WP4 CASE STUDY Report: Living Knowledge

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transformative social innovation theory

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1 Introduction to Science Shops

Denmark and the Netherlands have a long tradition for debate and participatory democracy especially within environmental regulation and management, and science shops are one of several examples of participatory research aiming at democratizing science and technology (S. G. K. Brodersen & Jørgensen, 2012). The concept of Science Shops was developed in the 1970s at Dutch universities in response to a growing demand from citizens and Civil Society Organisations (CSOs), as well as left-wing student activists and university scientists, to give citizens and CSOs a voice as well as access to and impact on scientific and technological knowledge. Thus the Science Shop model challenged the traditional orientation of science towards how knowledge is developed (Dickson, 1984; Farkas, 2002; Wachelder, 2003). Science Shops aim to strengthen the influence of CSOs on societal issues through access to scientific knowledge i.e. opening the ivory tower of the university (Fischer & Wallentin, 2002; Leydesdorff & Ward, 2003; Steinhaus, 2003), and the movement spread to Denmark and other countries in the early 80'ties.

The concept has continued to spread in waves during the 90'ties and 00'ies, the latest wave facilitated by the EU project PERARES from 2010-2014. The purpose and role of Science shops in general is to solve problems experienced by civil society through research, most often by facilitating access to students and researchers at universities, but the models and aims are various depending on context. The traditional definition of a Science Shop is an organisation that:

> *Provides independent, participatory research support in response to concerns experienced by civil society (Gnaiger & Martin 2001).*

Science Shops can be regarded as a platform for bringing together scientific analytical principles on the one hand, and the lay persons' (with or without scientific background) knowledge about the issue on the other, thus contributing theoretically based systemization of lay knowledge or problem conception and lay insights on perceived problems to science (S. G. K. Brodersen & Jørgensen, 2012). It should be noted that the international community of Science Shops, the Living Knowledge Network, is very diverse and ranges from large NGO's with paid services conducting independent research (only few of those exists though), to science shops located at universities that mostly facilitate contact from society to students and professors (Michael Søgaard Jørgensen et al., 2004). In short, the concept has a double purpose of facilitating change both in civil society and inside the university, in the traditional Dutch model, and aims at having an impact on the young generation of students.

Science shops are an especially interesting entity to study to see what kind of long-term impacts they have implied as an initiative which has been running since the 80'ties, and how CSO's have been empowered through the relationship with the university. The social innovations facilitated by the science shops are focused on three distinct areas (Michael Søgaard Jørgensen, 2007, 2014a):

- Innovative solutions to challenges experienced in civil society facilitated by a participatory research approach
- Facilitating change inside the university, opening the ivory tower, forming new structures, courses, and narratives
- Enhance the transferable skills and knowledge of students and the partners in civil society

Empowering CSOs and giving them influence to affect such solutions is an important aspect of science shop work, and there is a strong need for understanding when and how CSOs are able to obtain influence on societal concerns through Science Shops and other types of Community-based Research units and what role scientific knowledge plays herein. Likewise, it is interesting how science shops can help renew research and education at universities and enhance the skills and knowledge of students and influence their later professional work.

1.1 The meaning of "Science Shop"

The actual name used for a Science Shop is also very context specific, and "Science Shop" is seldom used in reality. Primarily the different countries use their national language, like the local Danish initiative that is called Videnskabsbutikken, which is a direct translation of science shop. In the UK and Ireland they use names like community research centre because "science" usually refers to the natural sciences like physics, biology, or chemistry (Michael Søgaard Jørgensen, 2014a). In the second local initiative in Romania they call themselves 'InterMEDIU', which is linked to the word Intermediate. In addition, since 'mediu' means 'environment' in Romanian, it is clear that these 'research and information/consultancy centres' operate in the environmental field. In the US a similar concept to the Science Shops was developed in the 1960s, the so-called Community-Based-Research (CBR). In short, it seems only the Dutch, German, and Danish initiatives use the term Science Shop. It is however used generally to refer to and talk about the concept and the different instances of it. In this report, the name science shop will also be used in general, and capitals will only be used when naming a specific science shop.

