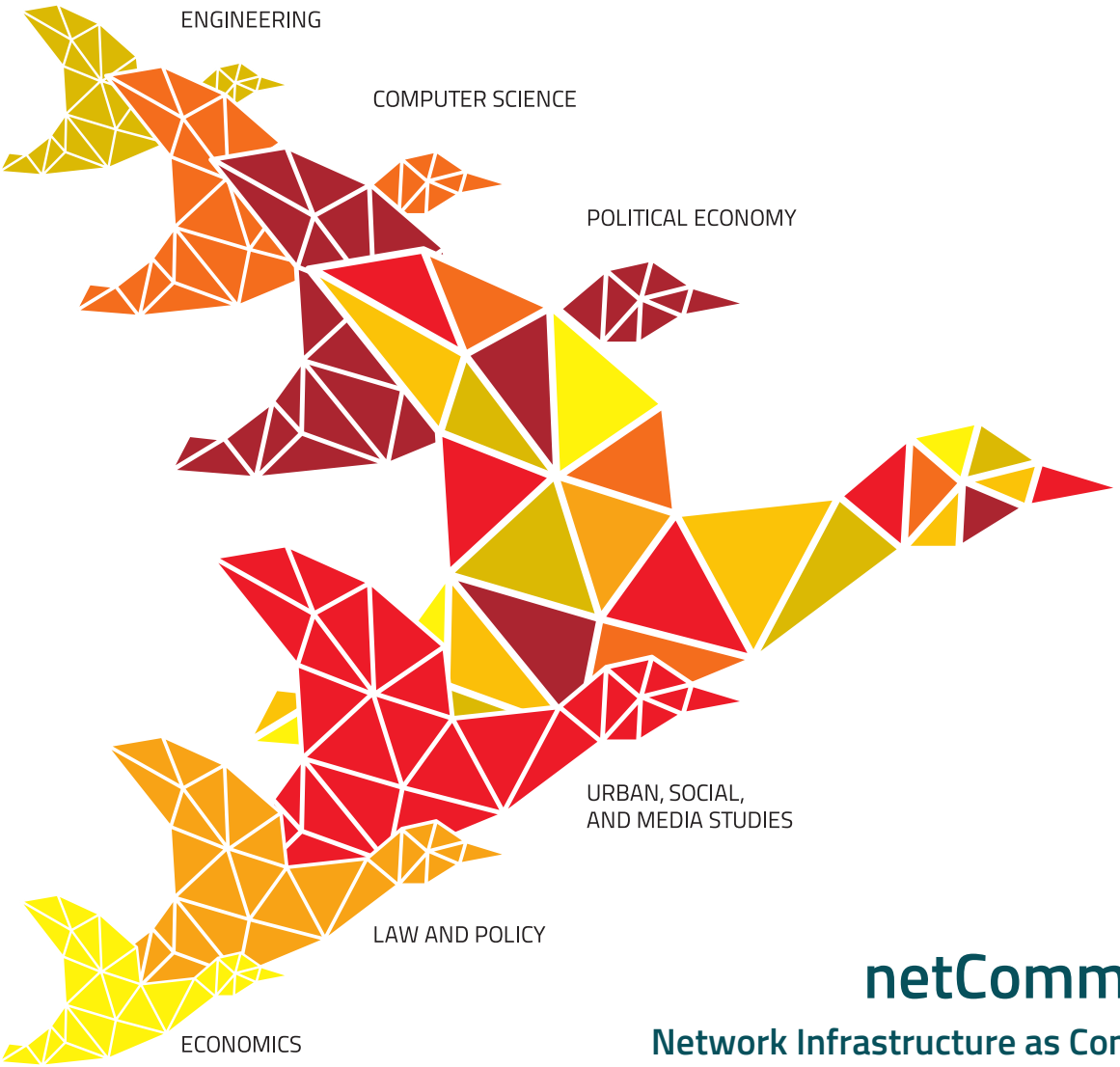

netCommons

Network Infrastructure as Commons

netCommons Deliverables: Multi-Disciplinary Methodology for Applications Design for CNs, including Design Guidelines and Adoption Facilitation (v2)

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v1.0	20/04/2018	Renato Lo Cigno, Panayotis Antoniadis	Proofreading of Part II and revision of the Extended Abstract and Conclusions. Application examples within netCommons development refined.

Executive summary

This deliverable presents an updated and significantly extended version of the initial participatory design methodology introduced in Deliverable 3.1 based on new information acquired through:

- Different hands-on experiences, with most notable the long-term process initiated at Sarantaporo.gr Community Network including both a "learning" process and "app design" process. Other relevant experiences are the creation of a new neighbourhood CN in Athens, the participation in the development of a Free/Libre Open Source Software (FLOSS) platform for self-organized learning in the city (Openki.net), and the development of a participatory design process for a similar scenario in a pilot in Zurich for the CAPS project MAZI;
- Knowledge exchange with other CAPS projects that have expertise and activities around the topic of participatory design, addressing the question how we can produce generic methodologies and lessons learned out of highly contextualized experiences;
- A Re-reading of the OTI experience in the US through the lens of our own recent experiences in the field and discussions with activists that participated in the SEED Grants project.

These experiences and the corresponding lessons learned are described in Part I of this deliverable while the resulting methodology and examples for its implementation are presented in Part II.

The methodology is actually a framework that allows a flexible and creative approach for coordinating people with different skills to perform a rather complex task, similarly to the ways jazz musicians manage to improvise based only on a limited set of constraints. More specifically, our methodology defines a set of high-level *Processes* that need to be carried out in a balanced way to achieve the desirable result, namely *Community Participation, Hybrid Space Design, Software Development, and Project Sustainability*.

For every process different *Threads of Action* are defined, for which a set of methodological *Elements* are provided: a proposed list of *Actions* that make sense for the specific thread, *Metrics* for the evaluation of the outcome of these actions, and *Guidelines* regarding the implementation of the actions.

The actual selection of the methodological elements that fit the corresponding processes and threads on the ground will depend on the *Context*, which includes more or less fixed variables that will reflect the special characteristics of the environment and the available skills in the team, but also the overall objectives and vision.

The context will be constantly evaluated and redefined at the *Local* and *Global Checkpoints*, by the *Team* in predefined coordination cycles subject to a specific *Tempo*. During these checkpoints the Team will evaluate the actions of the previous period, and their outcome, and plan for the next one using the same or an updated set of methodological elements according the change of Context, and possibly important external events.

These Checkpoints and the selected set of methodological elements will provide the required constraints around which the Team will have to collaborate and improvise along the way.

To facilitate the better understanding of the methodology, in Chapter 7 we provide a set of three implementation examples of the methodology, each one corresponding to a very different software development thread of the project.

Contribution to netCommons Objectives

As stated in the Description of Action (DoA), one of the key objectives of netCommons is

> "***Technical decentralization.*** *We will investigate how to produce local, distributed clouds and live streaming and conferencing applications based on peer-to-peer protocols that will represent added values for citizens that participate in CNs.*"

The work presented in this deliverable is a huge, coordinated effort trying to substance in some way the **how** included in the objective above.

Evidence shows that the development of local applications has historically failed, even in cases where all indicators were hinting to potential success. This means just that the current development processes (or the goal of the development) have failed. From a scientific point of view, this could then mean that more research is needed, either to devise a better development process or to "prove" that local applications are not really needed, bound to fail whatever the local conditions or simply too costly to succeed in real life. So far there is nothing hinting that the second possibility is the ground truth, so we set down to try to improve the state of the art on how to implement local applications and services carefully taking into account the needs of the application users and the local characteristics of the environment that act as constraints, often hidden to the application designers and developers, during the development process.

The methodology distilled in Part II starting from the abundant, but unstructured juice of Part I field work, is a clear contribution to our objective, that is now being put in action by developers of netCommons and the Community Networks (CNs) we are working with, and that will be documented in Deliverable 3.6, and further condensed in a public booklet intended to support, on-field, designers of participatory projects, to form software and services development, to their customized deployment in specific scenarios.

Impact of the Work

The work described in this deliverable has already had a significant impact on the development of the software in Task 3.4, where the smart farming application design has been changed and refined based on the documented participatory process. Also the P2P streaming application developed in Task 3.3 is being deployed in ninux following the methodology described here, and similar developments are undertaken in Task 3.2. All of this will be documented in Deliverable 3.6.

The impact external to netCommons work cannot be assessed yet, as clearly external adoption is slower and necessarily starts only after the proper documentation has been released, this deliverable being the first step. We expect that the booklet to support on-field action will have a significant impact on the development (and success) of local services and applications for CNs and beyond, as the methodology can be applied, with the proper modifications, to many other fields (software and not) too.

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List of Acronyms

AWMN	Athens Wireless Metropolitan Network
CAPS	Collective Awareness Platforms for Sustainability and Social Innovation
CN	Community Network
DIY	Do It Yourself
DoA	Description of Action
FFDN	Federation French Data Network
FLOSS	Free/Libre Open Source Software
ISOC	Internet Society
NPO	Non Profit Organization
MVP	Minimum Viable Product
OTI	Open Technology Institute
P2P	Peer-to-Peer
PD	Participatory Design
SSID	Service Set IDentifier
URL	Uniform Resource Locator
UX	User eXperience
SWOT	Strengths Weaknesses Opportunities Threats

1. Introduction

"*Local applications in CNs is a myth*" stated provocatively Juergen Neumann, co-founder of Freifunk.net during the "Off-the-cloud Zone" workshop at Transmediale festival in Berlin[1]. A few years before his colleagues Christian Heise and Monic Meisel in an interview by the Zeit journal were admitting that "*Internet is our killer application, unfortunately, but luckily too,*" and "*although Freifunk is sometimes marketed as a kind of counter-Internet, it can not compete with the Internet ... there is a lack of services and applications for the masses to lift the technology out of the niche of hackers and hobbyists*[2]."

There are similar stories and accounts from all CNs around the world, small and big. From the moment that a CN offers access to the Internet, local services degrade or, when they are successful, they address a very narrow audience.

Our approach toward developing a methodology for a paradigm that has not been particularly successful in the past, despite the strong motivation and multiple efforts around the world, was to create a first "sketch" of a possible methodology based on the background of the team and related work and then actually start implementing it to gain hands-on experience of this complex process and refine it along the way.

More specifically, the very first participatory design workshop at the Sarantaporo area, documented in D3.1 [1], generated two separate threads in the corresponding netCommons participatory design process:

1. The first, jumping ahead in the development of a specific application on smart farming in collaboration with a key player in the area;
2. The second, stepping back and focusing on training the locals on the specificity of the network, and supporting the development of a sustainable economic model in collaboration with the Sarantaporo.gr team.

Regarding the first thread, after the quick and natural decision on the nature of the application to be implemented for the case of Sarantaporo.gr CN, a different phase started where the focus was on the performance and usability of the first version of the application. A good first prototype allows to return to the villages with something that makes a good impression and can further engage people to collaborate in fine-tuning the details. The negative impression left by people coming with "promises" never delivered is very present in our discussions both with locals and with the Sarantaporo.gr team.

Regarding the second thread, one of the most important barriers for discussing the development of local applications for CNs is the lack of understanding of basic concepts that make it very difficult to explain the reasons why local applications are important, and often better than generic ones in many ways.

1.1. Organization of the Deliverable

This Deliverable is organized in two rather different, but complementary parts, which reflect the complex, dual nature of participatory design. Part I, composed of Chapters 2, 3, and 4 is dedicated to the hands-on activity; it has a pragmatic approach, we could say Galilean if our subject were physics, starting from experience and trying to distill some model and general scheme out of the experience. Together with netCommons experience we also report in Part I additional participatory design experiences of the team that complement the Task and empowers a more complete and satisfactory analysis. Part II, comprising Chapters 5 and 7, is instead more theoretical, we would say Newtonian in physics, designing a top-down methodology that can be used as a

[1] https://transmediale.de/content/off-the-cloud-zone
[2] http://www.zeit.de/digital/internet/2014-06/freifunk-internet-nsa

guideline by researchers and practitioners to implement participatory design in both realizing new CNs and in crafting applications that are important for communities.

Chapter 2 reports on several meetings organized along the two threads mentioned before in Sarantaporo and the Elassona area. It's important to note that the Sarantaporo.gr case study is rather specific and in a context, a rural area in Greece, very different from other relevant CNs, including the other ones represented in the netCommons project. The goal of this deliverable is to generalize the lessons from the Sarantaporo case study to be usable for other scenarios as well.

The activity in Sarantaporo was actually based on previous NetHood involvement in relevant complementary hands-on activities (one of them in the context of another CAPS project, MAZI[3]). Chapter 3 provides a short summary of these activities, highlighting important lessons learned that informed the proposed methodology. This chapter will help the interested reader to get more information about the detailed path of thought and action that led to this specific methodology. This is especially important because there are not many success stories around the world to offer enough "statistical" evidence of the proposed guidelines and recommendations. Chapter 3 is based on three activities led by NetHood's Panayotis Antoniadis, one of the authors of the methodology, who was one of the first advocates for the development of local applications for CNs ([2]) together with Alison Powell [3] and Laura Forlano [4].

Chapter 4 summarizes the experience of the netCommons team on these important areas of action: participatory design (Participatory Design (PD)), software development, and Do It Yourself (DIY) networking. It is this diverse experience, together with lessons learned from various disciplines (urban planning, community and urban informatics, and ethnography), that provides the main source of knowledge and credibility for the proposed methodology. Moreover, Chapter 4 includes a summary of our interactions with other CAPS projects on the concept of participatory design at large is presented, and the question on how it can become effective "beyond the local" is addressed. Finally, it also presents a detailed review of the Open Technology Institute (OTI)'s approach (see [5, 6, 7, 8]), which is taken as a reference point since it is the only example of an organized participatory design process for exactly the same design space: local applications for CNs.

Next, Part II develops the actual proposed methodology and presents examples of its potential application in the case of CNs which are in close contact with netCommons (ninux.org and guifi.net). Chapter 5 presents a significantly updated methodology in terms of main concepts and methodological steps. More specifically, based on lessons learned from related work and our own experiences in Sarantaporo, Athens, and Zurich. Next, Chapter 7 takes into account the diversity of possible contexts and situations, and, based on the software under development in Tasks 3.2 and 3.3, provides examples of the implementation of the generic methodology adapted according to important key characteristics of different scenarios.

The key idea behind the generalization of the methodology is the development of a framework that allows for autonomy and improvisation while at the same time includes constraints and a wide variety of suggested actions and guidelines that can both inspire and support a team that wishes to run a participatory design for local applications in CNs project.

While this deliverable is under release, the methodology is tested and evaluated by the project partners and other key actors in the CN community, allowing in the end the production of a reference methodological manual, as a stand alone booklet, which will be published as a separate document before the end of the project.

It is important to stress that in order to deeply understand a methodology it is very useful to understand how the methodology was produced and by whom. In essence, Deliverables D3.1 and D3.3 (this one) tell exactly the story of the creation of the methodology starting from the background and theoretical perspective of its authors, and describing step-by-step the experience from the field and the corresponding lessons learned toward the current version of the methodology. In this sense they are complementary and they should both read together for a deeper understanding of the methodology.

The forthcoming interactions with the rest of the "software developing" partners around the different actions

[3] http://www.mazizone.eu/

and guidelines proposed in the methodology will eventually provide new insights that will lead to further refinement of the methodology and more specific examples of its implementation.

Part I.

Case Studies and Experiences

2. The Sarantaporo case study

This chapter provides a detailed account of several participatory design and training sessions that took place in the Sarantaporo area and in Athens the second year of the project (see D 3.1 [1] for the first year's events). The documentation style is intentionally varied and has been performed by Alexandros Papageorgiou, a PhD student at the University of Thessaly, in the Department of History, Archaeology and Social Anthropology and recently Researcher at NetHood[1]. The different documentation styles have first allowed the netCommons team to experiment with different formats and identify those that fit better the needs and available resources. At the same time, they provide concrete examples of different possible approaches that are included in the methodology (Chapter 5).

Some of these documentation styles are quite verbose (e.g., the "thick description" in Sec. 2.2), but it was decided to include the in the main document, and not as an Appendix, because documentation is a key part of any participatory design methodology, and also because it is important for the interested reader of this report to be encouraged to follow in detail the whole trajectory of the development of the actual methodology.

To make the understanding of the relationship between the hands-on experiences described in this chapter and the methodological elements introduced to explain them easier, references to the different methodological elements are sometimes included either as footnotes describing specific moments of interest during the participatory design process, or as labels of the "lessons learned" subsection at the end of each narrative section.

2.1. Training in Pythio village

Documentation style: Summary of important moments in narrative form

On March 4th 2017, NetHood organized a training session in collaboration with the Sarantaporo.gr team in the village of Pythio. The goal of this training was to acquaint the local population with various aspects of the community network, in order for the inhabitants of the villages to initially understand how it works, think how they can best use it and become more engaged by gradually taking on its management, development and maintenance. Even though the network has been running in their area for the past few years, up to now not many among the locals have gone beyond being simple Internet users.

The seminar took place in Thronos, the tavern of Pythio village and was attended by around twenty people who came from different villages. NetHood and Sarantaporo.gr members had thought of an imaginative and playful way to present the network's architecture and features to the attendants. With the use of large printed and laminated Google Maps satellite images that illustrated the whole area[2] spread over four tables, chess pawns that represented nodes and antennas and colourful strings that depicted the invisible cables of the wireless connections, the network was conjured up before our eyes, as shown in Fig. 2.1. The addition of details like toy horses and cows, little houses and toy people made the experience even more fun and it was surprising to see middle-aged men drawn to play and joke with them. Apart from the amusing aspect of the presentation though, the mapping and visualization of the CN proved to be extremely helpful and effective.

[1] The collaboration between Alexandros Papageorgiou and NetHood in the context of netCommons has been a win-win collaboration through which Alexandros Papageorgiou is given access to very valuable field research material for his PhD, and as an exchange he shares his ethnographic notes in different formats as a means for the netCommons team to self-reflect on the participatory design process and produce useful documentation. This also allows him to finance partly his PhD research that is not fully supported by the University of Thessaly. See also Sec. 5.9.

[2] See the comments and discussion on the use of real maps in Chapter 5.

In particular, Panayotis Antoniadis and George Klissiaris had the opportunity to show the actual positions of the antennas and nodes and to deploy this visual image in order to explain the logic and the technology of the CN. The different sizes and colours of the objects used helped the facilitators describe the features of each of the network's components. Consequently, the way these components are put together to form an operating ensemble started to make more sense.

The information shared was also aiming to mend misinterpretations about the proper functioning of the CN. For instance, the participants had the concept of "interference" presented to them, namely that increasing the nodes working in close proximity does not help enhance the signal's performance, on the contrary, its quality deteriorates. This was a revelation for some people that kept adding access routers to improve the quality of their Internet access to no avail, finally leading to frustration. As explained, to ensure efficiency, a network must be properly designed and the nodes placed in strategic places, even if this means that not everyone has a node at their homes. Panayotis and George led their audience to understand that communication and cooperation between CN members is ultimately beneficial for all and therefore essential.

At the end of the seminar, participants affirmed that they now understood much better the architecture and different components of Sarantaporo.gr CN, as well as its affordances and limitations.

This action followed the first two steps of the "Planning for Real" technique[3] described in detail in D3.1, to "*create a physical model of the area of interest*" and to "*catch people's eye and interest for simply coming over at the meeting in the first place, in a non-committal free and open way*", in order to facilitate the third step of the technique "*open up the discussions toward expressing interests, values and desires*".

An interesting discussion came after the presentation, when Achilleas Vaitsis and George Klissiaris described the current state of things. They expressed, on the one hand, their inability to support the network at the same intense pace they had been doing during the previous years and, on the other hand, the ensuing need for members of Sarantaporo.gr CN locally to become more actively involved. It was a moment of unloading for George and Achilleas. Evidently, they needed to have their side of the story heard, after all these years that they spent mostly listening. We are considering it as a decisive moment during the participatory design process, one at which the locals were confronted directly not only with the prospect of assuming responsibility of the network, but also with the 'human', vulnerable side of their, until recently, all-powerful, all-knowing benefactors.

Achilleas and George also announced that a pricing policy would be implemented from then on, one that encourages sharing connections and 'taxes' having a node just for private use. Anyone can choose to have a node installed at their house. Since those users will enjoy a signal of better quality, the price they will have to pay will be higher than that of the users that will choose to receive the signal transmitted from the neighbouring nodes. The node owners will have the option to not share their connections with others. In this case, however, the annual price they will have to disburse will be even higher. The choice to maintain exclusivity of the connection is not forbidden, however, refusal to share is subject to a penalty. This policy dictated by the CN founders reflects their philosophy and vision, which they are trying to convey to the network members.

At one point, an elderly man wanted to phrase a question. He started by saying "*So, you have your clients here . . . .*" The man's wrong choice of wording sparked Achilleas' immediate reaction, "*Hey, wait a second there, you've got it all wrong!*"", in order to clarify things. This light tension proved to be a good opportunity to help members become clearly aware of the state of things, the fact that they are not clients but the actual providers of the network.

Little by little, assisted by the information they had acquired during the training and by the subsequent discussion, attendants seemed to comprehend the team's position, the decision of pricing connections and the necessity of their own involvement. "*If the use of my connection by another user does not reduce its performance, then why shouldn't I share it?*", a phrase heard by one of the locals which marked a moment of breakthrough in the learning process. The discussion ended in a positive mood, while the wish for more training sessions like

[3] A community planning participatory technique that has been initiated and developed by Tony Gibson in the UK and implemented for many decades in neighborhoods all over the world, chosen as the basis of the netCommons methodology. See Sec. 5.10.4.

this one was expressed.

Figure 2.1: A toy model of the Sarantaporo CN on a real map of the area, used to explain how the network works and the different types of antennas

2.1.1. Lessons learned

- Tangible, concrete visualization can go a long way
- Playful elements contributed significantly
- Gender inequality in participation is consistent
- Events destined to promote learning and community building should be put in motion since the very beginning of a CN initiative. They stimulate and strengthen the participatory dimension of the design process.[4]

2.2. Informal visit

Documentation style: Thick description[5]; ethnographic account combining detailed description with analytic interpretation and objective observations with subjective impressions.

In May 2017, Panayotis Antoniadis, Ileana Apostol and Alexandros Papageorgiou had the opportunity to visit a village in the area of Sarantaporo for a few hours, making a detour on their journey from Thessaloniki, where a conference on the commons[6] took place, to Athens.

Narration by Alexandros Papageorgiou, local names are pseudonyms to ensure some anonymity even if no personal information is involved

When we arrived at the village on that early May afternoon it was raining heavily. When we entered the local tavern Nikos and Maria, the tavern owners, welcomed us. They said we should have let them know we were coming so they could be better prepared, but Panayotis convincingly replied that we wanted to surprise them

[4] See the LEARNING thread of action in the Community Participation process, Section 5.7.1.

[5] What in cultural and symbolic anthropology is called a "thick description" [9] of a human behavior refers to the contextualization of observations and research 'findings', so to explain both practices and discourses within a society.

[6] https://commonsseauth.wordpress.com/program-in-english/

and we were only passing by anyway, to have lunch[7]. Although Maria was about to leave (there were only two more people in the tavern), she didn't hesitate for a moment to put her bags back to their place and go with Nikos to the kitchen to prepare our meal.

At first it felt like we were discommoding them, however, a thought that didn't cross my mind right away was that, without knowing or wanting it, we were honouring them with our presence. Besides, we could believe their word when they told us that it was no trouble for them. They might have said it because it was actually true, not because they were being polite. We shouldn't consider their time with our frantic urban standards, I thought, or feel guilty of selfishness because what they propose sounds convenient for us. After a while, George, a local Panayotis and Ileana have met before, came to join us. George is a very outgoing, talkative person, a well-kept man in his early seventies who has lived and worked abroad, mainly in Germany, and takes much pride in telling stories from his life. He understands and/or speaks many languages and, since our last visit, he was thrilled to try to communicate with Ileana, who is a native Romanian speaker. He spoke in Vlach (a language from Eastern Europe with a common root with Romanian[8]), she answered in Romanian, they spotted similarities and differences between the two languages and George was delighted. Surely because they managed to communicate, but also because he found a new partner to play a language analogy game he seemed to be really fond of. Even though George was evidently more eager to share his own, endangered idiom than to learn Ileana's, everyone's good mood made communication easy and the smiles on everyone's faces had no intention of going away any time soon. After a while the food was ready. Our hosts filled our table with plates containing colourful local delicacies, poured home-made Tsipouro into our glasses and sat with us.

During the ride from Thessaloniki, we had tried to deploy our strategy on how we would approach the people we would meet and what we would propose to them. One topic that we wanted to bring up at the conversation with our hosts was the creation of a space of and for the community network in every village. The adoption of the network by its users has been defined as the primary current goal of the Sarantaporo.gr team. The creation of 'action groups' was necessary not only for practical reasons–impossibility of the founders to spend much time in the area, tackling of local issues by those best informed and directly concerned (the members of the community themselves), making the most of existing skills and knowledge on particular kinds of action–but also for the network to truly become a commons, through the active engagement of some locals who would, with time, draw their fellow villagers in participating in the self-organization and self-management of this common resource. Since the CN in question was not produced as a commons by an internal social process, however, but through external funding, the goal is for it to be gradually reproduced as such. And to this purpose, the creation of a physical space has been acknowledged as an important next step. I mentioned the idea of a mobile network unit, like a mini-van that could carry educational material around the villages, but it was quickly rejected because we agreed that what is needed is a physical node, a place in every village in which the materiality of the network and of relevant relations would be embedded, and which could be appropriated by the inhabitants as owners and managers of the network.

Since the last time we were in the area for a training on the network Panayotis and Ileana had another idea: organizing a women's workshop. On previous occasions they had noticed than the women of the villages do not participate in the community's decision-making processes about the network: "*we don't know about these things, we trust our husbands to sort them out*". No in-depth analysis is necessary to understand that this statement can be valid for most, if not all, cases concerning women's participation in processes relevant to the political and economic organization of the community. Nevertheless, we were aware of potential complications that could arise and of the limits that our outsiders' position set with regard to disrupting traditional, generation-long balances in local gender relations. We concluded that we should not propose gatherings and activities that would be exclusive to a specific group. If we wanted to organize a workshop aiming to inform and train (and thus include) women on the use of the network, it should nevertheless be addressed to everyone. We would just

[7] See LISTENING and TRUST BUILDING threads of action in Community Participation process, Section 5.7.1.

[8] Vlach is a broad term used throughout the Balkans to identify, often with derogation, people speaking a latin-derived (and not Greek- or Slavic- derived) language, normally working a shepherds. Little enclaves of "Vlachs" exist in Greece, Macedonia, Serbia and most of the Balkan region.

have to find a way to attract women to such an event.

Panayotis had already made a move in that direction, combining this goal with the action group logic. In February, Xenia, a woman from another village who had shown up at the educational session on the network, seemed eager to learn more and to take responsibility. Panayotis had contacted her in the days prior to this visit to see if she would be available to meet and talk about possible actions around the network. So, perhaps this can be a better strategy to start from: instead of intervening in village affairs to help empower people 'our top-down way' (whether intentionally or not) we could rely on those people who are already motivated to participate actively in the management of the CN to become engaged actors[9]. And if there are women like Xenia willing and able to assume such a role, the better it is.

