an important part of the process. As it is commonly used, it is also commonly adapted and there are many different types of tools out there for creating customer journey. In essence, the customer journey comprises of a story, from the viewpoint of the end user, in how they experience and interact with the product, service, situation etc. Each touchpoint is thoroughly investigated and mapped out in the customer





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journey map. For more information about the different steps involved in mapping your journey, take a look at this [website](#), and use this [interactive customer journey map template](#), ready for you to map out the journey your end-users experience with your solution. Don't forget to validate your findings with your actual end-users as you have reached some interesting insights.

Website: <https://www.mightybytes.com/blog/customer-journey-map-template-download/>

Customer journey map template: <https://www.mightybytes.com/wp-content/uploads/2017/01/customer-journey-template.pdf>

ITERATION 4: THINK

All the tools that have to do with: think / ideate / brainstorm

How might we [filters: use cases, beginner]

To frame your ideation session, try the “how might we” approach. Start describing your ideas by beginning your sentences with “how might we...”, starting with an open-ended problem statement or insight. The idea behind this methodology is to explore the different points of view, question your assumptions or even explore the possibilities of your assumptions being reversed. This tool is especially useful when applied in connection with other tools, such as personas and scenarios. The power of the tool is explained on this [website](#), and you can use this [worksheet](#) to guide your own “how might we” session.

Website: <https://dschool.stanford.edu/resources/how-might-we-questions>

How Might We worksheet:

<https://static1.squarespace.com/static/57c6b79629687fde090a0fdd/t/589cc8b8d2b85721b37d3efe/1486670008488/HMW-Worksheet.pdf>

Idea Dashboard [filters: co-creation, intermediate]

Collecting ideas is important, but making sure everybody understands the ideas is also important. Materiality has been proven as an important feature of communicating ideas, especially when working with people from different backgrounds, such as designers, developers and managers, but also with end-users with different experiences. By using material objects, drawings of low-fi prototypes, you will all see the same thing - whereas explaining





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something in words can form different images in different minds.

Website: <https://dschool.stanford.edu/resources/idea-dashboard>

Idea dashboard:

<https://static1.squarespace.com/static/57c6b79629687fde090a0fdd/t/589cc8782e69cf0dd82b4508/1486669944346/Idea-Dashboard.pdf>

Brainstorming rules [filters: co-creation, beginner]

In ideation sessions you are looking to get lots of ideas. From a large amount of ideas, you can identify some that are better than others, some that are more predictable than others, and some that may even seem completely crazy at first glance. But make sure not to discard them without digging in deeper, and always build on each others ideas, to get deeper into the root of the idea and everything that it could reach. Use these rules when engaging with your focus groups, running co-creation workshops or facilitating group discussions, for example. For the brainstorming rules, take a look at this [website](#).

Website: <http://www.designkit.org/methods/28>

Brains behaviour and design [filters: use cases, advanced]

A comprehensive set of tools and methodologies into behavioural economics are provided by the Brains behaviour and design website. These tools are especially useful in understanding the behaviour of your users, citizens, participants. For example, the [reference cards](#) is a card deck that provides information about common behaviours and expectations of people. [The concept ecosystem poster](#) showcases the relationships between drivers behind a decision, and decision making factors. There are three tools for designing for behaviour change, called “irrational situation guides”: [introduce new routines](#), [understand trade-offs](#), and investigate [mismatches between future intentions and behaviour](#). The [strategy cards](#) give quick reminders and food-for-thought when thinking about your strategy, and the [losses and gains worksheet & cards](#) help you to think about today and the future in terms of your losses and gains.