1.2 Science Shop models

There is as mentioned two types of science shops; university based and non-university/NGO types, of which the NGO types can be very diverse. In general, both types collaborate with universities. The traditional university based science shops are called the traditional Dutch model, and will be illustrated by the two local cases in this report. The alternative NGO type is rarer, but the Science Shop in Bonn is of this type and is the biggest and one of the oldest science shops in Europe. The common denominator between them, according to a coordinator from Science Shop Bonn is:

> *This [the science shop] can be outside or inside the university, but it is in cooperation with the university.* (Steinhaus, 2014)

This seems, with a single exception, to be correct. Among new science shop initiatives those who opt for NGO models seem to fail though, where the traditional Dutch model seems to have relatively more success. The coordinator from Science Shop Bonn does not recommend themselves as a role model either:

> *We started our activities almost completely outside of the university; probably we are not the best example if someone wants to start.* (Steinhaus, 2014)

One reason is that they are large, have paid services, generate a lot of income, have a huge staff, and that there are easier models to follow when trying to start a new science shop. In general,

when talking about science shops the reference will be to the most common university based model unless otherwise noted.

1.3 The International and Local Initiatives

The two local initiatives Videnskabsbutikken at DTU, henceforth called Science Shop DTU, and the InterMEDIU network in Romania with a focus on InterMEDIU Iasi and InterMEDIU Bucharest, can shed light on different aspects.

Science Shop DTU was based on the Dutch model, but evolved over the 25 years it was in operation. Unfortunately, it closed in 2012 when the coordinator of the shop moved to another university, but many of the activities started during its lifespan continue to some degree at this other university. It is interesting due to the long timeframe, as it is hoped that the impact in the form of transformative social innovations[1] can be more easily traced compared to newer initiatives. Science Shop DTU is also an example of how such initiatives handle social developments and game changers, as the "old" science shop countries in general have faced difficulties and been in decline. Science Shop DTU is the focus even though Denmark also had several other science shops, which all more or less became defunct several years ago, and will thus only be mentioned shortly when relevant.

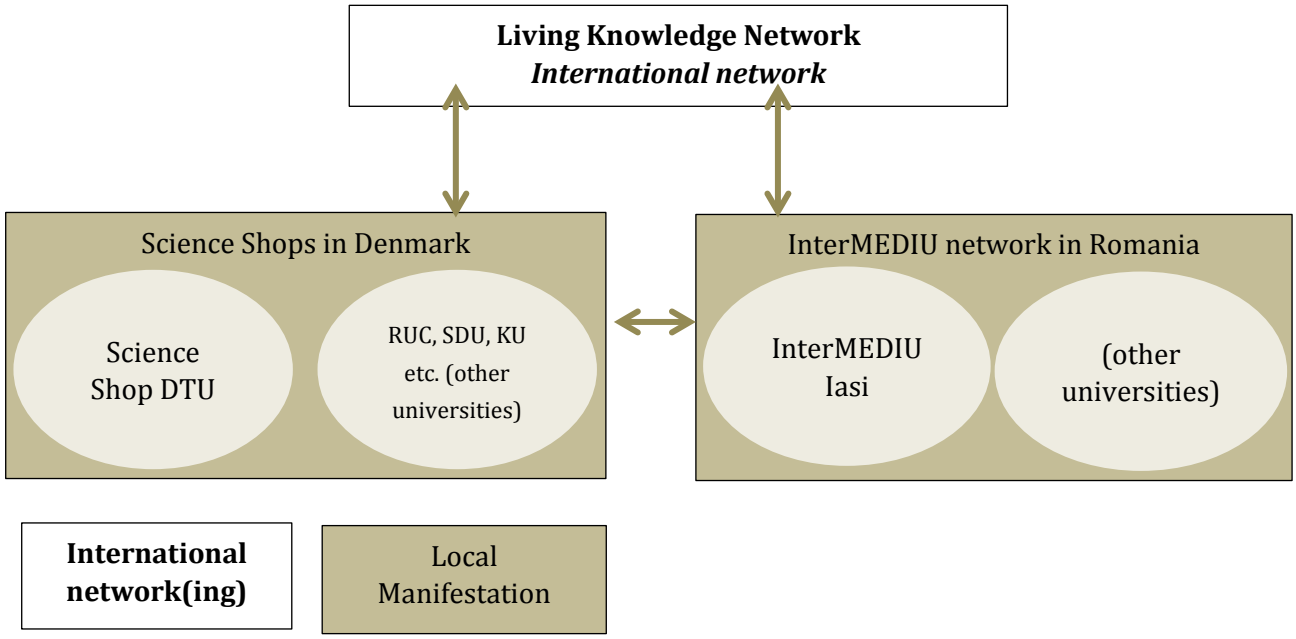
The InterMEDIU network is very different, being in an Eastern European country and new in comparison to Science Shop DTU. The hope was that the InterMEDIU network could provide a comparative case from a new science shop country with a very different local context, which it has done to some degree. The activity level at InterMEDIU is varying, and lower than it was at Science Shop DTU due to lack of resources and support from their host universities. However, they are a success in that the InterMEDIU centres are running despite the complete lack of funding.