As we were now sitting around the table, conversation flowed freely; we didn't want to maneuver it right away toward the topics that interested us. For a while the discussion revolved around languages, since George was still with us. I talked with Maria about the Vlach language. Her village is Vlach, it was built and inhabited by Vlach people for centuries. She told me that two other villages in the valley (one also belongs to the CN) were created by Vlachs. At some point she mentioned that there is another Vlach village in the valley, its inhabitants are 'strangers'[10] though, which means not from their village. We thought this comment to be funny (if *they* are strangers what does this make of *us*?) and Maria showed that she shared the meaning the word signified to us. It seems that people in the area use the word for anyone who is not from their village. Maria added that the people from the other Vlach villages are 'better' than they are: "*Do you know the expression 'A small village is a bad village?'*", she asked me. "*The fewer the people the worse it is*", she added without dwelling on details. She referred to another village, non Vlach, of people originating from Pontus: "*They too are better than us. Open, well-intended*".

I wouldn't take Maria's word for an absolute truth, as far as the quality of humanity in the different villages is concerned. However, the information that we found really useful was that the locals apparently maintain centuries-long divisions in respect to their conception of identity. This sort of differentiation may not be displayed in the form of rivalry or dispute (or it may, we haven't got much information about inter-village relations yet), nonetheless, it is reflected in language, as we witnessed, and, consequently, it might mean that the everyday *praxis* of the villagers is informed by a social *habitus* that implicitly dictates their reclusive singularity *vis-à-vis* with the other villages. In other words, based on observations so far, the sense of community in the valley west of Olympus does probably not extend beyond the spatial and conceptual limits of each village. This, of course, is not new information. The Sarantaporo.gr team is aware of this fact and, taking it into account, they have discussed the possibility of changing the network name, since the inhabitants of all other villages do not identify with it. Besides, Sarantaporo village was at that time off the network, as they decided that they did not want to pay the minimal contribution the Sarantaporo.gr team asked for (but the connectivity was restored after the 2nd training session described below).

Bearing all of the above in mind, it is safe to say that the best way forward for the expansion of the CN is to firstly help strengthen community ties within each one of the villages and promote its appropriation and management as a resource belonging to each one of them individually, hoping that, in the long term, people in the valley perceive the CN as a resource they all share. This conclusion highlights the importance of the role of action groups, as well as of individual members of the community as engaged actors.

In the course of my discussion with Maria we also talked about the threat of extinction that the Vlach language faces. She told me that when she was young people spoke Vlach at home, but institutional pressure represented by formal education limited the use of the language. "*The teacher told our parents to stop speaking Vlach at home because the children wouldn't learn Greek properly*". Nowadays, Vlach is rarely spoken within families

[9] See LOCAL CHAMPIONS thread of action in Project Sustainability process, Sec. 5.7.4.

[10] In Greek the word 'xenos' that Maria used means both 'stranger' and 'foreigner'; the meaning it signifies can therefore be ambiguous sometimes. It primarily states that someone or something is 'not us', and can vary from being unknown and unfamiliar to belonging to a completely different race, culture or language group. In this case, all degrees of "strangeness" automatically seemed exaggerated to us, considering that we were talking about a village less than 20 km away, with inhabitants from the same ethnic group and which have also lived there for many generations.

anymore. "*My children know Vlach but they never speak it to their kids. I make an effort and I speak it to my grandchildren but it tires me. I am very happy when I hear them say the words I taught them though*".

I expressed my opinion that it is a pity to lose this tradition and I added that the Internet and the CN in particular could help to document and preserve the language. I explained to her that new technologies offer this possibility: all this effort doesn't need to be done by just one person. There is some work in setting up a platform, but then every person contributes to it according to the time and resources that they afford. The platform is there, always available. We then used the CN on the spot to search for blogs or websites on Vlach on my smartphone. Indeed, we found some efforts in the form of lexicons that have been created informally and have been shared on the Internet. Maria looked very eager to read the translations, but also the way Vlach words were written in Greek characters, since Vlach is an oral language of Latin origin. Now and then she said: "*We don't say it like this. Maybe it has been written by Vlachs in other parts of Greece*".

In the meantime, Panayotis and Nikos were talking about creating a space for the network in the village. Nikos said that the space destined to become the school library could be used for this purpose. At that point the two conversations joined and it was suggested that the community space could also be used for research and documentation of the local Vlach dialect. It could work as a sort of community center that materializes and, to a certain extent, coordinates the social activity related to the network, provides the space where (at least part of) the content produced by the community online could be physically presented and visited, but also constitutes a material gateway for face-to-face encounters to inform and enrich digital interaction. However, since the village had a cultural association (as did other villages in the valley), it would have to be clear from the start that the space would belong to the CN and would be used primarily for its own needs and activities. The 'mixing' of functions and purposes would have to be well thought through, in order to avoid potential confusion and misunderstandings.

Indeed, George's dream is to build a folk museum on the history of the village next to the old school. He was hoping for some support from our project but Panayotis explained that this funding is for a very specific goal. It was getting late and it was time for us to go. Before we left the tavern, we bought Olympus herbs and teas that Nikos and Maria have for selling. Panayotis told them that their products are great gifts that friends in Switzerland really appreciate. We greeted our hosts warmly and told them to expect us in a couple of months, accompanied by more people.

We left the village and passed by a nearby village to say hi to another tavern owner, Kostas, and his wife, Anna. Kostas is very active and has contributed a lot to the development of the network in his village. He has also acquired significant technical knowledge on its functioning. If they had the time and were in the mood we would discuss about the network with them as well. Moreover, Panayotis had something to propose.

When we got there the tavern was closed. It was a really quiet afternoon in that village (or is every afternoon in the village like this?). A neighbour who heard us knocking came out and told us that Anna would come down to open soon (their house is above the tavern). We waited for a while, until the neighbour went and knocked on the door to tell Anna we were there. Eventually, she came and opened, welcoming us and offering us home-made cake together with the cups of coffee we ordered.

After a while Kostas showed up. He was not as warm and chatty as he was the last time we were there. When we asked about the network he looked troubled and mentioned that it was down on Easter weekend, a development that represents a serious blow for his establishment. Those are days that the tavern hosts a large clientele which by now expects to have Internet access there and apparently Kostas had to apologize for the network's inadequacy.

I guess that Kostas' position must be a delicate one, because he is 'in the middle' between his community and the Sarantaporo.gr initiative. Although he acknowledges the possibilities that the network provides for him and for the community, and offers his practical and moral support to it, he would reasonably hesitate to assume a role that might be interpreted by his fellow villagers as being the local representative of the network, since he would thus risk to become alienated from them, a risk that a village tavern owner cannot afford to take, especially in a place with very few tourists. As I try to imagine how it must have been for Kostas to receive

Figure 2.2: Informal visit to a village in the Sarantaporo area. Discussion about the potential role of women in the Sarantaporo.gr CN

the complaints of his clients on Easter weekend and to listen to their comments or even bad jokes about the network, I conclude that I wouldn't like to be in his shoes.

Nonetheless, Panayotis supposed that not much has changed and considered Kostas to still be a keen supporter of the initiative, so he told him about his idea. Early June, in about a month's time, there was going to be a conference on practices of the social and solidarity economy in Athens and the Sarantaporo team would take part to present their project. Panayotis' idea was to propose to Kostas to come to Athens and share his view as a local. "*No, no, thanks, I can't*", Kostas replied politely, "*there is much to do here. I can't leave the tavern*". "*Sure, no problem*", we didn't insist at all. Before we left we told him that we would be back in the beginning of July, together with more people, new interested visitors. "*Very nice, you are all welcome*", said Kostas with a tired smile.

As we were driving away, we commented on Kostas' attitude. Was it a sign of disappointment or weariness with regard to the whole endeavour? Was it just a bad day that we caught him on? There was no way to know. In any case, it made us think that it is surely hard for a single person to make all the effort of maintaining the network and advocating it, while functioning as an intermediary between the community to which he/she belongs to and a group of outsiders, no matter how benevolent they are.

At the end of our last visit in those villages, about two months earlier, we had made a promise that we now came to fulfill. The promise had simply been to return. To maintain contact. In the end, this is what mattered the most: building a relationship. Perhaps more than change, progress, development or any other fancy although meaningful term, also because it constitutes a requirement for the successful course of all these processes. People in the west Olympus villages (and probably people in general) may need wireless Internet connection, an improvement in their material conditions, or an empowered communal awareness. However, they equally need to just interact with people from outside their community who come to visit not because they have a project to carry through or because they can help compensate for a deficit of the community that they as outsiders have

identified, but because they want to see friendly faces again. This is why, when discussing practical issues usually concerning the network with people from the villages, it sometimes felt like conversation was held just for the sake of exchanging words, looks and gestures. The content appeared to be far less important, a pretext even.

The last time we were here, in March, at the moment of saying goodbye, our (then) new friends, Nikos and Maria, rushed to ask "*When are you coming back?*"[11]. One could tell by the tone of their voice and the expression of their eyes that this was an important question, albeit not made in a pressing or demanding way. And we can affirm with certainty that it was not driven by selfish, utilitarian motives either. Our answer could therefore not be given careless–or as a stereotype. "*You'll be seeing a lot of us*", Panayotis replied confidently. "*Every two or three months we'll be paying you a visit. You'll get sick of our faces*", he added with a smile.

It is no wonder that at first stop of our visit Nikos and Maria proposed to him to buy a house in the village. "*You have money, right?*" "*Well, not too much, I have some*", said Panayotis trying to put things under the right perspective. "*Well then, buy a house here! There are lots of nice empty houses that are not expensive*". This enthusiastic proposal came after our hosts had told us that a group of people from Lesvos (the island of origin of Panayotis' father) have 'discovered' their village and have bought houses there. Since Panayotis was (even in a remote way) also from Lesvos, and was a friend who liked the village, all the conditions seemed to be met for him to belong there in a more permanent manner.

I don't know if Panayotis and Ileana plan to become even more 'dispersed' (neither of them lives in their place of origin) by buying a house on the slope of Olympus, but as far as the promise of returning is concerned, they did keep it. And I know that they intend to renew that promise again and again, thus building upon the foundations of trust that they already laid and which constitute the essential basis for any 'common' future.

2.2.1. Lessons learned

- (Simple, purposeless) human contact is important for the building of relationship, which in turn is essential for building trust[12]
- Provided that there is a basis of trust, informal conversations allow the sharing of in-depth information that is rarely disclosed during formally organized meetings
- People in the villages do not have high hopes that things in their area will change any time soon
- The idea and feeling of community between different villages does not exist. It is a deeply rooted perception of local identity, as clearly distinguishable from one village to another. What remains to discover is whether there is a sense of community within villages. In any case, trying to 'forcibly communitize' villages that never before worked together or thought of themselves as constituting community, can prove impossible and destined to fail. What is meaningful is to try to invigorate existing community bonds, or to help bring out potential cooperation based on identifiable common needs.
- The position of power-user or engaged actor, as middleman (/-woman) between the Sarantaporo.gr team and his/her fellow villagers, can be complicated and uncomfortable, possibly requiring the assumption of a new role in informal local politics
- As outsiders, the team of experts needs to be careful as to respect local culture and to not disrupt firmly established local equilibria

[11] The literal translation of the Greek expression they used is: "When are you coming back to us?", whereby one word adds a subtle touch of intimacy and transforms the question into an invitation.

[12] See the TRUST BUILDING thread of action in the Community Participation process, Section 5.7.1

2.3. Training in Sarantaporo village

Documentation style: Minutes in narrative form[13]

On July 15th the Sarantaporo.gr team organized another open educational event, this time in the village of Sarantaporo. Although Sarantaporo is the village of origin of the team's founding members, they have been struggling to reach out to the inhabitants (several of which are relatives of theirs) and to make them embrace the initiative. This is why the team has decided to hold a training session there, while they notified members from every other village belonging to the network to join. The team also created events on facebook to inform the public. There was another reason for which the specific place and date were chosen–a festival was organized in Sarantaporo on that same weekend and the members of the team were hoping for more visibility and attendance. All the activities took place in the cultural center, a building that hosts most of the village public events (talks, theater plays, etc.).

The event consisted of three parts. The first, held on Saturday afternoon, was a seminar on digital networks addressed explicitly to anyone interested in learning (more) about how networks work and how they are built, in order to help develop or maintain the Sarantaporo.gr wireless community network. The second part which took place on Saturday evening was an open discussion under the title: "Transfer of experience and know-how from the Sarantaporo.gr community for the building of a new wireless network community in the Municipality of Northern Tzoumerka[14]." NetHood and Sarantaporo.gr had invited Vasilis Niaros an urban researcher working at the P2P Lab, "an interdisciplinary research collective focused on the commons" based in Ioannina[15] very close to Tzoumerka, and Vangelis Megas, a member of the Municipal Authority of N. Tzoumerka[16]. The third and final part of the event was a seminar for children and parents on basic computer and Internet use that was held on late Sunday morning.

The team had set up computers, screens, antennas and routers in the cultural center. Attendance was modest (around 10 people), but participants found the seminar quite interesting. Nikos, the newest member of Sarantaporo.gr, made a presentation of how wireless networks work and specifically how the local one is set up, in order for attendants to have an overall view of actions required to build a network. Then it was time for hands-on application of knowledge acquired during the presentation. All participants sat in front of a screen and were guided to create a wireless network step by step. Panayotis Antoniadis had brought a very interesting guest along–Nicolás Pace, a nomad hacktivist from Argentina, member of the Libre Mesh[17] project and the AlterMundi[18] community[19]. Nicolás was in Greece to take part in a series of workshops on libremesh organized the previous week in Athens[20]. He was intrigued by the Sarantaporo project and came to the village to learn more about the initiative and to share his own experience with the team and the locals. So, the team seized the opportunity of Nicolás' presence and invited him to say a few words about Libre Mesh to the people gathered in the cultural centre.

Nicolás made a brief presentation of LibreMesh. It is a technology that enables Peer-to-Peer (P2P) interaction and production. It allows for users to set up networks without the work of experts. The software runs on the devices and, therefore, it relieves communities of the effort to learn complex technologies. It also makes the procedure completely transparent. "*It's a physical skill, not a technical skill*", argued Nicolás, "*very easy for non-experts to use*". The accessibility of the technology makes it easier to for people to get involved. LibreMesh requires some effort nevertheless, as well as a necessary positive attitude towards participation and collaboration. "*This is a means, not a destination*", added our visitor, "*so that communities realize that they*

[13] See DOCUMENTATION thread in Community Participation process, Section 5.7.1.3.
[14] A mountainous region located in the department of Epirus in Western Greece, 210 km from Sarantaporo.
[15] http://p2plab.gr
[16] See FUNDING and NETWORK threads in Project Sustainability process, Sec. 5.7.4
[17] http://libremesh.org
[18] http://altermundi.net
[19] See FUNDING and NETWORK threads in Project Sustainability process, Sec. 5.7.4
[20] http://wiki.exarcheianet.gr/index.php?title=Libremesh_workshop_in_Athens_-_June_12-16th

have the power to do things together, to rebuild the social net that is the community. To build on the network."

After Nicolás' inspiring presentation, it was time for the open discussion in a circle, moderated by NetHood's Panayotis Antoniadis, in a sort of a round tables as depicted in Fig. 2.3. In order for participants to express their views spontaneously, the talk was very loosely structured. In the beginning, the guests from Ioannina presented their project whose aim is essentially to provide agricultural tools to farmers in the N. Tzoumerka region. However, a secondary goal is to promote the idea of sharing tools and building community among farmers. Therefore, the prospect of individuals connecting via a wireless network seems quite useful and could prove to be another valuable tool.

The locals listened carefully and then, one by one, they started sharing their experience with the visitors. The knowledge transfer revolved mostly around what actions the aspiring networked community should avoid and what mistakes that were caused by lack of experience of Sarantaporo.gr they should not repeat. Speakers mentioned their fellow villagers' "bad mentality" of seeing the network as service provided for free for which they are not responsible. The harsh (self-)criticism was mitigated by assuring participants that this mentality does not mark a local singularity. Rather, "the same mentality is found all over Greece". It was a fruitful, albeit tense, at times, discussion, since talking about mistakes is inevitably linked to the attribution of responsibility. Often, there was a more or less evident attempt by interested parties to defend themselves and justify their past actions. The members of Sarantaporo.gr said that in their effort and enthusiasm to attract people to use the network, in the beginning they made mistakes such as offering the connection straight away, without previously informing and educating locals on the possibilities of the technology, in a participatory design process[21].

Figure 2.3: Round table between Sarantaporo residents and node owners, researchers, and visitors from Ioannina and Athens

Several opinions about what could have been done differently were heard, by the Sarantaporo.gr team and local community members, followed by suggestions about what can still be done to mobilize the community and improve the network. Panayotis mediated in that direction: "*Mistakes have been made, but let's talk about how they (the visitors from Ioannina) can start while avoiding similar mistakes. Let's also try to mend what has been done wrong here.*" Vasilis Chrysos, a Sarantporo.gr member, posed a question: "*What kind of approach do we need in order to start over? To engage people, to do better?*" Panayotis also urged the people who had not spoken until then to try to think how the CN could be more useful. "*It is not about Internet, it is about the network*", said Dimitris, a young farmer from the village of Milea. Another opinion that was expressed was

[21] See the COMMUNITY ENGAGEMENT thread of action in Community Participation process, Sec. 5.7.1

that participation is not enough, a framework of principles is also needed. Achilleas Vaitsis from Sarantporo.gr pointed out the importance of an immediate and clearly defined common need. He referred to some animal farmers who asked to be included in the network, because they knew that that would reduce costs for them and because this way the workers staying at their farms would be able to communicate with their families. Yannis, a man from Sarantaporo who doesn't live there permanently anymore, said that the fact that the network is not reliable doesn't help people to believe in it. And he asked: "*If people get more involved, will it be more reliable?*" George Klissiaris explained technology's limitations and reminded participants that the network needs to be upgraded. An investment in infrastructure and human resources is required. And he added: "*One or two people cannot setup 30 nodes. We did it once, we cannot do it again. If the team is asked to help, we will gladly do it. But to go from house to house to explain and convince people, we won't do that anymore. We need new blood, young people living here to take over.*"

Panayotis proposed to start with a pilot project: "*Can we make an investment to install 3 devices in the square? This way it would be visible and public for locals but also for visitors.*" But, at the same time, he pointed out that people need to understand that "*if we want it just for ourselves we will destroy it for everyone. Internet from the square should not be appropriated*". The conversation, as in Pythio four months earlier, was oriented towards the problem of the unwillingness to share.

The participants from abroad, Nicolás and Lauren (a nomad activist from England currently based in Athens), who were listening carefully until now, decided to speak out and gave the discussion another perspective. Nicolás touched upon clearly expressing individual needs: "*You have been talking a lot about other people's needs, but not yours. Could it be that you don't need connectivity but you talk about what other people need? Each one should express their own needs.*" Lauren broached the matters of identity and management: "*Since the beginning of the meeting I wanted to ask: who is 'we'? I would start by finding the 'we' and allow them to do it themselves. I understand that this is what you (addressing the Sarantaporo.gr team) are trying to do. There are two possible directions such a CN can take: It can be very community run, where the role of the outsider team is limited to teaching the community to build the node on their own, or more top down, where you have a network but there are people paid to build and maintain it. In my opinion, the middle ground, whereby the framework of participation is built by an outsider team helping to create the community, doesn't seem to work.*" Nicolàs' and Lauren's interventions incited participants to engage in a more self-reflexive process instead of analyzing the behaviour of others and generalizing. However, participants, apparently lacking experience in such processes, had trouble embracing these suggestions. It was still very hard to imagine that the solution could come from within the community. Yannis, the man from before, grasped at outside help for a way out: "*A kind of entity has to exist to control and manage the network. If we get the money, we can buy infrastructure and build a network and decide how to repair it.*"

Members of the Sarantaporo.gr team responded: "*That's not the concept. This sort of control is what private providers do. It is not about a bully saying how things go, it is about the community governing it.*" (Nikos) "*It is not about the money, it is about people getting involved. Our team could still have the responsibility of maintaining*"–"monitoring, not maintaining", Nikos corrected him–"*the network, but people would manage it locally. We shouldn't be involved in anything inside the villages. Our sole responsibility would be the main/core network, between the villages.*" (George) "*It is also about working hours. We cannot travel 5 hours just to turn antennas around.*" (Nikos) "*It's about community, cooperation, not about bandwidth.*" (Achilleas) Panayotis added: "*If people don't have awareness they might destroy the network. We need participation and rules. This cannot be generated automatically. We need organization, the creation of a community that would create and manage the network. The question is: How could a group of locals start organizing it, not outsiders?*" Nicolás invited participants to use their imagination in order to reflect: "*Imagine you had infinite bandwidth and infinite money, what would you do?*" On a somewhat disappointed and cynical note, George responded: "*People would demand maintenance, as clients would.*"

Even though several questions remained unanswered, the sheer fact that they were posed represents the maturation of conditions that allowed for different thoughts, emotions, concerns and conclusion to be expressed. The transfer of technical knowledge that preceded was followed by the enriching exchange of experience, in a

comprehensive learning process that will lay the ground for the overcoming of obstacles toward the advancement of the participatory design process. The guests from Ioannina played a key role as "interested outsiders" and found themselves the discussion very informative, with respect to possible obstacles and points of attention when creating a community network.

The event was concluded the next day with the class on computer and Internet use for children and parents that Vasilis Chrysos taught.

2.3.1. Lessons learned

Sessions like the ones held in Pythio in March and in Sarantaporo in July represent milestones in the life of the CN, as they mark steps forward on many levels. They allowed for:

- Sharing of stories and points of view
- Reviewing of past actions and commenting on current status
- Shaping a common narrative
- Technical training, with the goal of enabling the setup and maintenance of the network by its users
- Opportunity for exchange with visitors
- Education on collective decision-making
- Familiarization with participatory design processes

It is clear that in order for local communities with no technological background to become involved in designing, building, maintaining and managing a community network for the purpose of identifying and addressing their needs, support in many forms is required. At the same time, it is evident that for the necessary fermentation to take place, considerable effort and time is needed, by all stakeholders. Based on these observations, the Sarantaporo.gr team has become aware of the importance of training and of the necessity of their continuation beyond the netCommons timeframe and scope of action. To that end, the different netCommons actors are resolved on pursuing further funding from Internet Society (ISOC) in order to carry on with the training thread in the coming years.[22]

In both cases of training, more experienced participants shared knowledge with less experienced ones. They shared technical knowledge, but also their lived experience, while attempting to shake off the (by now more or less fixed) idea of CN members that things could and should go on working the way they have been working so far.

2.4. (Simulated) participatory design for the farming app – Athens

Documentation style: Detailed minutes in narrative form, with summarizing reflexive comments in-between thematic units/sections[23]

[22] See the FUNDING thread of action in the Project Sustainability process, Sec. 5.7.4.

[23] As engaged actors, members of netCommons need to remain critically reflexive of our methods and of the positions we are assuming at every stage of the participatory design process. In this context the documentation style in this section is inspired by "collaborative ethnography" [10, 11] as a practical methodological tool for reference, transparency, self-reflection, representation and decision-making. An ethnographically informed group narrative can enhance the awareness of the collective effort to foster egalitarian and participatory procedures, thereby providing assurance to the members that power inequalities within the group will be avoided (or, at least, revealed). Consequently, bonds of trust can be strengthened, enabling a fertile context for the envisioning and actualizing of relevant short- and long-term goals. During the process of collaboration, members can function as equal partners and co-authors of accounts, to produce pluralistic texts that convey equally everyone's views and unveil internal meanings and group dynamics, which otherwise remain obscure. A collaborative ethnography constitutes a collection of verifiable data, thus limiting the margin of interpretative arbitrariness represented by the contribution of a single author. Through the exposition in the present section of the text that resulted from the group's collaboratively shaped account, the aim is to acquaint readers with an example of this process in its entirety. See also Sec. 5.7.1.3

Figure 2.4: Discussing about the key functionality and usable interface that needs to be provided by AUEB's farming app (AppLea)

As a first step, and not to waste resources through multiple visits at the Sarantaporo area, AUEB, Sarantaporo.gr Non Profit Organization (NPO) and NetHood conducted a series of short participatory design workshops in order to produce a "minimum viable product"[24] along the lines already agreed upon from our very first workshop in the area.

On November 8th, George Klissiaris and Vasilis Chrysos with their Sarantaporo.gr Coreteam hat, Panayotis Antoniadis from NetHood, and Merkouris Karaliopoulos, Iordanis Koutsopoulos and Aris Pilichos from AUEB met on the premises of AUEB, to discuss the next steps for the development of the farming app. A picture from the meeting is shown in Fig. 2.4.

> ***Reflection—****In the course of the discussion, two key points were analyzed as central to the team's ambitions and, consequently, to the app design. The first is the adoption of the app through the creation of a practical and easy-to-use digital tool that would make farmers work easier. The second is the encouragement of community building, or even of the creation of a cooperative, through the sharing of data among the users of the app. These two points, which have developed into the team's main goals, are indissolubly interlinked, as described further on.*

For the second point to make sense, users would initially have to personally benefit from the information shared by their peers. As a consequence of this practice through time, users would be led to explore more ways in which this sharing could be advantageous for all, by organizing in a collective manner. Since the goal of community building is given for granted, the team started off by mentioning some of the data that a farmer would need to upload to the app, like details about each one of their fields (name, position, coordinates, size-surface), as well as the type of cultivation, number of trees (if it is trees), etc.

Useful insights were shared, about potential obstacles and traps that are not always easily discernible. For instance, it is a known fact that farmers in Greece don't always register the correct number of trees because they apply for subsidies based on arbitrary numbers. So, going back to our case, the information uploaded could be far from reality, rendering benchmarking inaccurate and useless. Farmers performing this falsifying practice suspect that their peers do the same, which would result in downgrading the app's worth. Participants agreed that this was a valuable contribution (by Vasilis) because it depicts a concrete reality of how farmers act.

[24] See the PHASING thread of action in Software Development process, Sec. 5.7.3

The team tried to think of corrective measures, for instance through the evaluation of a post by other users on a forum. But then, if users report their peers' registrations as unreliable, the trustworthiness of the app as a whole would be undermined, driving users away. Participants acknowledged that the phenomenon of publishing false data is encountered in any type of platform app. The aim would be to mitigate it.

Panayotis pointed out that the the app has a social value even if people participate anonymously. This way users would not feel spied upon. Maybe they wouldn't even need to pinpoint their field on a map (since if they did their peers would recognize immediately who they are). "*Let us think about what kind of information is actually useful.*" Specific personal information doesn't concern others and wouldn't help users really. "*Why not consider a less 'scientific' sharing of data, one where 'serious data' circulate in a milder way, through social interaction?*", Panayotis added.

Vasilis said that on farmers' forums people show off their products, their machines, etc. So, maybe sharing photos and comments with each other easily could be a way to attract farmers to use the app. But then the question arose: "*Why would anyone choose the app to do this if they are already doing it on facebook?*" The answer was that the app would offer the possibilities that social media offer, plus something more. It could include a timeline–the option to follow developments over time could be addictive–and offer the possibility to tag. It was suggested that the interface be catchy, a space where someone could add a photo or an action with a click.

> ***Reflection—****It was now apparent to the team that what mattered was not only content, but also the way data would be shared. The aim would be to ensure a combination of enabling and prompting the sharing of truly meaningful information with a method of sharing that wouldn't affect users' rights to privacy or their feeling of privacy while being aesthetically and practically attractive.*

The discussion then shifted to the first point: The app value as a tool for organizing better one's own production. Participants clearly stated their opinion that this organization, rather than a game or a social medium, should be the app primary function. As Merkouris reminded, a farmer's calendar can be an easy-to-use, highly personalized feature of guaranteed usefulness to farmers independent of their will to share their data. Participants agreed that they need to get hold of photos of farmer' calendars, in order to get a clear idea of the kind of information that farmers register and to see the precise way it should be filled out. The information was shared, that two subcategories of farmers in the west Olympus region, those who produce organic products and those who are part of a cooperative, must declare their data anyway and, therefore, must keep a calendar. Instead of them doing it manually or by filling in excel forms at a later time, the app could offer the automatic generation of a graph, a pdf or excel file in real time by exporting the data the users have entered. Vasilis mentioned that there is a standardized way to make entries in a calendar or log and that this action is usually undertaken by the agronomist, also because farmers are not willing to do it themselves. Everyone agreed that it is essential to get first-hand information from 'active' farmers (some 'power-users' as Panayotis called them) and from their calendars. Some questions were made, answers to which could prove very useful: Are the entries in a calendar standardized? Are there specific types of information required by agronomists? Are there other, non-standardized notes that farmers take or would like to take?

