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Prototypes

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Dissemination Level

| | | |
|--------|--|---|
| PU | Public | |
| CO | Confidential, only for members of the consortium (including the Commission Services) | X |
| EU-RES | Classified Information: RESTREINT UE (Commission Decision 2005/444/EC) | |
| EU-CON | Classified Information: CONFIDENTIEL UE (Commission Decision 2005/444/EC) | |
| EU-SEC | Classified Information: SECRET UE (Commission Decision 2005/444/EC) | |

Dissemination Type

| | | |
|--------|--|---|
| R | Document, report | |
| DEM | Demonstrator, pilot, prototype | X |
| DEC | Websites, patent filling, videos, etc. | |
| O | Other | |
| ETHICS | Ethics requirement | |

Table of Contents

| | |
|--|----|
| Executive summary | 4 |
| 1. Design process overview | 5 |
| 1.1 Rationale | 7 |
| 1.2 Process timeline | 7 |
| 2. Iteration #1 | 9 |
| 2.1 Pre-ThingsCon | 9 |
| 2.2 ThingsCon | 10 |
| 3. Iteration #2 | 16 |
| 3.1 Design Challenge | 16 |
| 3.2 Workshops | 19 |
| 4. Iteration #3 | 23 |
| 4.1 Design-research on IoT Start-ups | 23 |
| 4.2 Start-up 1 and Start-up 2 | 27 |
| 4.3 Start-up 3 | 31 |
| 5. PESIA - Iteration #2 | 32 |
| 6. Next steps | 32 |
| | |
| Annex I - Tools & Flow - SoA analysis | 35 |
| Annex II - Tools & Flow - Iteration #1 | 42 |
| Annex III - Tools & Flow - Iteration #2 | 42 |
| Annex IV - Tools & Flow - Iteration #3 | 42 |
| Annex V - PESIA - Iteration #2 | 42 |

Executive summary

In the previous deliverable D3.3 we presented ideas for prototyping from the developers during co-creation workshops. This deliverable contains a framework, design principles and prototypes built upon the research from the co-creation workshops, the insights from the ethnographic research, a new design research on IoT entrepreneurs, several rounds of testing as well as reflections on possible integrations with the PESIA self-assessment questionnaire.

This deliverable concerns the second part of the tasks described in T5.2 (Design of ethical impact self-assessment tools for developer communities) and in T5.3 (Develop tools and materials to support developers in negotiating, articulating and acting on shared ethical values).

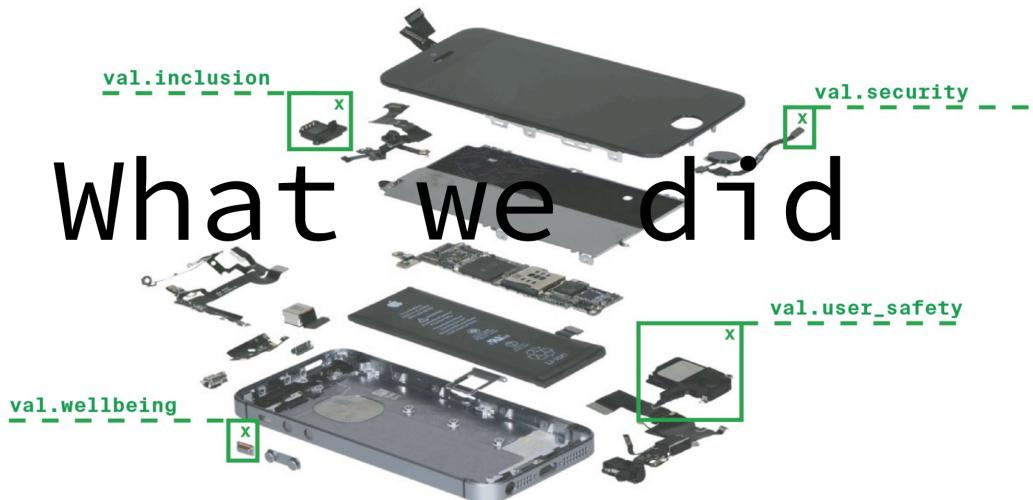
In our research, workshops and prototyping, we have uncovered valuable and unexpected insights into the underlying needs of IoT creators in relation to ethics. While some may expect simple checklists of ethical evaluation, instead we propose tools that lend themselves to ongoing and interventionist techniques and can take place over the course of the design process, and beyond during the implementation, when creating connected things. Furthermore, said tools are being designed to enable and structure several steps of ethical awareness: from articulation to moral imagination to addressing value misalignments in decision-making. Through deep collaboration with our partners, we have immersed ourselves in the ethical framework of VIRTEU and used it as the foundation for our prototype-tools.

From a methodological perspective, the main challenge to creating prototypes to conduct self-assessments and to support reflection on ethics of data practices in their design processes has been to map out the field of ethical tools, find their strengths, weaknesses, opportunities and threats, as well as assess the puzzle of what IoT developers say they need, what current tools provide, and what our research has shown in terms of the most outstanding gaps for tools for ethical reflection. Understand how we can best contribute to find the right language and structure that will not make it too daunting for IoT developers to complete without assistance. To address this challenge, we have drawn on the previous ethnographic work of our consortium partners and the knowledge from D4.4, we have carried out additional design-research on IoT entrepreneurs and several rounds of testing with different stakeholders and in different contexts.

This deliverable documents the activity carried out from August 2018, when the previous co-design activity was reported in D3.3 “Prototype Tool Concepts”, till August 2019. It describes the iterative prototyping process led by CIID including the different versions of the tools and their testing. The deliverable includes as well the results currently achieved by ORG aiming to transform the PESIA questionnaire into a digital tool that will be finally released and presented in D6.3. In the end this deliverable collects ideas of integration among the different tools toward the final PESIA kit.

1. Design process overview

1.1 Rationale

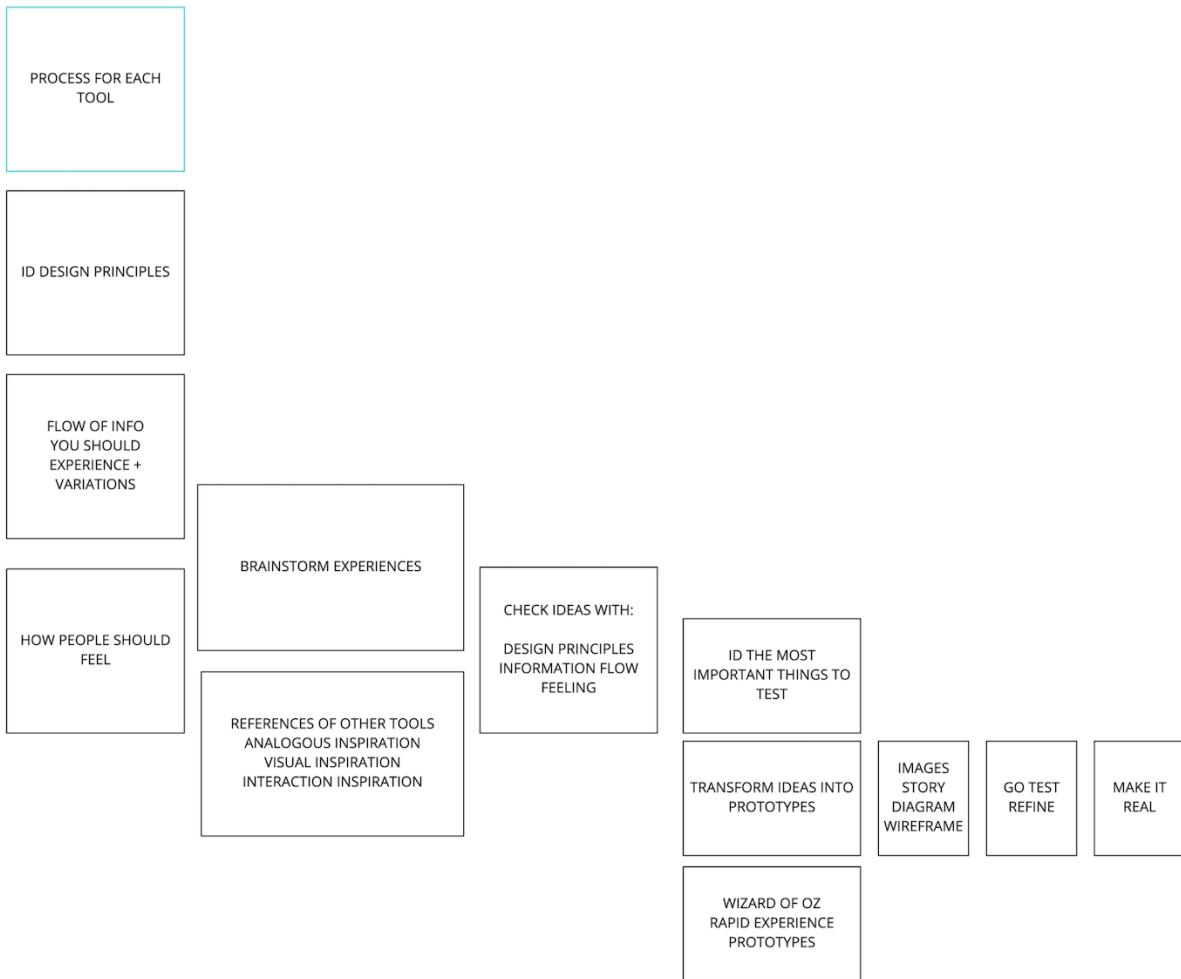


The process that we identified and began to test in December 2018 is one where the underlying goal is to develop and share **tools for ethical reflection and self-assessment**, tools that are crafted to be relevant to and integrated into various IOT design and development processes.

Therefore, first we needed to understand:

- What the state of the art is at present in terms of developing tools for ethics in technology, and then in IOT
 - Leading to: what that state of the art is missing
- How our project partners understood the concepts of ethics in IOT - as our partners focused on identifying the conceptual foundations of ethics in IOT as well as ethnographic foundations of ethics in IOT
 - Leading to: what our partners in the field have identified would augment and highlight the conversations they have started about ethics in IOT - for example, if our partners identify that ethics comes up when there are conflicts in underlying values, what kind of tool might we design to enable that conversation around conflicting values (ethnographic study of ethics in IOT)? Or, if the theory of "care ethics" is integral to enabling ethical self-reflection in IOT, how might we integrate that theory in our tools in a tangible and actionable way (conceptual framework of ethics in IOT)?

For each tool, as well as for each flow conceived and tested, we went through a process described in the following drawing.



In our own research, through co-creation workshops and interviews, we identified that several elements were particularly meaningful to approach among all of the areas identified together with our partners. **Ethics is something that comes up in difficult decisions**, in pivots, and of course, in public relations disasters where an outside party identifies a problematic aspect of the product.

Ethics can come up when e.g.:

- There is a difficult decision to make, which may happen because of financial pressure, financial or other types (sometimes different definitions of ethics!) pressure from investors, a client or others with higher power than designer/developer/team
- A member of the team quits or threatens to quit, which may happen because their core values in relation to the work they do have been crossed / or infringed upon too many times
- An external actor identified a problem and has informed the press about this (highest level of escalation), which may happen because of either predictable or unpredictable impacts of the product

However, simply stating a code of conduct, manifesto, list of values, without considering how those important elements are quite literally taken into account in the product itself has been one of the most impactful tests we have made thus far.

At the same time, we need to collect these values in order to understand at least what that start-ups aspiration is. This list enables us to ask questions that could alter how they perceive their values and how these values are or are not represented in the product.

This questioning of the values together with the product opens up a new area to re-think - an area that is uncovered by our PESIA questions - and an area that then requires an ethical re-think and re-design of the product. However, just as in any other difficult issue they will face throughout their work, this issue and its implied decision needs to be supported through a variety of tools that are tuned towards understanding possible impacts of this problem and therefore its solutions and decisions.