The Living Knowledge network, the International Network, is very active and vibrant consisting of many local initiatives. The Living Knowledge (Living Knowledge) network, which are also referred to as the international science shop network, is a newer entity stemming from the late 90'ties and formalized in the early 00'ties during an EU project called SCIPAS. The Living Knowledge network is an umbrella organisation where the different science shops handle different parts of the administration and monthly activities, as the Living Knowledge network has no employees, physical offices or funds. The primary function of the network is to facilitate communication, serve as an archive, build awareness and respect around and between science shops, and serve as a framework for international project collaboration.

The only permanent structural artefact of the network is the webpage, which acts as a contact point, an archive of past projects and experiences, as well as a toolbox for actors interested in starting new initiatives. The members handle the various duties and functions of the network. Science Shop Bonn for instance is operating the contact point, and Science Shop Groningen was coordinator of the latest European project (PERARES). One of the interesting aspects of the Living Knowledge network is how such an entity can empower local initiatives, i.e. how it can help the

[1] Transformative social innovation is currently ill-defined

science shop community start new science shops or empower science shops to support their colleagues in other countries. The focus of the case study in this report is shown in the figure underneath.



2 Methods

2.1 Researcher relations to the case

2.1.1 Proximity and distance

The two researchers in the case study are on two sides of the extremes in proximity to the initiative. Michael Søgaard Jørgensen (MSJ) was involved in the creation of the Science Shop at DTU in 1985 and was part the staff during its whole lifespan. Michael was also involved in the creation of the Living Knowledge network in 2001. Furthermore, he has cooperated with the Romanian initiative, providing mentoring and other forms of support. Michael is thus deeply entrenched in the Living Knowledge network. The second researcher, Jens Dorland, has no affiliation with the initiative, and had no knowledge of it before the start of the case study. This combination allows the case study to take advantage of both proximity and distance.

2.1.2 Reciprocity and mutual benefits

In this case study there is two types of relationships in focus, the one between the initiative and society, and the one between the case study researchers and the initiative. Mostly the informants among the customers of the science shop see us, the researchers, as part of the science shop as Michael's relationship is used to set up the interviews. The informants are mostly satisfied as the role of the science shop has been to help them as best they can, and as such, they have already received benefits. They likewise see opportunities and benefits in staying in contact with MSJ, so they were happy to participate in interviews.
Michael coordinated the local initiative in Denmark, so here the concept of reciprocity makes little sense. The local initiative in Romania and the international network are in themselves interested in the results, and are generally interested in helping colleagues and friends that they know within the network, so here there is likewise little need to discuss reciprocity.

2.1.3 Social innovation actors as research subjects or objects

As MSJ is both co-author and one of the main subjects of interest in the case study, there is little to discuss in relation to enticing his interest as it is implied. Several of the other informants also work at Aalborg University, who are conducting this case study, so it has been easy to draw them in as discussion partners, especially as one of them is researcher for another TRANSIT case study. The informants among the CSOs who formerly worked with Science Shop DTU have been less active in the research process, as most of them are in new jobs or roles and the science shop has ceased to operate, so it has mostly been discussions of their past.