Some of the participants said that there are various farming apps that offer the calendar feature, but they are not that good. Vasilis suggested that part of the research could be the evaluation and comparison between existing apps, with the aim of detecting common weaknesses and deficiencies that the team's app would try to tackle and mend. He went on to propose the inclusion of a standardized list of different products–pesticides and fertilizers–that farmers use, so that they avoid entering names manually.

Panayotis had the idea, inspired by Linkedin, for the app to offer the feature of incremental and reciprocal visibility and access: "*for instance, if I make public the fertilizer I use, I will have access to the ones my peers use, or to the information of how many users use the same fertilizer as I do and how many use a different one.*"

George underlined the importance of giving the users the choice of whether to share their data or not. Moreover, he stressed that it should be explained to users from the very beginning that the app safeguards their data by

default. Nothing is transmitted unless they choose so. By deciding to share data anonymously, you become part of the community. And being part of the community gives you access to anonymous information about other farmers' cultivation as well as to gamified features.

As Panayotis observed, the aspect of allowing users to own and control their data goes beyond what a company like GAIA offers and, as everyone concurred, it creates the app's surplus value. The point in question was also deemed by the group as crucial for the building of trust between them and the community 'under construction'. Panayotis took the idea even further, examining the possibility of 'data cooperatives', that is of farmers owning and managing their data in a cooperative manner.

> ***Reflection—****Evidently, the topic of producers individually, and the emergent community as a whole, owning, managing and sharing their data collaboratively is recurring, since it represents a central interest and concern of participants and a key role that the CN could play. Even though the necessity of the app to be practical in an immediate way is undoubted, the discussion is led again and again to what is viewed by the team as exceptional and pioneering about the app's possibilities: collective data ownership and community building through data sharing.*

More ideas were expressed regarding incentives for sharing. Namely, George suggested that participating in community should be 'rewarded' beyond getting a virtual sticker, for instance by earning discounts on their subscription or offers like coupons for a free consulting event. Panayotis added that the farmers could make use of the benefits of sharing in a cooperative manner, e.g., by cashing in their sharing points as a group in order to be rewarded with a collective prize.

Furthermore, a clear sign on the interface could indicate the mode the user has chosen for the app, with a red light showing that the app is on 'local' and a green one signifying that it is on 'sharing mode'. However, Panayotis pointed out that the control of data by the user is only partial or nominal, since the data will be (at least initially) stored on a remote server. Only once the data can be stored on a local server people can obtain full ownership and control. For example, the CN could have a server where shared data can be stored. Even though participants liked the idea, they acknowledged Vasilis' remark, that such a step exceeds by far the project capacity. It would require the development of a tool that users could simply plug in at their home and it would work. The project is lacking the people and the resources to do that. After being asked by the others, Aris, the team's developer, said that if chosen so, all the data received by him could be encrypted and thus private.

Vasilis pointed out that since experience has shown that when you try to make something multi-functional it is easy to 'get lost', the team should identify those central features that make this app useful and meaningful for farmers. He emphasized again the app main role as a tool and the unique opportunity that this process represents, because tools usually come with a cost, while now farmers can participate in designing a useful tool for free. George suggested to circumscribe the app functionality according to something very specific, like almond farming. Later the app can be developed and extended to cater other crops. In an attempt to look ahead, he added that, in the future, it would be useful if the history and features for each cultivation could be filtered and configured, so that a user would 'see' only the features that interest him. George brought up Joomla and Drupal as examples to be considered for the app architecture so that its development could be supported through extensions and plugins. Moreover, different themes for varied visualizations could be available.

At this point, there was once more a consideration of the team's limitations, as well as of what would actually make sense for the users. For instance, Panayotis said, if users do not understand and are indifferent toward the value of a local server, then it might be pointless for the team to dedicate time and effort in that direction. On the contrary, it would be worth striving for if users become aware of the implications and ascribe value to it. Another element that was brought out through the discussion was the temporal dimension of the design, in other words, the order of actions to be taken and of milestones to be set. Apart from being two interwoven yet distinct categories of the design's focus and fields of targeting, the personalized use of a calendar and the participation in community can also be identified as two different stages concerning the gradual adoption of the app and the relevant involvement of users.

Reflection—*The team was unavoidably being led to exploring and defining the aims of the project in relation to its resources. Examining the issue of setting realistic goals, the team concluded that they should distinguish between goals to be met inside the scope of netCommons and ground to be laid in view of the app's future development. Therefore, strategic investment of effort should be made, in order to avoid wasting time in needless and futureless actions. Ideas of individual members or of the team as a whole, albeit contributing to the participatory process sometimes by extending the project's scope and vision, and at other times by demarcating its limits, would each have to take their place in the hierarchical (based on pertinence and feasibility) and temporal order. The need of the farmers' participation in the design was being made all the more visible.*

A calendar is essential to farmers, however, the team's goal is not just to digitize it through the app, but to use technology's social features to promote sharing and building of community. That is why, they all agreed, the management of privacy is what distinguishes this effort and what makes the app potentially a commons. At the same time, they conceded that, while privacy constitutes a prominent consideration for the team and the project, locals in the Sarantaporo area do not seem that interested. Nonetheless, Panayotis commented that, as mentioned before (related to subsidies), they do care about privacy. They just do not understand the technical part of data ownership and management, like data being stored in clouds, etc. Training on this aspect could prove essential. Panayotis added that if farmers understand that owning their data could also benefit them, they might become even more interested. The team agreed that privacy and data sharing could be a big research project on its own and, therefore, it might be a worthwhile to make the attempt to pursue funding for it. Aris was asked what he thought in terms of the feasibility of the aforementioned suggestions. He said it is all reasonable and possible, given the time and effort. Aris added that he likes the idea of the app feeling familiar and being easy to use. He also likes the game aspects and believes that they can work as sources of motivation. George asked Aris what he thought should be the development's first milestones. "*The improvement of the UI to make it user-friendly*", Aris replied. So, the following question regarding the first milestone came up: what kind of data do we need to gather?

Having said all this, it was suggested that the simplest and more realistic goal in terms of resources and technology, not to mention 'safer' in terms of usefulness for the farmers, seems to be the creation of a user interface mainly representing a digital calendar to import farming data in and export data for the agronomist and the cooperatives from, plus an option to share the calendar (and related data like photos and comments) and earn points, through which one would get access to other users' calendars. Also, the lists of default options should be area- and cultivation-specific. All the while, participants repeated their views on the importance and the potential of promoting privacy-related ideas. Moreover, it became all the more perceptible that, every time the team was reaching a deadlock in planning in the face of the unknown future ramifications, the key that could unlock the closed doors of relevance, acceptance and possible consequences was held in the hands of the community of users.

Achilleas Vaitsis, member of Sarantaporo.gr Coreteam who lives in Larisa (about an hour away from the villages), who is also an amateur farmer, knows more people in the villages and has easier access there, could help by finding the right people. And perhaps he could meet that person(s) regularly, every week or two, to get feedback on the use of the app. He could even work as a power user himself, as he has almond trees[25].

The discussion about the app continued. Merkouris stated that serious work on the development must be done, first in terms of strategy. The team must determine which specifications (specs) could be realized versus which will be actually realized.

Panayotis pointed out that the turn that the process seems to be taking at this stage is focusing on the app's

[25]Later on Achilleas was contacted and he said his knowledge is too limited to offer any useful insight. However, he was very eager to find interested farmers. After he knocked on some closed doors, he contacted Theodoros Minas, ex-mayor of the region, who is very active and was positive toward the project. He had been also one of the key participants at our first visit in the area. It was planned that Alexandros Papageorgiou of NetHood would travel to Sarantaporo region in December in order to meet with Minas and gather feedback that would help the design of the app. Alexandros also contacted Dimitris Dallas, a very active young farmer from Milea who was present at the training last July, and found out that Dimitris too would be more than happy to help.

usefulness for the users individually, not necessarily through sharing. After Merkouris' comment that we shouldn't define every new idea as a turn, Panayotis specified that indeed, it is not a u-turn, but an adjustment. Panayotis went on to say that, in this perspective, it would make sense "to 'empty' the desktop", to 'relieve' the app of the weight of the gamified modules, to simplify the app. In his opinion, the gamification and community aspects shouldn't be tested right away with producers. Instead, focus should be given on the creation of the log. This should be the first milestone, to get feedback from farmers about the calendar's utility. Panayotis asked if the others agreed.

Merkouris pointed out that the exporting feature should not be 'killed'. The others agreed. One could view his/her calendar and choose what data to view (through tags) and to export, or one could view the public view. As far as visualizations is concerned, Panayotis said that it would be interesting if users had the option of shifting from the calendar view, which is the input view, to other visualizations. George stated that for him what would make sense would be for users to able to see trends, statistics, not private data. As the discussion had went back to the calendar, Panayotis insisted that the dates should come first. First you choose the date and then make entries of the actions you made on each date. This also creates the individual timeline. Another point that George mentioned was that the difference between GAIA and our research team is that GAIA collects data for their app on their cloud, while we aim to give control to farmers and to their cooperatives. Merkouris agreed and rephrased: "*As a farmer, I will have ownership of the calendar locally*" ("*We won't implement it but we will design it*", Panayotis complemented) "*and I will be able to choose what I will do and under which terms I will do it*". Merkouris went on to make clear that these privacy knobs would not be easy to implement on a local infrastructure at this early stage, but the interface would be useful in that direction anyway. Later on, a server would be needed, either at one's home or at the village's coffee place (usually the main meeting place).

> ***Reflection—****As the discussion was going back and forth, the non-linearity of the participatory design process was being revealed. Since there was no appointed moderator to strictly determine the topics, the order in which they would be discussed, or the moment that the deliberation over each one would be considered as concluded, participants were 'free' to follow the flow of conversation, to express their opinions whenever they deemed fit, and to collectively (explicitly or not) decide whether a topic had been covered. This approach was adopted, first, for reasons of equality and absence of control by any one participant and, second, because it was estimated that the process could deliver more imaginative and innovative results within a looser and less formal structure. Therefore, different topics were raised and discussed, then the conversation shifted to other aspects and at later points it returned to previously examined topics. This seesaw movement allowed the fermentation and fine-tuning of ideas and actions to be taken. The conversation was every time more informed, enriched by several inputs, hence more inclusive, and could thus move the process forward, toward setting goals and assessing outcomes collaboratively. The type of data to be gathered, determined through feedback from farmers on the app initial design was the first milestone set. Other possible aspects of the design remain pending, depending on results from the first milestone.*

Merkouris asked the Sarantaporo.gr Coreteam members to present how the network is going, referring to the infrastructure. George replied that it's going very well, having accrued its bandwidth tenfold. However, the access hardware is obsolete and needs to be substituted. Ten UniFis, paid by the users, have been installed so far and they are working splendidly. The team is waiting for a response by ISOC, for an application they made for hardware and training. If they get it, they plan to propose to the CN users to fund 50% of the upgrading of the hardware, with Sarantaporo.gr NPO offering the other 50%. Or to offer one plus one to the users[26]. This way the team will pay for 30 units and will get 60. The team will also install (and pay for) the main UniFi node in each village. It is a sort of exchange now ("free (of charge) is dead"). The team is hoping for more commitment and consideration for the network by the users, since they saw that offering things for free did not

[26]Notice that this is a slightly different economic model than the one initially proposed by the Sarantaporo.gr team in the training session in Pythio, Sec. 2.1

help to make people appreciate the value of the offer. It is a lesson they've learned through experience. Vasilis stressed that, compared to before, many more users buy their own equipment now.

Vasilis and George acknowledged that the discussions with the netCommons team and the advice they got helped them adapt their model through methods that ensure more resilience and viability. They insisted that namely the training session in Pythio village in March contributed significantly to 'educating' participants and they expressed the wish that it happened more often.

George also mentioned the extremely useful contribution of a Telegram group that was created in August. It proved to be more effective than any other means of communication that had been used before (FB, emails, face-to-face). Members of the group are node owners who have settled their financial liabilities toward the CN. There is daily activity in the group, constant posting about developments–it is an educational tool as well. Through a post of a problem on Telegram someone went and fixed it.

Panayotis asked the team if they would be interested in supporting other projects like the one in Ioannina-Tzoumerka (P2P Lab), as a step up, in becoming a meta-organization that counsels other organizations who would want to follow similar paths. Vasilis said that by now their team has sufficient knowhow, but it is a matter of availability in the end. Panayotis specified that they could look at it as a business model or a way to ensure funding, through the creation of proposals to be something like mentors for the building of a network of such CN initiatives all over Greece. They could even hire people to work for them and go right and left and help them grow.

Panayotis asked whether the Coreteam members themselves would consider quitting their jobs to work for Sarantaporo.gr NPO full-time. On behalf of the entire team, George and Vasilis responded that it is a matter of job stability. Only members who have got less steady jobs could be interested. Panayotis said that ISOC has some funding capacity, they could be interested in an ambitious, well-presented project with a countrywide scope[27]. George agreed that it's a good idea and a great opportunity, provided that there would be people available to work full-time on the project. These people do not exist for the moment, hence the team's hesitance. Panayotis understood fully, but added still that the P2PLab group in Ioannina would be available, plus there is a context of research. They could chip in one person, Sarantaporo.gr NPO another and these two people could run the project.

> ***Reflection—****The Sarantaporo.gr Coreteam was asked to share news on the CN's current status. They described recent positive developments, observations and tactics, based on lessons learned. They mentioned namely the contribution of last March training and the adoption of a Telegram group that has proved a successful medium of communication, education, and also community building. Next, the Sarantaporo.gr Coreteam was inquired on their willingness and capacity to undertake the role of a meta-organization with broader, advisory functions for other organizations that would be interested in creating community networks. They could pursue funding for such an enlarged activity. The team replied that it sounds interesting, however, they currently lack available people and resources. Certain members could consider engaging in this project if some level of financial security could be guaranteed.*

After a two-hour meeting participants called it a day. It won't be long before they have news to share.

2.4.1. Lessons learned

- Participatory design brainstorming, even if "simulated", is a very useful process, for sharing information and ideas, and for learning how to think and work together, how to make use of everyone's inputs in a collaborative way. It not a linear process. Rather, it goes back and forth, however, each time the discussion returns to a point or a topic that was already mentioned before, it is more informed, enriched

[27] Eventually, Sarantaporo.gr CN won one of ISOC's Beyond the Net grants a few months later, https://www.internetsociety.org/beyond-the-net/grants/2017/sarantaporogr-community-network/

by several inputs, hence more inclusive, and can thus move the process forward, toward setting goals and assessing outcomes collaboratively

- Individual queries are attended by participants, resulting in specifying and narrowing down open questions to be researched in the field. As the scope, timeframe, aims and milestones of the research are collectively shaped and agreed upon, increased assurance as for the pertinence and the destination of the research questions is achieved
- It also allows the identification of available resources and capacities, which in turn helps to determine the tasks that each contributor will undertake
- It is a space and time to test one's own ideas and visions and to have them 'peer reviewed', not only with regard to their individual applicability and sustainability, but also to their arrangement and harmonization within a grid of relationships regulated by limitations, prerequisites, causes, effects and contingencies. In other words, a singular idea might make sense, however, only when examined in view of the larger picture drawn by other related facts and criteria can it be both properly evaluated for its relevance and potential impact and aptly positioned in the course of future actions to be taken
- Getting feedback from the community of future users is absolutely necessary for deciding the next steps, however, it is useful that there are already concrete ideas and images to present to them

2.5. Focused interviews with farmers

Documentation style: Results from interviews categorized according to points of interest of both interviewees and the design team

NetHood's Alexandros Papageorgiou visited the village of Kokkinopilos on 11th December 2017. He would meet two farmers from Milea on the next day, to discuss about the farming app.

2.5.1. Sakis, 11-12-2017

Alexandros first met Sakis, the owner of La Noi tavern, at Kokkinopilos village. Sakis maintains vines in the town of Elassona, the region's center 40 minutes drive from Kokkinopilos, and produces Tsipouro. Alexandros and Sakis were having an informal conversation after dinner and Alexandros seized this opportunity to ask Sakis his opinion on the app.

It is important to note that each farmer approached the topic in correspondence to their own experience and their own crops. So, Sakis talked about and through the prism of his area of activity and expertise: vines.

First and foremost: Weather

That's the primary parameter for farmers and the most useful information. However, it is something that, according to Sakis, they know anyway. They are there, they see that it rains and they act accordingly. And, as for vine farmers, they know what to do, mainly to spray the plants with pesticide after the rain. What would be useful though, would be to know the weather conditions at their fields even when they are absent. This way they would know what they should do and when, since timing, in direct connection with the weather, is perhaps the most important factor when making decisions about irrigating, spraying and fertilizing.

So, for the app to be truly smart, ideally it would have to integrate localized data on (past and upcoming) weather conditions and individualized information from different fields, in order to produce recommendations on the actions that farmers should carry out to optimize their production[28]. While discussing, Alexandros suggested

[28]For this 'IQ rise' of the app to take place, there would be the need for input of significant expert knowledge that would enable the app to combine all possible articulations of weather conditions, field features and type of cultivation, while also taking into consideration other important parameters like the season of the year in order to produce valid, individualized expert advice. For this to happen, the collaboration of farmers and agronomists would be needed, however, the willingness of the latter to contribute is highly questionable, since they might view the app as a potential threat that could render their expertise superfluous. As for the

that farmers can enter data of the actions they take daily, or at least of the more significant actions that they take occasionally, in order for the app to be able to 'produce advice' based on the knowledge that was mentioned before and on the knowledge of farmers' past actions. "*No!*", protested Sakis, "*the app should be designed in a way that I don't have to do anything! It should be able to provide me with counseling regardless of me actually following its advice. Let it assume that I do as it says even if I don't*".

Calendar

Sakis says they don't keep a calendar really, they calculate approximately. For vine farmers it is easy, after it rains they need to spray or the grapes will get infected. That is the main, if not the only, important variable about their work and the one in accordance with which they must make decisions. In Sakis' opinion it would be hard for vine farmers to be convinced to use the app as calendar.

Sharing-Privacy

Sakis said that all producers mind their own interest and they are competitive to each other. Each one has their own agronomist. Agronomists, based mainly in Elassona, have also an interest in keeping every farmer as an individual customer, since they can thus provide more counseling and sell more products. So, given the competition, producers wouldn't want to share their data with their peers. Plus, farmers have their secrets that they don't want to share. The more 'rare' the information, product of individually accumulated experience, observation and experimentation, the less likely it is that a farmer would want to share it with others. What if their contribution was anonymous, Alexandros asked. "*What would be the point of sharing?*", Sakis asked back. To create a database, a repository of knowledge, an archive. For instance, farmers could collect anonymous individual data and create overall yearly statistics. They could thus follow the development of their total production to compare different years or the outcome of different methods. Sakis acknowledged the usefulness of this. However, for sharing to become meaningful, it is true that farmers should have established the will to cooperate rather than to compete. Sakis said that vine farming represents a relatively small production in the area, so farmers wouldn't be very motivated to start sharing. They would see little possible gain in it. Therefore, the talk went back to how the app could be useful to each farmer individually.

Other points raised by Sakis.

- He suggested to have knowledge from books and websites gathered on the app. Instead of looking around on the Internet, one could find any information they need, e.g. on diseases, infections, relevant actions to be taken, etc. on the app[29].
- He suggested to design the app in a way that farmers could avoid 'doing work'. To be allowed to make the least possible entries. Through this approach, one could also conclude, first, that Sakis has grasped fully what an app for smart farming is for and what it should be able to do, and, second, that he is pragmatic, taking the users' limited technical skills into consideration. If the app is not simple enough to use, there is a high chance users will not bother using it.
- In his knowledge, almond tree growers don't really care if their crops go bad, because they are part of subsidized programs, meaning that if their crops get damaged because of weather conditions they will be compensated by the State. The micro-climate is not propitious for almonds, he said, even though the west Olympus valley is the second highest almond producing region in Greece. Sakis made this comment to point out that almond growers wouldn't be particularly motivated or concerned about improving their farming techniques.

farmers, there is no guarantee for their eagerness to help either, apart perhaps from the few people we have contacted so far.

[29] Alexandros discussed this point with Sarantaporo.gr's George Klissiaris a few days later. George said that this would raise copyright infringement issues. "*Also*", he added, "*it is not interactive at all. It is an idea more fit for a website than for an app. Especially if the app is 'prone' to sharing. Plus, it shows how farmers want everything done for them without them having to lift a finger*".

2.5.2. Dimitris, 12-12-2017

Dimitris Dallas is a young farmer from Milea village. He exclusively owns almond trees, so his experience and knowledge is for the most part limited to this specific cultivation. Alexandros met him at Thronos tavern, in Pythio village, where the March training had taken place.

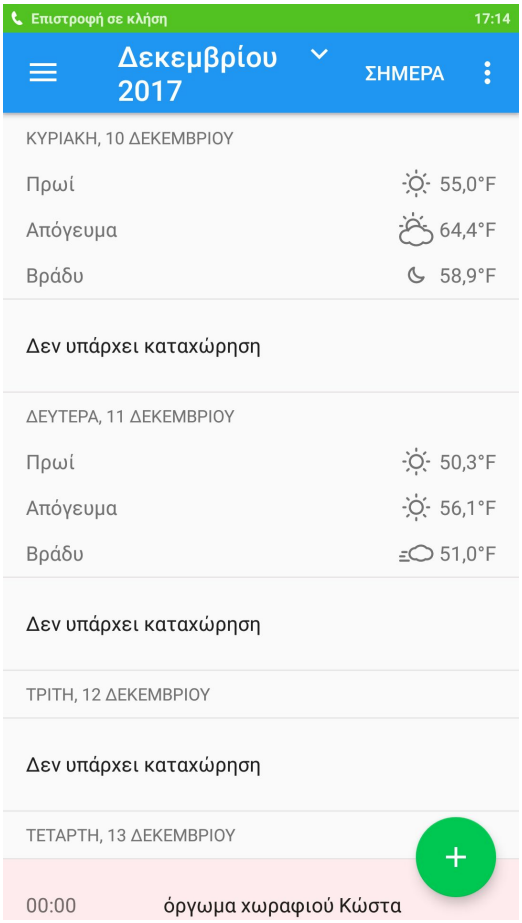

Figure 2.5: Screenshot of the weather info panel of the farming app depicting a standard calendar with the short-term weather prediction included and day slots which when clicked allow the user to enter an activity for that day, already performed or planned. See D3.4 [12] for more details.

Weather

Again, as did Sakis yesterday, the first thing that Dimitris highlighted was the importance of knowing the weather. Farmers usually consult and cross-check different weather websites. It would be useful if the app could extract information from different websites to provide a reliable forecast. This way the farmers could save time by directly accessing the app.

Calendar

Dimitris said that most farmers do things in an unorganized, untidy, random manner. They do not work with precision, instead they calculate approximately. Almost no one keeps a log of actions. What they need, Dimitris pointed out, is the rationalization of their methods. He said that even agronomists often fulfil their duties in a poor manner–he told the story of an agronomist who came to his field, counted his trees just by eyeballing and accused him of overstating the number of trees he owns to earn more from subsidies. By highlighting how professional scientists can not only be sloppy and 'non-scientific' when doing their job, thus setting a really bad example of diligence, but also base their hasty conclusions on prejudice, actually insulting farmers, Dimitris wanted to stress the lack of professionalism and consentiousness that traverses the farming sector in

the area. As Sakis had mentioned the day before, Dimitris repeated that this valley is the second in Greece in almond production. However, weather conditions are not favourable and crops are often devastated. Therefore, farmers are not keen on investing more (money, time, effort) in the cultivation of almond trees, because they get compensated by the state in case of damages. When Alexandros was showing him screenshots of the app, Dimitris particularly liked the screenshot depicted in Fig. 2.5 representing the weather info panel with short term forecast presented as calendar.

He found the feature very useful in terms of having a record and a plan of everyday actions, along with the respective weather conditions.

Sharing-Privacy

Dimitris shared a quite interesting information that the netCommons team didn't have before. About forty almond growers have been cooperating via a newly founded (in its second year) union. So, even though, according to Sakis and Dimitris, almond growers in general are not very diligent in their duties, several of them have joined forces to form the only existing cooperative in the west Olympus valley. This means that they have decided to bring together their individual interests in a common effort, managing their production collectively, reaching agreements with buyers to market their product as a whole, etc. This cooperative could present an opportunity for the app to be proven of value, since it can be applied directly as a collective tool for sharing. Dimitris' contribution can turn out to be decisive because he is a key figure in his village and inside the Union. Our team would have to consult him and other interested members of the Union to explore ways in which the app could be useful for them. The only 'drawback' is that Dimitris doesn't own a smartphone, but, as he said: "*The time is near, I know I won't be able to avoid it forever. And if it is for a good reason I don't mind*".

2.5.3. Theodoros, 12-12-2017

A little later Theodoros Minas, ex mayor of Sarantaporo and organic apple farmer, met with Alexandros in Thronos. Theodoros was very eager to help from the very first time Achilleas had contacted him, since he was convinced that this initiative could be quite helpful for farmers in the region.

Weather

Theodoros confirmed what the other two interviewees had stressed, that weather constitutes the most fundamental parameter in farming and thus the most important information.

Calendar

The meeting with Theodoros was the most targeted and productive in terms of discussing the calendar's design, since organic farmers are obliged to keep a log[30], to have it validated by an agronomist and to submit it to the Organization for the Certification and Monitoring of Farming Products. Theodoros said that several organic farmers are not thorough in keeping their log, or it is their agronomist who fills it out, but still, it is a mandatory activity. Therefore, proposing a farming app focused on the calendar feature to this group of producers makes much sense.

First of all, the app could help simplify the process of entering data, as it could include lists of all possible options for every category of action or product. So, instead of handwriting the information, farmers could simply scroll up and down and choose the correct option. Theodoros affirmed that the list of options is limited anyway and it would thus be easy to include them all. It would be practical if the options on the menu appeared in the order of frequency that each one is selected. Theodoros indicated his unrestricted availability to contribute to this process with his knowledge. Already during the discussion with Alexandros, they made an initial recording of the drop-down menu's content.

Second, as it was discussed by the netCommons team during the participatory design meeting at AUEB and confirmed by Theodoros, it would be extremely useful if the data entered by the farmers could be exported directly in the required format, as a pdf or excel file. However, as we can see in the picture below, there are two

[30] Organic farming in the region involves three types of production: almonds, walnuts and apples.

fields (on the far right) whose content cannot be predetermined, rather it needs to filled out manually. Therefore, the app needs to offer this option.

Third, with regard to the Notes-taking component, Theodoros said that it would be useful if it were linked to the Calendar, thus refining the monitoring of both past and future actions.

Last, Alexandros told Theodoros that currently the app allows users to filter their activity per field. "*Would it make sense if there was also the option to filter it per cultivation?*", was Alexandros' question to Theodoros who responded affirmatively, since many farmers have several crops, often more than one in each field.

As Theodoros had promised over the phone, he had brought his calendar with him so that he could show it to Alexandros, who also took pictures (see Fig. 2.6) to show to the rest of the team how a farming calendar was kept with traditional technology.