Here we take inspiration from our interviews with IOT developers and designers, e.g. FROLIC Studio interview, as well as frameworks for decision-making, where we see a need for supporting both creators and their possible external powered counterparts, investors etc., to think through and be able to discuss and present difficult decisions in a meaningful way.

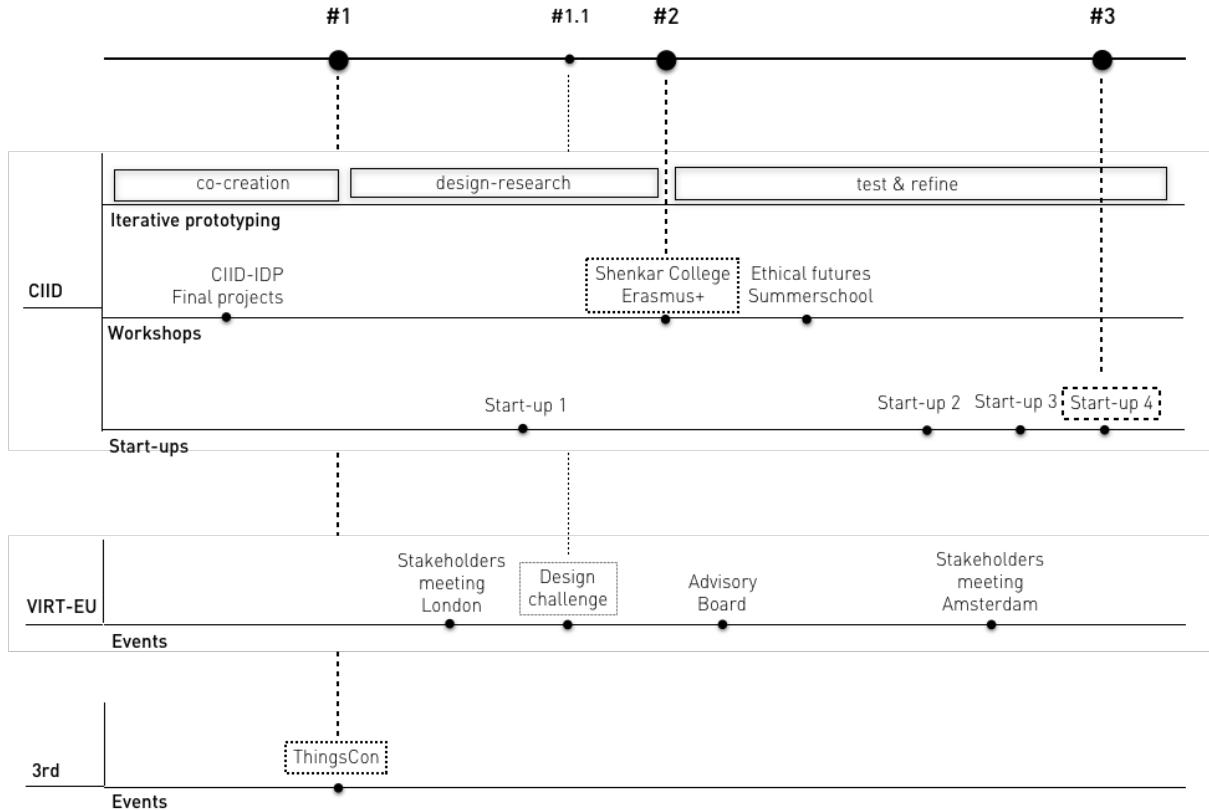
In order to make a decision, there are many processes one could follow. The process we have identified through both our fieldwork and desk research contains some of the steps of a notional "moral algorithm". **Take the things you care about. Take the options you are identifying. Go more deeply in those options by thinking through what kind of scenarios they might enable or disable, on a spectrum of positive, creepy, negative. Having thought through the impacts of those options, now evaluate: how well they would meet the priorities you stated before? Whichever option has the best alignment should be the option you would take if you are trying to take the most morally-aligned decision. Decisions may require re-evaluation of the values themselves, or the options.**

This framework is inspirational, however, we needed to consider how and whether it integrates with decision-making in the IOT area and for our audience. We went through several rounds of workshopping and testing the framework, iterating upon it between each session. Thinking through a difficult decision in terms of what one might do requires the ability to engage with the fields of futurescaping, speculation, imagination, foresight. These are fields that support the required thinking to understand how a decision might impact a product, its context, its users, its society, beyond the most desired and obvious use case scenarios. Only making time, space and energy for this kind of thinking can help developers and designers to create more ethical products.

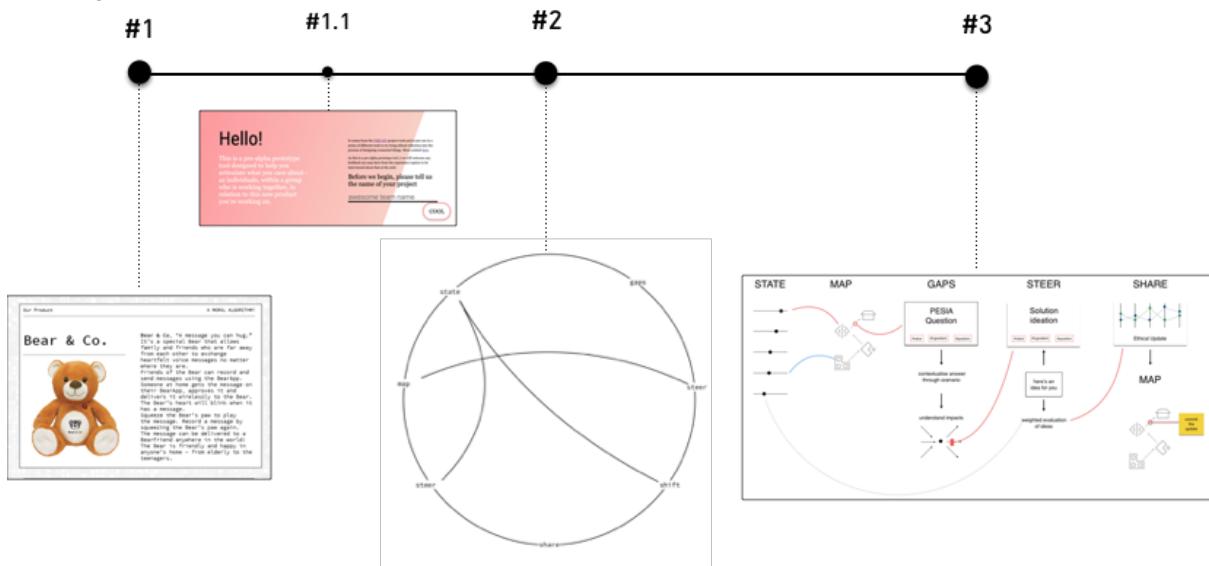
And if creators ought to create more ethical products, or try to take ethical critiques into account when building their product, then they need both help and time to learn how to think in this way as opposed to through the classic lens of pure financial viability.

1.2 Process timeline

The iterative prototyping process is a seamless one where insights, design principles and feedback shape and re-shape the different tools in slightly different formats and configurations through events, presentations and testing sessions. All these "events" and reflections/design activities are summarized in the following timeline.



In order to present the different versions of Tools and Flows prototyped and tested, we envisaged 3 main iterations.



We have tested a variety of our tools, at different stages of fidelity, with 5 professional groups, 2 student groups and 2 groups of stakeholders.

Professional groups:

1. Consulting group designing an IOT product for an external client (Start-up 1)
2. Early stage start-up creating an IOT control system for remote robots (Start-up 1)
3. Early-stage stage start-up developing a wearable for personal behaviour awareness and change (Start-up 3)
4. Mature start-up creating a modular IOT solar-powered electricity system (Start-up 2)
5. Participants in the VIRTEU Design Challenge - designing for the connected home

Workshops:

- A. Design and engineering students collaborating to create ideas for start-ups for the connected home (Workshop with Shenkar College within an Erasmus+ project)
- B. Diverse students collaborating to envision solutions for future problems (Futurescaping workshop during CIID SummerSchool)
- C. Stakeholders (Amsterdam and London workshops)

2. Iteration #1

2.1 Pre-ThingsCon

Developing new tools for supporting ethical decision making requires a deep understanding of what kinds of ethical tools might already exist. In fact, the proliferation of ethical tools for design has followed recent discussions about ethics and responsibility in the way of the EU promotion of RRI principles. The partners conducted an extensive overview of all available ethical tools, guidelines, codes of conduct and working group statements intended towards an audience of designers, engineers and developers. A list of these tools is included in Annex I. The VIRT-EU tools the project produces leverage existing knowledge in the deployment of tools in this space and addresses problems these tools have already encountered in their adoption and implementation. Although the gaps we identified in existing tools are not absolute - some tools try to address one or the other - few tools address any one of these gaps with the thoroughness it requires.

1. The tools that exist currently lack the ability to truly take into account change and input over time. As such, they do not reflect the evolution of a company's decisions and how those decisions do or do not match the company's material product choices.
2. Together with point 1, we see a lack in active integration of legal aspects upon which decisions might infringe.
3. There is very little consideration of social discussion that can enhance an individual's understanding of a given issue. How have their peers dealt with this issue? How would their peers review their decision or solution? Would there be a way to integrate willing and able legal/ethical experts as reviewers in the process of decision-making?
4. Though considering unpredictable outcomes is crucial to these tools addressing tensions that have not yet occurred but may occur in the future, there is little to no attention paid towards immersion in speculative outcomes nor structured speculation to enforce that creators consider where their product might go if certain technological developments (whether negative or positive) were to occur.
5. Many IoT developers describe that their sense of ethics and company values often become more or less prioritised and even misaligned when they are choosing certain materials that compose their product, and secondly, when they have meetings with investors and other stakeholders. Yet the current ethical tools do little to facilitate or prepare creators for the difficult discussions that will take place around the material and investor decisions.

Based on the previous research and workshop activity on November 29th and December 6th 2018, we ran co-design workshops at CIID and ThingsCon, where we explored a new flow and structure for some of the different components we have been building over the previous few months.

We had a first run of the flow and framing at CIID with a group of 6 people that mixed designers, technologists, journalists and project managers. Based on feedback and brainstorms after the CIID co-design session, we decided to make several changes.

1. We changed from participants choosing a few values out of a list to have participants work with a full list of the values of Bear & Co. - as when you work for a company, you cannot pick and choose immediately, rather you have to negotiate your stance.
2. We tested a new visual method for reflecting upon and weighing one's values.
3. We decided to incorporate the numerical ratings and weightings throughout the more creative steps of the process - both for ease of navigation and for a tighter reflection of a two-sided process (where one is more creative, whether through visuals or stories, and the other is purely quantitative translations).

2.2 ThingsCon

At ThingsCon, we had 12 people - again a mix of designers and technologists, though in this case the individuals were already interested in IOT and its implications.

PART 1: Company and Values

The image shows a digital interface with a light blue background featuring a repeating geometric pattern. In the center is a white rectangular card with rounded corners. At the top left of the card, the text "Our Product" is visible. At the top right, the text "A MORAL ALGORITHM?" is visible. Below this, the title "Bear & Co." is displayed in a large, bold, black font. Underneath the title is a photograph of a brown teddy bear sitting upright. The bear has white paws and a white belly patch featuring the "Bear & Co." logo. To the right of the bear, there is a block of text describing the product:

Bear & Co., "A message you can hug." It's a special Bear that allows family and friends who are far away from each other to exchange heartfelt voice messages no matter where they are. Friends of the Bear can record and send messages using the BearApp. Someone at home gets the message on their BearApp, approves it and delivers it wirelessly to the Bear. The Bear's heart will blink when it has a message. Squeeze the Bear's paw to play the message. Record a message by squeezing the Bear's paw again. The message can be delivered to a BearFriend anywhere in the world! The Bear is friendly and happy in anyone's home - from elderly to the teenagers.

We begin the workshop by inviting the participants to join a new connected toy company, "Bear & Co." We introduce the company by showing a video about the current product that explains how it works and demonstrates some use cases.