2.1.4 Overall methodology

The research questions were taken as inspiration and synthesizing devices for making interview guides in more nonprofessional terms, as especially the informants outside the academic world probably would have difficulties understanding the terms in the methodological guidelines. An interview guide was customized specifically for each interview. In interviews with academics, the research questions were used in a more direct form. A translated version into Danish of the questions in the methodological guidelines was made as well to help facilitate a more natural discussion in the Danish interviews.

2.1.5 Interviews

18 interviews have been conducted. The goal has generally been to hold as many interviews as realistically possible within the available timeframe and at the least cover informants from both outside and within the initiatives under study. The interviews were generally from one to two hours, with informants inside the initiatives having longer interviews than external informants. Interviews were semi-structured open interviews, starting from an interview guide but being conducted like a conversation, and steered according to the nature and knowledge of the informant in question. There have generally been four groups of interviewees:

- Main actors of the science shops
    - The coordinator and fulltime employee at the science shop at DTU in Denmark.
    - Two earlier employees at the Science Shop
    - Science shop employees and coordinators in the international network
- Secondary actors in the science shops
    - These have acted as supervisors in science shop projects or in other ways collaborated with science shops, without being employed at the science shops.
- Recipients/customers
    - The actors from civil society seeking help and collaboration from the university through the Science Shop. This group might cover anything from NGO's/CSO's, to cooperatives and individuals.

2.1.6 Participant observation

Participant observation has been conducted in relation to the international network, as the local Science Shop at DTU ceased to be functional in 2012. Likewise no participant observation has taken place in Romania, as there were no activities of relevance in the period of the case study, and as the Romanian initiative runs on a volunteer basis there are little day-to-day activities to follow.

- Living Knowledge Conference 6 – Copenhagen 2014 April 9th-11th
    - The Living Knowledge conferences are a series of conferences run by the international science shop network. Jens Dorland and Michael Søgaard Jørgensen, the scholars conducting this case study, were both organisers of the event and present at the conference. Michael also presented several papers and coordinated sessions. The hours spent at the conference exceed 100 hours.

- Steering committee meeting for PERARES
    - PERARES was the latest of a series of EU projects related to the international science shop network. Jens Dorland and Michael Søgaard Jørgensen both attended a 3-day meeting in Brussels August-September 2014. The status and future of the network and science shops were discussed, as well as what had been accomplished in the network during the project. The man-hours spent at the meeting were approximately 100 hours.

2.1.7 Document reviews

There are documents from many different sources, the two most notable being a database with documents and reports dating back to 1985 from the Science Shop at DTU, and the Living Knowledge website archive, with reports and documents from the EU projects conducted since 2000. Additionally the way back machine have been used to reconstruct webpages of the local science shops in Denmark back to the late 90'ties, as well as other documents available online. The sheer amount of documents makes the document review very difficult. Currently there are 840 files encompassing project reports, newsletters, articles, and other media, but excluding the archive from Science Shop DTU. Of these 840 documents, only 27 have been read in detail and referred to in this report, although many more have been skimmed.

- Science Shop Documents
    - These documents entail reports from conducted projects, a magazine produced in the national network, as well as internal documents like a handbook with procedures and rules. These documents explain the internal workings and self-perception of the science shop, which when contrasted with interviews from staff and secondary actors can produce an analysis of the activities in the science shop.
- Living Knowledge Documents
    - The reports and other deliverables for EU projects contain documentation and analysis of science shop activities, which can be used as empirical data and comparison for the analysis being conducted in this case study.
    - The newsletter, journal, magazines and other documents produced as part of the network activities can be used as first hand empirical data in understanding the international network and its importance for the local initiatives.
- External Documents from media and public authorities
    - Newspapers, webpages, ministries, the EU Commission and many other actors have written and published documents related to science shops. The relevance here is how the external actors perceive and relate to the science shops as well as traceable impact. The historical reconstruction of webpages also gives insight into the historical path of the science shops in Denmark.