Website:

Reference cards:

http://www.brainsbehavioranddesign.com/pdf/ReferenceCardsAll_BBD_v1.0.pdf





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The concept ecosystem poster:

http://www.brainsbehavioranddesign.com/pdf/EcosystemPoster_BBD_v1.0.pdf

Introduce new routines:

http://www.brainsbehavioranddesign.com/pdf/IS_TrySomethingNew_BBD_v1.0.pdf

Understand trade-offs:

http://www.brainsbehavioranddesign.com/pdf/IS_DelayedGratification_BBD_v1.0.pdf

Future intentions vs. behaviour:

http://www.brainsbehavioranddesign.com/pdf/IS_GoodIntensions_BBD_v1.0.pdf

Strategy cards:

http://www.brainsbehavioranddesign.com/pdf/StrategyCards_BBDv1.0.pdf

Losses and gains worksheet & cards:

http://www.brainsbehavioranddesign.com/pdf/LossGainsWkshtsCards_BBD_v1.0.pdf

ITERATION 5: CONCEPTUALIZE

All the tools that have to do with: conceptualize / frame / examine / visualize

Co-Creative Workshop Methodology [filters: co-creation, advanced]

The Co-Creative Workshop Methodology is designed by U4IoT Consortium partner - [Stembert Design](#) - for Internet of Things (IoT) related contexts. As a methodology, the Co-Creative Workshops are among others part of the Coordination and Support Action (CSA) [U4IoT](#) to support LSP projects participating in the [European Large Scale Pilot \(LSP\) Programme](#).

The Co-Creative Workshop Methodology enables you to engage end-users and stakeholders within your projects and co-create IoT solutions in only a couple of hours. The [Co-Creative Workshop Handbook](#) provides you with guidelines for the organisation, facilitation, analysis and documentation of Co-Creative Workshops. The methodology consists of a four phase co-creative cycle, with guidelines for Co-analysis, Co-design, Co-evaluation and Co-implementation. The complementary [Co-Creative Workshop Toolkit](#) contains materials for organising workshops around five topics - Smart Mobility, Smart Entertainment, Smart Agriculture, Smart Cities and Smart Health. Empowered by the toolkit end-users can communicate on an expert





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level, whilst experts are enabled to emphasise with the needs of end-users. The insights elicited through a Co-Creative Workshop are ideal to inform your design- and development processes.

U4IoT supports LSP partners in the European LSP Programme to implement the Co-Creative Workshop Methodology into their projects by providing hands-on training sessions. These training sessions enable LSP partners to autonomously organise, facilitate, analyse and document Co-Creative Workshops throughout their projects.

Stembert Design: www.stembertdesign.com

European Large Scale Pilot (LSP) Programme: www.european-iot-pilots.eu

U4IoT: www.U4IoT.eu

Co-Creative Workshop Handbook: Not yet available online

Co-Creative Workshop Toolkit: Not yet available online

The Bristol Approach Framework [filters: co-creation, beginner]

This framework has been tried and tested by the KWMC in Bristol: The Bristol Approach: a way of working that aims to understand the issues people care about. It provides you with a real-life case study and a framework for engaging local people actively involved at the community level in design, testing and evaluation. The Bristol Approach framework contains six phases: framing, design, deployment, orchestration, outcome and identification. For a description of the project, including a video, take a look at their [website](#). For more details on the six phases, take a look at [The Bristol Approach Booklet](#).

Website: <http://kwmc.org.uk/projects/bristolapproach/>

The Bristol Approach Booklet:

https://issuu.com/knowlewestmedia/docs/bristol_approach_booklet_issu

Six Thinking Hats [filters: co-creation, beginner]

A classic ideation technique where six participants each adopt their own point of view (a function, or a role) by thinking about a problem. Each participant is given a hat, which means that they are the driver for a certain type of thinking within the team: white hat calls out for information and facts, the yellow hat symbolizes optimism and brightness, the black hat is the devil's advocate, the red hat signifies feelings, hunches and intuition, the green hat focuses on creativity and new ideas and possibilities, whilst the blue hat manages the thinking process. For more information on this methodology, visit





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their [website](#).