We then ask participants to reflect upon how they do or do not identify with our company values - a predefined list of what we at Bear & Co. have decided is important. They first draw their engagement with the values by creating a radial visualisation, and then translate this visualisation into the numbers it represents.

Participants first draw their abstract shape of values, and then unfold and answer exactly what each value is on a scale from 0-1

Rationale: Our rationale for using a fictitious company and product is two-fold. Firstly, these co-design sessions are oriented towards a broader audience than just one company, therefore we needed to have a project for the group to be able to all understand (still at varying levels given different technical backgrounds) and engage with. Secondly, we are interested in the potential of a simulation or rehearsal of ethics, where individuals and teams are not immediately working on their own problems, rather they are getting familiar with how to talk about and navigate ethical issues without the immediate consequence of impacting their company's own product development. The overarching idea for the rehearsal is that it is part of a series of simulations where the next simulation might be a simulated ethical situation that involves a specific company's own product. The next situation might be the company's actual product and an actual dilemma that they are currently facing or will face in the near future given their product development plan.

Notes: Some groups chose to show their individual lines rather than only have a single group line. This confirms a potential idea for augmenting the Values Visualisation process such that individuals would first note their own lines and then negotiate their lines with their teammates' lines, coming up with a final visualisation that potentially shows their differences and therefore possible future tensions.

We ask participants to take on a role when they sit down to the company table. However, the role immersion is extremely minimal: a piece of paper with a role such as "product designer" on it. Participants suggested that we might include more information so that they would know what their role might care about in terms of the values and scenario evaluation.

PART 2: The Problem

We present "The Problem" as a question that a remote co-worker is trying to evaluate, incorporated as a Skype call (pre-recorded video) in the middle of the flow of the workshop. The question has at least two distinct choices. It is not immediately obvious whether one or the other would be better. We also provide a few discussion points for the group to consider the choices. They are invited to create their own alternatives but given the time constraint this is not the main focus of that workshop's activity.

| Main Scenario | A MORAL ALGORITHM? |
|---|---|
| <h1>Happy or Sad Bears?</h1> | |
| Description | |
| <p>The Bear is up and running and the BearApp is solid. We're now adding a new feature to the app where app holders can track the emotional progression of the voice messages. Super exciting new step for Bear & Co. to push into the field of tracking emotional wellness and providing as much</p> | <p>usefulness to our customers as possible. We're deciding whether to do the machine learning on the chip in the Bear itself, or in the cloud. What do you all think?</p> |
| Option A <p>Let's implement the A.I. feature. People are going to love tracking how their communication progresses.</p> | Option B <p>No way. People can figure out how each other are feeling by just being in better touch.</p> |
| Discussion Points | |
| <p>Would implementing machine learning make Bear more or less sustainable? Are there under-represented audiences who might be able to communicate better if they had the support of the emotional tracker? Would people be fearful that they were being monitored?</p> | |

"The Problem" sheet that participants receive after listening to the call

Rationale: As our ethnographic team at LSE points out, and as Katie Shilton writes, pivot points could be moments to integrate an ethical reflection tool. Pivot points could be about technical constraints or getting platform approval, as two examples. "Confronting technical constraints such as not being able to collect data continuously from phone cameras or microphones also spurred values conversations about why these constraints might exist (Shilton and Greene, 2017)." Therefore, we chose to force a situation where certain technical constraints and new features were being added to the product.

PART 3: Moral Imagination

After understanding the question their "remote colleague" posed to them, we asked the participants to evaluate their options by engaging their moral imagination: that is, how could things go well, weird, or bad if they took either one of the options?

We asked them to consider "destabilising factors" such as under-represented communities or users in this scenario building.

Participants' scenario inputs to the option of implementing A.I. in the bear

In the above case, the participants considered the option to Implement the A.I. (Option A) and the good, weird and bad scenarios that could come from this option. They used our provided destabilising factors but swapped some. In "good x under-represented", they wrote: "People in the spectrum can benefit from extra social/emotional information they might miss, therefore they can participate more." In "weird x climate", they wrote "False sense of happiness because the A.I. is based on fake/false emotions. This creates the impression that there is something wrong with you. This makes you less busy with living sustainably." The connection to the destabilising factor is tenuous in this scenario, though the emotional consequences are clear. Lastly, in relation to "bad x context", they wrote "In China, the bears are used for social credit score. This creates unease and therefore social unrest and results in violence. The Tianemen Big Bear Burning." These scenarios are in the realm of possible and were written by a team that already works on IOT design and development on a daily basis.

Based on the situations they envisioned could occur if they took either option, they then rated how well each option would do in meeting their core values. If an option was misaligned with a value, they rated it at 0, whereas if an option would clearly support a value, they rated it at 100. This step again crosses between rich storytelling and numerical evaluation.

Option A is to implement the A.I., Option B is to not implementing the A.I.

Notes: The step of scenario making requires more structure though they work as of now.

As they consider an option, they want to more fluidly map out the positive and negative possibilities before diving into a scenario. This is demonstrated by the notes that participants took for themselves on The Problem sheet as well as the discussion that began and often needed to continue for a long time before a group was ready to engage in writing a scenario.

Writing a scenario comes more easily to some than others. Furthermore, they would benefit from direction about where in the Futures Cone (Voros, 2007) of likelihood they should aim. The cone includes possible, probable and preferable futures. These are the three areas we would like them to explore but perhaps this could be integrated into the experience both spatially and graphically.

How might we weave the consideration of values more directly in the scenarios as opposed to integrating them as bookends to the scenario writing experience? For example, they could work on scenarios that cross the following angles: "weird", "sustainability" and "under-represented populations."

Other approaches to scenario writing include the facilitators sharing certain predictions and trends to inspire the participants' understanding of the possible outcomes or futures that could occur from a given dilemma. We could integrate this step more clearly; as of now,

those relevant trends are to some extent encompassed in the "Destabilising Factors." However, we only hand out simple cards with a terse description rather than going into depth about each one.

PART 4: Algorithmic Evaluation

Having completed the values and moral imagination exercises, participants input the numbers they have created throughout these exercises into the "Moral Algorithm" spreadsheet. In this spreadsheet, they create weighted ratings (that take the importance of each value into account) and once they add each weighted rating for each option, one option will have gathered more points than another. The points numerically show that one option was evaluated to be more aligned with the group's values and the relative importance of those values.

Option B (not to implement the A.I.) has the most points in this team's case

Rationale: While a checkmark solution to ethics is strongly against VIRTEU's ethos, this series of steps towards a mathematical answer is less a checkmark than a complex algorithm that documents participants' internal evaluations. According to Steven Johnson's book, *Farsighted*, "A moral algorithm is a series of instructions for manipulating data that generates a result in this case a numerical rating for the various options being considered. I suspect many of us will find this kind of calculation to be too reductive, taking a complex, emotional decision and compressing it down to a mathematical formula. But, of course, the whole process is dependent on the many steps that have preceded it."

PART 5: Newspaper

We created a template of a newspaper article for participants to summarise their experience and pull out some crucial elements, such as which values were the most supported or tested by their decision-making.

The team wrote that they became particularly considered when considering possible social outcomes of implementing A.I. in the bear. They also write that the experience was hard work and insightful. Their decision not to implement A.I. "came from their values of privacy and security." Indeed, if we look back at their Values Card, we see that they noted .9 for privacy, security and social impact in terms of the importance of those values to their team. Furthermore, technically, the Moral Algorithm worksheet gave them the answer that Not implementing the A.I. would be more in line with their values.

Final Feedback

After having experienced the workshop, we invited the participants to brainstorm alternatives for the different steps and tools they experienced. They left feedback for each major area and some volunteered to continue to work on the project with us.

The main points of constructive critical feedback are the following, and are all points taken into account in the further iterations of the experience.

INTRODUCTION

Give an overview of the exercises in the beginning, a personal introduction with people's backgrounds and examples of what an A.I. could or could not do in "The Bear Case."

Give more explanation about the roles and their according views. More movement - maybe try changing roles

VALUES

All values seemed equally important. Maybe have more diverse values such as technical, financial, social, environmental impact. To use values it would be good if there was some scarcity in points you can assign. Now there is no reason not to draw a full circle, but in real life that is not realistic.

Describe an example instead of terminology: This can support the team so we can talk about the same thing. Words are open to interpretation, leading to miscommunication.

Value Bingo: Make it a method on its own in order to have team members synchronise their values and discuss those where there is less overlap.

1 group marked their shape with each individual's own perspective

MORAL IMAGINATION

The statement "if everyone in the world" contradicts the exercise because we are asked to think of specific scenarios and contexts that do not apply to everyone in the world

It was not easy to think about under-represented groups. You might come up with a set of cards.

Rating Card: 1 group divided the rating into a rating for users and a rating for the company.

MORAL ALGORITHM

Make a simple app to fill in certain parts instead of only papers

In the beginning, it was difficult for me to understand and to put values on moral content but at the end everything became clear with the algorithm method. And I saw how it could help me / us to see which could be a good decision or not for the company.

One group's notes on the algorithm sheet: Option A scores higher, but has to do with the fact that because of the AI we valued values for AI higher than without, because there was more risk. So we didn't value identically for each.

OVERALL: How might we package this experience in different ways?

Could we have another session online?

The workshop should be necessary for any AI project at the EU level to start

Think before building: this would be useful at the ideation and business strategy phase. For example, when deciding if AI would be a good idea. Then explorations can be done in each expertise before anything is built. Especially in legal/privacy/security matters in context to user needs.

Help companies get their priorities straight: I can imagine this as a consultancy service. What values are important in the company, but also some learning about the different values, for example, compare it to the pyramid of Maslow: without basic safety (e.g. privacy), other values are less relevant. And what should be the role of the company? We are quick in assessing that governments should not provide social media, but is it the task of a company to adjust the behaviour of people

Useful in IOT Dev: When deciding on what to develop. When considering it being "useful" or "beneficial" for a user.

Based on the ThingsCon experience and the feedback received we concluded that several aspects of the “flow” would benefit from more structure, attention and time. In particular:

Values:

Coming up with communal re-definitions of the values

Openness of adding more

Limiting how much each value can be supported

Moral Imagination & Storytelling:

Try to integrate more of a “futurescaping” approach

“Destabilising factors” / trends / predictions

Risk / likelihood of scenarios: staying on the edge of imagination and reality

More clear tie to the values

Consider the potential of other tools for storytelling: collages, prototyping

Roleplay:

More full description of what the roles mean and how to play them

Possibly shifting roles

Newspaper:

A solid technique to summarise, find threads

Could be improved to indicate next steps?

This workshop is a simulation: the company, roles and problem are all semi-fictitious. It is a moment for people to practice reflecting and working on problems that are not immediately in their sights, but that they may have to consider at some point in their near future. The kind of mental gymnastics that we put our participants through is designed to be used again and again - until it becomes a pair of glasses, a coat, a pair of boots they put on when they face similar problems in their own companies.

It could be possible to make the simulation closer and closer to a given IOT company's current decision-making. Each part of the exercise could become more modular, but fit together as a full day as well. Values orientation could occur at designated moments throughout a product journey, whereas the decision-making “Moral Algorithm” could be used for important decisions (but how to identify those... when often “tiny” decisions have big impact). The reflective newspaper-article could be a way to understand the role the product could have in a bigger context. Each part could help a company to also negotiate with their potential clients or investors if they sense misalignment.

3. Iteration #2

3.1 Design Challenge

In order to provide a digital tool that the applicants to the VIRT-EU Design Challenge would have been able to use independently, without any facilitation from our side, we focused on the first “activity” of our flow: VALUES.

Link to the tool: <https://virt-eu.firebaseioapp.com/>

The tool is an interactive series of slides guiding the group through the articulation and negotiation of their personal and company values.

Hello!

This is a pre-alpha prototype tool designed to help you articulate what you care about - as individuals, within a group who is working together, in relation to this new product you're working on.

It comes from the [VIRT-EU](#) project work and is just one in a series of different tools to try bring ethical reflection into the process of designing connected things. More context [here](#).