3 Analysis of the Living Knowledge Network

3.1 Transnational networking: Living knowledge Network

This chapter serves the double purpose of presenting the specific activities of the Living Knowledge as a network as well as the general characteristics and aims of the Living Knowledge members i.e. what do science shops do. The Living Knowledge network is a loose affiliation of science shops and other like-minded initiatives connected through the Living Knowledge mailing list. All the activities done in the network are conducted by the members, as the network have no resources of its own. A distinction is made between the activities done as Living Knowledge activities (newsletter, magazine, webpage etc.), the activities done within the framework of Living Knowledge (EU projects, conferences, mentoring etc.), and lastly the activities by science shops in general unrelated to the international network and collaboration.

The mailing list has around 400 subscribers (Steinhaus, 2014), which can be individuals or organisations, and is regarded as an unofficial membership list. The group of science shops that have participated in Living Knowledge projects numbers around 30, of which there is a core of 5-10 science shops that have been partners in most of the Living Knowledge projects (Michael Søgaard Jørgensen, 2014a). The two local initiatives, Science Shop DTU and the Romanian InterMEDIU centres, have both been members since the inception of Living Knowledge. It should be noted that there is no board or council governing the network.

3.1.1 Historical outline of the Living Knowledge network

Science Shop DTU had in the early years, during the second half of the 1980'ies, dialogue and mutual visits with some of the Dutch science shops and also had many foreign visitors over the years, but a new dimension to the international relations started around 1997. The new international collaboration started when an American researcher Richard Sclove, who also had connection to the Danish Board of Technology noticed the Danish science shops as he already had connections to the science shop movement in the Netherlands and community-based research units in the US. Richard Sclove connected Henk Mulder, the coordinator of Science Shop Groningen, with Michael Søgaard Jørgensen, the coordinator of Science Shop DTU. Around the same time, a public officer in the EU Commission approached the Dutch national network of science shops and encouraged them together with science shops in other countries to make a project application to the EU STRATA programme. Subsequently the coordinators of different local initiatives made the draft application for the EU project SCIPAS (Study and Conference on Improving Public Access to Science through science shops), which included a Work Package with focus on the formation of an international network of science shops. The network was established on the last day of the 1st international Living Knowledge conference in Leuven in 2001.

This conference, the 'Living Knowledge: building partnerships for public access to research', and is together with the project documents seen as milestones for the European network of science shops called Living Knowledge (Hende & Jørgensen, 2001). Gnaiger & Martin (2001) discussed the expected benefits to science and society interactions at the time, shown in Table 1, which will be used as sensitizing devices in this section to discuss what the benefits and the role of the network are and have been.

Table 1 - Expected benefits of Living Knowledge

1. Increased visibility and accessibility: Science shops become more publicly visible, thus more accessible to potential client groups. It opens avenues for support from universities and citizens, as well as policy makers.
2. Improved documentation and evaluation: New participants (e.g., newly established science shops) get support more easily, by standardisation of documents, protocols, etc. without neglecting their regional context.
3. Dissemination of results: Research results become more widely disseminated (including internationally). Successful research models can be replicated and further developed. Research themes can be distinguished; information on emerging subjects can be compiled and communicated to policy makers and (other) research institutes.
4. Collaboration: Collaboration yields synergy and helps utilise previous experience. More comprehensive studies can be done. Citizen group driven studies on transnational issues become more practicable. Science shop policy and strategies will also benefit from co-operation.
5. Quality control: A network enables standardisation in documenting, evaluating, archiving and retrieving science shop research results.

Following SCIPAS there has been a string of other European projects, INTERACTS 2002-2004, ISSNET 2003-2005, TRAMS 2005-2008, and PERARES 2010-2014[2], which all focused on developing and/or analysing different parts of the Living Knowledge network. As such, the network seems to have been very successful at facilitating international collaboration. The next step for the Living Knowledge network is to establish itself as a legal entity, which was discussed at the final meeting of the PERARES project in August-September 2016.