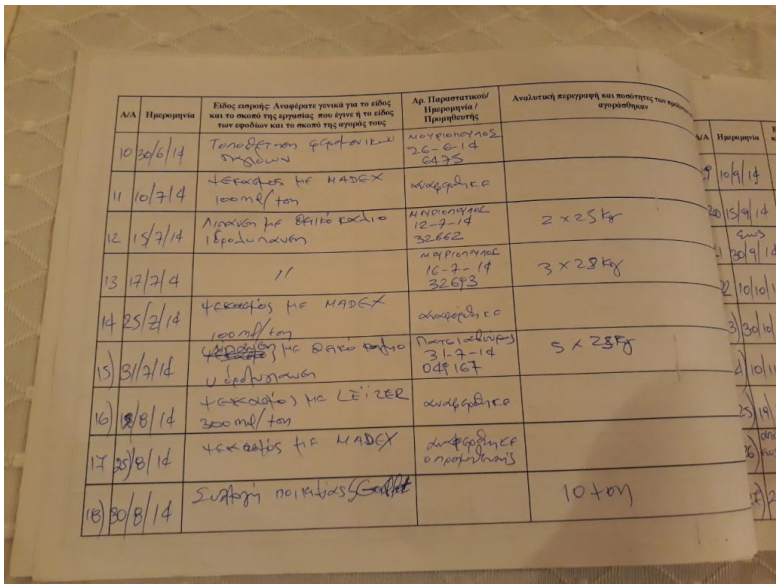

Figure 2.6: From left to right, the columns represent: entry number, entry date, type of input (describe the type and purpose of the activity carried out, or the type of supply and the purpose of its purchase), number of supporting document/date/supplier, detailed description and quantities of products bought.

Theodoros mentioned that he had used a smart farming app in the past–ifarma–but had abandoned it after a while because it was 'too confusing'. It offered many more features than he actually needed. This raises an important point to be considered by the design team: the app should be as light as possible, constituting a truly useful tool for users, especially in the course of the trial period when users will be getting familiarized with it. In view of this aspect, Alexandros asked Theodoros what other types of service, not necessarily in direct connection with farming, would be useful if offered by the app.

Theodoros suggested a couple of items that are important and normally neglected by farmers (this should in any case be cross-checked for relevance with other farmers).

1. He said that farmers often neglect the maintenance of their tractors, namely forget to change their motor oil. This results in potential damage of the motor which can be very costly to substitute. As they discussed with Alexandros, the app could present the option for users to enter the intensity of use of their tractors (since it is pretty standard), and it would then send them notifications for maintenance accordingly -every three months for high intensity, every six for medium and every twelve for low.
2. Theodoros said that the Ministry of Agriculture posts warnings for farmers on their website, depending on the season of the year, upcoming weather conditions and potential threats for each cultivation. Although the content of the warnings is usually quite important, farmers often forget to enter the Ministry's website. Theodoros suggested that the app redirected the warnings as notifications, preferably filtering

them according to the production of each farmer, as registered on the app.

Sharing-Privacy

Alexandros explained the idea of data ownership, as well as the app gamification features to Theodoros, he showed him available pictures of the design in progress and asked him what he thought. Theodoros was positive to ensuring privacy, although he didn't seem to perceive the related effects to their full extent. As for the app social aspect–sharing pictures and comments–he liked it a lot, but, like Dimitris and Sakis, he was concerned with respect to sharing 'sensitive' data and to the competitive spirit that could be intensified as a result of the reward system.

2.5.4. Lessons learned

About the farming app:

- Weather is undoubtedly the most important parameter and point of common interest for every farmer. The importance of weather is twofold - it lies in forecasting the conditions of coming days with the highest possible degree of precision, and in knowing with accuracy and on time the conditions at one's field/s. Feeds from weather forecast websites should undoubtedly be incorporated, while Sarantaporo.gr's weather station could also be used to get real-time feeds on weather conditions on the spot. GAIA has another three weather stations in the area
- Easy-to-use, effortless: All three interviewees expressed the opinion that the app should better demand the least possible contribution (data input) by the users. In order for farmers to be 'trained' to contribute to the app they should first be convinced about its effectiveness, or they will probably not use it. Users need to see the app's utility in an immediate and straightforward manner. According to our informants, if the app relies on data input by users to become meaningful, then there is a high chance that most of them will not commit to the collective cause of enabling its potential
- More reasons to keep it simple: As Theodoros, an experienced farmer, pointed out, there are several, very sophisticated farming apps (like 'ifarma' that he used for some time), which offer many elaborate features. However, after a while he abandoned it, because it was tiring and confusing. The app offered much more than he practically needed. Given, on the one hand, the limited time and resources our team has to develop this app, and on the other hand, the reduced familiarization of users with technology, we should aim at catering to the actual needs of farmers with clarity and precision, without overburdening them with information and options of little usefulness. This way the app could present an advantage over other similar tools and also (and more importantly) over the non-use or rejection of such a tool. Furthermore, we should not disregard the value of hands-on training and the importance of facilitating it as much as possible. Users will learn how the app works through its daily use rather than through a seminar. Therefore, the app level of complexity should be as low as to not alienate users, but to allow them, instead, to discover the app features through its use
- Another dimension whose role we should not circumvent is the appropriation of the app by the users, meaning the cognitive and emotional awareness of owning the app and the data imported in it. In other words, users must know and feel it's theirs. For the appropriation to happen to the full extent, it is not enough for users to be notified of the factual occurrence of ownership. They need to be (and feel) active participants during the design process. Our team is aware of this and for this reason we have planned to include users in all stages of design. Apart from this first participatory design meetings with Alexandros, the farmers he has interviewed stated that they are willing to be in direct contact with the development team during the preparation of the app's first version, for consultation and feedback
- Some aspects of the gamification component might be redundant and could involve risk. Firstly, it could risk making the UI 'heavier' thus complicating the use of the app, which, as analyzed above, could lead to its abandonment. For this reason, the calendar component should be visually more prominent than the game ranking. Second- and more significantly, current professional relationships between most

farmers are determined by competition, not by cooperation, with the exception of a group of almond tree growers whose members have recently formed a Union that promotes their common interests. All others are competitive to each other. Consequently, they would not readily share information on their cultivation. As our informants said, most farmers have 'secrets' they would not want to disclose under any circumstances. Moreover, a platform on which users could socialize and create community by chatting, sharing photos and commenting them, exchanging likes and comments for uploaded content, etc., is one (harmless) thing, while a platform which represents a field of competition for rewards is quite different Regarding privacy and ownership and management of data, interviewed farmers didn't seem to grasp fully the concepts and their practical repercussions. It appears that the only way in which the app users could comprehend the meaning and consequences of these possibilities would be through the familiarization that occurs by way of training and day-to-day use

About Participatory Design:

- Alexandros made some points clear from the beginning of every interview. He explained briefly the scope and timeframe of the project, as well as its non-commercial nature. He emphasized that, even though he would show some pictures of the current status of the app and he would share some of the team initial ideas, the primary reason for which he had invited interviewees to these meetings was to ask them what would be meaningful for them as farmers and future users of the app. Then he would transfer the farmers observations to the technical team in order for the appropriate adjustments on the app to be made. Alexandros also told interviewees that the whole team would visit the region, most probably in March 2018, to have the first version of the app installed and tested on users' smartphones
- Initial feedback from the field confirmed the value of PD with end-users. Despite their preparation and experience, the development team still ignored many elements of information shared by interviewees
- As it has been established time and again in the past, the role of power users or active agents is crucial for bridging the community of users with the team of experts. In the current conjuncture this fact seems to be confirmed once more. It is highly important that some farmers contribute to the design and testing of the app, as well as to its adoption by others among their peers. The Union of almond tree growers could also be a propitious power group, since it represents a unique case of collectivization in a region otherwise devoid of a solid sense of community, as we have established through our experience. We argue that power users could play a key role in the 'build it and they will come' approach: farmers do things as they have been doing for decades, state policies on subsidies being the main axis for change. The other axis is determined by scientific developments, like techniques and pesticides, introduced by agronomists, companies and the state, in other words by actors who are external to the community. People will not change their habits easily. However, if something new, genuinely useful and easy-to-use is proposed, it might trigger the change even of established habits. And, the difference in the case of participatory design is that, although the innovation initially comes from outside, our goal is to discover correspondences with community needs. Also, it can and should be a process that, once in motion, it would develop further organically, within the community of users. So, change, even in the way farmers keep a log for instance, could be produced internally
- For this to happen though, certain individuals in the community must mediate to acquaint their peers with the novelty and to familiarize the team of experts with local *modi operandi et vivendi*. For instance, Dimitris talked about the necessity of 'scientification' of farming in the region, meaning making it more rational and scientific. Theodoros also confirmed the advantages of a possible systematization and modernization of production. Therefore, we found out that these ideas preexisted among (at least part of) the locals and were not imposed from outside. Power users like Theodoros, Dimitris or Sakis can work as invaluable intermediaries, bridge builders founding relationships and channeling knowledge in both directions
- Each party is lacking something crucial that the other party has. The group of experts lacks the knowledge of community life -relationships, habits, historical background, rhythm of life, linguistic particularity,

professional expertise, etc.-, while the local community lacks the knowledge of how new technologies work and what they could offer, and, consequently, the ability to imagine in which ways these technologies could benefit the community. Each side has a piece that, under the right circumstances and with the right handling (which is what participatory design is all about), could be shaped to fit with the other in such a way that both sides would be enriched. What we deem exceptionally instructive and enriching goes beyond the practical benefits that can occur. We consider that the very process (which all participants would engage in, more or less) of negotiating, making compromises, teaching and learning, doubting and trusting, sharing, exiting one's comfort zone, dealing with otherness and looking at your own self through a new mirror, renders individuals and groups of people better equipped to live and work together

2.5.5. Guidelines for interviews

In the course of the interview:

- Above all, listen
- Do not reach hasty conclusions
- Do not tend to generalize. Do not dare to reach generalizing conclusions until you have heard several opinions
- Show genuine human interest beyond the scope of the research. Make your interlocutor feel that you actually care about more than the success of the project, e.g. local and personal problems, relationships, customs, etc.
- If you don't have genuine interest do not act like you do. Let someone else conduct the interview instead
- Do not homogenize different types of cultivation. If you are not a farmer, do not assume and, most assuredly, do not pretend you know things about farming. Instead, seek to learn
- If you are not a developer and you have limited technical-technological knowledge, try to prepare yourself the best you can before the interview, in getting to understand how the specific technology works. But again, do not pretend you know more than you actually do. Honestly admitting your lack of expertise is fine as long as you show seriousness, engagement and motivation. In fact, if the interviewee realizes that the interviewer sitting opposite them is an equal collaborator rather than an intimidating expert, this can help lift the barrier of awkwardness caused by supposed intellectual distance
- If you are a developer, try to avoid using sophisticated, specialized technical vocabulary that would probably intimidate and dis-empower your interlocutor. Also, avoid using terms in English besides the ones that are very commonly known, like antenna, Internet, Facebook, etc. Try to find a 'language in common' that both of you share, by explaining technical terms in non-technical words and by asking the meaning of agricultural terms and processes that you are not familiar with. In fact, it is a two-way learning process that leads to the creation of a common language rather than to the discovery of one

3. Analysis of hands-on experiences

In this chapter we summarize three different projects in which NetHood is involved, outside netCommons, which have provided invaluable hands-on experiences that have informed the development of the proposed methodology in Chapter 5.

3.1. The MAZI CAPS project

The key objective of the CAPS project MAZI[1], is to develop a DIY networking toolkit with guidelines for the deployment of local applications over very small scale Community Networks, in the typical scenario consisting of a single node.

Participatory design plays a key role in the project and four different pilots are under implementation using different methodologies. Chapter 4 briefly describes this methodological approach, but here we give a short overview of the corresponding experience of the NetHood team in Zurich, and more specifically in the Kraftwerk1 cooperative housing project counting three settlements with over 1000 residents in total[2].

More specifically, in the Zurich pilot of the MAZI project, NetHood in collaboration with the INURA Zurich Institute (IZI)[3] have the task to design and deploy a specific local network in the premises of the cooperative. After a lot of preparatory work, discussions, and engagement with local activities of the community, the first "offering" of the NetHood/IZI team was a collaborative hybrid community art project hosted in one of the community gathering places, the so-called "Pantoffelbar" (meaning the "slippers bar").

The main local applications used include NextCloud for photo uploading by the community and the Interview Archive (an application developed in the context of the MAZI pilot in Berlin, to collect context-specific interviews[4], "adapted" for the Zurich pilot). It is beyond the scope of this deliverable to go into the details of this installation, but it will be helpful to report here a few important decisions and corresponding lessons learned from the process, which is described in detail in MAZI project's deliverables[5].

More specifically, through the experiences in this pilot some strategies that have worked better than others for community engagement include the following:

- *Avoid offering solutions to possible problems, but become part of the community and try to solve your "collective" needs.* In practice, NetHood was hosted at the office of IZI in the Kraftwerk1 premises having everyday contact with the residents. It also participates regularly in community activities like the "Circolo", and contributed to the recent book of Hans Widmer (Kraftwerk1 co-founder and author of the book bolo'bolo that inspired the cooperative housing movement; Kraftwerk1 was one of its first settlements) that was launched in Kraftwerk1 restaurant[6].
- *Bring people to the discussion table for all relevant reasons (not only for the "final" objective).* In practice, the NetHood/IZI team initiated a new working group inside the Kraftwerk1 cooperative with

[1] http://mazizone.eu

[2] See http://o500.org/zurich.html for a short report produced in the context of a Horizon2020 project co-ordinated by Panayotis Antoniadis and Ileana Apostol (at that time with ETH Zurich).

[3] See http://inura.org and http://inura.ch

[4] See https://theconversation.com/how-to-build-a-more-organic-internet-and-stand-up-to-corporations-70815

[5] See http://www.mazizone.eu/about/deliverables/, and more specifically MAZI Deliverable D2.7 "Design, progress and evaluation of the Kraftwerk1 pilot, Version 1", available at http://www.mazizone.eu/wp-content/uploads/2017/06/MAZI_D2_7_final.pdf, and subsequent versions to be published soon.

[6] This level of engagement is not always possible for a technological project but in cases that it is feasible it is the best way to engage people in the corresponding processes.

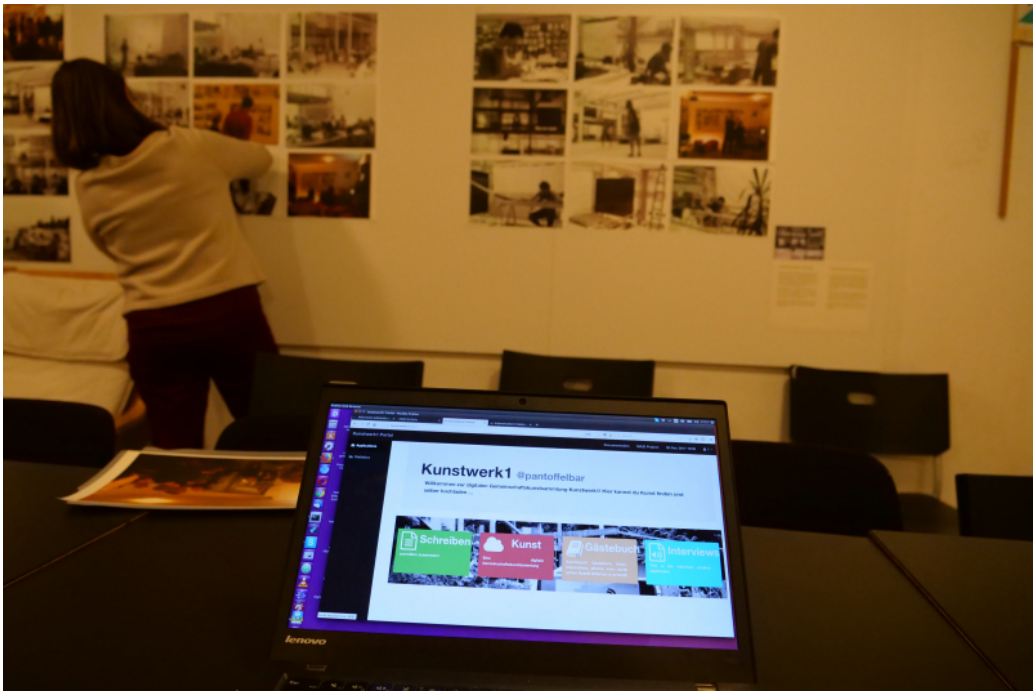

Figure 3.1: MAZI Zurich pilot's local application: The hybrid photo exhibition installed at Kraftwerk1 Pantoffelbar

the name "Internet Salon" to address a wide variety of issues around technology and cooperatives.

- *Present the technology as a tool to be appropriated even without your intervention.* In practice, instead of participatory design workshops on how the MAZI toolkit could be used, NetHood&IZI started developing their "own" project inside the cooperative showcasing the capabilities of the technology. And the goal is that inside the "Internet Salon" working group support will be provided to people that wish to also experiment with their own installations, a process that could lead to a discussion at the "assembly"-level for potential "official" uses of the MAZI toolkit.
- *Start physical, bring the network "to the ground".* In practice, the first installation started as a physical photo exhibition with printed photos from the early days of Kraftwerk1 and the organization of a public discussion on reflection about the past, the present, and the future of Kraftwerk1. The corresponding local network was presented then only as a means to download the exhibited photos (which have historical value and were for the first time digitized and publicized). It was only in subsequent gathering that the attention was drawn to the more interactive options offered by the network, which are still under development.
- *Bring together people from different backgrounds and perspectives and let them discover each other's worlds.* In practice, NetHood has organized many interdisciplinary events both in the context of the MAZI pilot and before[7].

3.2. The Openki platform

The Openki FLOSS platform[8], is relevant for this work for three different, but interrelated, reasons:

1. The focus of Openki is on the facilitation and support of participatory learning processes[9], like the ones

[7] See http://nethood.org/events.php.
[8] See http://openki.net.
[9] See http://about.openki.net

required to make CNs better understood by the wider public but also to engage this public in participatory design and other activities related to the building, maintenance and use of a CN.

2. Being a self-hosted application with a focus on face-to-face communication is a candidate local application itself for supporting the operation of medium or large scale CNs, both in urban and rural areas.
3. Openki applies an interesting software development and participatory design methodology through a creative and democratic use of the github "issues" functionality[10], that allows the users of the platform to participate in the formation of the main functionality and deliberate on various topics, from the wording and the design of UX details, to high-level conceptual aspects of the platform.

In the following, we elaborate shortly on the first two points and focus on the third one through the personal experience of Panayotis Antoniadis (NetHood) as a volunteer contributor in the Openki platform.

This experience has contributed to the collection of important insights that have influenced parts of the methodology presented in Chapter 5 and is thus part of the process that led to its finalization. For this, it is important to describe it here both as a concrete example of certain elements included in the methodology but also as a means to understand better and evaluate the methodology itself, through its history.

3.2.1. Openki: a self-organized learning web

One of the most important lessons learned from OTI work [5, 6] is the urgent need for widespread education around issues of technology, which is extremely difficult to take place in a top-down way. It requires the development of grassroots learning processes, "training trainers" from the local community (digital stewards is the terminology used by OTI), allowing quick and bottom-up dissemination of vital knowledge on how the Internet works and how it can be built by the people for the people.

Paolo Freire and Ivan Illich are two well-known figures advocating for such organic forms of education and Ivan Illich in his classic "Deschooling society" [13], even imagined in 1971 the use of technology ("bulletin boards") for facilitating "learning webs".

In 2017, Openki.net is exactly such a platform which aims to claim the term "course" to mean a participatory process that allows people with different skills and resources (most importantly open spaces) to come together and develop learning programs on a wide variety of topics, accessible to all.

The concepts behind community networks are a very specialized, but still of public interest, topic that it is not taught in school and a large part of the population will never get the chance to get properly educated on such issues.

So, educational efforts like the one started by OTI in Detroit and other places in the US need to be replicated and adapted to different contexts, and for this Openki.net might be a very helpful platform, especially since it follows the main principles of FLOSS software development.

3.2.2. The Openki platform as a candidate local application for CNs

The fact that Openki.net is built on top of the Meteor platform[11], as some very well known self-hosted applications like Rocket.Chat, makes it very easy to "self-host" and thus from a technical perspective at least a candidate local application for CNs.

The reason why it could be meaningful to deploy Openki.net in a CN it twofold: First, as mentioned above the sustainability of CNs depends on the participation of the community, which requires grassroots learning, and Openki is meant to organize exactly such processes from the bottom-up, compatible with the train the trainer methodology. Second, Openki is in general a platform that focuses on real places and face-to-face contact,

[10] See https://github.com/Openki/Openki/issues
[11] See https://www.meteor.com/

bridging the digital with the physical, that in addition to learning can contribute significantly to community and trust building, key requirements for successful CNs as well.

In terms of functionality, it is also important to note that Openki is designed to be a very robust and lightweight facilitation platform, focusing on bringing together the right people and help to self-organize outsourcing a wide variety of tasks to other specialized FLOSS platforms, like Etherpad for collaborative writing, NextCloud for file sharing and Framadate for voting, and why not PeerStreamer for remote participation in courses.

In addition, the platform is very sensitive in terms of privacy and data manipulation, and thus trust is expected to be built through face-to-face contact and not through intrusive reputation systems. Such policies might sound "too free" for a global platform but for a local application in a CN they might actually work very well, especially if the other mentioned complementary services are already provided through a platform like Cloudy.

Although, the main reason why special attention is directed at Openki in this chapter is not because of its potential to become a successful local application for CNs[12], but because of its interesting software development process.

3.2.3. The Openki software development methodology

NetHood's co-founder Panayotis Antoniadis is a supporter and user of Openki since the launch of its beta platform in 2015. His interest lied in the complementarity between the core vision of Openki and NetHood and the huge potential for collaboration in the area of Zurich where both organizations are based.

More specifically, in both projects the hybridity of space, the recognition that one needs to combine properly the digital with physical space for supporting the self-organization of people at the neighbourhood or city scale, plays a key role.

It is important to note that the software platform is already functional, supporting the organization of language courses at the Autonomous School of Zurich[13], and it is run by three people with less than 50% engagement and without any financial support, except for small donations. The secret behind creating a teaching platform platform with already more than 1300 courses proposed and more than 400 that took place, and translated already in 6 different languages, is based on the appropriate organization of the work to allow for temporary volunteers to offer meaningful contributions, and we think that part of this success is due to Openki.

More specifically, the work of Openki is divided in three main parts, which is the main responsibility of each of the three core members:

- Back-end software development and server maintenance,
- Front-end software development and User eXperience (UX),
- Co-ordination and communication.

Every activity is properly recorded and documented in two commercial online services: Trello and Github.

Trello is used for internal tasks and for implementing a simplified version of the Scrum methodology without the need for all collaborators to by in physical proximity and with pre-defined working hours. All the different boards for different areas of work are divided in the same set of cards: Done, In progress, Current sprint, Backlog, Todo soon, Todo later, On hold[14].

Github is used for design and software development both among the core team and for the communication with temporary collaborators and simple users of the platform. Especially the "issues" feature[15], is used extensively

[12] Openki is currently in its beta version but through its recent collaboration with an important art space in Zurich, Kunsthalle, for a 5-month exhibition powered by Openki: http://kunsthallezurich.ch/en/openki attracted more collaborators and a first official release of the platform is expected for Zurich by the end of the year.

[13] See https://en.wikipedia.org/wiki/Autonomous_School_Zurich for information in English

[14] The popular "sprints" in agile methodologies are of variable frequency and no hour budget is allocated per task due to the informal working environment. So, to make the system work properly nevertheless, individual tasks have to be broken into chunks of a few hours work (no more than five).

[15] https://github.com/Openki/Openki/issues

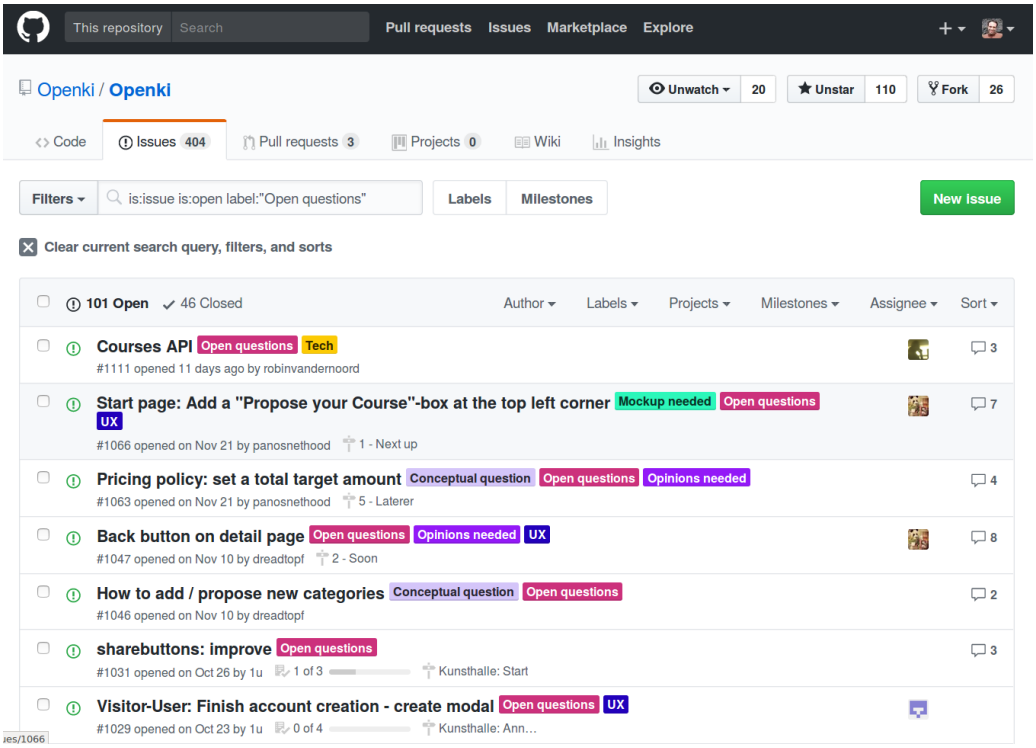

Figure 3.2: Descriptive labels at the github issue repository of Openki, like “Opinions needed”, “Conceptual question”, encourage non-experts users to share their opinion about high-level functionality of the platform

and appropriate labeling allows to filter easily the different types of discussion, ranging from low-level technical issues to high-level conceptual design. The github Openki ticketing platforms is shown in Fig. 3.2.

This is the forum mostly used by Panayotis, as an external supporter of the project, which helped himto integrate in the team and participate in many discussions on new features, design improvements, even code contributions, despite the very limited available time.

But to reach this point, as all newcomers, Panayotis had to adapt to certain rules that help organizing the work[16]:

- New issues had to be as concrete as possible and correspond to a single improvement;
- For more complicated issues it was better to describe the ”problem” and not the solution to allow for discussion about different alternatives;
- Labeling plays a key role and it is better to be performed by a single person, the github issues coordinator;
- Being polite and acknowledging the value of all contributions can play also a key role.

The use of github (or other similar platforms) as tools for creating transparency for the project, engaging external contributors, and encouraging users to submit their feedback (either directly or mediated through members of the team) is very important for the sustainability of any FLOSS software development process[17].

3.3. The ExarcheiaNet neighbourhood CN

The design of applications for CNs requires contact with a local community, software development, but also access to the underlying network infrastructure. For this, it is important that the project team has a good understanding of what it means to build and maintain a CN, and especially of key concepts like the difference between the backbone and the access network.

[16] See Sec. 5.7.3.2 and Sec. 5.10.3.
[17] See CONTINUOUS FEEDBACK in the Software Development Process, in Sec. 5.7.3.2

This section summarizes the experience of NetHood through its participation in the creation of a new CN in Athens, the so-called Exarcheia Net, a small scale Community Network in the Exarchia neighbourhood, which was recently featured at the P2P foundation's blog[18].