As this is a pre-alpha prototype tool ;) we will welcome any feedback you may have from the experience (option to be interviewed about that at the end).

Before we begin, please tell us the name of your project

awesome team name

COOL

Saying What You Care About

This round is a solo activity again but now we are asking you to reflect on what you care about in relation to your product.

SEE EXAMPLES

NEXT

At each stage examples, readings, definitions are provided in order to inspire and prompt the conversation.



We found a story for each one of you to start thinking through.

Take your smartphone out, open the camera, and position it in front of your respective QR code (one per team member).

Take a few minutes to read your respective stories.

Story number 1



DONE

Saying What You Care About

Here are 15 values coming from similar start-ups to yours.

You can add any of these to your clusters.

Even if not specific focus of our tools, negotiation and navigation of conflict turn out to be an essential moment within a start-up process and therefore some care and some sort of facilitation was provided as well.

Definition Negotiation

Maybe you both talk about “privacy” but understand it differently.

Can you agree upon one of the definitions?

In the end, even if this first tool covers only the “values articulation” part of the process, some hints toward potential conflicts/gaps are already provided in order to keep the dialogue interesting and open.

Interoperability

Promoting interoperability as one of the key values to create a trusted IoT ecosystem. Facilitating data portability, both for taking data out and in.

NEXT VALUE

Take a small Post-it and write down the word you want to have in your company. You can add as many as you want to the existing clusters on the table.

NEXT

Try to re-write at least 2 new definitions per contested word, then discuss again. If you still can't agree on one communal definition, here are some pointers for discussion:

Some pointers:

When you respond to the other, try saying things like “It sounds like you are concerned about ____”

Try to make sure you repeat the most important things others say to ensure people see that you understand what they are saying.

Remember this is your teammate and try to show that you recognize and respect each others' opinions, distinct backgrounds, mutual admiration and goal of building something together

If you cannot come to a common definition, that's fine, just keep your individual definitions and put an asterisk * on words you could not agree upon

NEXT



Sometimes you
can't have your cake
and eat it too.

Here are a few
stories of certain
values that, when
put together, can
create tension.

Transparency + security:

A company is making a tracking wearable to find people in a crowd during concerts and big events in case of disasters and emergencies.

The device's data is shared with event organisers, public health services and local police. The company cares deeply about transparency as in, being open about why they are building the tracker, and security as in, keeping their users as safe as possible.

Pickpocketings have occurred during the concerts and police are using the tracking devices' GPS data to pinpoint the thieves. Should the company tell the concert goers that their data can be shared to the police before the concert goers start using the wearable?

But then the concert goers might not use the wearable anymore, and will not have a safe experience if there is an emergency.

MORE CONFLICTS

NEXT

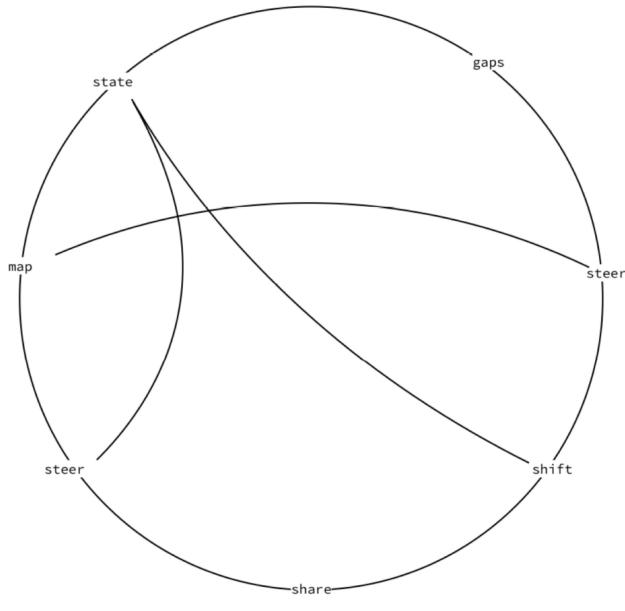
3.2 Workshops

In this last step of the second round of iteration we started to incorporate the PESIA report, the insights from our design-research as well as the feedback from the digital experience of Tool 1 released for the Design Challenge.

This work has lead to the development of a series of tools that we see as something unique, relevant and useful to the field of tools for bringing ethics into the process for creators of IOT. We identified our design principles, related inspiration or similar tools upon which we want to build, the research each tool comes from, its relation to the different ethical theories, as well as how it could fit into a "bigger picture" as a set of tools that would connect to and be aware of one another.

We of course cannot solve the entire problem of ethics in connected technology. But, we are trying to find the relatively unique ways in which we can contribute. The tools we are developing are not all (yet) drawing directly on PESIA. However, now that we have PESIA, we are trying to consider how our "ancillary" tools can support creators to map and reflect upon their products in a way that gets them ready for PESIA. Furthermore, we are integrating some aspects of PESIA directly into some of the tools (as and where relevant).

For each tool, we decided upon two variations of a flow of what information a person should go through, brainstormed about different experiences they would have for that information, related our tool to other existing tools, built paper prototypes and are now running testing sessions for those paper prototypes. As shown in the timeline below, after this testing, we will build digital prototypes, again test those, and then finally (in September) build a system that works and integrate it with full design of the overall look and feel.



The **journey** is not necessarily linear - the first two tools are crucial to the journey and then continue to follow you around wherever you go

Constant **evolution** over time as you build (with data) - as you move through the journey and jump around, your data follows you, you should be able to edit and remake the first two and/or you will be promoted to revisit them because of your inputs to later tools

Object and ethics - **materiality** of ethics

Make object's **invisible** connections visible - data movements, processing through the cloud, under the API

Smart **dilemmas** - that are related to your product

Expert dictionary and **vocabulary**

Immersive **speculation** that allows you to simulate and rehearse

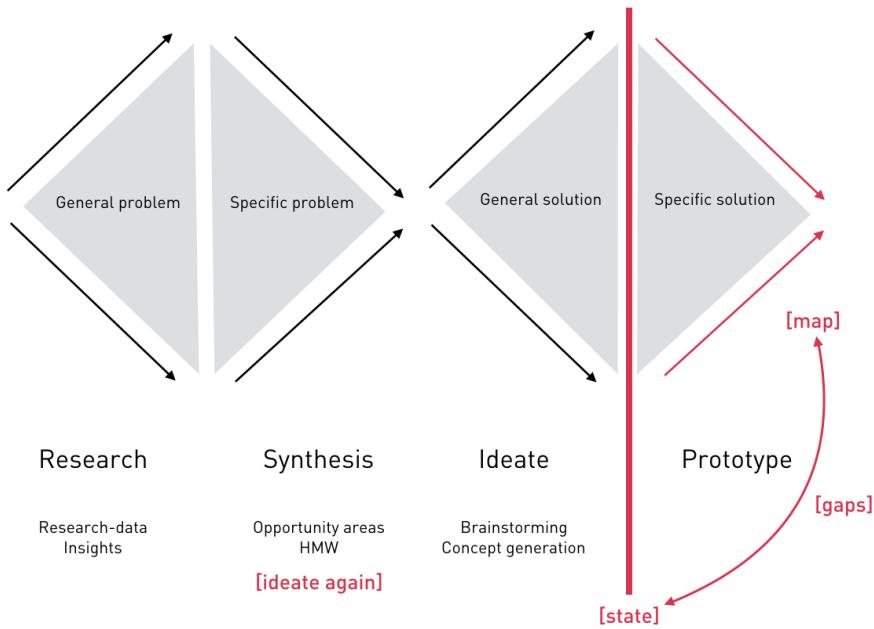
Counter-tech **trickster**

Each tool serves a distinct purpose, but is conceived in a way that it could be just one step in an overall journey. The journey is not necessarily linear - the first two tools are crucial to the journey and then continue to follow developers around wherever they go. The system allows for constant evolution over time as developers build (with data) - as they move through the tools and jump around, their data follows them, they should be able to edit and remake the first two and/or they will be prompted to revisit their original ideas because of their inputs to later tools. There are several key points to this overall journey - that it should allow for a materiality of ethics to come through, to make an object's invisible connections visible (data movements, processing through the cloud) to collect and help generate dilemmas that are related to your product, for example.

We tested this set of tools in 2 workshops with a different focus and different flow.

The “**Ethics Ideation Sprint**”. From the 3rd to the 9th of July 2019 with 10 students from Shenkar College (Tel Aviv) selected for an Erasmus+ project on creative leadership ([link: https://clever.erasmus-plus.org.il/](https://clever.erasmus-plus.org.il/)).

This 5-days workshop led the students through a design sprint in the context of the “connected home”. Their goal was to use the double-diamond process, by the UK Design Council, to ideate an IoT home device and pitch it.

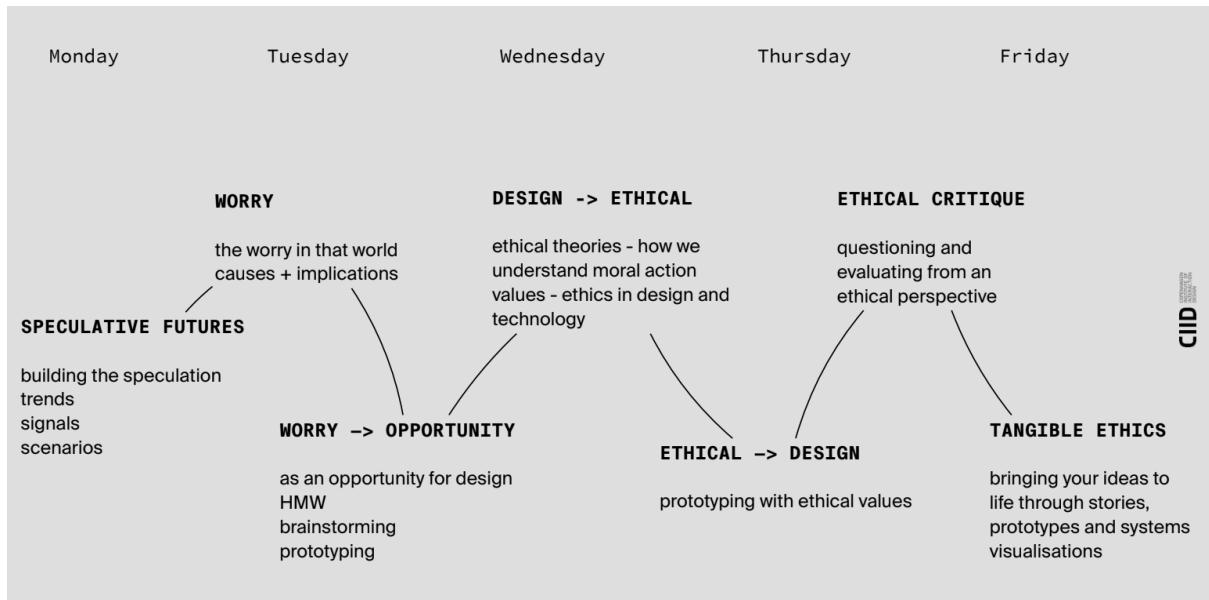


We therefore tested our tools in combination with the design process:

- interrupting their ideation flow to let them think and articulate their values,
- letting them map the solution envisaged
- suggesting potential gaps based on the PESIA framework
- facilitating their speculation and assessment of different options.