Website: http://www.debonogroup.com/six_thinking_hats.php





PHASE 2: EXPERIMENTATION

Having formed a concept in the previous phase, it's now time to put it to the test. First, the "prototype" iteration consists of building and creating a prototype. Prototypes can take on many forms, from tangible MVPs (Minimum Viable Products) to intangible service or experience design prototypes, but the main goal of the prototype is always the same: to "test" it in the second iteration. The purpose of building a prototype is to find answers, discover new insights and ideas, and to filter and measure the assumptions made. Therefore, these two iterations are often repeated numerous times, bringing you back to the first phase of exploration for new insights, ideas and concepts - by debunking your assumptions or validating insights. Once a well-defined, tested and validated prototype has come out from the many iterations throughout the processes, the process of "pre-launch" has to do with analyzing, validating, distilling and orchestrating the upcoming launch of the prototype. The "develop" iteration continues to develop, deploy and generate the prototype into a product or service.

ITERATION 1: PROTOTYPE

All the tools that have to do with: prototype / build / create

IDEO course on prototyping [filters: prototyping & testing, beginner]

If you would really like to get deep into the topic and learn the ins and outs of prototyping, IDEO offers a free online prototyping course on their designkit. The course lasts four weeks and is focused especially on the prototyping phase of the process. The course starts at set intervals, so sign up on the [website](#) and see when the next course is starting.

Website: <http://www.designkit.org/resources/8>

MVP [filters: prototyping & testing, beginner]

MVP, or Minimum Viable Product, is a prototype which requires the least amount of resources to fulfill the purpose of being able to test what you are looking to test. Think about how to prototype your idea from inexpensive materials, like creating a paper prototype. As this methodology can be applied in so many areas (from physical products to digital interfaces to services), it is impossible to provide a clear-cut how-to guide. The idea,





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however, is simple: is your idea a physical product? Make your design from cardboard! Or are you working on a digital interface? Fake the different screens in your app by making it on powerpoint, and then just pretending to press in the right spots to move the screens along. Or maybe you're working on a service? Do yourself, what you imagine the service does – deliver products, offer customized feedback, etc.!

Some examples of different types of MVPs can be found on this [website](#). These [case studies can serve as an](#) example of how others have benefited from MVPs. To check whether your MVPs fulfill all the requirements defined, you can use this [template](#).

Website: <http://scalemybusiness.com/the-ultimate-guide-to-minimum-viable-products/>

Case studies: <https://www.forbes.com/sites/darden/2016/06/07/how-to-design-your-next-minimum-viable-product-3-case-studies/#305f55a3733b>

MVP template:

<https://www.creatlr.com/template/Bw4Rbc8l4kKm0dFcdXoTje/MVP/download/>

Solution Prototype vs. Empathy Prototype [filters: prototyping & testing, beginner]

Before you begin prototyping, identify what kind of prototype you are aiming for – what is it that you are looking to achieve?

Website: <https://dschool.stanford.edu/resources/prototyping-dashboard>

Prototyping Dashboard:

<https://static1.squarespace.com/static/57c6b79629687fde090a0fdd/t/58ed2005db29d6ca0509a2e5/1491935237380/Prototyping-Dashboards+%282%29.pdf>

Community Canvas [filters: co-creation, advanced]

Community management can be helpful in some cases, and even required in others. If you haven't already come across the need for creating a community around your project, it could be useful by now. Prototyping and testing in a co-creative manner together with the community, the user-base of your concept can spark new and innovative ideas while testing and validating these together with the stakeholders you are targeting. The benefit of building a community extends beyond prototyping and testing, since a well-established and run community can help you reach great impact as well as sustainability of the concept in the long term. For more information, take a





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look at their [website](#) or the [summary of the Community Canvas](#). For more detailed instructions, go to the [pdf of the Community Canvas](#) and start working on the [Community Canvas template](#), while asking yourself these [key questions](#).