SCIPAS 1999-2001	The aim of SCIPAS was to identify, describe and comparatively evaluate the diversity of existing science shop models and practice in different countries as well as starting the international network that became Living Knowledge (Gnaiger & Martin, 2001).
INTERACTS 2002-2004	The aim of the project was to contribute to improved interaction between NGOs, universities and science shops by providing information on the experiences and expectations of co-operation between small and medium NGOs and universities through intermediaries such as science shops (Michael Søgaard Jørgensen et al., 2004).
ISSNET 2003-2005	The consortium intended to strengthen science shops world-wide, by establishing and improving an unique infrastructure that increases public access to science, the public awareness and understanding of the beneficial impacts of science, as

[2] These projects will not be explained in detail, but reports are available on the Living Knowledge webpage.

	well as the limitations and implications of science and technology on their daily lives (Bok, 2005).
TRAMS 2005-2008	TRAMS developed specific structural services for the International Science Shop Network Living Knowledge. In this way, the co-ordination actions in TRAMS contributed to the goals of the network. The training and mentoring activities that have been developed in TRAMS fulfil an expressed need, and provide a benefit for civil society, through the activities of the science shops and other Community-Based Research organisations involved in the Living Knowledge network (Bok, 2001)
PERARES 2010-2014	The PERARES project aimed at strengthening public engagement in research (PER) by involving researchers and Civil Society Organisations (CSOs) in the formulation of research agendas and the research processes. Several different activities were part of the project; one of them was to start ten new Science Shop-like initiatives throughout Europe, mentored by experienced partners.