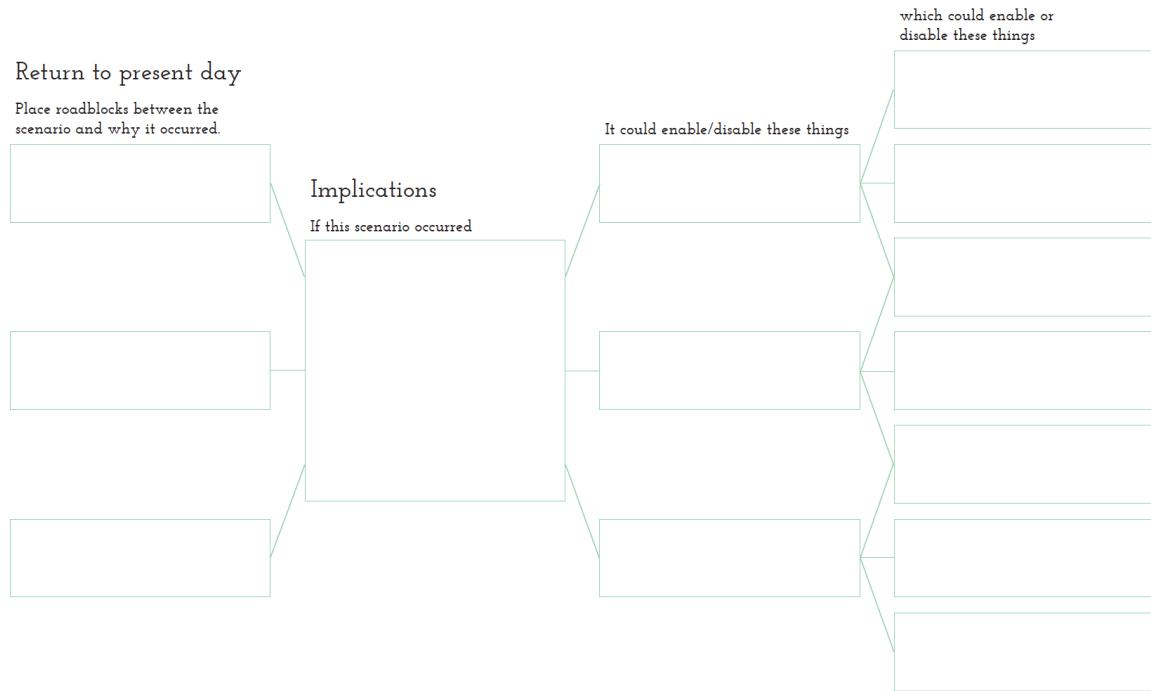
3 groups went through the same flow using the tools: STATE, MAP, GAPS, STEER, SHARE (Annex III - Iteration #2).

Another 5-days workshop followed the previous one. **“Designing Ethical Futures”** was part of the CIID Summer School (link: <http://ciid.dk/education/summer-school/ciid-summer-school-copenhagen-2019/workshops/design-ethics/>) and it was geared more toward futurescaping and speculation.



The process started with a day of speculation where 20 students were provided with Scenarios and Trends to build their own Story in the context of “Memory in the future”. This

was the base for the following speculative design activity focused on designing ‘barriers’, envisaged on a bowtie diagramme, for the issue they “worry” about.



During the following 3 days the same ethical tools were used: STATE, MAP, GAPS, STEER. From the observation of these 2 close experiences we noticed how speculation in deep-time could support a better assessment of ethical issues and more effective re-design of devices. This kind of more fluid and imaginific process was the most beneficial for the end-users of the tools.

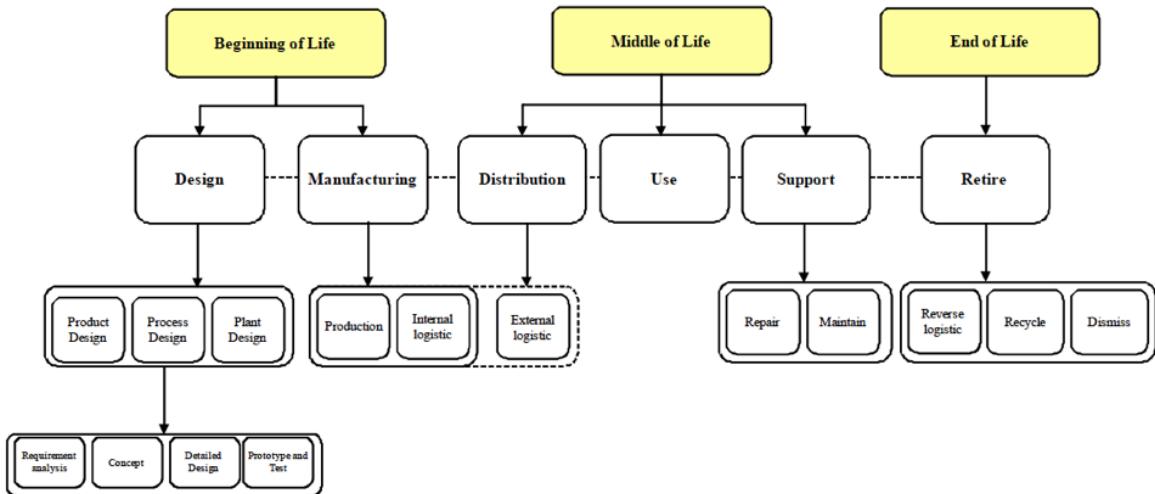


Nonetheless the whole flow was time-consuming, it came with a high cognitive load and it was heavily based on paper and long text. These features were carefully considered during the last iterative cycle when we were customizing and integrating our tools into start-ups processes and realities presenting some strong constraints in terms of time, mental space and agility.

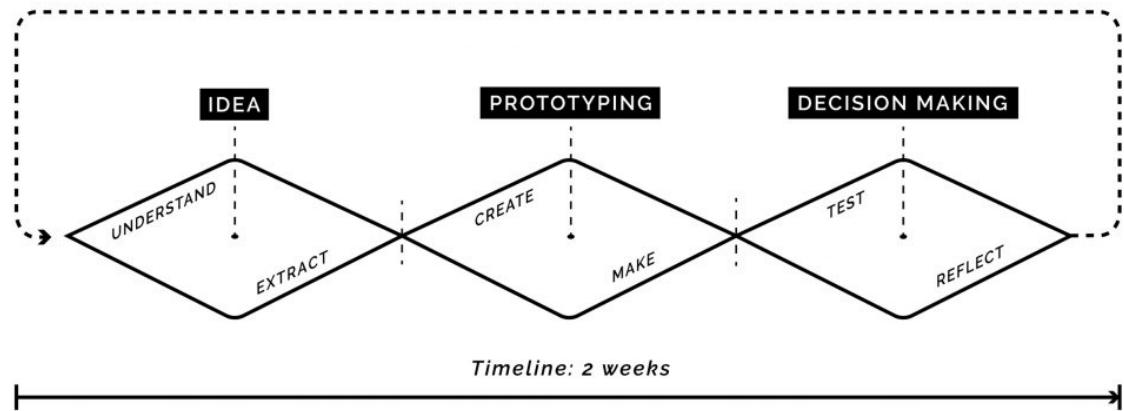
4. Iteration #3

4.1 Design-research on IoT Start-ups

The last iteration aimed at a refining of the tools based on the needs of IoT start-ups, their internal processes as well as their external constraints. In the desk research the product/business life-cycle was observed from different angles, e.g. design, management, economy, logistics. Either the Start-up is set up for the real market or for the financial one, i.e. aimed for selling within 2-5 years, the “design” space is still confined at the very early stage of the “Beginning of Life”.



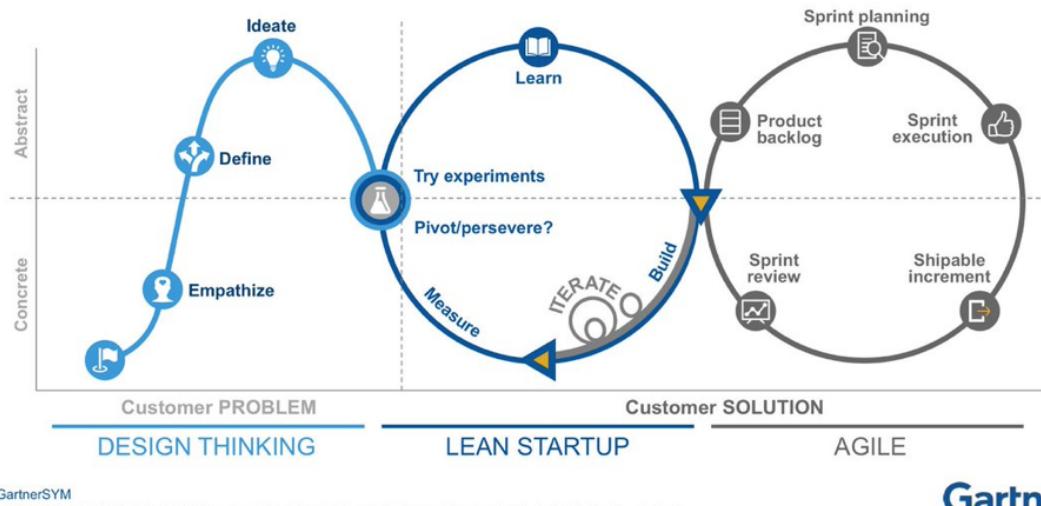
And the typical design cycle, very close to the one we tested with Shenkar College, goes from 2 weeks up to 4 months time generally speaking.



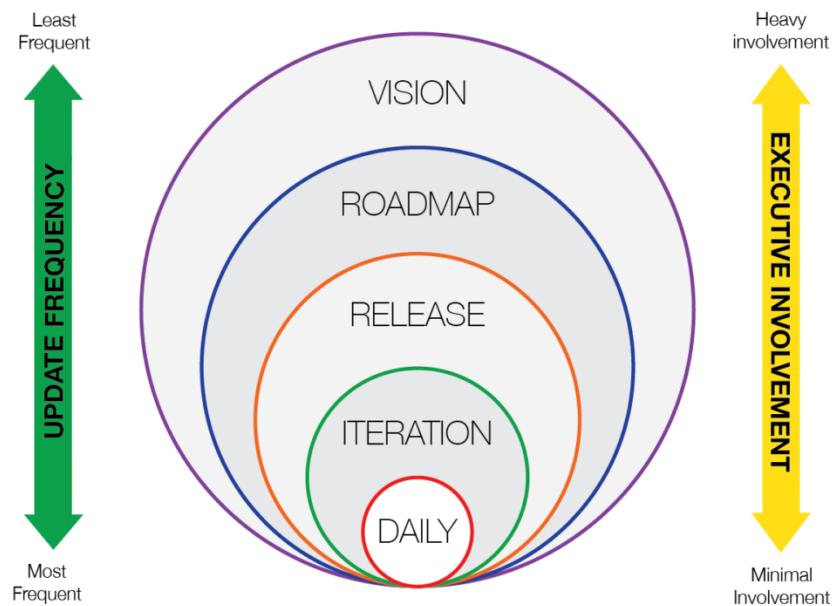
It is, though, an iterative process and several business or environmental/engineering theories acknowledged and incorporated this “design thinking” modus-operandi into more traditional business/product development models.

As nicely visualized by Gartner, Design Thinking, Lean Start-up and Agile are 3 approaches sharing an iterative nature swinging from an abstract/planning activity to a tangible and measurable one used as a base for the next cycle.

Combine Design Thinking, Lean Startup and Agile



Along the way of an agile start-up there are several decision-making moments ranging in frequency, executive involvement and tools used. As stated in “Consequence Scanning”, by doteveryone, ethical considerations should happen within an Agile event that fits into an iterative development cadence. The agile event shouldn't take longer than 45min, different stakeholders should be invited and it should end up with actionable points.



To better understand how IoT startups make decisions that influence the development of their product we carried out an additional field research. This research did not explicitly touch on ethics, it was more to understand the product development process in general so that we could orient the design of our tools to better fit their decision-making process and moments.

We talked to 3 people creating IoT devices. We did qualitative interviews, conducted remotely using a shared digital canvas to sketch and take notes.



Christian
Engineer, Copenhagen
Fresh out of university, co-founder of a young start-up making a smart home system for hearing impaired people.



Manjari
UX Designer, Amsterdam
Mid-career designer working for an agency that supports startups. Project she shared: a wireless camera for a lifestyle wearable and car security.



Tim
Industrial Designer, Copenhagen
Experienced product lead and innovation consultant. Co-founder of his first start-up: a wearable tracker to help people set good habits.