- Website: <https://community-canvas.org/>
- The community canvas in a nutshell: <http://bit.ly/community-canvas-summary1>
- Guidebook, detailed instructions to the canvas: <http://bit.ly/community-canvas-guidebook1>
- Template, community canvas worksheet: <http://bit.ly/community-canvas-worksheet-summary>
- Template, key questions: <https://docs.google.com/document/d/1fyuwwqX911i9CK1BjY8jXkk3v2m8ZCHeV3dVqYuDiGM/edit>

ITERATION 2: TEST

All the tools that have to do with: test / filter / measure / analyze / validate

Prototype testing plan [filters: prototyping & testing, intermediate]

For simple, clear instructions for planning your prototypes, this downloadable [Prototype testing plan template](#) can be used to see the process step-by-step. On the [website](#) you can also watch a video about the why & how behind this method, that gives you clear guidelines for prototyping and testing.

Website: <http://diytoolkit.org/tools/prototype-testing-plan/>

Prototype testing plan template: <http://diytoolkit.org/media/Prototype-Testing-Plan-Size-A4.pdf>

I like I wish [filters: prototyping & testing, beginner]

For collecting constructive feedback in a positive and creative form, try the “I like, I wish” format. Originally designed to be used within interdisciplinary teams, by creating a format in which all team members can feel comfortable with giving feedback to one another, leading to better team dynamics and collaboration going forward. This is something that is recommended to use within your teams, but has also been proven efficient to gather feedback from your users. User feedback in the form of “I like, I wish, what if” formulates





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the feedback in a way that is more comfortable for users who feel uncomfortable with direct criticism – by formulating it in the form of an “I wish” sentence. The third factor, “What if”, is in turn directed at collecting new ideas and suggestions from the participants. To use “I like, I wish” within your team, take a look at this [website](#) from Aalto Design Factory. For facilitating an “I like, I wish, What if” session, take a look at this [method card](#) by d-school.

Website: <http://ilikeiwish.org/>

Method card by d-school: <https://dschool-old.stanford.edu/wp-content/themes/dschool/method-cards/i-like-i-wish-what-if.pdf>

User innovation toolbox [filters: prototyping & testing, beginner]

Designed by imec Living Labs, the User Innovation Toolbox is a set of methods and tools to be consulted when looking for an appropriate and inspiring way of doing user-centric innovation research. It is a collection of over 80 user-centric innovation research methods suited for agile innovation development environments and multidisciplinary R&D teams. This [toolbox](#) organizes a wide variety of approaches from different backgrounds (design studies, market research, social sciences, ...) in order to provide the right tools for the right questions. This methodology can be used at different stages of the innovation development process.

Website: <https://www.iminds.be/en/userinnovation>

Usability test [filters: prototyping & testing, advanced]

In order to create a product, service or digital interface which is of value for the users, usability is of utmost importance. It is important to create outcomes which are easy and intuitive for the users to use, not causing them difficulties or stress in achieving what they are looking to achieve when using the prototype. UX has to do with creating an optimal user experience, while considering factors like user research, project management, usability evaluation, visual as well as interaction design, and even content strategy and web analytics. For all of these themes and more, complete with methods, templates and guidelines, take a close look at all the materials available on this [website](#). For a number of usability testing guides and tools, you can take a look at this [collection](#). You can also download many [templates](#) to use when conducting your usability testing (consent forms, recruiting, plans and materials, reporting and much more). For example, this comprehensive [usability test plan template](#) may come in handy.





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Website: <https://www.usability.gov/>

Collection for usability testing: <https://www.usability.gov/how-to-and-tools/methods/user-research/index.html>

Templates: <https://www.usability.gov/how-to-and-tools/resources/templates.html>

Usability test plan template:

<https://www.usability.gov/sites/default/files/usability-test-plan.docx>

ITERATION 3: DEVELOP

All the tools that have to do with: develop / deploy / generate / distill / orchestrate / pre-launch

The Bristol Approach to Citizen Sensing [filters: co-creation, intermediate]

KWMC has developed 'The Bristol Approach' which provides a new framework for running inclusive, community-driven digital projects that involve sensor technologies and will lead to the creation of an open 'city commons'. The framework was launched in November 2015 and iterative applications in future technology programs will help people to better understand how active citizenship can be combined with digital innovation. You can find the methodology explained on this [website](#).