This experience, in addition to having helped NetHood members to better understand how CNs work and become a more informed mediator in the participatory design process in the Sarantaporo case study, it brings forward an important challenge: the possible conflict between the motivation of the project team (e.g., local applications) and the local community (e.g., affordable Internet access) as far as the potential role of a CN is concerned. It contributed also to networking activities that benefited the Sarantaporo case study and inspired the development of the methodology.

The story of ExarcheiaNet started at the same time with the netCommons project. At the time of the proposal writing, Panayotis Antoniadis decided to connect to the well-known Athens Wireless Metropolitan Network (AWMN) CN by installing a node on the roof of his family house in Athens. After a first contact, for various reasons this was not possible and a replacement Ubiquiti antenna owned by Panayotis was left transmitting on the roof but not "paired" with any other antenna of AWMN. Interestingly, at the direction that this antenna was transmitting, an informal refugee hosting settlement was created later the same year, and there was an urgent need for Internet access. This much needed Internet access was eventually provided through the already installed orphan node at Panayotis' house. This was meant to be the first link of a neighbourhood CN, which is still small (5 nodes in total), but with a very diverse and vibrant community of locals and visiting activists participating in it.

To boost the activities around Exarcheia Net, Panayotis organized a series of workshops with special guests, Juergen Neumann (Freifunk's co-founder), 4 members of the core libremesh team with links to Ninux, guifi.net, and Altermundi), and Senthil Kumas from OpenFreenet (India)[19]. These workshops were very successful both for the revitalization of the Exarcheia Net activities and the creation of specialized working groups but also regarding the Sarantaporo.gr case study[20].

The question of local services vs. Internet access has surfaced in many of these discussions. The fact that ExarcheiaNet has been initially built to serve the urgent needs for Internet access of a vulnerable population has been the reason that very often the question of providing local services[21], has been left as a second priority.

In summary some important lessons learned from this experience include the following:

- It is critical to understand the differences between the backbone and the access network of a CN and distinguish between the community of node owners (a community of practice) and wider community that has (or not) access to a CN through public access points;
- It is extremely helpful to bring people from the international community to visit your local project both in terms of getting help but also gaining credibility in the eyes of the local community and creating funding opportunities locally and internationally[22];
- It can prove useful to bring together different skills and perspectives from the beginning of the project.
- The team should find the right balance between the needs of the community and its own (political) objectives.[23]

[18] See https://blog.p2pfoundation.net/athens-community-wifi-project-exarcheia-net-brings-internet-refugee-housing-projects/2017/06/08

[19] See http://wiki.exarcheianet.gr/index.php?title=Libremesh_workshop_in_Athens,_June_12-16th2017 for a summary of the different events with dedicated links to each one.

[20] In addition to the opportunity offered to Sarantaporo.gr members to share knowledge and experiences with our special guests and talk about Sarantaporo.gr in different occasions, Nicolas Pace (Altermundi.net) got really interested by the project and followed us in the training session, and contributed in a proposal for funding from ISOC's "Beyond the Net", that was eventually successful providing a huge help for the sustainability of the Sarantaporo.gr CN. See Sections 5.7.1.4 and 5.7.4.4.

[21] Many of the members of ExarcheiaNet are digital activists very sensitive in issues of digital sovereignty and some of them active in related project like social.coop

[22] See NETWORK in the Project Sustainability Process in Sec. 5.7.4.5

[23] See NEEDS in Sec. 5.6.6

4. Participatory design, beyond the local

This chapter reflects on the concept of participation based on the initial experiences of the netCommons team in the case of Sarantaporo.gr in the light of multi-disciplinary exchanges with researchers from different CAPS projects with similar objectives, and related work in the US, by the Open Technology Institute (OTI) in the context of the 2015 SEED Grants [5, 6, 7, 8].

4.1. Participatory design in CAPS

In June 27th 2017, four Collective Awareness Platforms for Sustainability and Social Innovation (CAPS) projects, netCommons, MAZI, Commonfare, and EMPATIA co-organized a focused workshop in the context of the Communities & Techonology conference at Troyes France[1]; Fig. 4.1 shows a picture from the workshop.

All these CAPS projects share a common characteristic: they develop and apply different participatory design methodologies in different real-life scenarios. Interestingly, both the methodologies and the scenarios are very different, which makes the identification of common patterns an important finding.

The title of the workshop "Participatory design, beyond the local" [14] expressed exactly the goal to share experiences and methodologies and make a first step toward a common understanding of the challenges in engaging citizens in the design of technologies that serve the common good.

The participants of the workshop representing the four CAPS project were the following: Stefano De Paoli (Dundee, Abertay University, PIE News Project, now become Commonfare), Peter Lyle (M-ITI, Commonfare), Mariacristina Sciannamblo (M-ITI, PIE News Project, now become Commonfare), Karlo (Milan, Computer Science Department, Empatia), Michelangelo Secchi (Empatia), Gareth Davies (Open University, MAZI), Kalinca Copello (Coimbra, Empatia), Ileana Apostol (NetHood, MAZI), Panayotis Antoniadis (NetHood, netCommons).

After a short round of self-introductions, the four projects were shortly presented with a focus on their participatory design methodologies.

Before, Kalinca Copello from EMPATIA presented in a form of a keynote the details of a specific participatory design process in a rural area in Durban, South Africa, that turned into a rare success story with more than 40000 people eventually using the developed application.

For netCommons, the presentation of Kalinca was very inspiring because it revealed very interesting lessons learned from a case study that shares some important characteristics with the Sarantaporo case study. So, some of the lessons learned described by Kalinca apply also for the case of netCommons like the fact that there is a need to get developers to go to the community, to understand their needs, as revealed from our first visit to the Sarantaporo area.

To this respect, Kalinca mentioned many interesting failures and misconceptions of her team before engaging with the community, like the lack of community spirit (often assumed that exists by default in challenged areas), the existence of social hierarchies that need to be respected in the software functionality, the requirement for f2f contact in voting situations, and most importantly that nothing would have happened if there was not the mediation of a local social movement, which however increased significantly the time required for the different processes to advance. As Kalinca mentioned people from this movement said "*Do you want to work with us?*

[1] http://comtech.community/

Figure 4.1: Researchers from four CAPS projects working on various aspects of participatory process share their knowledge and experiences from their pilot studies

You have to adapt to our rhythms"[2].

Commonfare includes 3 pilots with different groups coordinated in terms of participatory design processes by Madera who tries to bring together the different elements to build a single platform covering all needs. A key methodological approach is "public design" that assumes that design is a political process and everything is under negotiation even the name of the project which changed to Commonfare from PIE news. The reasons that PIE includes the term "poverty" as described in the Eurostat statistics, but then the people involved in research activities reject the label because they experience it as a social stigma and a labeling in which they don't fit.

This was another important lesson for netCommons. Participatory design is a challenging process that might require from the application developers to change, possibly more than once, their initial plans. We have already experienced this from the very first steps of our crowdsourcing application, which has been recently changed focus (see Sec. 2.4).

Commonfare reported also important challenges in getting technical partners to engage in this participatory design approach, because, especially at the beginning, they expected from pilot partners, via researchers, to get the requirements for building the platform, an issue that we highlight also in our methodology in Chapter 5.

In terms of methodology, MAZI follows a more distributed approach since each of its 4 pilots has one academic and activist group collaborating closely in the same physical location, and follows its own participatory design process. Then convergence takes place through cross-fertilization events. In netCommons we don't have the option of comparison since there is only one team in the project, NetHood, responsible for the methodological aspects of participatory design. However, the design space of MAZI is very similar to the one of netCommons, only at a different scale. More specifically, MAZI applies a very diverse set of participatory design methodologies for (very) small scale local applications.

In this sense, the outputs of the MAZI project could be seen as complementary to the proposed methodology in netCommons and it will be interesting to attempt some comparisons during the upcoming evaluation phase. MAZI is also a good example of a slow process of team building, which started in a Dagstuhl seminar [15] and through a series of events and common publications [16] led to the project proposal, and thus there was already a basis to build upon.

[2]See the TRUST BUILDING and COMMUNITY ENGAGEMENT threads of action in the Community Participation process in Sec. 5.7.1.

EMPATIA is different in that by definition participatory budgeting, the core focus of the project, is a participatory process driven by institutions in a top-down way and with significant stakes (large budgets are often allocated according to the decisions made by the participants). A very interesting perspective introduced in this context was the need for designing in a participatory way the participatory budgeting process itself!

In this context, EMPATIA stressed the need for a physical space, a "common kiosk" with open hours, in a public space where people pass by, and can create a physical connection. However, and since in the case of EMPATIA representation is a very important aspect, such open spaces still don't solve the problem with the more isolated people that are always difficult to include in participatory processes.

The **netCommons** project brought in the discussion the Sarantaporo case study and validated some of the lessons learned from the experts in the room. And especially the point made by Kalinca on the need to empower the community to do it themselves instead of offering it as a service, a situation that the Sarantaporo.gr team had to face in the core village of the network, Sarantaporo, where there was recently a refusal to pay the very small amount required to keep the Internet access on, for non obvious reasons, and against the benefit of the community itself.

Some interesting common patterns were already revealed from the first introductory presentations. For example, one challenge raised by Commonfare was to get technical partners engaged in their participatory design approach, because, especially at the beginning, they expected from pilot partners just to get the requirements for building the platform. And this was exactly the case for all three other projects.

There were also interesting discussions regarding the role of the project design itself since participatory design requires trust and in the time frame of the Horizon2020 projects one cannot really start new processes from the beginning.

After the introductory presentations and the discussions about similarities, differences, and lessons learned we identified three possible ways forward:

- Write an edited book with properly structured stories from participatory design processes with aim to make the results useful beyond the local;
- Develop a set of guidelines for participatory design methodologies and more generally citizen engagement in CAPS projects and beyond;
- Produce a handbook on participatory design for commoning projects in the spirit of Martila et al.'s work on "commons design in participatory design" [17].

Some additional points that were brought in the discussion was the political dimension of technology, the importance of the design of tools instead of final products for achieving the "beyond the local" objective, but also the importance of language and the need to deliberate around terminology.

4.2. The Open Technology Institute experience

The Open Technology Institute (OTI) has led recently a very relevant project, the 2015 SEED Grants, which produced among others a participatory design methodology for local applications in CNs, exactly the objective of this task. The methodology includes different aspects of the design process, online tools to carry out specific parts of it, two detailed descriptions of the case studies and their outcomes [7, 8], a summary report [5], and a book on "Community Technology" [6].

In a way all this material would be enough to cover a large part of this task, and to some extent it inspired the initial methodology described in D3.1 [1]. However, there are a few important reasons why there is much work to be done by netCommons and others in this area, in addition to the social and cultural differences between US and Europe.

First, OTI's focus has been on rather small communities for many of which the community network was not in place but part itself of the design process, and this is why, eventually, the particular focus on education [6]. On

the contrary, the target communities of netCommons are already established Community Networks all different between them and clearly different from the OTI's case studies.

Second, the OTI team was mostly comprised by social scientists and the objective was not to produce new software applications but to explore the use of existing ones as potentially local applications in different scenarios.

Indeed, the SEED grants project was very successful on the mobilization of local actors, the digital stewards, for building their own Internet access infrastructure. This process has been particularly successful in Detroit[3].

However, it didn't result in the creation of new specialized software for this case study. Notice also that the corresponding "toolkit" produced,[4] is abandoned since 2015[5].

However, the experience of OTI and its very rich outcomes in terms of methodology are very valuable and we have avoided to rediscover the wheel in several areas, like the Project Planning and Facilitation tools[6].

4.3. Overview of OTI's documents

In this section, we go through different parts of OTI's document to identify possible challenges, inspirations and lessons learned that will inform the netCommons methodology presented in the next chapter.

The **(Re)building Technology Zine v.1** [7], begins as follows:

> "*Today our shared digital infrastructure underpins mass digital surveillance, online bulk data collection and marketing, corporate control of Internet services, school performance metrics, workplace monitoring, and other systems of control. To resist these systems, people continue to build community-based technology projects and demonstrate an alternative vision.*"

And a little later:

> "*Community technology is a method of teaching and learning about technology with the goal of restoring relationships and healing neighborhoods. Community Technologists are those who have the desire to build, design and facilitate the healthy integration of technology into their communities.*"

This publication described a set of very useful methodological elements summarized below and compared with our own initial experiences in the Sarantaporo case study:

- a very comprehensive introduction to several event organization and brainstorming tools (pp. 17-33), like Discussion formats including the Fishbowl and Break-out groups with gallery walk. During our visits in the Sarantaporo area it sounded very difficult to engage in such "creative" formats with people living in rural areas with busy schedules and simpler ways in engaging in common activities;
- a short guide for "network building" workshops (See Fig. 4.2) is provided (pp. 35-40), which is related to our long-term training process started in Sarantaporo. Through our initial experiences the use of a real map of the area and physical toys, as motivated by the "Planning for real" methodology (see Sec. 5.10.4, instead of pen and paper worked very well;
- Searching for the right people ("Neighborhood skills") is another important task analyzed in this report (pp 41-44) and indeed an aspect brought up also repeatedly in our discussion with the CAPS experts, as discussed above.

Some interesting quotes from the stories that follow are included to highlight important challenges that a designer of a local application for CNs might have to face.

From the post "Mesh technologies and social challenges[7]," we learn that:

[3] See a recent news article including a short documentary: https://motherboard.vice.com/en_us/article/kz3xyz/detroit-mesh-network
[4] https://commotionwireless.net/
[5] See also http://communitytechnology.github.io/docs/cck/local-applications/local-applications/
[6] http://communitytechnology.github.io/
[7] https://talash.by/node/5

Figure 4.2: Falanster case study, network design workshop (reproduced with permission from https://talash.by/node/5)

> "*The hardest issues at the moment are social patterns, habits, and stereotypes. When we communicate with different communities they understand networks as the capability to have Internet access. They don't understand why they need to use local network functionality, if the Internet exists. They also see all our efforts as trying to provide Internet access for free. Their understanding can be described with simple formula: Mesh = Wi-Fi = Internet.*"

The case of Detroit [8] was imagined as a scenario where Internet access would come first and local applications would follow: "*Locally maintained networks require community investment to a degree that results in community improvement,*" says Nucera, "*Additionally, there is the added bonus of Internet access, which AMP [Allied Media Projects] considers to be a human right.' Once network installation wraps up, the stewards will begin populating the networks with locally specific apps that serve the needs of their neighborhood. Stewards will help with the development, installation, and testing of these apps.*"'

However, the project in Detroit stayed mostly an Internet access scenario and has recently evolved to a project under the "Resilient communities" framing. See also a recent Motherboard article titled "To Save Net Neutrality, We Must Build Our Own Internet" on this project that gained significant attention due to the recent threats against Net Neutrality in the US[9].

The **RebuildingTechZine v.2** [8], focuses more explicitly on locality and more specifically on the reasons why local applications matter, through different real stories, which are quoted below without commentary.

- Examples of local applications (p.5):
  "*Using the COWMeshbnetwork, when people want to share media, they simply plug in a media-filled USB drive to the Pi, and it is shared across thebnetwork. COWMesh particularly focuses on local language content, as little content is available in the hundreds of major languages in India.*"

[8] https://www.alliedmedia.org/dctp
[9] https://motherboard.vice.com/en_us/article/7x4y8a/net-neutrality-fcc-community-networks

- On the importance of physical representation (p.9, project Falanster):
  "*They also create T-shirts, posters, stickers, and jewelry to distribute at the festivals, and have painted a mural to counter the narrative that all infrastructure must be provisioned by telecommunications companies or the state. They organize their activities through regular mesh club meetings.*"
- More examples of local applications (p.11):
  "*Now Alternative Solutions for Rural Communities (ASORCOM) is seeking to add local services to offset access limitations due to low bandwidth. Because there are no telecommunications companies operating there, they are seeking to develop local digital literacy in addition to basic infrastructure . . . they set up a wireless network that distributes Internet access, an OwnCloud instance for file storage, and Etherpad for collaborative documents.*"
- Achievements (p.34, Falanster project):
  "*1. We worked in outdoor forest conditions for the first time, and set up a network which included two microservers with local applications (MediaGrid and Etherpad). We also used a splash page to orient newcomers.*
  2. The community tried to use some of the services for their specific needs. For instance, presenters used the network during a demonstration of a 3D-printer, and uploaded their presentation.
  3. We collected many ideas on how to use these networks for geek community events, during ourdoor events, as well as how to run a co-modeling meeting."
- Lessons learned (p.35, Falanster project):
  "*We came to the understanding that a network with web services may not be attractive because of lack of a tangible interface. We need to add more social activities and complimentary services, such as a mobile charging stations for smartphones, or sensible festival information on the network. The posters (see Fig. 4.3) were not enough to increase attendees' interest in using the mesh.*[a]
  1. Non-technical people preferred to choose sporadic walking and talking to the nearest circle of people, rather than trying virtual collaboration with the whole festival community.
  2. We learned not to rely on the organizers understanding of mesh networks. We need to engage them in co-creation and planning of network features as a substantial part of their festival planning. For example, there could be a schedule, festival announcements, and a local website with more information about the festival on the network. These measures can help to overcome disinterest for volunteers on the first step."

[a] As it is made clear in Fig. 4.3 the physical representation of the local network in the case of Falanster was not always very much elaborated. The MAZI toolkit places a lot of importance on such physical representations of the local network, e.g., https://github.com/mazi-project/guides/wiki/Deployment-tips, and this is an important Thread of Action in netCommons methodology as well. See Sec. 5.7.2.1.

- Aspirations (p.42, Youth Mesh Media project):
  "*Through the Mesh project, via the green school participation, https://www.santanatimorleste.com/green-intranet, we aim to involve youth not only in creative work but also to support them in sharing the stories of their lives and the history of the land. This will help youth to express and communicate but also strengthen their bond with the land, and reduce migration to Dili. The network will be an intranet to collect photographs, videos, music, stories, artwork, maps and other content from community members and from the children who participate in Green School activities. As part of the project, community members and participating children will learn the art of media making and improve their computer skills.* "
- Strategy (p.76, Free Geeks project):
  "*By starting with a short-term tangible project (recycling computers), Free Geek organizers are able to build relationships with their communities at the same time they build tech. This approach helps create the dialogue and creative confidence necessary to keep the core community tech project going and identify new opportunities for community tech work.*"

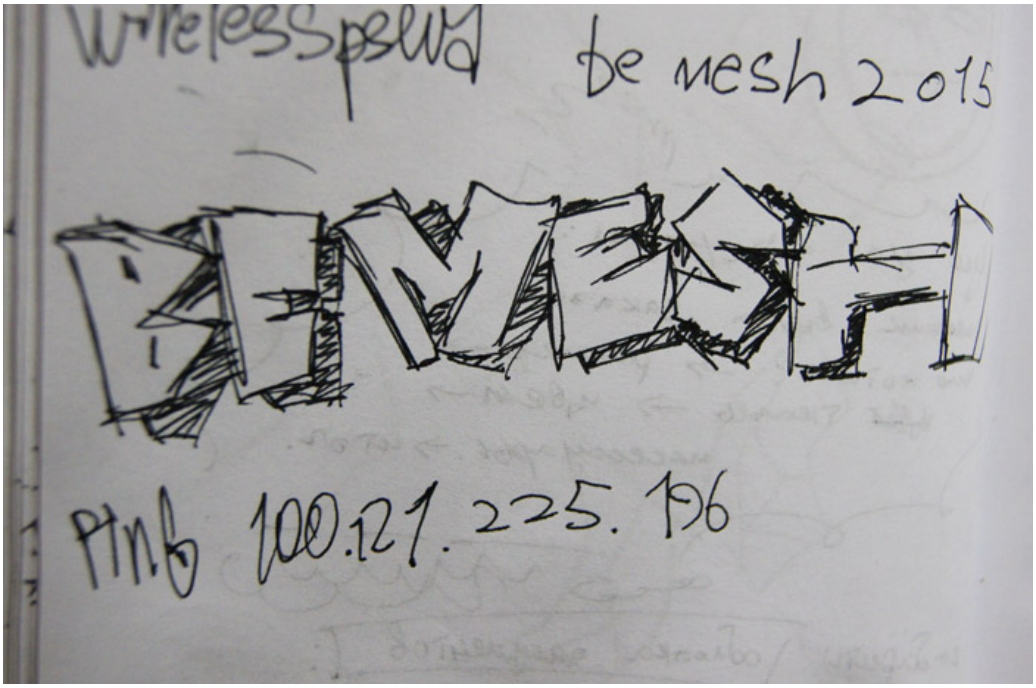

Figure 4.3: Falanster case study, visualizing the presence of the local network (reproduced with permission from https://talash.by/node/5)

- Realization (p.77):
  "*Many Free Geek community trainings come from volunteers feeling ownership of the project and stepping up to share the skills they'd developed. Culturing a vibe that encourages this kind of participation is a task of facilitation. It requires a lot of relationship building, personal attention, and, crucially, a willingness to recognize all effort that people put in.*"

4.3.1. Summary

We have quoted the final recommendations of this work in the previous deliverable, but perhaps it is interesting to stress some of them through the results of a related Master thesis at MIT by Maya Wagoner [18]. Wagoner notices that four out of "10 Community Network Lessons" are related to "*cautions against technosolutionism for people wishing to build their own community technology*" like "*be sure the project is not technology in search of a problem*" or "*focus on the community process as much as the end result*" and she concludes that "*these projects emphasize first and foremost that the people using, benefiting, and facing potential harms from the network should be those initiating, leading, and building the project*".

This is a very important lesson learned from this relevant project, together with the need to focus on education, before anything else. Our methodology in Chapter 5 reflects both these points in the definition and guidelines of the Community Participation and Software Development processes.

Part II.

Distilling a Flexible Methodology

5. The Methodology

Based on our experiences and the lessons learned summarized in Sec. 5.1, we extend the initial focused methodology presented in D3.2 [1] with a more generic and more flexible approach, presenting a restructured and enhanced methodology with guidelines for a selected set of key processes that need to be maintained, documented and reflected upon throughout a participatory design for local applications project.

The methodology is designed in a way that new processes and other methodological building blocks could be added or refined according to the specific case study.

Part I express exactly our background and trajectory toward this outcome, which we consider a working document to be further refined during the upcoming evaluation period.

More specifically, in the upcoming Deliverable 3.6 the evaluation of the methodology will be presented through interviews with netCommons leaders of each process inside WP3 before and after its implementation, together with additional interviews with actors external to netCommons that are currently active in development/deployment projects.

Through this evaluation, the methodology will be further refined and presented as a separate booklet, easy to read and consult on the field, which will be published as a separate document before the end of the project.

5.1. Summary of hands-on experiences

Based on the knowledge acquired through the wide variety of hands-on experiences described in Part I, we summarize the most important of the lessons learned, those that form the basis for the development of the methodology described in Sections from 5.2 to 5.10, while Chapter 6 presents a simplified and condensed version of the methodology that can be used in cases where constraints (time, resources, ...) do not allow the use of the extended version.

1. Real maps and toys are really useful and can make a difference. This is in contrast with methodologies like the one by OTI, working with drawings and stickers (compare Fig. 2.1 and Fig. 4.2). From our experience, the extra effort to put everything on top of a real map of the target area is really worth it, at least in certain scenarios.
2. The "distance" between the engineers and the local community can be a fundamental barrier, beyond real needs (it is characteristic the example of Sarantaporo village "rejecting" affordable Internet access because of misunderstandings). So, it is crucial to visit often the area of interest and establish regular communication with key actors, even if it does not seem necessary from an "operational" point of view.
3. It is almost impossible to stick to your initial plans and methodology. People are busy and sometimes want even to check your level of commitment to their own needs rather your own project (see Sec. 4.1). So, it is really important to be patient and adapt accordingly to changes of plans, cancellation of appointments, etc.
4. The most recurring challenge in participatory processes is the misunderstanding of the carriers of the technology, and in general the outsiders experts, as the "providers" of solutions. It is critical to demand the participation of the community in actually contributing to the development and deployment of whatever solution from the very beginning. Promising too much to attract attention is the most typical mistake done also by the Sarantaporo.gr team (promising "free Internet" as far as the deployment of the CN is concerned.

5. It cannot be stressed enough that for a participatory design process to be successful a certain numbers of local actors need to be engaged in the project and its goals. In Sarantaporo, we had the chance to be in close contact with the Sarantaporo.gr team but on the other hand we "inherited" the problems that have arisen due to their own "distance" from the area.
6. Informal feedback can be sometimes much more useful than the one delivered during the "official" process. Especially in rural areas, people are used to "please" those that come to provide them with "solutions" and in official settings this is often very obvious. So, make sure that you stay in the area some time after your events are finished ... and talk to people to understand how they really feel.
7. Training and learning is critical and it needs a physical location and regular events, that need to be coordinated by local actors. For this, special funding needs to be pursued in collaboration with the local community. netCommons is proud to have supported through the events described in Chapter 2, and especially the training workshop (see Sec. 2.3), Sarantaporo.gr NPO to receive two complementary grants (one by ISOC's Beyond the Net programme[1] and the second by FundAction's Rethink grant[2]).

5.2. Main idea and inspiration

The core idea behind this methodology is the description of the overall structure of a potential project and a set of key elements among which the leading team should choose from, according to the context and available skills and resources. The focus is on providing an appropriate variety of options and a creative way to self-reflect and make decisions as a team through the analysis of past actions and the planning of new ones.

More specifically, the methodology is designed in a way that draws an analogy with music, and more specifically improvised music in that the notes that will mark the overall process over time are not already on the score, ready to be "performed" by a classic orchestra that knows them by heart, but they are written on the fly according to certain rules and constraints, similar to a Jazz improvisation.

In other words, inspired by the book **"Yes to the Mess: Surprising leadership lessons from Jazz"** [19], we approach the problem of participatory design for local applications in CNs as a complex problem that requires a lot of experimentation, improvisation, reflection in action, serendipity, listening, and "minimal structures that maximize autonomy" [19].

The analogy with music and the inclusion in the process of a PROJECT SCORE aims to highlight the importance of time and synchronization points, as the agile development methodology **Scrum**[3] does, but with a less corporate and productivity-driven approach, which is more suitable for non-profit organizations and grassroots projects as most CNs are.

The inclusion of an empty "action sheet" together with the appropriate elements that will mark the different actions, their form, and other attributes is a novel approach, to the best of our knowledge, and here we present only a first draft paying more attention to the methodological elements that are most relevant for the netCommons project.

The methodology has been partially inspired also by **Methodkit** (see Sec. 5.10.1). Actually, the different methodological elements could be seen as Methodkit cards but which are "structured" in a certain way to allow for the team's efficient coordination over time. This latter aspect has been inspired by the Scrum methodology whose regular "sprints" (typically every two weeks[4]) and evaluation meetings help teams to stay informed about each other's activities and also productive. So, schematically, the netCommons methodology is a combination of MethodKit and Scrum methodologies, using as an overarching analogy the improvisation process in Jazz.