We came out with 3 key-findings: Drivers of Influence, Activation Moments, Decision Making ‘Tools’.

Drivers of Influence. There are powerful channels of influence around startups that set the framework in which decisions are made.

Key Takeaways, Opportunities:

- Integrating ethical requirements into funding practices can act as a default to force behaviour, prevent funding of un-ethical products from the start
- Educating mentors about how to integrate ethical thinking and critique into their practices can help startups be aware of what they can't see / don't yet know
- Media and press on shining examples or cautionary tales, especially about industry leaders, helps subtly build ethical thinking across all startups
- Working at the level of larger communities and networks can reinforce people-to-people relationships with stronger ethical awareness

Activation Moments. While there's not a straightforward development process that startups follow, key turning moments greatly influence the direction of a product.

Key Takeaways, Opportunities:

- An ethical tool might have two loops. Loop 1: shape the framework of values at the start (evolve slowly over time as needed), Loop 2: revisit ‘tool’ or framework and use as a guiding tool for new ‘starts’ (ex: choosing a new component, or evaluating a new market).
- To best support the activation moments, there's a need to dig below, or reveal the values of key elements. Help people understand what they don't yet know. (ex: a way to reveal values of off-the-shelf products, or a way to reveal / change the values of user interactions, or a way to trace and evaluate the data flow of a product).

Decision Making ‘Tools’. Ultimately, critical decision making happens in the brain. But simple tools can help prompt and guide these mental exercises.

Key Takeaways, Opportunities:

- Any tool should ultimately support conversations, either by prompting divergent thinking, or helping guide alignment
- The simpler the better, startups have limited amount of time—steep learning curves and time-consuming processes diminish the utility of the tool. “But really we keep it pretty simple. My favorite tool is a post-it.” - Tim

Based on our desk and field research we distilled some design principles, partially tested with the 3 start-ups presented in this chapter, that are guiding our UX and UI design activity. These principles are:

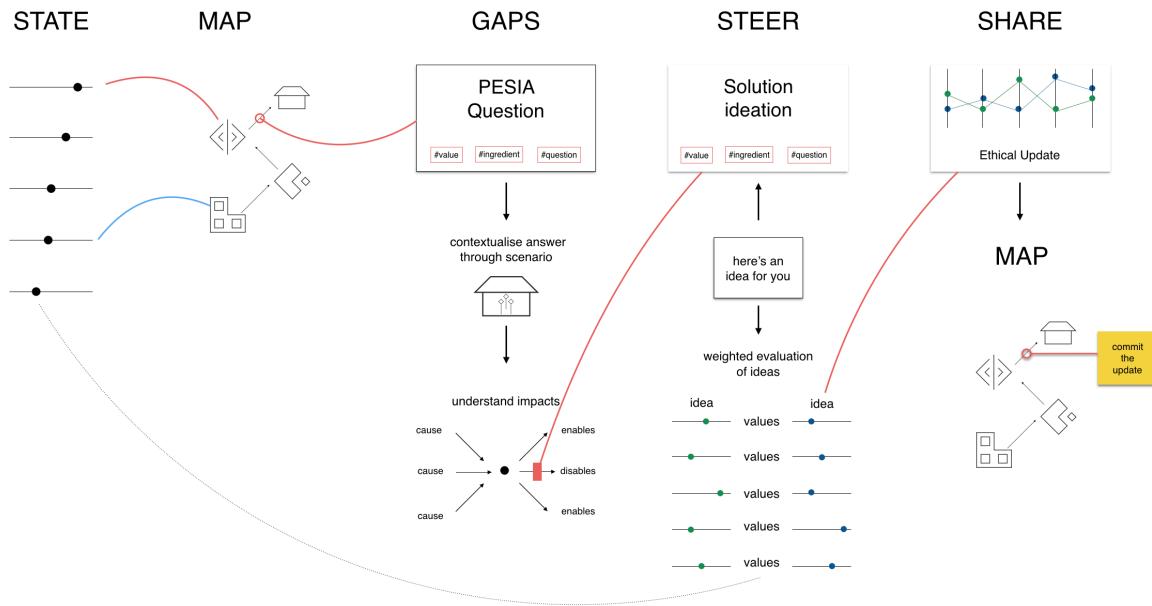
- Playful. To ease the cognitive load and nurture speculative thinking.
- Modular. The tools can be used alone and/or in a flow that is not predefined.
- Crafted. The outcome as a digital and tangible visualization of values, components and choices.
- Iterative. As the nature of Design Thinking and the typical start-up process we want our tools to be a living baseline, open for constant, collective revision.

4.2 Start-up 1 and Start-up 2

Start-up 1 is an early stage start-up operating in the field of advanced robotic solutions for industrial manufacturing, providing robot integration services.

Start-up 2 is a well-established start-up providing prepaid solar energy systems to off-grid, low-income households and businesses in developing countries through small-scale mobile repayments.

Both the start-ups went through a 3-hours flow including: STATE, MAP, GAPS, STEER and SHARE (Annex II - Iteration #2).



Reflections and learnings from the testing sessions:

Map:

The process for the mapping tool:

- A. We give a template that has prompts along the bottom for the participant to try to explain the product in terms of the Device and the System. They draw connections between the different components to demonstrate data flows or dependencies.
- B. Once they identified / stated their values, they should return to the Map and mark where their values are represented in terms of material decisions.

The prompts range from “Who is working on the product” to “Where is the data stored”? If participants have a product idea in mind already (not the case for the student groups), this mapping is relatively easy.

Often at part (B), they add more items to the map. In two examples, they had “forgotten” the users (2,3).

Participants found the Map to be one of the most useful tools. It also seemed to be somewhat of a brainstorming tool for them - documenting ideas they would like to commit to in their actual product development.

→ **ideas for iteration:**

More clearly structuring the areas that participants should consider when making the Map. At this point, we have identified that participants could be asked a few probing and possibly speculative questions about the people, institutions, context and locations where their devices operate. This would support and be supported by the “Care Ethics” underpinning of the VIRTEU work.

State:

The process of the **State** tool is as follows:

- A. We share the rationale behind Stating what you care about. Then, we share the collected values from the research.
- B. We ask that the individual teammates write a shortlist of their values, prioritise those.
- C. The teammates should compare prioritised lists, find commonalities and differences. They should make a final list together and then write definitions for the values they have come up with.
- D. For some groups, we also asked them to “weight” these values to reflect the idea that not all values are necessarily at the highest level of importance.

There is a consistent first question - issue of “is this about what I care about as an individual or what I care about in terms of the product?” (1)

The tool of stating is considered a team-building exercise of understanding what the others on the team think is important and how they define that differently (2, A). When there are different definitions of the same words, they take time to figure out how to integrate the varying definitions together. Some found the weighting of the values to be excessive, and found it “silly” to put numbers in relation to such “fluffy” topics (2).

Priming the participants with questions such as: “what will you hold on to no matter what” or “what values, if stepped upon or infringed upon by your investors, clients, etc., would make you quit?” was well-received.

Priming the participants with dilemmas from Bear+Co. was also well-received but needs to be more smoothly integrated into the process. In that case, the participant (1) said that she liked thinking about ethical issues of another company to prepare her to start thinking in this way for her own work.

Once the facilitator introduced the list of values from the research, participants used almost 100% of these rather than coming up with their own. They did not question the relevance of those values, though some did decide to fold several values together, seeing some as impossible to uphold without the others - for example, “responsibility” as a fundamental value for everything the company should do (2), without which, none of the other values could be upheld. Another example of this was that “accountability” and “interoperability” needed to go together.

→ **ideas for iteration:**

The listing and comparing of values is relatively flat, becomes slow and spins towards vocabulary and ability to explain oneself rather than collective discussions and debates of what matters to the teams in possible conflicts of interests.

Therefore, this seems like a place to simulate possible value clashes rather than only serving as a place for straight articulation.

For example, what happens when you choose two values that can conflict against each other?

Can we help expose / tell stories that demonstrate these clashes like openness + inclusion in Bear+Co

Gaps:

We, as facilitators, pull 5-10 questions from PESIA - either in the detailed privacy impact assessment or the more “generic ethics and social impact section”. These questions can be based on core components of the product in question as well as the values that the start-up is seeking to uphold. In terms of checking through core components, there are some categories that are easily relevant in PESIA - for example, if it is a “wearable” or has a “machine learning algorithm” or is designed for “vulnerable populations”. In terms of asking questions from the generic ethics and social impact section, typically all of the questions in relation to the different values will be somewhat relevant to the group.

The process of **Gaps** has worked in this way thus far:

- A. Facilitator, as a “computer”, “processes” the information the participants have created so far, and identifies relevant questions. These can be written on post-its and then placed at the relevant intersections on the Map (for example, at the square of “machine learning”, or at the square that has the most emphasis of the value of “transparency”)
- B. Participants read through each question and need to answer Yes, No, or Not Sure
- C. If they can immediately make a change in their Map according to their answer, they are welcome to. If it is taking longer to figure out what to do in relation to their answer, or their answer is identified as “high risk” (by the facilitator), then this can be the question / answer they should focus on.

Participants found the questions useful and wanted to have access to all of them to learn more about any possible issues they should be ready to handle in the future - even if questions might not be related to their product as of that moment.

Some groups had already taken the question into account in discussions with their teammates, but they had not yet integrated a change into their actual product map nor had they found the ideal solution necessarily. Therefore, the question from the “external critique” of PESIA stimulates a moment to focus on an issue that is pressing yet has not been addressed (2, 3). It has not been addressed because that issue has been designated as something they will deal with later in their product development process - “it’s on the roadmap for Q3” or “we know it’s something we have to figure out but the other work comes first.” The fact that the external critique of PESIA brings this issue up to the forefront clearly makes it more of a priority for the teams yet as our system does not have a specific integration with their product development management software, we don’t know if they will necessarily (ever) focus on the change that they identified from using our tools.

Steer:

The process of Steer has worked in this way thus far:

- A. Once the participants choose which PESIA question they want to focus on - whether because it is something they can tackle, something they are especially worried about or something we have “identified” as high risk - then we ask them to try to understand why their answer to that question might be problematic.
- B. The useful tool at this place is the template to reflect on a possible user and how they would be impacted by the answer to the PESIA question
- C. Once they have the user in mind, and a clearer understanding of what the core issue is that relates to their PESIA answer, they can map out possible events that would lead to this issue happening, as well as repercussions from that issue using either the template inspired by the future-wheel or the bow-tie structure.
- D. They then place a roadblock at the place in this tree of events that they want to and can intervene.
- E. If they already have a few ideas for how to intervene, they can directly write those. Otherwise, they can describe the issue and pass it around to other groups / teammates to generate a brainstorm.
- F. Once they have at least 2 ideas, they can use the “Idea Evaluation Matrix” which is a template that requires participants to evaluate each idea in terms of how well it meets their ethical values.

Some participants found (F) to be excessive and struggled with it not being relevant to their ideas - that they had come up with solutions that were not about their values, and then suddenly they are being asked to consider their values again (2, A). At the same time, some said they might show (F) to investors in order to support a decision.

Participants enjoyed the process (C) of creating a chain of impacts / repercussions / consequences as well as what would lead to the event, and appreciated the metaphor of placing a roadblock. They found the (C) tool to be one of the **most useful**.

Interestingly, (C) brought up the question of “where does my circle of responsibility over the product end?” (2).

When posed with the possibility of having an extended network of peers or experts to help answer the issue (E), most found this idea to sound like it would be too slow-moving or not useful.

While some found (B) to be too fluffy, at the same time, it was clearly difficult for them to identify the actual problem in their answer to the PESIA question unless they took the time to write some sort of story (2, 3).

Share:

The process of Share is one step:

- Fill out an “Ethical Update” - a template that helps the participants to summarise the work that has been done in the session

We have not yet encountered a situation where a team is directly dealing with a decision that would be problematic from the point of view of their remote teammates or investors, thus the idea of Sharing in order to get everyone on the same page or explain a decision has not yet been tried in practice.