Website: <http://kwmc.org.uk/projects/bristolapproach/>

SILK method cards [filters: co-creation, intermediate]

The Social Innovation Lab for Kent has developed a set of method cards for participatory design methodologies, drawing from social science, community development, business and design. Alike many of the method cards and toolkits from the first phases of our user-engagement toolkit, these method cards also present tools for the very early phases of the project. However, many of the tools also have to do with the later phases: planning and communicating your project etc. Take a look at the deck of [SILK method cards](#), split in five different themes: plan, communicate, insight, workshop and design. For more information on the tool and how it came to be, visit this [website](#).

Website: <http://www.socialinnovation.typepad.com/silk>

SILK method cards: https://issuu.com/silkteam/docs/method_deck/18





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Design with intent [filters: co-creation, advanced]

Design with intent focuses on the interaction between design and behaviour. It aims to create both socially and environmentally favorable behaviour changes and provides you with a set of design patterns and approaches to encourage desired behaviour as well as discouraging undesired behaviour. The tools are arranged in eight categories, each providing tools for a different purpose from a different perspective: The architectural lens, error-proofing lens, interaction lens, lucid lens, perceptual lens, cognitive lens, machiavellian lens and security lens. For an overview of all the different tools per category, download this [worksheet](#). Download also the [Design with intent cards](#) complete with an introduction to the method, and for more background information on the method, visit their [website](#).

Website: <http://designwithintent.co.uk/>

Worksheet: http://research.danlockton.co.uk/toolkit/Dwl_worksheets.pdf

Design with intent cards:

http://designwithintent.co.uk/docs/designwithintent_cards_1.0_draft_rev_sm.pdf

CTA toolbox [filters: co-creation, advanced]

CTA stands for constructive technology assessment. The CTA toolkit anticipates challenges and uses of new technologies and innovations in a way that the analysis of this feedback can be fed back into ongoing development, implementation and societal embedding of the innovation. It plays an important role in the early phases of the development process. The toolkit provides an indication of when each tool should be used and at which stage of the process. Familiarize yourself with the CTA methodology on this [website](#) and browse around the six tools in their [toolkit](#): social technical configuration, multi-path mapping, innovation value chain, actor analysis, scenarios and CTA-lite workshop.

Website: <http://www.cta-toolbox.nl/>

Toolkit: <http://www.cta-toolbox.nl/tools/#aim>

Hackathon [filters: co-creation, advanced]

Hackathons are events taking place in a set period of time (usually limited to a few days, often during the weekend) that invite interdisciplinary teams,





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consisting of both front-end and back-end coders and designers from a variety of fields to participate in a competition-like environment. The outcome at the end of the event is a prototype of an application, substantiated with a concept and sometimes even business model/strategy to support the concept. The teams are free to choose their approach, each presenting their prototype at the end of the event to the judges (and audience). For clear instructions on how to set up your own Hackathon, take a look at this [Hackathon guide](#).

Hackathon guide: <https://hackathon.guide/>





PHASE 3: EVALUATION

Many of the toolkits available across the various sources have focused on the previous two phases, but the third phase of evaluation is equally important. Beginning with the first iteration “launch”, the final prototypes, products and services are realized and delivered. Very similarly, the second iteration “implement” refers to delivering to the stakeholders, but further so, focuses on the process of fully implementing the product/service and explaining its importance and impact for the context. The third iteration “Identify” finally identifies the outcome of the process and ensures the ongoing sustainability of the product/service in the future.

ITERATION 1: LAUNCH

All the tools that have to do with: launch / deliver / realize

Scrum & Sprint [filters: prototyping & testing, advanced]

Scrum is a framework for developing complex products. In going through this product development process, each team member is given specific roles and the process is followed thoroughly, ticking off tasks in going forward. The Scrum process can be organized as a sprint, a maximum one-month intensive event for completing a project from start to finish. The Scrum is included in this phase of the process, as the end goal of it is launch, which is something that most of the tools don't address. A wealth of materials on Scrum can be found on their [website](#), and [the scrum guide](#) provides a comprehensive document in learning the rules of the game. Prefer to watch a video? Take a look at their repository of [webcasts](#) to learn more.