[1] https://www.internetsociety.org/blog/2018/02/building-sustainable-community-network-sarantaporo-greece/
[2] http://www.sarantaporo.gr/node/408
[3] https://www.scrumalliance.org/
[4] https://en.wikipedia.org/wiki/Scrum_(software_development)

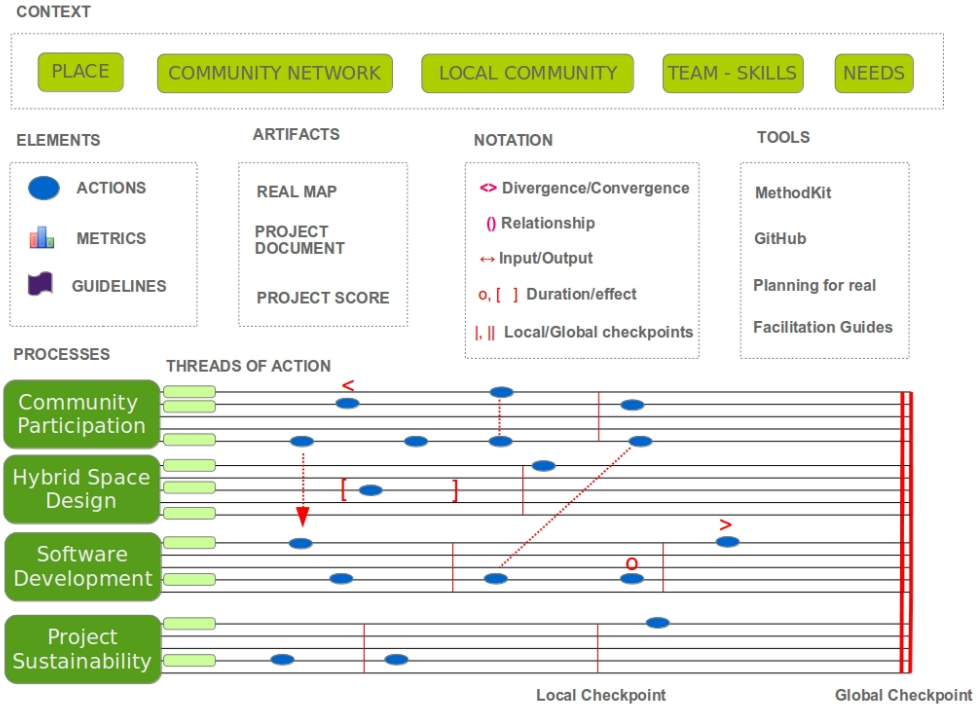

Figure 5.1: The main building blocks of the methodology

5.3. Building blocks

We have identified four important **Processes** that are relevant for the successful design and development of local applications for CNs:

- Community participation,
- Software development,
- Hybrid space design,
- Project sustainability.

Note that there are also two additional (important) processes on the deployment and maintenance of the CN itself and the hosting and operation of the application that will not be addressed in this version of the methodology, assuming at this stage that the participatory design project is developed in an area with a running CN with all the required facilities for hosting and maintaining local services.

For each of these Processes we propose five different **Threads of Action** that need to be carefully planned, documented and reflected upon based on a set of available **Methodological Elements**: **Actions**, **Evaluation Metrics**, **Guidelines** for supporting the implementation of the different actions, and (optionally) expected **Input** & **Output** from / to other Actions.

In principle, the potential/eligible set of Actions for each different Thread inside a Process will depend on the **Context**, e.g., on the SKILLS available in the **Team**, the technical knowledge of the local community, and more. For example, the Software Development process will include a certain set of threads and actions, if there is a competent software development team to rely on and more or less different ones if it is only available FLOSS software that can be used.

This means that the actual threads and actions decided for every process will need to be adjusted according to the different Context variables (e.g., “Small scale project with no technical expert”). Since the resulting

combinations are very large, the goal of the methodology is not to be exhaustive, but to provide meaningful examples that can be adjusted by the team according to the actual Context. In the following, we will assume that the THREADS of every process are "fixed" and it is only the ACTIONS to be selected by the TEAM along the way.

In light of this complexity and freedom to improvise, what should keep the project on track are the synchronization, self-reflection and evaluation **Checkpoints**, which will be both **Internal**, for every process, and **Global** for the whole project, according to a previously defined TEMPO. During these, ideally face-to-face, gatherings, the team will evaluate the evolution of the different processes and threads of action, identify important **Relationships**, like input/output, and other dependencies between them, update the elements of the methodology itself, and plan the next set of actions.

Additionally, duration, dynamics and expression markings, the **Notation**, could be used to identify certain qualitative characteristics of the way different actions are applied. For example, for a participatory workshop action, an additional **"⟩"** symbolizes a goal toward "convergence" (to concrete implementation plans), while **"⟨"** symbolizes a "divergence" (toward many different ideas).

Like in music, with just a few core symbols one could describe and characterize a wide variety of combinations of actions whose visualization will help to realize how the project is advancing as a whole and possible sources of harmony or cacophony to be identified as best practices or as challenges to address (respectively).

So, the most important element that needs to be updated and reflected upon throughout the project is the different Context variables that will influence the specific character and the "eligible" sets of methodological elements of the different processes.

More specifically, the Context refers to the initial conditions, opportunities, and constraints that the project faces in terms of PLACE, BUDGET, TIME, SKILLS, RESOURCES, LOCAL ACTORS, and NEEDS.

Some of the context variables are more "fixed" than others like for example the PLACE, the geographical location and its characteristics, or even the community demographics which might not change during the duration of a single project. The Project's characteristics like TIME, BUDGET, and SKILLS are also relatively stable but they can change intentionally or not, e.g., with a successful complementary grant application, or the collaboration with motivated LOCAL ACTORS that become part of the team. Then it is very important to identify what is the LOCAL COMMUNITY and its relationship with the COMMUNITY NETWORK (CN) and its characteristics, which could evolve over time. Finally, the short-term objectives and overall NEEDS of the community and the protagonists are also key contextual variables, which could also change according to the evolution of the project, the successes and failures.

What is important is that all relevant context variables are carefully identified and considered at the initial selection of the main methodological elements and also during the Checkpoints.

To facilitate the face-to-face gatherings during the Checkpoints, the methodology suggests the inclusion in the process of certain artifacts:

- A (printed) PROJECT DOCUMENT, which will be constantly updated (e.g., after every checkpoint) and which will contain a concise description of the project and the corresponding application which will be used both for communication purposes toward the community and the outside world but also as a "boundary object" between the team members.
- A printed REAL MAP of the region which could be used for brainstorming sessions both internally in the team and in meetings with the community, together with small objects to represent important elements like nodes of the network, meeting points, etc.
- A printed PROJECT SCORE, to be filled with the selected actions and their relationships during the duration of the project.
- A set of brainstorming TOOLS in the form of canvases, cards, etc, that could be used to facilitate the generation of ideas and the creation of common understanding in different meetings.

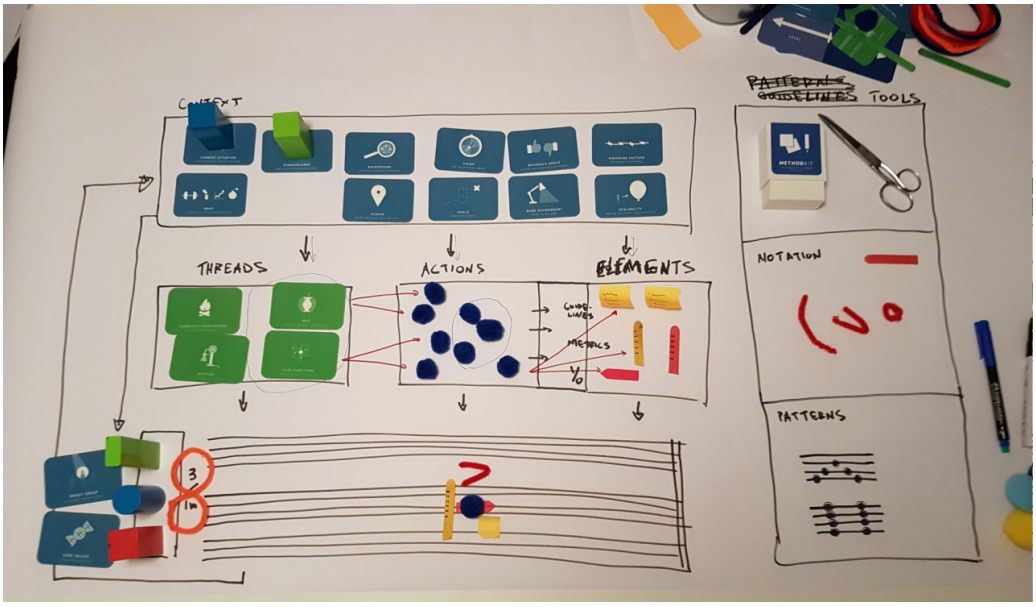

Figure 5.2: Overview of the methodology on a PROJECT SCORE

Given all the above methodological elements, the project team is invited to:

1. Define a strategy. In other words based on the values of the Context variables select an initial set of Actions, Metrics, and Guidelines, which will be tried out until the next Checkpoint;
2. Plan the different Threads of Action by placing the different selected elements on a real or digital PROJECT SCORE, similar to notes on a music sheet, for each "process" and try to express their character and inter-dependencies over time through the proposed (or invented) Notation;
3. Implement the different Threads of Action and document them as they evolve more or less according to the plan. For each process, additional Internet Checkpoints could be used to facilitate the coordination between the different threads;
4. At every Global Checkpoint:
   - Evaluate the progress of the different Actions according to the selected Metrics, identify interesting Relationships between them, and consider the possible effect of external Events,
   - Re-evaluate the Context variables and the choices of Actions, Metrics, and Guidelines,
   - Update the PROJECT DOCUMENT,
   - Repeat steps 1-3.

In the following we describe in more detail all these elements together with an initial set of proposed Actions, Metrics, and Guidelines, depicted also in Fig. 5.1. These will form the basis for the more concrete examples presented in Chapter 7 on the application of the methodology for the netCommons case studies on Sarantaporo, ninux.org, and guifi.net and the corresponding software development processes taking place already inside WP3.

As mentioned above, an important characteristic of the proposed methodology is that it provides "minimum structure for maximum autonomy" [19] and the objective is to transform it to an "open" methodology that could be updated by experts around the world, even adjusted for different scenarios.

So, the suggested methodological elements described below could be further refined and updated based on real life experiences and form a sort of crowd-sourced participatory methodology elements repository subject to constant evolution.

Sec. 5.9 presents also a set of possible Shortcuts, since it will be rare that all required skills, budget and time

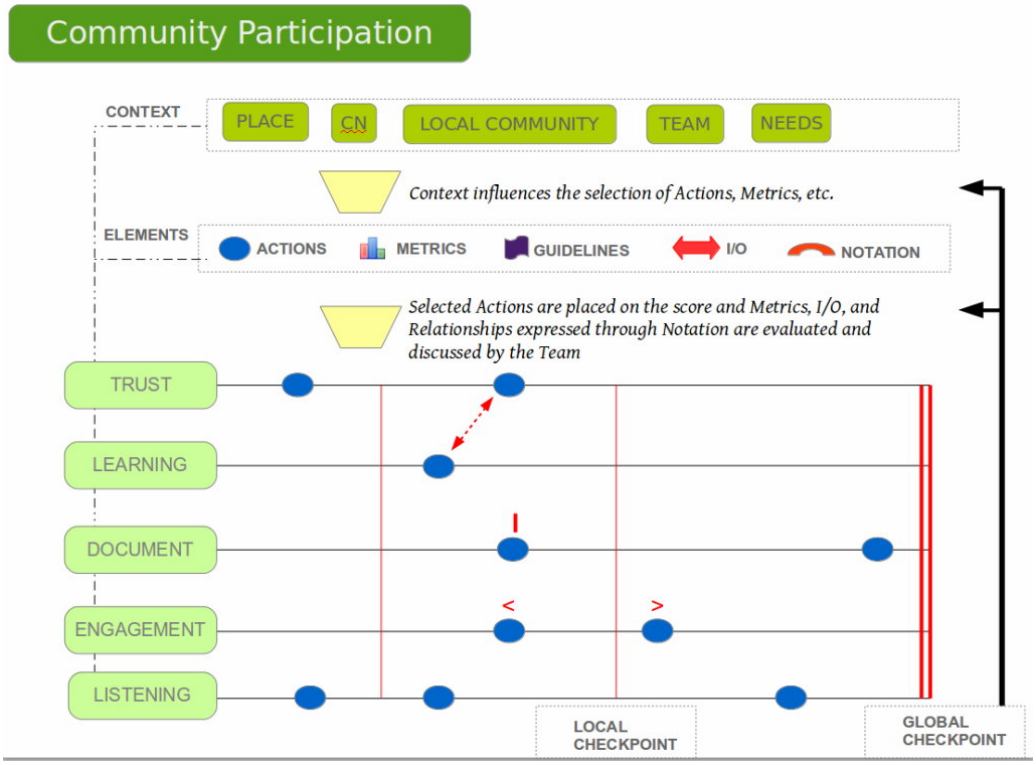

Figure 5.3: Representation of the different steps of the methodology and "feedback loop" at the Global Checkpoints for the case of the Community Participation Process.

will available in the team. This option, like in music, to create future impact starting even with little resources, i.e., only a few actions in a single thread, is one of the key motivational messages that we would like to pass to the potential designers of local applications for CNs. Start playing a nice tune, even if simple, and others will join.

5.4. Capitalization

The capitalization of the different components of the methodology is used to imagine them as Methodkit cards, as "things to think of", as it is the nature of the Methodkit cards, and not as prescriptive recommendations. This attribute of the the capitalized elements of the methodology becomes more clear in Chapter 6 where we condense the whole methodology in the form of a single Methodkit card deck.

Notice however that the goal with this methodology goes beyond identifying all the important aspects that need to be "thought of" or "acted upon". For this, it includes sets of concrete options for the different high-level aspects that need the attention of the project team (e.g., the different threads of action in the different processes). These suggested actions, metrics, etc. will be written in the following form: -This-is-a-specific-action-, while the different building blocks of the methodology, like the Context and the Processes will be written in first letter capitalization (Title Case).

Using the engineering terminology, high-level aspects could be considered as "variables", and suggested actions, metrics, etc., as "values" of the corresponding variables. For example, as described below, one of the core Processes of the methodology is this of Community Participation, which includes a series of Threads of Action like for example COMMUNITY ENGAGEMENT and LISTENING, for which a certain number of possible actions could be implemented like Participatory-Workshop, Informal-Meeting, etc. Similarly, in the building block Context, the variable NEEDS might take a different set of values like No-Internet-Access, Self-

Determination, etc., as described in detail in Sec. 5.6.6. Boldface is used for emphasis when judged appropriate, typically the first time a methodological element is introduced.

5.5. Target audience

This methodology assumes the existence of an actor or a group of actors who has access to an existing CN and who is motivated to design and build a local application for this CN with a long-term perspective. That is, we assume that the goal is to initiate a sustainable project that will continue to develop even if the initiators will need to step out (e.g., when a funded project like netCommons ends).

A *local* application refers to an application or service hosted and running in a server attached to a node of a community network. The service could be accessible only when someone is connected to the CN, or it could be accessible both internally and from the outside Internet world. What is important is that it is hosted and running in a server attached to a node or a CN, or that uses the community network as an indispensable element to be used.

We also assume that the software development follows the principles behind FLOSS software that will be open to international collaborations. When one builds software that addresses small communities (and competing with the global Internet platforms) there is a need to invest in the concept of "design global manufacture local" [20] and build software that can be easily replicated but also customized (see also [21, 22]).

Finally, we assume that there is a genuine interest to build tools and applications that address the true needs of the local community and not to "sell" a specific technology, and thus the term "participatory".

In summary, this methodology is developed having in mind interdisciplinary teams of various sizes who intend to develop local applications for CNs based on the FLOSS model putting a high priority on the sustainability of the project through active community engagement.

5.6. Context

The overall strategy will highly depend on the typology of our main actors (expertise, links to other key actors, resources, etc) and on the exact motivations behind the implementation of a local application for the corresponding CN. In other words, the first step is to understand the actual context, and the actual needs, that the local application will try to address.

In reality there are many radically different scenarios that one could face. For example, in terms of the type of community network, as described in detail in D3.1, and most importantly in terms of the type of communities of people, not necessarily part of the CN, that could have access to the application.

The next subsections present and discuss in detail the most important variables that describe the Context, in no particular order.

5.6.1. PLACE

This context variable refers to the given environment where the project takes place: the geographic location, the demographics of the population, some high-level social, political, economic, and cultural characteristics.

It is out of the scope of this deliverable to provide a detailed analysis on how these variables could/should influence the implementation of the methodology, and this is why they are all put together under the same context variable.

But it is important to identify the corresponding values (see examples in Fig. 5.4) and keep them always in mind in order to reflect on how they influence the different decisions at different levels. This is critical in the beginning of the project but also during its evolution and especially when important "discoveries" about

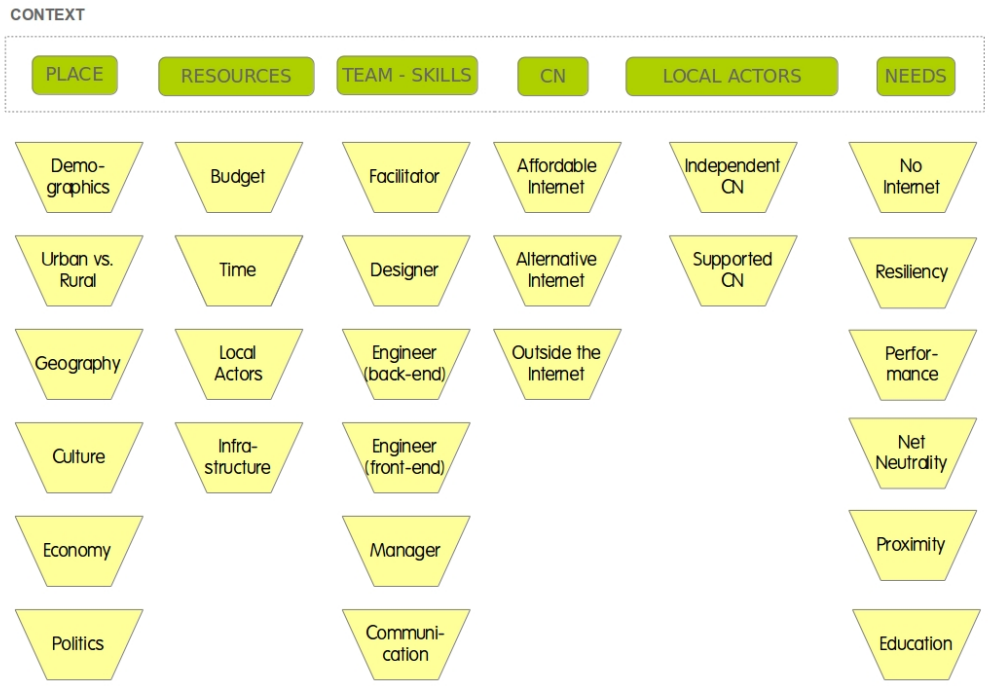

Figure 5.4: Important Context variables and examples of possible values, or categories of values

the nature of the place are made that can help to improve the common understanding of the team of this very important contextual element.

5.6.2. SKILLS

The first important question one needs to ask before determining the right strategy for a participatory design process is related to the available SKILLS and resources of the leading team and the potential external partners.

As a basis, there should exist in the team, on the one hand, an **Application-Designer** and **Software-Developer**, who will implement the actual application according to the local needs, and on the other hand, a **Community-Organizer** and **Event-Facilitator** responsible to engage and interact with the local community and try to identify matches between the local needs and the functionality potentially offered by the application.

The setting up of such a team can lead already to a quite costly process in terms of human resources and overall expenses. But there are still many key skills that should be ideally covered by specialized people such as community outreach and communication, education, documentation, funding, and more. Community-Networking-experts would be also needed on the technical side if they are not already part of the target community.

The most challenging aspect is the “cultural” differences between the two types of expertise that need to be combined, especially in light of the non-obvious reasons why local applications are actually needed, especially from the perspective of a non particularly technical and/or political person.

In case where there is only one side represented in the actual team it would be important that someone from the team takes the “missing” role, e.g., an engineer playing the role of the facilitator, or a community organizer playing the role of the software developer[5].

[5]This would work only in the case that the already running software is proposed and subject to adaptations that the person in charge could direct to the actual developers of the software.

5.6.3. RESOURCES

Especially for low budget projects, one should carefully identify the available resources which will determine the priorities and feasibility of the different steps; see Questionnaire no. 4 in D3.1 [1].

In short, the most important resources on the side of the team are the available BUDGET and TIME, and already available SOFTWARE and INFRASTRUCTURE.

On the side of the community, there might be many visible (and non-visible) resources, like available OPEN SPACES for gatherings or training sessions, old unused devices that could be recycled, and so on.

5.6.4. COMMUNITY NETWORK

The next important variable that will determine how to detail and implement the many features of our methodology is the target CN for which a local application is to be designed, developed and deployed.

More specifically one could identify three radically different case studies in this context:

- **Affordable-Internet**: This category includes CNs which are built to provide affordable or even free Internet access to small or large communities. For example, there are numerous rural or small-scale urban community networks built by experts with varying levels of engagement of the local community, with the clear goal to provide affordable Internet access. Typical examples that fit this category could range from the Sarantaporo.gr network serving more than 10 villages all the way to the OTI initiatives in the US in Detroit and NY, among others. Large parts of the Guifi.net network also fit this category and the same for Freifunk.net in Germany and FunkFeuer in Austria, as well as the many community ISPs that form the Federation French Data Network (FFDN) in France.
- **Alternative-Internet**: This category includes CNs built as big "sovereign" networks that do not depend on the Internet to provide useful services at a smaller scale. Typically, these are city-wide or even region-wide community networks, whose members are mostly technically savvy and key requirement for participation in the community is the installation of a node. Some projects are built exactly around this idea, like AWMN and ninux.org. Other projects, like Freifunk and Guifi.net, while focusing on Internet connectivity have some of their core members actively building local (sometimes local-only) services along these lines.
- **Outside-the-Internet**: This category includes typically small-scale CNs or offline networks, built to provide local services in a specific location, often through a single node like the PirateBox or the MAZI toolkit.

In all these three scenarios the participatory design of local applications makes sense but possibly for different reasons and most importantly it is a different "community" that needs to be considered.

We get back to these differences while laying out the basic elements of our methodology and in the presentation of our selected case studies for demonstrating the use of the proposed methodology in Chapter 7. More specifically, we focus on different case studies for each of the two first types of CNs. The 3rd category, Outside-the-Internet, is a case covered in depth by the CAPS project MAZI, and actually the outcomes of that project could be seen as complementary to this work.

5.6.5. LOCAL COMMUNITY

So, which is the "social" community to be served by local applications running on a specific type of CN? For each of the two main types of CNs described above, there are two different options for the corresponding type of engagement of the local community.

In the first CN type, Affordable-Internet, the community building and maintaining the network is typically much smaller than the community *using* the network, for Internet access. In the most participative scenario, the first community is fully "contained" in the second one, and it is actually members of the "social" community, a

village, a neighbourhood, a wider urban area, that have built the CN to serve the needs of the whole community, an **Independent-CN-for-Affordable-Internet**. On the other extreme, there are the cases that the main actors that built the network come somehow from the outside and it is only a handful of local actors that help to maintain it with the continuous support by the external experts, a **Supported-CN-for-Affordable-Internet**. Sarantaporo.gr is an example of a CN that lies today closer to the second case, but tries hard to move toward the first one.

For the second CN type, Alternative-Internet, the social community typically overlaps with the network community. The candidate applications are to be used primarily by the "node owners" of the CN, those actively engaged in the construction of the network itself, an **Independent-CN-for-Alternative-Internet**. Ninux.org is a typical example of this category, while AWMN is another one, very proud for the wide range of local services replacing all major Internet services, developed by its members. But there are also cases that Alternative-Internet CNs are meant to serve the wider community as was the case of RedHook WiFi, a **Supported-CN-for-Alternative-Internet**.

Note however, that RedHook WiFi was actually both an Affordable-Internet and Alternative-Internet CN, and in reality every CN lies somewhere between these two extremes.

Finally, there is a third category in which the CN does not exist already but is only "potential" and the creation of the CN (together with its local applications) is part of the objectives of the overall process. The work of OTI has focused a lot on such cases and this is why we will not put a lot of emphasis on those. In other words, we will assume that the CN already exists and the main actors behind the building of this CN could be part of our participatory design team, or not.

Of course, similar relationships exist, and should be identified, regarding the relation of the software developers of the team with the local community. Again, those could be part of the community or outsiders.

In both cases, it is critical to identify the available or potential links to different local actors in the community. Community centers, non-profit organization, activist groups or local authorities might prove instrumental in helping to engage the community and offer credibility and meaning to the technical solutions provided.

In addition to this core difference of the type of social community in relation to the network community, there are of course numerous different types of communities in relation to other characteristics such as size, culture, geographic area, politics, economics, and many more.

It is impossible to account for all these differences and how they could affect the implementation of the methodology but we will take some examples in the case studies developed in Chapter 7.

5.6.6. NEEDS

Before entering in the analysis of the needs of the community one must tackle the single question that very often rises before, during, and after the design and implementation of a local application: **"Why local?"** . Why it is not enough to connect to the Internet and use the generic application (cloud-based or not) that everyone who has Internet access uses every day?

Antoniadis [21] has argued around four main reasons why, but there are even more. In the following we provide a complete list of possible reasons why a community would benefit from hosting a local application in their community network, starting from the more practical reasons toward the more political ones.

No-Internet-Access: in cases where Internet access is simply not available or very limited, local applications can actually enable a wide range of basic digital interactions not possible otherwise. This is perhaps the most obvious scenario in which local applications make sense.

Resiliency: local applications could be seen as an alternative to the Internet-based services when the latter fail for various reasons (a physical disaster, an economic or political crisis, among others), increasing the resiliency of the system and the community.

High-Performance: for a certain range of applications, local servers could help to achieve better performance, which is especially the case when Internet connectivity is limited of low quality (e.g., highly asymmetric).

Net-Neutrality: the access to local applications in a CN can enjoy the net neutrality principle of fair treatment leading to better performance, support of local actors, and also openness to innovation.

Physical-Proximity: local applications running on a CN can have useful information about the physical location of its users without the use of any private information such as GPS coordinates or IP addresses.

Digital-Skills: hosting local services and applications, exposes the local community to the challenges of running Internet platforms and complex issues like privacy, freedom of expression, and more, providing the means for digital emancipation and education on digital skills.

Community-Empowerment: the engagement of the community not only in the creation of a community network but also in the design of a local application can contribute to feelings of empowerment and in general increase the community spirit and social cohesion.

Data-Ownership: by construction, the data generated and stored through a local application are owned by members of the community. This ownership could/should lead to the appropriate governance structures for the management of this data for which there is the unique option, compared to Internet-based platforms, to be democratic.

Self-determination: the power over the design of a local application, is a more subtle than ”ownership”, but very critical power potentially offered to a local community, which could be also democratically shared among all of its members.

Privacy: derived from the data ownership and self-determination reasons, local applications could be seen as a means to build services that collect and manage information according to the needs of the local community and could lead to systems that are more respectful to privacy and freedom of expression, without providing an a-priori guarantee for this.

Notice that many of these NEEDS if they are expressed on their own might not be enough to motivate the need of a local application. But if considered **in combinations or even all at the same time**, it becomes clear that the development and deployment of local applications in CNs not only make sense, but they are a key requirement for a healthy digital ecosystem now and in the future.

Typically, some of the above reasons will be correlated with the types of CNs developed in an area and its relationship with the local community. For example, Independent-CNs-for-Alternative-Internet are often driven by the values of -Privacy-, and Data-Ownership, while Supported-CNs-for-Affordable-Internet CNs are most often driven by the No-Internet-Access in the area.

In any case, it is very important that the project team is aware of the reasons why a local application makes sense for the LOCAL COMMUNITY and the COMMUNITY NETWORK (if different) but also for the team itself. There could be situations that the reasons are different for different actors and this should be well understood and reflected in the way Processes and Actions are planned and carried out.