The original idea of the Share moment was to possibly write a “PR scandal” style news article as a bargaining chip in a discussion of which option to choose for a difficult decision - about what would be problematic if idea B were chosen instead of idea A.

4.3 Start-up 3

Start-up 3 is a young start-up providing a service that helps people change their mindset around their habits. Consisting of a wearable wristband and a nudging messaging service.

As we prepared for our final test with an IOT start-up, we reflected upon the lack of tension that we were able to create, or let alone simulate, during the articulation of values step. This step, we thought, should not only enable the team to state what they care about and go through the team exercise of discussing those varying definitions and priorities, but also, it should be a place where we could provoke possible "conflicts" in value statements already. For example, that in fact one team cannot necessarily equally defend the values of openness (open platform) and inclusion.

We thought perhaps we could redesign the exercise to be weighted more towards value clashes rather than simple statements, and that perhaps those clashes could come out in a different process that included a scenario, dilemma and ways of thinking through that dilemma that would come from the ethical framework.

We decided to run a rough version of this revision with our final test, and we found that the scenario and the ways of ethical questioning were far too abstract, requiring more expertise than would be possible to acquire for the IOT team themselves.

Tools and flows are included in “Annex IV - Iteration #3”.

This test shows us several insights:

1. While it is valuable to learn about the ethical landscape and its accompanying varieties of moral reasoning, that completely theoretical learning has to be encapsulated in a separate module from the tools. Then, we need to more clearly and tightly note where those theories do or do not appear throughout the tools (and why). However, putting the theory as the headline rather than as a categorical tag places a paralysing emphasis on Ethics (capital E intended).
2. Furthermore, it remains valuable to simulate situations that would require ethical thinking - as opposed to waiting for the problem to arise to become empowered with how to think through those situations with moral reasoning. Understanding a scenario in terms of how well it would or would not meet one's virtues, then analysing it in terms of what one could or could not do (capabilities), and finally exploding the options through a care ethics lens are ways of thinking through the VIRTEU ethical framework that have already been embedded in our tools. We will share this learning with our partners - specifically the partners who are responsible for coming up with the Ethical Framework - and make our last plan in relation to these insights.
3. As with previous tests, this IOT startup found the mapping exercise (which we had already iterated to be a much more expanded stack of interrelations of the Device, its data, context, users, infrastructure), to uncover valuable gaps.

5. PESIA - Iteration #2

The PESIA prototype presented in this Deliverable builds on the structure of the PESIA questionnaire as revised by Open Rights Group. The current version of the questionnaire aims to be even more user friendly than the previous one. The language of some questions has been modified from the previous Deliverable 4.4 but they will go through further iterations before the final tool is released in December 2019.

Questions have been grouped in 5 main sections. The first section follows a traditional data mapping approach seen in most data privacy tools, asking questions about the origin of the data, its use and on what bases it is processed, plus establishing any further sharing. The second set of questions try to determine whether the project involves a high risk in terms privacy and data protection, and has several subsections. Next we look at any processes in place or planned to handle the data properly, with a lot of these questions indicating compliance of good practice. Some of these measures can be mitigating barriers to risks elicited before. The next section focuses on external relations, from basic compliance with user rights under GDPR to broader participation that may not be necessarily a legal obligation but rather a social consideration. Finally we look at the risk management practices. We plan to rework this section more extensively through the tool itself, so it becomes less a series of open questions and more feedback and targeted measures based on previous answers. Separately we are consolidating the social and ethical questions, which will be brought in as part of sections 2 and 4.

The questions had been translated into a flow diagram taking into consideration the interaction with the user and therefore the different paths of a potential user journey.

This is a preparatory step toward the development of a digital tool. Mock-ups are already presented within this report. (Annex V - PESIA Iteration #2)

The current PESIA questionnaire already represents the knowledge-base for the CIID tools, in particular for formulating prompts about potential gaps (GAPS) envisaged between values (STATE) and components (MAP). In the next iteration these tools will get even closer to be organically integrated into the PESIA kit.

6. Next steps

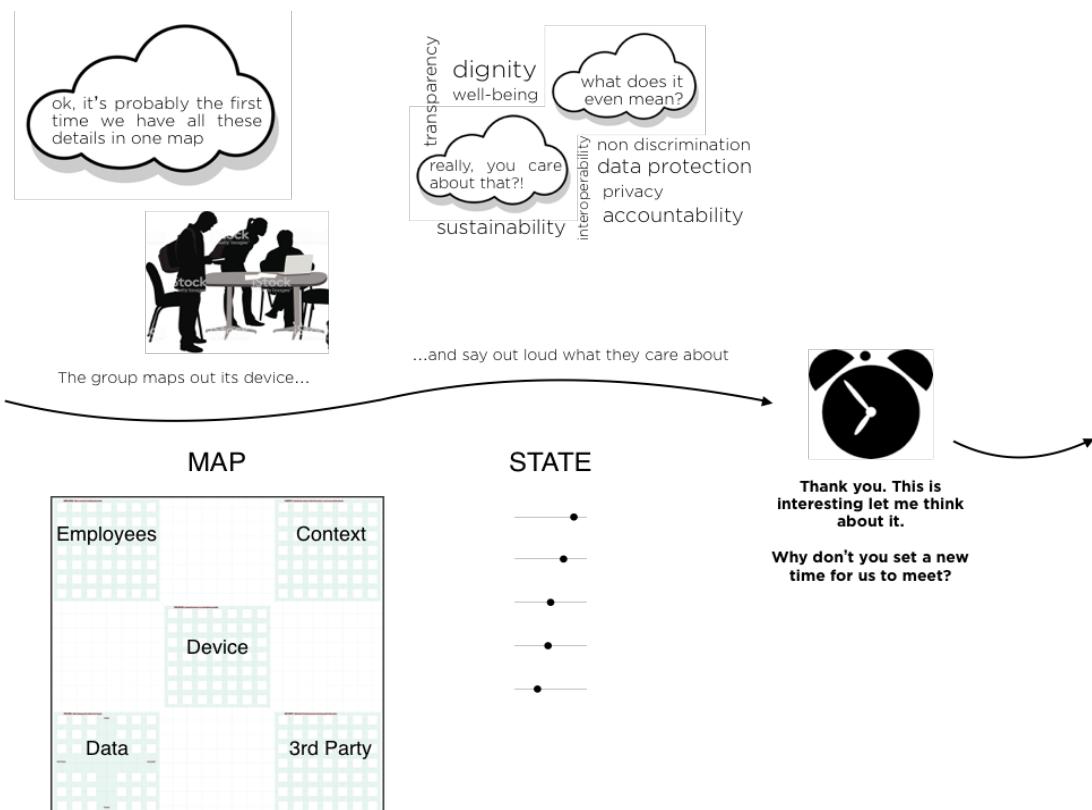
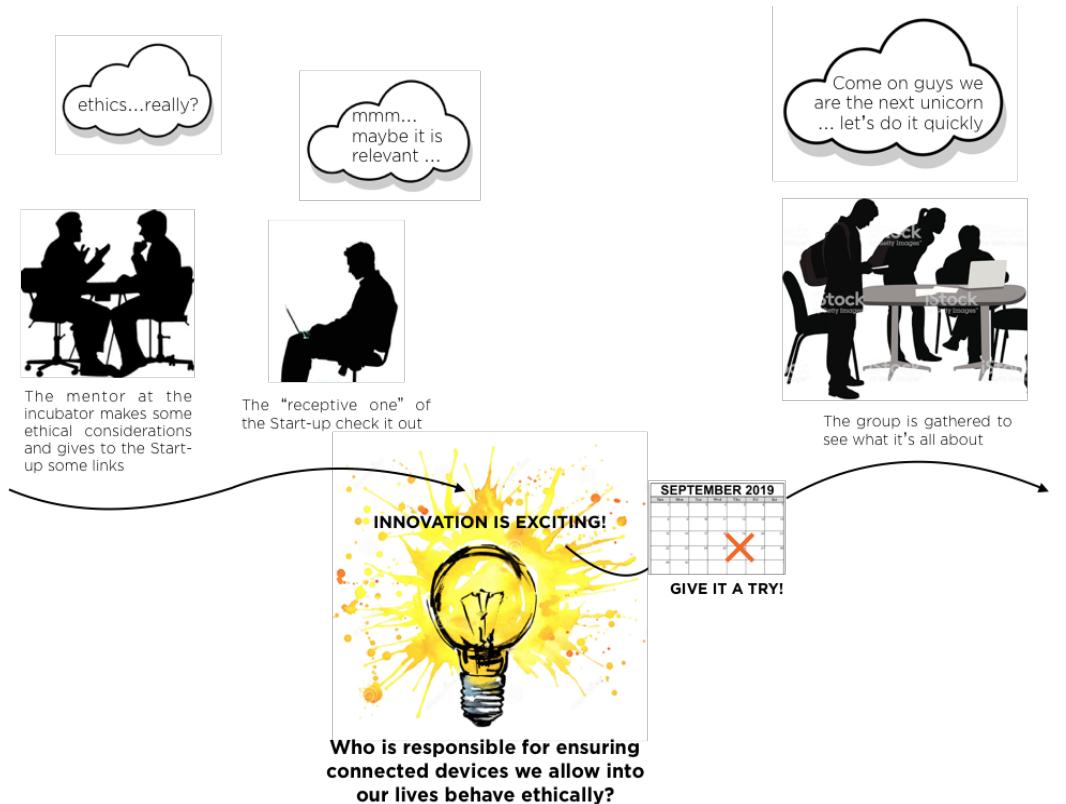
In the last 4 months of project we will focus mainly on 2 aspects:

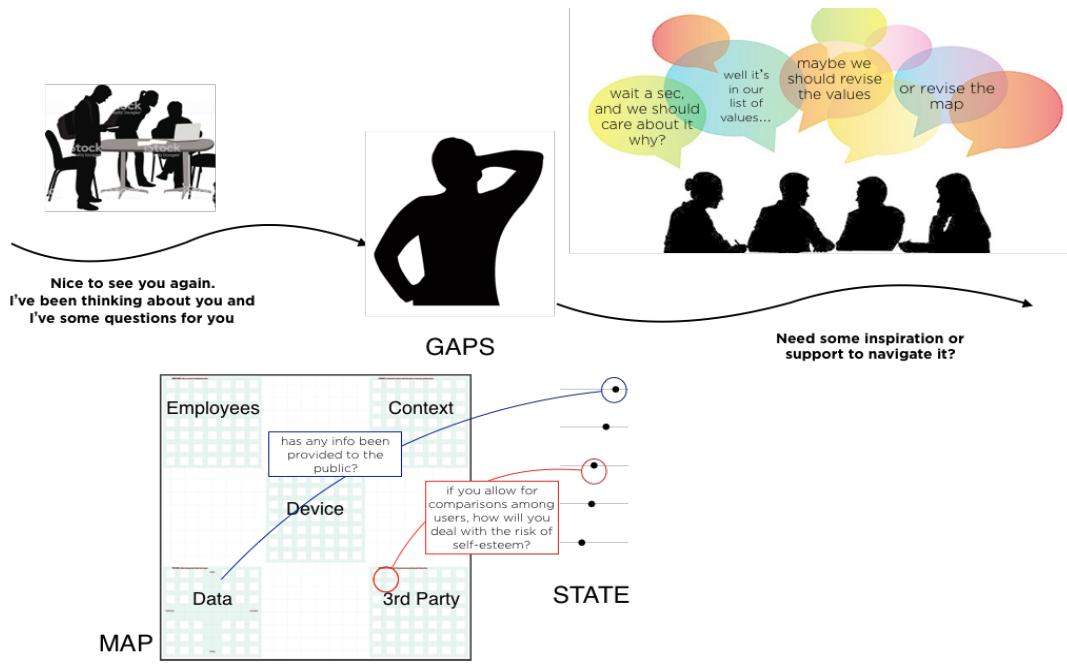
- convergence of the Ethical Framework, the PESIA questionnaire/database and CIID Tools;
- development of a digital tool with a specific focus on Start-ups user journey.