Website: <https://www.scrum.org/>

The scrum guide: <http://www.scrumguides.org/docs/scrumguide/v2016/2016-Scrum-Guide-US.pdf#zoom=100>

Webcasts: <https://www.scrum.org/resources/webcasts>

Value Proposition Canvas [filters: co-creation, beginner]

The value proposition canvas is a well-known tool to verify if the values you are aiming to offer through your concept are created, whether it is a product or a service. This template allows you to pay special attention to the wants and needs of your end-users. You can download the template, after having filled in your email address, from this [website](#).





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Website: <https://strategyzer.com/canvas/value-proposition-canvas>

Business Model Canvas [filters: co-creation, intermediate]

Towards the end of your development processes, it's time to think about the viability of your concept. The business model canvas is a widely used template where you can fill in all of the necessary information to make sure you have covered the most vital aspects of creating a successful business. To consider end-user engagement, pay special attention to the value proposition part of the canvas, to make sure you are creating real value for your end-users. Also ensure that the customer relationships and customer segments boxes are filled in with true and validated information. From this [website](#), you can download the template after filling in your email address. It's a good idea to check the previous tool, the Value Proposition Canvas, first, since information from this canvas feeds into the Business Model Canvas.

Website: <https://strategyzer.com/canvas/business-model-canvas>

ITERATION 2: IMPLEMENT

All the tools that have to do with: implement / produce / explain

Co-implementation [filters: co-creation, advanced]

The term co-creation is widely used and applied along the entire process, and co-implementation refers specifically to this last phase of the journey. From co-design to co-production and finally, co-implementation, the purpose is to engage with your end-users from start to finish. You can read more about co-creation on this [website](#). To look at co-implementation specifically, read the introduction to [manual joint knowledge production](#) and finally, download the [handbook](#) - manual of joint knowledge production for urban change - to guide your way through co-implementation.

Website: <http://www.mistraurbanfutures.org/en/our-research/co-creation>

Manual joint knowledge production:

<http://www.mistraurbanfutures.org/en/manual-joint-knowledge-production>

Handbook:

http://www.mistraurbanfutures.org/sites/default/files/project_handbook_english_version_may_1_2013.pdf





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Social media strategy [filters: co-creation, advanced]

Explaining your outcome is also a part of implementation - spreading the word, getting your idea out there. Social media can be a strong tool to reach a large audience in a short amount of time. To create a social media strategy to communicate your outcome, take a look at this [website](#) - you can find some downloadable templates also by filling in some contact details.

Website: <https://coschedule.com/blog/social-media-strategy-template/>

ITERATION 3: IDENTIFY

All the tools that have to do with: identify / outcome

Tips & tricks [filters: co-creation, intermediate]

Since early 2014, the Bristol Living Lab (hosted by [KWMC](#)) has been working with academics and local residents to identify some of the key questions, issues and considerations that impact the work of community activists. Building on the 20 years of experience and expertise of KWMC and following some key workshops they organised, Bristol Living Lab developed the ideas into sets of 20 recommendations. The recommendations are inspired by the work and advice of local activists: 'Tips and Tricks for community activists' and 'Tips and Tricks for Living Labs'. They have supported representatives of other Living Labs and international delegations to explore how they can develop positive relationships with communities, create an environment of trust and openness, and demonstrate the impact of their work. For more information, consult this [website](#).

Website: <http://kwmc.org.uk/projects/tipsandtricks/>

Crowdsourcing [filters: co-creation, advanced]

Many have heard of Crowdfunding, where you are looking to get financial funding in an open platform manner from future users. It's a great way to see, without burdening yourself with a large financial investment, whether people are ready and willing to pay for your products or services. However, Crowdsourcing can also be extended further: instead of money, you can also





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crowdsource ideas and prototypes (see for example Hackathons in previous tools), branding or marketing content. Often in the form of a competition, a successful crowdsourcing campaign is closely related to the creation of an engaged community of users. Before you start your Crowdsourcing campaign therefore first take a look at the Community Canvas tool in this toolkit. This [website](#) offers a downloadable book called "[guide to crowdsourcing](#)" to help you get started.