5.7. Processes

In our methodology, a Process characterizes the type of a set of actions toward a certain goal that is considered as essential toward the overall objectives of the participatory design task. It also implies a certain set of skills and resources needed to be in place for the corresponding goal to be fulfilled. In the following we describe the four Processes of our methodology that have been identified as the most important ones according to our hands-on experiences in different settings, and most importantly during the last 15 months (November 2016 - January 2018) of field work in the area of Sarantaporo.

For each Process we provide a set of suggested Actions, Evaluation Metrics, and Guidelines, among others,

again according to our own experiences and lessons learned.[6] For some of the processes, like Community Participation, the description is more detailed while for others like Software Development are more limited, expecting that they will be further developed during the evaluation period through our interactions with the other project partners in WP3.

So, through the internal evaluation process that has started already, and which will be documented in Deliverable 3.6, those less developed parts of the methodology will be further enhanced with more suggested actions, metrics, and guidelines based on the experiences with ninux.org and guifi.net but also with the further progress of our main case study in Sarantaporo.

Finally, note that the selected threads of action for every process include the actions that are the most important to communicate at the project level, between members of the team that might have very different backgrounds and expertise. In practice, the "internal" work of each process could be organized differently according to the specialized skills and methodologies that the corresponding team members have experience in.

5.7.1. Community Participation

Local applications can make a difference when they assume, and even depend on, the engagement of the local community, since this is their competitive advantage compared to Internet-based solutions.

By properly placing on the timeline of this thread participatory workshops, brainstorming sessions, field research, observation periods, online participation and aligning them with corresponding actions of Hybrid Space Design, and Software Development, a Team can implement a wide variety of spiral or other processes as those described in "Design thinking" and "participatory design" handbooks like for example the "Divergence" and "Convergence" cycles of the IDEO guide [23] introduced in Sect. 2.4 of D3.1 [1].

The more such cycles the better, and the more the community is engaged in the development process along the way, also the better. In any case the participatory design cycles should be complemented with the initiation of a more long-term process that will guarantee future engagement and sustainability.

Below we define a set of selected Threads of Action for the Community Participation Process whose suggested Actions are inspired by the hands-on experiences summarized in Chapter 2 and Chapter 3:

5.7.1.1. LISTENING

Focused participatory workshops are a very effective tool to produce concrete ideas and action plans. But to understand the needs of the community sometimes it works equally well, or even better, if a Team member just walks around and observes, focusing on the numerous details of everyday life and letting oneself be inspired by them. Needs are not always conscious and not always expressed in public, but they express themselves in the most unexpected moments.

Considering the digital dimension, where it makes sense, NetHood's earlier work on hybrid flanerie [24] is very relevant pointing to the richness of the digital space overlaying the physical and thus the key role of existing platforms like Facebook and Flickr groups or Twitter and Instagram hashtags in observing and sensing the community spirit and why not engaging also where people actually digitally hang-out.

Suggested Actions:

- Explore-Local-Media (announcement boards, newspapers);
- Online-Exploration (facebook groups, instagram, twitter);
- Random-Walk;
- Participant-Observation;

[6] In certain cases, footnotes provide some additional explanations and references to previous part of the document to facilitate comprehension.

Figure 5.5: The different threads of actions and suggested actions and metrics for the Community Participation Process

- Informal-Discussion;
- Personal-Interview;
- Personal-Recordings (audio, photos, videos).

Supporting methodological elements:

- Evaluation metrics: Identification of needs; Diversity of gathered information; Representative sample;
- Guidelines: Details matter; Stay more; Let yourself be surprised;
- Input: Technological capabilities; Scenarios;
- Output: See Sec. 5.7.1.3 DOCUMENTATION.

5.7.1.2. COMMUNITY ENGAGEMENT

The most important step in ensuring the actual participation of the local community in the development of the target local application is to arrange different forms of gatherings ”on the ground”. These gatherings should aim both to communicate the goals and motivation of the project and to engage the local community in co-creating its final outcome.

In Deliverable 3.1 we have focused a lot on this specific part of a participatory design process, and Chapter 2 provides a very detailed view of our experiences and lessons learned, codified in the following:

Suggested Actions:

- Participatory-Workshop;
- Public-Demo;
- Public-Conference;

- Informal-Meeting;

Supporting methodological elements:

- Metrics: Levels of attendance; Diversity of attendance; Quality of information gathered; Engagement of local actors in the project;
- Guidelines: Technology pull (instead of push); Patience and respect; Adaptability and improvisation; Give space and time to everyone to express themselves; Honesty and transparency; Provide future perspective and encourage collaborations; Trust in the process[7]; Don't offer solutions but frameworks for engagement.
- Input: Mapping of the place (organizations, key people)
- Output: Needs; Actors; Challenges; Requirements; Opportunities.

5.7.1.3. DOCUMENTATION

Documenting the outcomes of the LISTENING and COMMUNITY ENGAGMENT threads it is vital for two reasons. First, it is extremely important that all the other Processes depending on the outcomes of the Community Participation Process to be adequately informed. Second, documentation can play itself a very effective "boundary object" between the team's researchers and/or activists with the local community that can help further refine the conclusions and create transparency and opportunities dialogue.

A way to engage the community in the documentation process is by producing short stories disseminated through local media or even wider dissemination if appropriate.

Suggested Actions:

- Short-Summary-of-Event;
- Detailed-minutes-in-narrative-form;
- Detailed-minutes-with-Commentary;
- Thick-description;
- Educational-Material;
- Blog-Entry;
- User-story.

Supporting methodological elements:

- Evaluation metrics: Feedback and annotations; Common understandings;
- Guidelines: Share soon the documentation and invite comments annotations by participants (e.g., through google docs); Publish interesting material through social media or other channels;
- Input: The outputs of LISTENING and COMMUNITY ENGAGEMENT
- Output: Different forms of documentation (as described by the actions).

5.7.1.4. LEARNING

Especially when there are limited digital skills in the local community, learning plays a key role for empowering the community to participate in the application design process in their own terms and not only as "users".

It is important to notice that even in the case of digital natives, the possible benefits of local applications and corresponding trade-offs are not at all clear, so learning processes along these lines will be also a key element of a participatory design process for local applications.

[7] The Team should gain the trust of the community regarding its competency and the feasibility of the goals set out in the beginning of the process. In addition to the aforementioned objectives, that all contribute to the creation of trust, the quality of the intermediate results (e.g., a demo of the minimum viable product) can play also a key role to this respect.

The OTI's digital stewards concept [6] is very relevant here and in general the whole produced methodology, focused a lot on education and learning. The Openki platform provides also inspiration and a possible tool to use, which is itself a candidate local application for CNs (see Chapter 3).

Suggested Actions:

- Training-Seminar;
- Train-the-Trainer-Seminar;
- Produce-Educational-Material; (documentation, games, visualizations, regular course material);
- Establish-an-Educational-Programme; (independent or in collaboration with existing institutions or educational centres);
- Translate-Existing-Material; (e.g., OTI's output).

Supporting methodological elements:

- Evaluation metrics: Attendance; Participation; Number of local trainers;
- Guidelines: Real maps and toys can make a big difference; Lessons learned from OTI's experiences;
- Input: Available skills and needs;
- Output: Educational material.

5.7.1.5. TRUST BUILDING

When one invites a group of people to put effort and participate in a certain activity, the success both in levels and quality of participation, and later adoption of the final product, can be attained only if there is a certain level of trust. Trust that there are good intentions and true respect of the needs of the community, and trust that the effort invested will be worth the result.

Especially in cases when the members of the Team are not "naturally" members of the local community, one's personal perceived engagement with a community is perhaps the most important success factor and the most difficult to provide guidelines for.

Suggested Actions:

- Project-presentation; (formal or informal);
- Participation-in-local-project;
- Engagement-in-community-affairs.

Supporting methodological elements:

- Evaluation metrics: Feeling welcomed; Feeling trusted; Establishment of relationships/collaborations with local actors;
- Guidelines: Transparency; Don't pretend to care; Find a place for your (true) self in the community.

5.7.2. Hybrid Space Design

This process refers to the actual design of the application in terms of user experience, desired functionality, and "corporate identity" according to the needs of the community. The "hybrid space" specification wishes to stress the importance of designing both digital and physical elements, including their possible interactions and interdependencies.

More specifically, we suggest that the Team should consider a local application as part of the overall hybrid space, instead of yet another digital platform. This perspective can play a key role in showcasing the advantages of local applications (see Sec. 5.6.6 NEEDS), and at the same putting them in practice toward adoption facilitation (see also Chapter 4, of Deliverable 3.1).

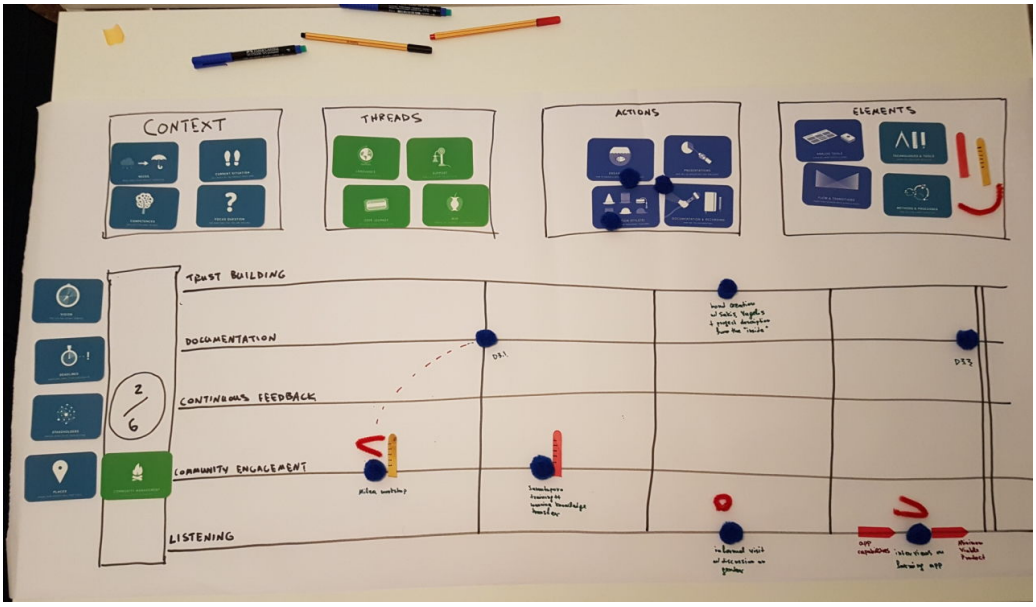

Figure 5.6: Using the PROJECT SCORE to identify actions taken place during the netCommons PD process in the Sarantaporo area in the different threads of the community participation process.

5.7.2.1. PHYSICAL PRESENCE

Visualization of the CN application in physical space, and vice-versa, is extremely important. It is one of the key competitive advantages of local applications that are hosted in the actual physical locations where they are relevant, and this should be made visible through posters, projections, artifacts, and more. The creation of a physical "home" for the local network and its services is an investment with significant potential impact. See also a similar argument (and relevant example) from the urban planning field[8].

Suggested Actions:

- Creation-and-placement-of-poster;
- Installation-of-hybrid-artifact; (e.g., like a display, permanent or during events; see also Sec. 5.7.2.2 HYBRID ELEMENTS);
- Installation-of-Kiosks; (permanent or during events);
- Organization-of-Pop-up-Events; (in a square, at the street);
- Creation-of-dedicated-space; (existing or own)[9].

Supporting methodological elements:

- Evaluation metrics: Visibility; Collective awareness; Representation;
- Guidelines: Don't underestimate the power of visualization and physical presence; Think of the sustainability of the physical elements against bad weather, theft, damages.

5.7.2.2. HYBRID ELEMENTS

The application needs to be designed in a way to take advantage of the possibility for hybrid interactions, facilitated by the physical elements placed in public spaces, as described above (see D3.1 [1]).

[8] https://www.pps.org/blog/torontos-neighborhood-planning-offices/

[9] Permanent presence at the street level can increase significantly the awareness of the existence of the CN and its applications and the opportunities for community engagement. For this, if possible, it is highly recommended to invest resources to run a visible physical space as a hub for the CN and its applications.

Supported Actions:

- Design-of-a-hybrid-brand-identity[10];
- Design-of-entry/exit-points-in-application[11];
- Deploy-physical-input/output-devices[12];

Supporting methodological elements:

- Evaluation metrics:
- Guidelines: Carefully define borders[13]; Provide alternatives for participation to people with limited digital skills or capabilities (e.g., Hybrid Letterbox[14]); Make sure that the visual identity of the application and important texts are the outcome of participatory processes.

5.7.2.3. DESIGN FOR NEEDS

Since one of the most important barriers for the design, implementation, and adoption of local applications for CNs is the lack of awareness of their value compared with Internet-based platforms, it is critical that the design of the applications reflects the actual NEEDS addressed, promoting those that are most relevant for the community.

For example, -Resilience- and High-Performance are two very practical and "measurable" reasons why local applications in CNs can make really a difference. So, when these two reasons are indeed relevant for the community it is important to incorporate in applications visualizations that demonstrate these in practice. For example, this could be a sort of "Speedtest" to showcase good performance, or a resiliency metric expressing the robustness of the infrastructure in case of different types of disasters.

But notice that the project team has often its own NEEDS for developing the project in the first place and these should not be neither "hidden" nor underestimated. Education and training can often help to develop the needs of a community toward more political causes. Also, technology is political and a participatory processes could be seen as an effort for collective learning and emancipation and not as a unidirectional process in which one group provides "services" to another. Needs should be expressed and debated, and hopefully design should allow for constant negotiations, compatible with the "design for tussle" principle [25].

Finally, notice that the possible actions for this type of thread are mostly generic, like building a prototype or a mockup, since the actual object of design will heavily depend on the context.

Suggested Actions:

- Create-Mockup;
- Build-Prototype;
- Develop-Concept.

Supporting methodological elements:

- Evaluation metrics: Usability; Participation; Adoption;

[10] Match online with offline design elements, use appropriate names for local Uniform Resource Locators (URLs) and Service Set IDentifiers (SSIDs) of public Wireless Access networks.)

[11] Design for the transition between an online to a physical interaction, e.g., the organization of a face-to-face meeting.

[12] The aforementioned transitions could be facilitated by actual artifacts present in physical spaces as described in PHYSICAL ELEMENTS.

[13] The fact that the users of a local CN application are living in physical proximity is a very special feature, and one of the most important advantages of local applications, that needs to be taken into account in the application design. Here lies a trade-off for the application designer and the corresponding deployment strategy. Should such applications be also accessible from the "outside" world or frame it as a "local only" application. In many cases, it will be important first of all to draw the "border" of what is inside and outside. And then to take advantage of some benefits that arise from the fact that a community has full control of the infrastructure that a certain application is running. For example, the use of custom internal URLs, special access rights to those that connect from the inside, etc.

[14] http://www.design-research-lab.org/?projects=hybrid-letter-box

- Guidelines: Balance needs with politics; Visualize quantitative metrics, like performance [15]; Design for values like privacy[16], democracy, and self-determination;
- Input: User and people stories, needs, requirements; Implementation constraints;
- Output: Mockups, prototypes, etc.

5.7.2.4. DESIGN FOR APPROPRIATION

A key characteristic of software that makes it more friendly to participation is the offered capabilities for customization, or "infrastructuring" in the participatory design terminology [26]. The more options the users and the community are offered to adapt themselves a given software platform to their needs the more the platform will be able to address them, quite obviously.

So, it is crucial for a successful local application to allow for a certain degree of customization. This is important not also for the need for appropriation[17], but also for the sustainability of the overall project making it possible for the same piece of software to be used across space and time. Wordpress is by far the most notable success story to this respect, and the MAZI toolkit[18], another related effort in the context of netCommons. It is important to showcase these capabilities and observe how they are used.

Suggested Actions:

- Create-Mockup;
- Build-Prototype;
- Develop-Concept;

Supporting methodological elements:

- Evaluation metrics: Usability; Participation; Adoption;
- Guidelines: Even small customization options can make a difference; The administrator as the "user";
- Input: User and people stories, needs, requirements; Implementation constraints;
- Output: Mockups, prototypes, etc.

5.7.2.5. GOVERNANCE

All the aforementioned design elements, digital and physical, are subject to a wide variety of options, requirements, and constraints. It is the main purpose of a participatory design process that the decisions about all these complicated design choices are as representative as possible of the community's needs, desires, and politics.

However, these are not fixed since they evolve over time, and most importantly are subject to negotiations and compromises. This means that, ideally, the selection of the different customization options discussed above but also the other important decisions like the management of data, should be subject to democratic process and not under the full control of a single person or organization.

[15] E.g., a monitor that visualizes the part of the network that would be operational in case of different "disasters", or an internal "speed test."

[16] The possibility for the members to participate in face-to-face assemblies might be used to increase the security of the system when the focus for example is on privacy and freedom of expression. One could even imagine for example apps that "sense" when members of a CN meet in person and assign more "trust" to those in an online decision making process.

[17] An interesting observation by William Whyte [27] (p.34-35) from the field of Urban Design is very telling:

> "*Chairs: Now, a wonderful invention - the movable chair. Having a back, it is comfortable; more so, if it has an armrest as well. But the big asset is movability. Chairs enlarge choice: to move into the sun, out of it, to make room for groups, move away from them. The possibility of choice is as important as the exercise of it. If you know you can move if you want to, you feel more comfortable staying put. This is why, perhaps, people so often move a chair a few inches this way and that before sitting in it, with the chair ending up about where it was in the first place. The moves are functional, however. They are a declaration of autonomy, to oneself, and rather satisfying.*"

[18] http://mazizone.eu/toolkit

Here the design process is inherently hybrid since democratic decision making cannot take place only in the digital world, but it could be significantly supported by appropriate functionalities for deliberation and voting, like those provided by existing software, like Loomio.

Suggested Actions:

- Select-existing-application-for-decision-making;
- Integrate-decision-making-with-administration;
- Hybrid-assembly-for-decision-making;[19]
- Participatory-Workshop.

Supporting methodological elements:

- Evaluation metrics: Representation; Inclusiveness;
- Guidelines: Be ready to give up on your own assumptions about what the application should do and how.

5.7.3. Software Development

The starting point in terms of software development and level of flexibility to accommodate the needs of the target community is a central point for the design of a successful strategy. Clearly, the less the existing functionality in terms of actual code or commitment by the Team and the more flexibility in terms of time and development, the more options will exist for exploring and addressing the local needs.

It is perhaps obvious to say that one should not underestimate the amount of resources required to produce software of production quality especially today that Internet-based platforms have accustomed people into very smooth and even addictive UX designs. Experience has shown that developing social software is much more challenging than one could expect and requires much more than the coding of specific functionality, including continuous moderation and communication with the users.

So, the choice of the appropriate methodology in developing software might be also a pragmatic one. Building software from scratch, can be very expensive and rarely the required lifecycle for software development can fit the available resources and time for participatory processes on the ground.

For this, and especially in the context of CNs, it is very important to consider the possibility to build on existing FLOSS platforms, at the same time avoid the trap of relying too much on existing implementations, assuming that they are good enough to be just deployed as they are (as in some of the case studies of the OTI project).

When a team wishes to build new software from scratch, again it is highly recommended to start from the beginning an open source software development methodology in order to make it easy for external actors to contribute but most importantly make it easier for the community to provide feedback.

5.7.3.1. DEVELOPMENT FRAMEWORK

When the goal is to engage communities in the design of software that is not meant to be commercially exploited, it is critical that this software in addition to the “open source” and “free” attributes is also properly “libre,” that is free “as in freedom”. Here it is important to notice that this feature is not binary (like in the cases of open source or free) but it depends highly on how easy it is actually to replicate and customize a certain piece of software. Facilitating self-hosting can increase significantly the participation of the overall community in the software development process.

Suggested Actions:

- Analysis-of-dependencies-and-trade-offs;[20]
- Explore-choices-of-similar-projects;

[19] Organize physical meetings but allow also feedback from legitimate community members through online channels.
[20] Comparison of different development frameworks in terms of usability, flexibility, support, and sustainability.

- Selection-of-development-framework;
- Evaluation-of-development-framework.

Supporting methodological elements:

- Evaluation metrics: Engagement of the wider FLOSS community;
- Guidelines: Eating your own dog food; Design global, manufacture local; Different degrees of "freedom" of software exist.

5.7.3.2. CONTINUOUS FEEDBACK

It is important to receive feedback from the community, in any possible way, for the current status and future of the application, and make sure that it is clear how this feedback influences the implemented functionality, explaining the rationale behind, especially when this is not the case.

In this context, the github/gitlab approach, see also Sec. 5.10.3, has proved extremely effective and inclusive, in receiving user feedback both on technical aspects and high-level design decision. More specifically, the use of the "Issues" feature with tags and milestones not only help developers coordinate but most importantly, in our context, they allow users of the software to report issues and express their desires for the software functionality. With appropriate moderation github/gitlab can become in essence a very effective online participatory design and development platform. Successful FLOSS applications like NextCloud are using exactly this mechanism to receive feedback from users and engage developers, and our own experience with Openki (see Sec. 3.2 only verifies this evidence.

Suggested Actions:

- Set-up-the-online-participation-environment[21];
- Bootstrap-the-online participation-environment[22];
- Respond-to-feedback[23];
- Prioritize-feedback[24].

Supporting methodological elements:

- Evaluation metrics: Participation; Resolved issues;
- Guidelines: Appreciate all contributions and respond politely; Acknowledge the value feedback and provide information for measures taken; Consider the role of a translator of user feedback to the selected online participation platform[25];
- Output: User stories.

5.7.3.3. PHASING

It is very helpful when a participatory design process starts with the development of a very draft MINIMUM VIABLE PRODUCT. Of course, how soon a team will be ready for this depends on the starting point. If it is

[21] In the case of github issues, decide on the labeling of issues and milestones and the overall feedback policy.

[22] In the case of github, the project team could start using the Issues feature internally. This is useful not only to provide a welcoming environment for new comers to express their own feature requests and ideas about the software application. It creates also a certain level of transparency about the activities and culture of the team, and could help also bring together the non-technical members with the software development team.

[23] It is important to create a rhythm for replying to feedback that it is not too fast nor too slow.

[24] In regular intervals the team should prioritize various feature requests according to their feasibility and overall impact. It is important that such decisions are well communicated to the users.

[25] There will be many cases that the feedback mechanism will not be inclusive since it might either require technical experience (e.g., github issues) or participation in physical meetings. For this, it is important that in the team there is a "translator" of different forms of feedback in others. For example, someone that could transform information gathered "on the field" through actual meetings with the community or participant observation, to github issues that are easier to understand and manage by the development team.

an existing mature platform like NextCloud or Etherpad this can play already this role. On the other extreme, if the team is open to implementing any type of software, the development of the minimum viable product could/should take place after the first few rounds of feedback with the local community.

Finally, notice that the usefulness of the minimum viable project will also depend on the networking effects of the application. There are applications that make sense and can be useful even if one person is using them (e.g., backup service) and others that require a critical mass of people to become meaningful, e.g., social applications, e-democracy, and others.

Suggested Actions:

- Define-Minimum-Viable-Product (Minimum Viable Product (MVP));
- Implement-MVP;
- Use-internally-MVP;
- Alpha-version;
- Beta-version;
- Production-version.

Supporting methodological elements:

- Evaluation metrics: Usability; Adoption;
- Guidelines: Eat your own dog food; Create alpha/beta testing processes with engaged local actors.

5.7.3.4. FUNCTIONALITY

This is the core software development thread whose details will depend on the skills, experience, and habits of the software development team.

Suggested Actions:

- Implement-functionality;
- Develop-test;
- Deploy-functionality.

Supporting methodological elements:

- Evaluation metrics: Usability; Correctness; Performance;
- Guidelines: Re-use existing software as much as possible (do not re-invent the wheel); Eat your own dog food.

5.7.3.5. DOCUMENTATION

This is the weak point of most FLOSS projects and perhaps the most critical aspect for a successful participatory design process. It is recommended that if the resources permit, the documentation should be a task of a non-developer.

Suggested Actions:

- Documentation-for-users;
- Documentation-for-developers;
- Integrate-documentation-in-the-application.

Supporting methodological elements:

- Evaluation metrics: Simplicity; Readability;
- Guidelines: Documentation should be ideally written by non-developers; Explore good examples of documentation for inspiration.

5.7.4. Project Sustainability

This process concerns project-wide threads of action that facilitate the coordination between the team members and the overall interactions with external actors toward the long-term sustainability of the overall project of community empowerment.

5.7.4.1. PROJECT DOCUMENT

A project has higher chances to last over time when its story is well articulated and documented.

The so-called PROJECT DOCUMENT, which is recommended to be printed and discussed in every Global Checkpoint, can play this role and in addition it forms a boundary object between the different cultures and perspectives represented in the team and beyond.

This Thread of Action serves as a reminder for regularly consulting and updating this common document throughout the duration of the project.

Suggested Actions:

- Create-Project-document;
- Update-Project-document;
- Translate-Project-document.

5.7.4.2. COMMUNICATION

To attract collaborators and founders, but also to increase the engagement levels of the community, it is critical to develop the story of the project, making clear its history, objectives, and vision, and disseminate it in different formats and through different channels.

Suggested Actions:

- Project-web-site;
- Social-media-post;
- Blog-entry;
- Research-article;
- Online-Interview.

Supporting methodological elements:

- Evaluation metrics: Outreach; Feedback, Readers and followers;
- Guidelines: Develop well understood analogies and metaphors (e.g., the organic Internet [22]).

5.7.4.3. LOCAL CHAMPIONS

It is crucial not only for the long-term sustainability of the project but also for its very acceptance of the community that there exist local actors that play a key role in its implementation either as ambassadors or even better as part of the team.

Suggested Actions:

- Meeting-with-local-actor;
- Collaboration-with-local-actor;
- Empowerment-of-local-actor.

Supporting methodological elements:

- Evaluation metrics: Level of engagement of local actors;

- Guidelines: Find ways to empower local actors through the project.

5.7.4.4. FUNDING

Complementary funding is critical both for the sustainability of the project, but also for the inclusion of complementary skills that are not available in the team. It is also an important factor that can generate trust and engagement on behalf of the community.

Suggested Actions:

- Explore-funding-possibilities;
- Build-a-local-team;
- Apply-for-complementary-funding;
- Support-applications-for-funding.

Supporting methodological elements:

- Evaluation metrics: Engagement of local actors; successful grant application;
- Guidelines: Plan early in the process toward complementary funding; You don't always need to receive part of the additional funding since this will anyway add complementary resources to your project.

5.7.4.5. NETWORK

It can be very rewarding to create links with groups and communities from other countries and become part of international networks. This will increase the credibility and relevance of your project, and it will also attract interest and potential support from external actors in software development, best practices, communication, and more.

Suggested Actions:

- Become-part-of-external-network;[26]
- Contribute-to-external-network;
- Participate-in-inter-national-event;
- Organize-inter-national-event;
- Invite guests-in-local-event;[27]

Supporting methodological elements:

- Evaluation metrics: Visibility of the project in external networks; Participation of network members in local events;
- Guidelines: Conceptualize your project as part of a wider movement that you contribute to (and receive support from); Connect to global initiatives.[28]

5.8. Relationships and Notation

Many actions depend on each other's input/output or have other types of relationships like before/after vs. parallel or different forms of dependence like the success of one influences the success of the other.

[26] National or international

[27] See Section2.3

[28] If possible it would be very helpful to make your process a special case of a wider (e.g., international) project and link to activities of other communities. It would be especially helpful to bring visitors from these communities to participate in the process, like the visit of Nicolas Pace from Altermundi in the training session in Sarantaporo.

It can be very inspiring for a team to reflect on such relationships between their actions and try to draw them on the PROJECT SCORE as depicted in Figs. 5.2 and 5.6.