We imagine the tool “MAP” to have a more central role in the plethora of tools and approaches provided. This choice is based on the results of our testing and it aims at leveraging the specific knowledge and interest of the target audience, i.e. developers and start-up entrepreneurs.

The MAP, embodiment of choices at all levels, is therefore the entry-point and the returning-point for the never-ending journey of the tech entrepreneur where he understands and checks his/her values and statements against reality.

Hereby we present a first draft of the user journey for the digital tool.





Annex I - Tools & Flow - SoA analysis

| Author | Title | Year | Price | Type | Link |
|---|-------------------------|------|-------------|-----------------|---|
| StudioDott collab with Know Cards | IOT Ideation Cards | 2016 | \$149 | Toolkit / Cards | http://studiodott.be/en/2017/01/iot-ideation-op-thingscon-amsterdam/ |
| StudioDott collab with Futurice | IOT Service Kit | 2015 | open-source | Toolkit / Cards | http://iotservicekit.com/ |
| Simone Mora | Tiles Toolkit | 2018 | free cards | Toolkit / Cards | http://tilestoolkit.io/ |
| MIT | Moral Machine | 2016 | n/a | Website | http://moral-machine.mit.edu/ |
| Vi Hart + Nicky Case | Parable of the Polygons | 2014 | free | Games | http://www.gainesforchange.org/game/parable-of-the-polygons/ |
| Simply Secure | Trustworthy IOT | 2016 | free | Worksheets | https://github.com/simplysecure/resources/tree/master/Trustworthy_IOT |
| Mixed Reality Laboratory and Horizon Digital Economy Research The University of Nottingham Microsoft Research | Privacy Ideation Cards | 2016 | n/a | Toolkit / Cards | https://www.nottingham.ac.uk/research/groups/mixedrealitylab/projects/information-privacy-by-design-cards.aspx |

| | | | | | |
|---|------------------------------------|-----------|-----------|--------------------|---|
| Maheen Sohail | Practice Ethical Design | 2017 | free | Framework | https://medium.muz.li/how-to-practice-ethical-design-d8a6a8dcf4b0 |
| Dorian Peters & Rafael Calvo for the Positive Computing Lab | Tools for Positive Computing | 2014-2017 | free | Worksheets | http://www.positivecomputing.org/p/we-re-pleased-to-share-some-of-tools-and.html |
| Cloud Security Alliance | Futureproofing the Connected World | 2016 | free | Guideline | https://downloads.cloudsecurityalliance.org/assets/research/internet-of-things/future-proofing-the-connected-world.pdf |
| Markkula Center for Applied Ethics | Making a Difficult Decision | 2015 | free | Web app/Mobile app | https://www.scu.edu/ethics-app/ |
| Trend Micro | Data Center Attack | 2018 | free game | Web - video - CYOA | http://datacenterattacks.trendmicro.com/ |
| Data Privacy Project | Mapping Data Flows | 2015 | free | Worksheets | https://dataprivacyproject.org/ |
| Artefact Group | Tarot Cards of Tech | 2018 | \$45 | Toolkit / Cards | http://tarotcardssoftech.art |

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| | | | | | tefactgroup.com/ |
| Andrew Lovett-Barron | Decay of Digital Things | 2014 | n/a | Toolkit / Cards | http://cards.decay.io/ |
| Humane By Design | Principles | 2019 | free | Posters | https://humanebydesign.com/ |
| List of tools | List of tools | 2019 | free, but individual tools payme nt | Toolkit / Cards | https://ethical.net/resources/?resource-category=tools |
| Amber Case | Calm Scorecard | 2018 | free | Q+A | https://medium.com/@caseorganic/is-your-product-designed-to-be-calm-cdde5039cca5 |
| Projects By If | New Digital Rights | 2016 | free | Digital mockups | https://newdigitalrights.projectsbyif.com/ |
| Tactical Tech + Mozilla | Data Detox | 2016 | free | Website | https://datadetox.myshadow.org/en/home |
| DOWSE | DOWSE | 2016 | free/open source | Interactive Object | http://dowse.equipment/ |
| Bjorn Karmann + Tor Knudsen | Project Alias | 2018 | n/a | Interactive Object | http://bjoernkarmann.dk/project_alias |
| Mozilla | Hacker cards | 2017 | n/a | Website | https://thimbleprojects.org |

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| | | | | | /mozillalearning/308795/ |
| Open IOT Studio | Privacy Machines | 2016 | free | Concept | https://github.com/openiotstudio/privacy-machines |
| Peter Bihr | Privacy Dimmer | 2016 | free | Concept | http://thegoodhome.org/projects/privacy-dimmer/ |
| Tega Brain | The New Organs | 2018 | n/a | Website | https://neworgans.net/ |
| Utrecht University Data School collab with data analysts from the City of Utrecht | Data Ethics Decision Aid Utrecht | 2017 | basic questionnaire free | Toolkit / Cards | https://bit.ly/2VIMTuB |
| Jet Gispen (Delft Technical University) | Delft TU Ethics for Designers Toolkit | 2017 | free | Toolkit / Cards | https://bit.ly/2UfSCWq |
| Tech for Good Global | Tech for Good | 2009 | free | Principles | https://bit.ly/2FMmRtS |
| Ben Zevenbergen | Networked Systems Ethics | 2017 | free | Guideline | https://bit.ly/2TW8CHM |
| JustPeace Labs | Ethical Guidelines for PeaceTech | 2017 | free | Guideline | https://bit.ly/2FZAUO4 |
| Digital Analytics Association | The Web Analyst's Code of Ethics | | free | Code of Practice | https://bit.ly/2TW7e8i |
| The British Computer Society | DIODE Ethical Technology Assessment | 2011 | paid | Technology Assessment | https://bit.ly/2UyHQJS |
| SATORI Project | SATORI Framework for Ethical Impact Assessment | 2017 | free | Framework | https://bit.ly/2K1jXGW |
| Uppsala | EthXpert | 2011 | free | Computer Aided | https://bit.ly/2TQHJLw |

| University | | | | Tools | 2YH7vPU |
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| BAE Systems | BAE Systems | 2017 | free, but consul tancy is paid | Scenarios | https://bit.ly/2FZgy7p |
| Engineering Council | Statement of Ethical Principles | 2017 | free | Principles | https://bit.ly/2UhPp8u |
| Royal Academy of Engineering | Engineering Ethics in Practice | 2011 | free | Guideline | https://bit.ly/2WFM67O |
| Centre for Democracy and Technology | CDT DDTOOL for Algorithm Design | 2017 | free | Visual Aid | https://cdt.in/fo/ddtool/ |
| ADAPT Centre & Trinity College Dublin | Ethical Canvas | 2017 | free | Visual Aid | https://ethicscanvas.org/ |
| Open Data Institute | ODI Data Ethics Canvas | 2017 | free ,paid trainin g and consul tancy | Visual Aid | https://bit.ly/2uM2tE9 |
| Austrian digital rights activists | Data dealer | 2013 | free | Games | https://bit.ly/2FN1RTQ |
| Aral Balkan | INDIE ethical design | 2015 | free | Icons and Badges | https://bit.ly/1kz1K1F |
| Usman Haque, Alexandra Deschamps Sonsino | Better IoT (IoTMark) | 2017 | free | Trustmark | https://bit.ly/2KeYoTE |
| Peter Bihr and Mozilla | Trustabletech | 2018 | free | Trustmark | https://bit.ly/2YXsi1Y |
| Embedded Microprocessor Benchmark Consortium | IoTMark-BLE | 2018 | paid | Trustmark | https://bit.ly/2lhjcXE |

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| The Free Software Foundation | FSF Respects Your Freedom | 2012 | free | Trustmark | https://bit.ly/2FMPfvN |
| B Lab | B Corp Impact Assessment | 2019 | free | Certification | https://bit.ly/2ybLOJA |
| Profit Through Ethics Ltd | Responsible 100 | 2018 | free | Quantitative Assessment | https://bit.ly/2OmtkmO |
| Platonig | Moving Communities Canvas | 2017 | free | Worksheets | https://bit.ly/2UBPbcx |
| Never Again Initiative | Never Again Tech | 2016 | free | Pledge | https://bit.ly/2hsmVot |
| ACM | ACM/IEEE-CS Software Engineering Code | 2018 | free | Code of Practice | https://bit.ly/2lkZmvu |
| ADS | Aerospace Defence Security Ethics Toolkit | 2015 | free | Scenarios | https://bit.ly/2vfcxpt |
| The American Society of Mechanical Engineers | Code of Ethics of Engineers | 2012 | free | Code of Ethics | https://bit.ly/2XEofpU |
| The Critical Engineering Working Group Berlin | Critical Engineer Manifesto | 2011 | free | Manifesto | https://bit.ly/1IbQJxN |
| ALLEA - All European Academies (EU FP7) | RRI Self-Reflection Tool | 2017 | free | Toolkit / Cards | https://bit.ly/2viTtXu |
| Res-AGorA Project (EU FP7) | Res-AGorA Responsibility Navigator | 2016 | free, expert facilitation 50EUR | Co-Construction Method | https://bit.ly/2PmLJww |
| British Standards Institute BS8611 | British Standards Institute BS8611: Guide to the ethical design and application of robots and robotic systems | 2016 | £176 | Guideline | https://bit.ly/2KU8461 |

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| Norton Rose Fulbright | Norton Rose Fulbright AI Ethics Toolkit | | paid | Toolkit / Cards | https://bit.ly/2Dv4jhh |
| Future of Life Institute | The Asilomar Principles | 2017 | free | Principles | https://bit.ly/2jPLY2V |
| Doug Wallace and Jon Pekel | Ten Step Method | 2006 | free | Checklist | https://bit.ly/2ICavII |
| Ethics and Policy Integration Centre | Organization and Business Ethics Toolkit | n/a | free | Toolkit / Cards | https://bit.ly/2XCOGMI |
| Airbnb and NewsDeeply | Airbnb Another Lens | 2017 | free | Toolkit / Cards | https://bit.ly/2ukFYTT |
| Microsoft | Microsoft Inclusive Design Toolkit | 2018 | free | Toolkit / Cards | https://bit.ly/1NuHOsk |
| ThingsCon | Trustmark | 2018 | free | Trustmark | https://bit.ly/2GCU50t |
| International consultation, international agencies, NGOs and governments | Principles for Digital Development | 2015 | free | Principles | https://bit.ly/2rDbRLo |
| International development NGOs + rights groups | Responsible Data Handbook | 2018 | free | Toolkit / Cards | https://bit.ly/2VhirVJ |
| Jo Edelman | Helpful Practices for Strong Communities and for Three Types of Activism | n/a | free | Worksheets | https://bit.ly/2VVzVlp |
| Katherine Mzhou | Design Ethically | 2019 | free | Toolkit / Cards | https://bit.ly/2YHmngk |

Annex II - Tools & Flow - Iteration #1

A collection of the first tools and presentations used to facilitate workshops.

https://owncloud.itu.dk/index.php/apps/files?dir=/VIRT-EU/Public_Deliverables/D5.3-Tools/AnnexII&fileid=7842410

Annex III - Tools & Flow - Iteration #2

A collection of tools and overall explanation of the flow as explained and tested during iteration #2.

https://owncloud.itu.dk/index.php/apps/files?dir=/VIRT-EU/Public_Deliverables/D5.3-Tools/AnnexIII&fileid=7842478

Annex IV - Tools & Flow - Iteration #3

A collection of tools and overall explanation of the flow as explained and tested during iteration #3.

https://owncloud.itu.dk/index.php/apps/files?dir=/VIRT-EU/Public_Deliverables/D5.3-Tools/AnnexIV&fileid=7842480

Annex V - PESIA - Iteration #2

Revised PESIA questionnaire, translation of the questionnaire into a flow chart, first mock-up of the digital tool to be developed.

https://owncloud.itu.dk/index.php/apps/files?dir=/VIRT-EU/Public_Deliverables/D5.3-Tools/AnnexV&fileid=7842481