Website: <https://www.gitbook.com/book/towcenter/guide-to-crowdsourcing/details>

Guide to crowdsourcing:

<https://www.gitbook.com/download/pdf/book/towcenter/guide-to-crowdsourcing>



BACKGROUND MATERIAL FOR THE TOOLKIT DESIGN

In this chapter the background information to the design of the toolkit is included. This information is provided for reference to understand what the toolkit structure is based on, but will not be published online.

This toolkit has been designed based on literature research collecting information on existing toolkits, innovation processes and methodologies. The structure of the toolkit (the three phases and the iterations inside these phases) represent a summary of the different innovation processes identified through research. The sources which have contributed to the different terms used inside these phases are:

Source						
Schuurman et al. (2016)	Exploration		Experimentation		Evaluation (testing)	
	Idea	Concept	Prototype	Pre-launch	launch	post-launch
Stefan Moritz: Practical access to service design	SD Understanding	SD Thinking	SD Generating	SD Filtering	SD Explaining	
					SD Realising	
mediaLABamsterdam	Know User	Frame insights	Prototype	& Test		
	Define Intentions	Ideation & concepts				
UK Design Council	Discover	Define	Develop		Deliver	
The Bristol Approach	Framing	design	deployment	orchestration	outcome	identification
Design Thinking	Discover	Define	Develop		Deliver	
	Empathize	Define	Prototype	Test		
		Ideate				
ZURB Design process	Define		Prototype	Analyze		
	Ideate		Build			
UX process flow	Research	Strategy	Test	Validati		



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				on		
		Design		Measur ement		
Basic design process	Observation	Brainstormi ng	Prototyping		Implement ation	
	Discovery	Ideate	Create		Produce	
	Design	Visualize	Build		Launch	
	Research				(Test)	
	Immersion					
	Understand					
	Observe					
The design gym	Examine	Understan d	Ideate	Distill		
			Experiment			
Living Labs methodology	planning	concept design	prototype design	usabilit y evaluat ion	innovation design	innovatio n design
	appreciating opportunities	designing concept	appreciating opportunities		appreciati ng opportuniti es	user experienc e evaluatio n
		evaluate utility and usefulness				commerci alisation





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From these, the structure used in the toolkit, consisting of phases and iterations, was formed:

Exploration		Experimentation		Evaluation	
idea + concept		prototype + pre-launch		launch	post-launch
1 understand		1 prototype		1 deliver	
research		build		realize	
know user		create		launch	
planning		appreciating opportunities		innovation design	
2 discover		2 test		2 implement	
immersion		filter		produce	
empathize		measure		explain	
observation		usability evaluation		appreciating opportunities	
appreciating opportunities		3 pre-launch		3 identify	
3 define		analyze		outcome	
need / pain		validate		user experience evaluation	
opportunity / gain		distill		commercialisation	
frame insights		orchestrate			
concept design		4 develop			
4 think		deploy			
ideate		generate			
brainstorming					





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5	conceptualize					
	frame					
	examine					
	visualize					
	evaluate utility and usefulness					

Furthermore, four “tracks” have been identified, which on the website will work as filters. These tracks have been identified as the needs of the LSPs, based on questionnaire and interview answers from the LSP projects. The summary of the needs, as expressed by the LSP projects themselves, and their categorizations, are included below:

LSP needs identified from questionnaire/interview results:

Current Phase

- Defining **use cases** through **co-creation** (Synchronicity)
- **Co-creating** solutions (ActivAge)
- Defining requirements (AutoPilot) -> **use cases**
- First tests (AutoPilot) -> **prototyping & testing**
- Design & Development of MVP (IOF2020) -> **prototyping & testing**