The actual Notation might defer from project to project depending on the actual relationships that are useful to identify between the different actions and it does not need to be formalized. Improvising during the Checkpoint gatherings might prove an inspiring and playful group experience that will add to build common understandings.

5.9. Shortcuts

It will be very rare that all required skills and resources will be present from the beginning in a team. For this it is important to creatively plan for "shortcuts" in the proposed methodology and make it possible to develop a project even with the tiniest resources. As in music, it is possible to produce interesting results even with one chord.

It is very difficult to put together a "complete" team for the design and implementation of local applications for CNs, especially given the lack of a wider understanding about their actual value. For this, it is important to be ready for improvisations and "shortcuts" in the implementation of the overall methodology. But what is really important is that the effort invested produces re-usable results that add to a common pool of achievements in this area. For this, the development of adequately "libre" software and the corresponding documentation are a fundamental requirement.

5.9.1. Skills

One of the most important challenges for implementing the proposed methodology is the need for a wide variety of skills that is very unlikely that can be found in the same organization.

An example of a shortcut that we implemented in the case of Sarantaporo case study, was the collaboration with Alexandros Papageorgiou, a PhD student whose work was closely related and highly complementary with ours as described in Chapter 2.

5.9.2. Productivity

In terms of productivity of the Team itself, there are various methodologies like Scrum which have proven very successful. The Openki team uses a simplification of the Scrum methodology through Trello, adapted to the basic concepts of Sprint, Backlog, etc., but without detailed accounting of the hours expected/spent for the different tasks. In situations where people are volunteers, or worse when some are volunteers and some are not, more flexible ways to boost productivity are needed.

Some relevant recommendations using the simplified Scrum methodology of the Openki team include the following:

- Define always small tasks that are feasible in the given duration between sprints;
- Don't leave tasks in progress after the end of the sprint.

Indeed, such methodologies work much better in work environments where all participants are paid for their job. In such cases, Scrum is an excellent way to keep track of the tasks needed to fulfill an objective and the proposed framing around "user stories" very relevant to a participatory design scenario (in which these user stories are developed in close collaboration with the community and with a "critical" attitude in terms of inclusion of all voices and also in terms of servicing the "common good")

5.10. Tools

5.10.1. Methodkit Decks and Cards

The MethodKit approach presents key aspects of the process through the "things to take care of" framing, instead of more normative prescriptions like how patterns look like.

It is part of our objective for the "toolkit" version of our methodology to include a few sets of methodkit cards for particularly important types of action, like the participatory workshop organization.

For this, there is already a very good base with the Methodkit deck on "workshop organization", the first one to be licensed under Creative Commons, can be freely printed locally and might provide also guidance.[29] In the case of Sarantaporo, it was not possible to use it because of the language barrier, but in smaller internal workshops those cards proved very helpful and inspiring.

5.10.2. Canvases

MethodKit provides nicely designed versions of standard and customized version of "Canvases" for Strengths Weaknesses Opportunities Threats (SWOT) analyses and business models, which are freely available as pdf.[30]

5.10.3. Github

The experience with the participatory software development process of Openki (see Chapter 3) brought to our attention a very interesting feature of the github/gitlab platforms, which is worth exploring: the so-called "Issues".

What is interesting with this feature is that it has the potential of mixing the design with the software process in very interesting ways, but it is not straightforward how to achieve a good balance since the primary use of github is by the software developers and mixing bug fixes and low-level technical issues with high-level UX design might be complex.

In short, github can be a little intimating for non-technical people but mostly in terms of content and not in terms of functionality since as a discussion forum, for example, github is rather user-friendly. In any case, github will likely not succeed to engage all typologies of actors in a given community. For this, it is important to include in the team "translators" that can get feedback from the field and translate it into the more technical language that will be developed inside github.

It is also recommended to create a separate repository for Issues related to the high-level functionality of the platform which will be meant to be used mostly by external users and only the part of the "public facing" members of the development team. This repository could be actually the Documentation repository, since this is the entry point for the users of a software platform, and the corresponding github repository the place where they will be welcomed to post their "issues" free from the day-to-day technical issues of a typical github repository, that can be overwhelming and discouraging.

5.10.4. Planning for real

There are numerous methodologies for community engagement through participatory workshops of various kinds. If there are experts on this topic as part of the team, most probably they will have their own preferences about which event, workshop, brainstorming session methodology is most appropriate and it is very important that someone feels confident and comfortable in applying such a methodology in public.

Based on our own current experience, we provided in [1] two concrete examples of such methodologies that have been tried in the Sarantaporo case study Chapter 2 and whose lessons learned are summarized below.

[29] https://methodkit.com/shop/methodkit-for-workshop-planning/
[30] https://methodkit.com/pdf/

The “planning for real” methodology is an especially interesting approach not typically present in related handbooks, which we have chosen as the basis of the netCommons methodology (see [1]).

The basic steps of the **“Planning for Real” participatory technique** are the following:

1. create a physical model of the area of interest; in our case in the area of Sarantaporo, the sarantaporo.gr community network, so people can talk while looking at and touching for real the shared space of interest;
2. catch people’s eye and interest for simply coming over at the meeting in the first place, in a non-committal free and open way;
3. open up the discussions toward expressing interests, values and desires;
4. try things out, before making commitments;
5. create implementation options by means of triangulators (e.g., option cards);
6. engage those interested gradually in the participatory process, by getting nearer and nearer to a commitment, and develop an action plan according to the revealed skills;
7. form action groups around a particular kind of action.

5.10.5. Questionnaires

All questionnaires developed by netCommons are available in the Appendix of D3.1[1] and the analysis of the answers received and guidelines for the use in different contexts will be included in Deliverable 3.6.

5.10.6. Facilitation

There are numerous event facilitation guides but in our context perhaps the Project Planning and Facilitation tools by OTI, are a good starting point[31].

[31] See http://communitytechnology.github.io/

6. A simplified version of the methodology

The proposed methodology is rather ambitious in terms of resources required to implement it. The assumed regular coordination meetings, the proper documentation of processes and threads of actions, all seem quite reasonable parts of a successful project but in practice they are often neglected tasks in light of pressing deadlines and busy schedules.

So, in this section we present our whole methodology in the form of a simple Methodkit deck, the "netCommons Local Applications for CNs deck", with "things to think of" cards, following the basic format of a Methodkit card, with an important concept in capital letters, and a motivational sentence explaining the concept.[1]

They are divided in three main parts:

1. Context,
2. Threads of actions, and
3. Methodological elements.

Figure 6.1: Existing Methodkit cards that could be part of the simplified version of the netCommons methodology.

Context:

- PLACE: What are the special characteristics of the place where your local application will be deployed.
- TEAM: Available skills and perspectives in your team.

[1] Notice that some of these cards are actually already part of other existing Methodkit decks like the "Project" one (see Fig. 6.1, and we have intentionally re-used many of them to reduce the effort needed to actually produce the netCommons methodkit deck.

- COMMUNITY NETWORK: What type of CN will host your local application.
- LOCAL COMMUNITY: How is the local community related to its CN.
- RESOURCES: More or less hidden available resources that you can use.
- NEEDS: Why is it important to build software suitable to run in a local environment independently from the Internet?

Threads of action:

- LISTENING: How do you listen to the communities characteristics and needs.
- COMMUNITY ENGAGEMENT: Events that help you engage the community in the design of the applications.
- DOCUMENTATION: What you learned about your community.
- LEARNING: Have you reserved enough time for training the community in new concepts?
- TRUST: Show who you are and be engaged.
- PHYSICAL PRESENCE: Ways your local application is made visible in the ground?
- HYBRID SPACE: Links between the digital and the physical, entry & exit points.
- DESIGN FOR NEEDS: How your applications addresses specific needs.
- DESIGN FOR APPROPRIATION: How your application allows for customization and appropriation.
- GOVERNANCE: Enable the community to collectively decide about important features of your application and its use.
- DEVELOPMENT FRAMEWORK: The software framework of your application.
- CONTINUOUS FEEDBACK: Is it easy for the users of the software to send you feedback on issues and feature requests?
- MINIMUM VIABLE PRODUCT: A working but very thin prototype of your application.
- PHASING: A realistic plan for the deployment of different versions of the software application.
- FUNCTIONALITY: The core functionality offered by your local application.
- SOFTWARE DOCUMENTATION: Is your software well documented both for its users and developers?
- ACCESS: From where and how someone can access the local application.
- SPACE: Where someone can learn about the community network and its local application and talk with the people behind.
- PROJECT DOCUMENT: A living document that describes what is your project about and its current state.
- COMMUNICATION: Share your project's objectives and results.
- LOCAL ACTORS: Who could become the community champion of your project?
- FUNDING: Support the community to find complementary funding for your project.
- NETWORK: Build relationships with external communities and international networks.

Methodological elements:

- REAL MAP: A printed map of the area of interest to be used for brainstorming and learning sessions.
- PROJECT SCORE: Visualize the threads of actions that take place in difference processes of your project and explore their relationships.
- TOOLS: The tools used for facilitating brainstorming and playful interactions.
- SHORTCUTS: Creative ways to feel gaps of skills or resources for a successful project.
- RELATIONSHIPS: Consider how your different actions depend and/or influence each other.

- TRANSLATION: Consider the need for translations in language and concepts between members of the team and between the team and the community.
- TEMPO: Establish an appropriate rhythm for the project's members gather to discuss about their processes and possible inter-dependencies between them.

Producing a simple deck of cards with the main building blocks of the methodology, as above, complemented with expressive and attractive graphics, will allow for a quick understanding of all the main aspects of a participatory design process that need to be considered by an engaged team. It also allows for alternative ways of structuring brainstorming sessions according to the needs and available resources, as described in detail in the MethodKit's "How to" guide.[2]

The resources available do not allow us to complete this task during this project, but we will further refine the titles and text to be included in such cards hoping that their potential value will attract the interest of external to the project experts to develop appropriate graphics, including the founder and designer of MethodKit, Ola Möller, with whom we are already in contact.

[2] https://methodkit.com/how-to-use/

7. Examples

The methodological elements and tools presented in Chapter 5 need to be adapted to the specific scenario of interest, and indeed they would look very different in practice depending on various important characteristics of the field.

Since this document is produced in the context of the netCommons project, we provide below three different examples of a possible implementation of our generic methodology, one for each different CN strongly connected to the project (Sarantaporo.gr, ninux.org, and guifi.net).

This exercise will help the software developing teams of the project to understand better the rationale behind the specific methodology, which will facilitate the adoption of the developed software in their local communities and beyond.

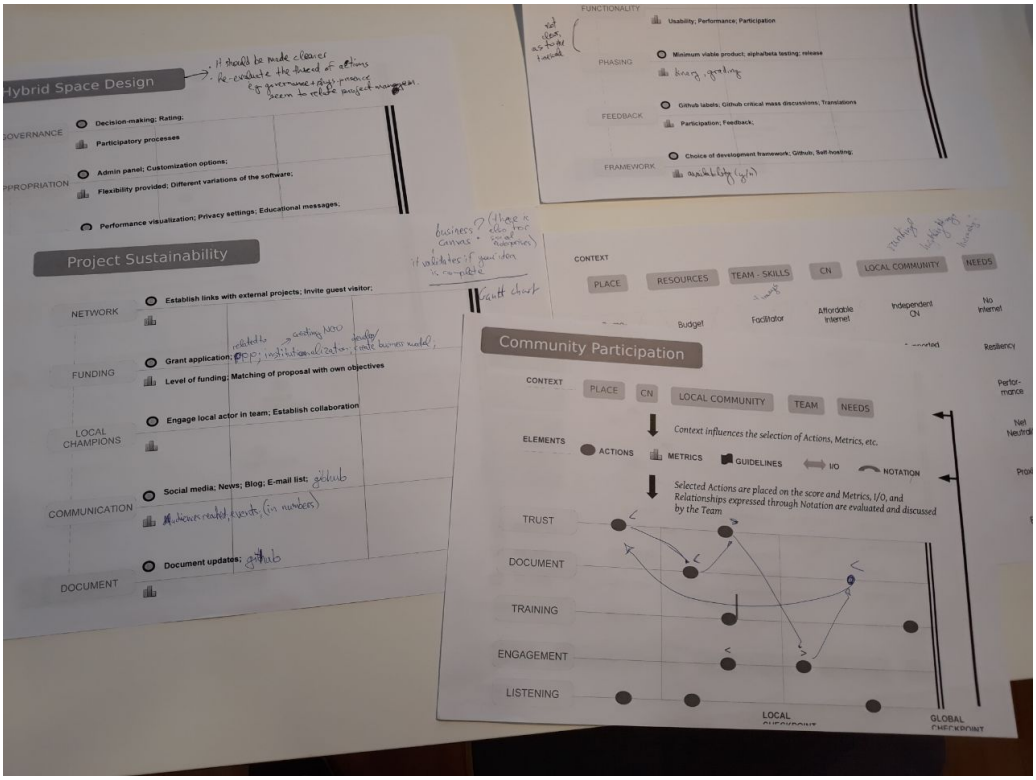

Figure 7.1: Interviews with the different software development teams of netCommons: Using printed versions of the Project Score to brainstorm about suitable Actions, Metrics, and Guidelines for the different Processes.

The feedback received from the netCommons partners[1] will help to finalize the methodology and in addition to the deliverable D3.6, it will be distributed in a more readable format (a dedicated booklet) to other CNs in Europe and beyond.

But let's now develop three different speculative scenarios on different ways that the software produced in netCommons project could be adapted to the needs of communities of different types given the restrictions in available resources and the particularities of the specific target environments.

[1] Fig. 7.1 depicts the co-creation process carried out during the netCommons plenary meeting in Paris

7.1. Sarantaporo.gr CN

The Sarantaporo.gr CN was the main case on which the development of this methodology was based in the first place. As the process develop and in light of this new methodology we will analyze this on-going case study using the building blocks and elements introduced above.

So, as already described in detail, Sarantaporo is a Supported-CN-for-Affordable-Internet, for which a clean slate software development is followed, but with the restriction/requirement (both contractual but also according to the research interests of AUEB) for an application with crowd-sourcing and gamification functionality.

An important NEED behind the development of local applications for the Team is Community-Empowerment, which in this case is very important for the maintenance of the network itself, and also Data-Ownership, which is very relevant for the case of smart farming. For the locals, the idea of local services over their CN is still a difficult concept to grasp and from their perspective the main focus is on Digital-Skills.

The LISTENING and COMMUNITY ENGAGMENT threads of action have been carried out through a variety of Actions, as described in detail in Chapter 2 and depicted in Figure 5.6. In parallel, we have initiated a long-term thread of LEARNING that has already resulted to positive developments (see Section 2.3) and will hopefully prove helpful also for our software design process.

Some of the described Threads of Action of the Software Development process are very difficult to achieve in this context, such as the CONTINUOUS FEEDBACK, due to limited digital skills of the local community, and DESIGN FOR APPROPRIATION, due to implementing a mobile app instead of a web application. However, during our forthcoming participatory design workshops in the area we will attempt some TRANSLATION between the potential users of the application and the software developers.

We have been also successful in initiating and supporting the FUNDING and NETWORK threads of the Project Sustainability Process with very good results, as described in Chapter 2.

For the next period, and given the current situation of all engaged actors, the focus will be directed toward the links between the Community Participation and Software Development Processes which have been progressing somehow independently since our first participatory workshop in November 2016.

More specifically, there are already two important COMMUNITY ENGAGEMENT events are being organized, more specifically a Participatory-Workshop in March 2018 and a Public-Conference in July 2018. Before and after these events the AUEB-NetHood-Sarantaporo.gr NPO team will meet in order to try in practice the methodology for planning and evaluating the Actions during and in between these two events.

7.2. Ninux.org

Ninux.org is an Independent-CN-for-Alternative-Internet, in essence a community of interest comprising many technology enthusiasts building overlay wireless networks in various Italian cities.

There are many similarities with AWMN (Athens Wireless Metropolitan Network), which is a community proud for the wide variety of local services running on its network, some of them implemented by members themselves and given funny names like woogle, wahoo, and wltube (”w” standing for ”wireless”) that clearly express the utopian vision of building an alternative Internet.

Ninux.org islands are not so big as AWMN used to be[2] but still there are many local services running. The fact that PeerStreamer is an application implemented by members of the community itself makes it an interesting case study for a participatory design process, but with many constraints.

Given the distance between the members, their increased digital skills, and already established online communication channels, in order to engage people in the design process, even if for small adaptations and improvements, there are three key steps that need to be accomplished[3]:

[2] Unfortunately, AWMN size has been in constant decline the last two years.

[3] See Fig. 7.2 for an example of a possible set of planned Actions using the terminology and notation of the methodology, selecting

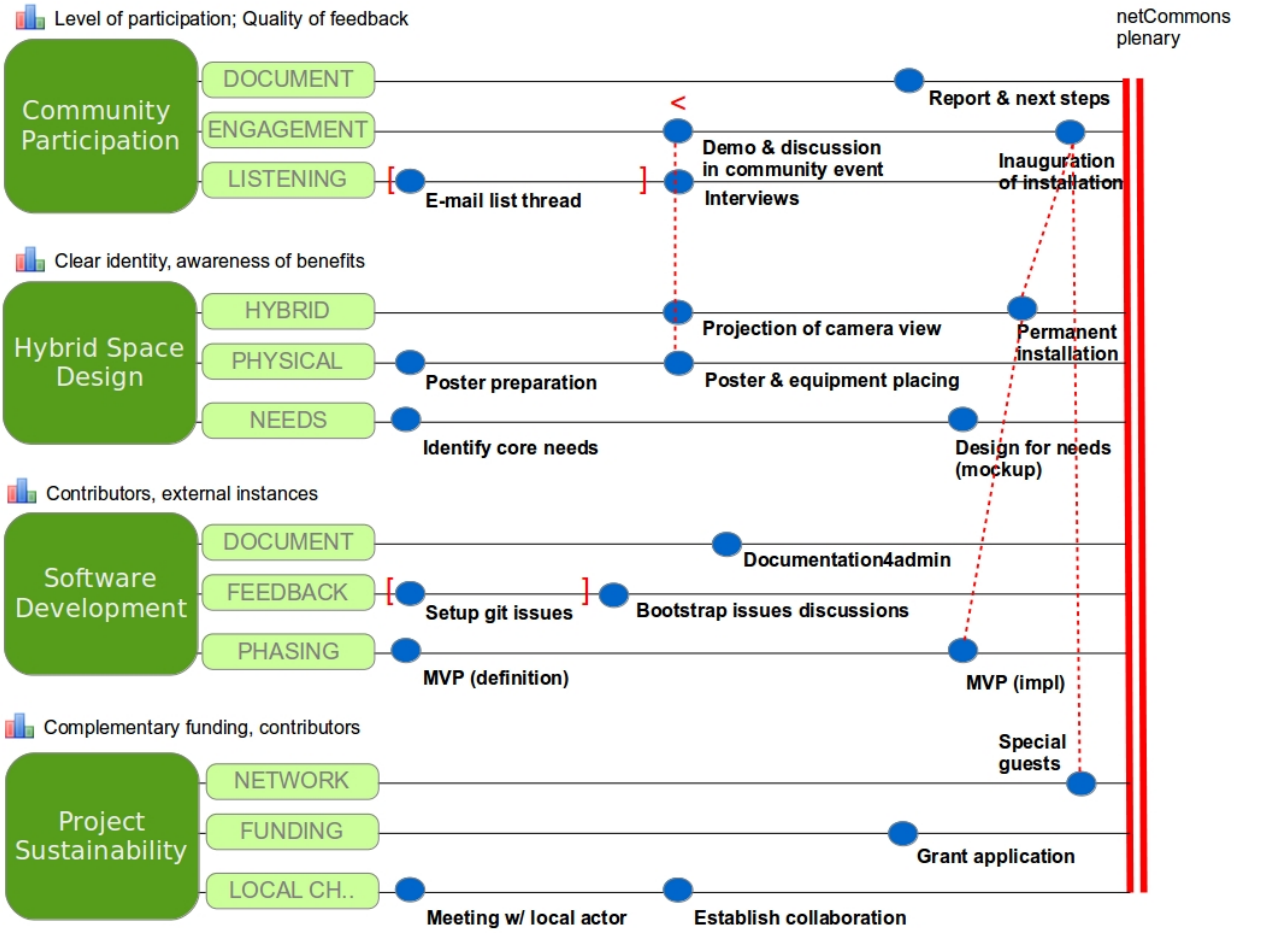

Figure 7.2: Example of the planning phase of the methodology for the case of ninux.org and Peer Streamer

- Provide a demo of the running application and guidelines to reproduce it in a local environment;
- Establish an online discussion on the Issues of the github code repository by starting with comments and feedback between the members of the development team and partners of the netCommons project. That is, make the development process more transparent and more social in order to manage to engage "outsiders";
- Produce comprehensive documentation including the potential value of the application in terms of different NEEDS as described in Sec. 5.6.6;
- Organize a big event that is relevant for the community and use PeerStreamer as an integral part in the event. There is no need for a face-to-face feedback mechanism in this case, since interested people are already "online". The battle of the mesh in Berlin is for example a great opportunity to showcase peer streamer and invite people to contribute to its further development.

7.3. Guifi.net

The case of guifi.net and more specifically Cloudy is a typical case of software that is designed to promote and facilitate the use of existing FLOSS applications like Etherpad, NextCloud, etc.

The emphasis on High-Performance as a NEED that could be satisfied by local applications (see D1.4), has

only some of the suggested Threads of Action according to the available resources and skills

been meaningful for a certain number of members of the community but mostly the “already converted”.

To this end, as described in the DESIGN FOR NEEDS thread of action (5.7.2.3) the Visualization of the performance of local applications compared to their Internet-based alternatives might be a playful and effective way to engage more people around this “reason why”.

To make a step further without the need for a proper participatory design process, we propose a few possible methodological steps that would render Cloudy (and the supported applications, including PeerStreamer) more accessible to a wider part of the guifi.net community.

First, the -Resiliency-, Data-Ownership, and Self-Determination NEEDS might work in times of political crisis and the increasing interest by the Barcelona municipality on digital sovereignty (see the CAPS project DECODE[4]).

A relatively easy design strategy in the context of the HYBRID ELEMENTS thread of actions, would be to build a proper hybrid brand identity by using appropriate local URLs and SSIDs that increase the community spirit and identity.

Moreover, it is very important to improve the DOCUMENTATION of the Software Development Process but also the COMMUNICATION that will ensure more awareness of the availability of the Cloudy services and their importance. Similarly to the PeerStreamer scenario, bootstrapping discussions in the github repository could prove very effective in engaging savvy members of the community.

Finally, FUNDING is another important Thread of Action that UPC and guifi.net have already a lot of experience and pursuing local and/or EU funds for supporting pilots to experiment with local services run on top of Cloudy would be very helpful.

[4] https://capssi.eu/data-sovereignty-for-the-sharing-economy-decode-project-kickoff/

8. Conclusions

Participatory design processes for local applications in Community Networks have to address two important challenges:

1. the necessary sustained interactions with real people that have limited understanding of the potential role of a CN and especially the difference between local and global services.
2. the significant resources required for software development and especially on the user interface implied by the inclusion of users in the design process.

In netCommons we had the chance to engage early in the project two of the founders of Sarantaporo.gr and discover unexpectedly during our first visit in the Sarantaporo area that GAIA Epicheirein/Neuromedia, a company developing ICT solutions in the area of smart farming, is also active in this area.

This helped us to address those challenges subject to the time and resource constraints of the project, and both engage in an application development process addressing the real needs of (a part of) the local community, and initiate in parallel a long-term participatory process through learning processes that can lead to a more inclusive representation of the local community.

In addition, external to the project hands-on experiences allowed to acquire a more holistic perspective on the different processes that need to complement each other toward achieving the very challenging task of designing local application for CNs, which has few success stories to showcase to date.

The generic methodology presented in this deliverable is itself a work in progress and will be updated and presented in a more attractive format (a small booklet) after the evaluation phase that takes place from January to July 2018.

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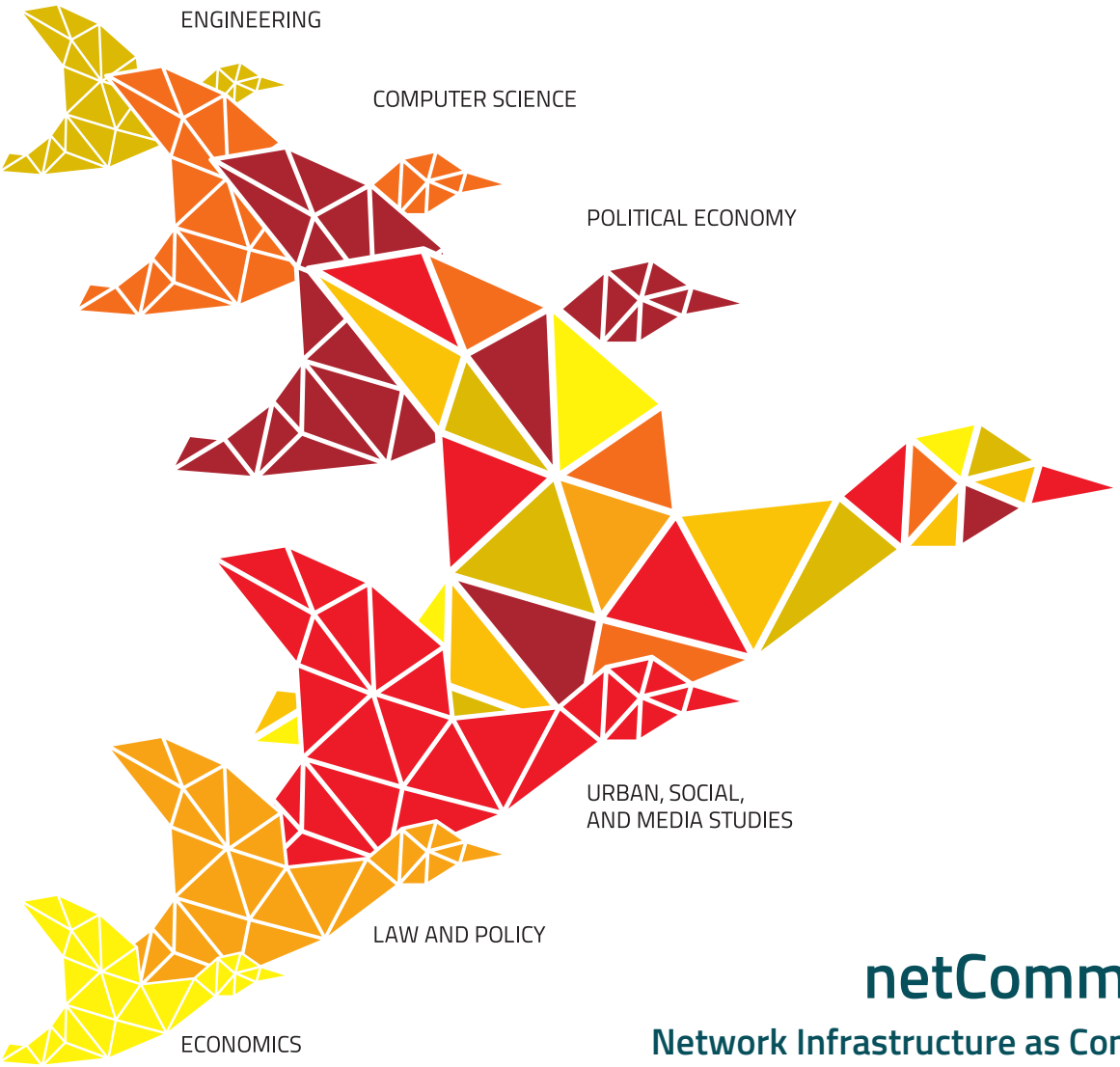

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