LSP Entry Points

- **Use cases**, requirement specification, user acceptance (AutoPilot)
- **Use case** validation, user acceptance, ecosystem development (IOF2020)
- **Use cases**, scenario creation, user needs through **co-creation** (ActivAge)
- **Co-creation** tools for cities

LSP Methods

- User acceptance testing UAT (AutoPilot) -> **prototyping & testing**
- Esafety challenge = awareness campaign, iMobility challenge = product demos -> **prototyping & testing**, udrive = unobstructive observation of driving habits = observation (AutoPilot) -> **user research**
- Participatory research (IOF2020) -> **user research**
- Advisory boards / steering groups (IOF2020)
- Focus groups (ActivAge) -> **user research**
- Interviews (ActivAge) -> **user research**
- Mock-up evaluations (ActivAge) -> **prototyping & testing**
- Usability testing (ActivAge) -> **prototyping & testing**
- UX evaluations (ActivAge) -> **prototyping & testing**





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- Technology assessment (ActivAge) -> [prototyping & testing / co-creation](#)
- [Co-creation](#) methods (Synchronicity)
- Workshops (Synchronicity) -> [co-creation](#)
- Webinars (Synchronicity) -> [co-creation](#)

Toolkit

- [Co-creation](#) IOT services for cities (Synchronicity)
- Tools for end-user engagement but also [co-creation](#) (Synchronicity)
- Useful to complement UCD (ActivAge) [co-creation](#)





ANNEX: SCREENSHOTS OF THE TOOLKIT ON THE WEBSITE

Welcome to U4IoT Toolkit

This toolkit is to guide the Large-scale pilot (LSP) projects and especially the pilot sites through the innovation processes, with a special focus on user-engagement. It comprises methodologies and tools found across literature and online, put together in a format that follows the different phases along the innovation process. These three phases, namely: exploration, experimentation and evaluation, have been further divided in 3-5 iterations. These iterative steps within the three phases contain links to more detailed instructions, tools and methodologies for the trial sites to refer to in the quest for end-user engagement along the innovation processes.

Although organized in a manner that the phases and iterations could be followed in a step-by-step manner, from beginning until the end, the purpose of the entire process is that it is followed in an iterative manner. This means that the different phases and iterations in the innovation processes are often overlapping, repeating, and mixing in order. Throughout the journey the need to jump back and forth between the different phases is to be noticed.

Read more ▼

PHASE 1 - Exploration	PHASE 2 - Experimentation	PHASE 3 - Evaluation
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The first phase of the toolkit is "exploration". This phase begins with the iteration "understand", and forms the basis for understanding the context, problem, and users. Followed by the second iteration "discover" that is characterized by immersion in the situation, empathizing with the users and

Expoloration Tools

ITERATION 1: Understand

Design Thinking Crash Course +

Living Lab Methodology Handbook +

Interview: The five why's or Laddering +

Collage +

Photo Journal +

ITERATION 2: Discover

Game Jams +

Observation & Shadowing +

Guided Tour +

Empathy Prototype +





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Design Thinking Crash Course ⊖

user research, beginner

Ideo and d.school are the most commonly known names in the field of Design Thinking, so this is a good place to start. One way in which you can begin is by going through the entire process once, in a crash-course like manner, compressed in a very short amount of time. This Design Thinking Crash Course will help you do just that, so gather your participants and begin the journey! Take a look at this [website](#) for everything you need, and this [playbook](#), that serves as an instruction manual to guide you, the facilitator, through the process. However, it is worth to remember that such a short session can only work as an introduction to Design Thinking, since in reality it is important to work "in the field". Design thinking is not limited to the boundaries of the four walls in which you are conducting workshops. Instead, you need to really get out there, interact and empathize with your users to understand them. For many ideas on how to follow the process in the real world, take a look at the [Bootcamp Bootleg](#) cards by dschool, or follow the instructions on the [field guide](#) to

Living Lab Methodology Handbook ⊕

Collage ⊕