Figure 1 - Living Knowledge timeline

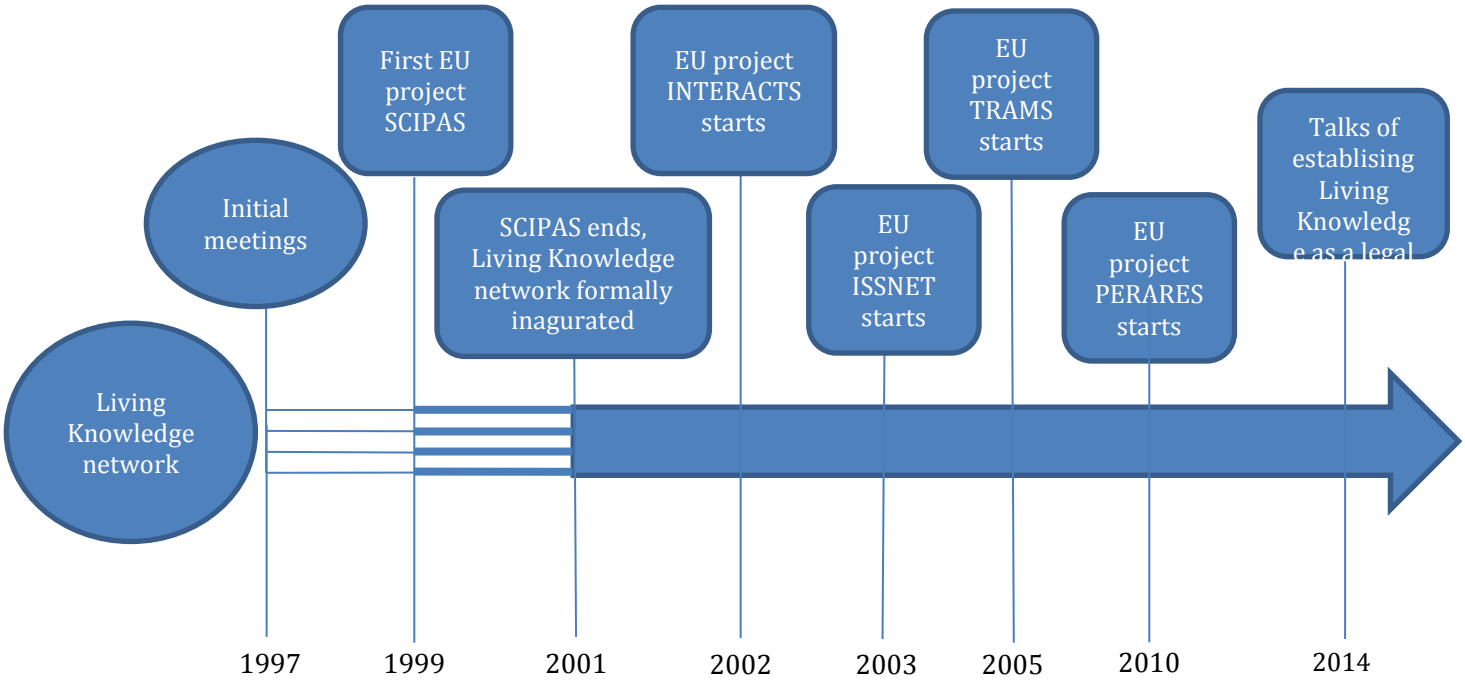


Table 2 - Living Knowledge detailed timeline

Year / period	**Important activities/changes/milestones in transnational networking *Living Knowledge***	**Important changes in context**
1997-1998	Meetings between Dutch and Danish science shops and other community-based researchers about strengthened international cooperation among science shops	Dialogue with officer in the EU Commission about the possibility of funding an international project within the STRATA scheme

	Preparation of application for EU funding of international science shop project	
1999-2001	First EU-funded international science shop project – SCIPAS – about modes and impacts of science shops and establishment of an international network and an international journal	
2001	First international science shop conference, Living Knowledge 1, as part of SCIPAS project The international network of science shops, Living Knowledge, established at the end of the conference International journal, website and electronic newsletter started	Science shops and an international science shop network included in EU's Science and Society Action Plan as Action 21
2002-2004	EU-funding of the INTERACTS project with focus on social science analysis of local science shop projects, their shaping and impacts	
2003-2005	EU-funding of the ISSNET-project with focus on developing the international electronic infrastructure and printed materials about science shops 2nd Living Knowledge conference integrated into the project	
2005-2008	EU-funding of the TRAMS project enabling experienced science shops' training and mentoring of new science shop initiatives Development of an on-line tool box for science shops	Third wave of new science shops in Europe
2007	Dialogue with EU Commission about the possibilities for funding civil society organisations' research activities and funding of science shop research	EU call with focus on civil society organisations' participation in research activities EU call with focus on community-based research, including science shops
2008	Living Knowledge part of forming GACER – Global Alliance on Community-Engaged Research	
2010	EU-funding of the PERARES project as the first EU-funded MML-project with focus on influencing national research programs and training and mentoring of new science shops	EU launches MML-funding scheme (Mobilisation and Mutual Learning projects) Formation of UNESCO chair in community-based research

		Fourth wave of new science shops
2014	Preparations of establishment of Living Knowledge as legal entity	

3.1.2 Purpose, Aim, and Values

The Living Knowledge network is as mentioned currently not a legal entity, and is not an organisation but a loose affiliation of partners that share an ideology and use the same type of research methods, participatory research (Steinhaus, 2014). One of the purposes is to enable the members to answer calls for projects by the EU Commission and other relevant actors, where Living Knowledge as a network has more weight to put behind an application than an individual science shop has. However, some calls only accept one applicant, like an NGO, which Living Knowledge cannot answer, as it is a network and not a legal entity. This is one of the reasons there are considerations to establish Living Knowledge as a legal entity (Michael Søgaard Jørgensen, 2014b).

The aim of Science Shop is to help civil society actors, and their clients can be of many types, from individual citizens to large NGOs, in some cases even SMEs and local authorities. In the SCIPAS project (which was one of the first joint international research projects conducted by the Science Shop community), one of the aspects investigated was client types. It was concluded that Science Shop clients fall within the following groups (Gnaiger & Martin, 2001):

- Community/Voluntary groups (including environmental groups and religious groups)
- Trade Unions
- Political Parties
- Individuals
- Public Institutions
- Local Authorities
- SMEs

It is very context specific for the individual shops who they accept as clients. In Romania for instance, SMEs and local authorities are accepted due to the hard economic situation and because they have few other options for getting help in the form of research. Examples of projects are investigation of pollution effects on the local environment from production and measurement of water quality (Teodosiu & Teleman, 2003) i.e. issues of relevance to civil society as well. It should also be noted that the main labour in general is students, which limits the type of requests that can be answered:

> *"The reason why you request assistance through the Science Shop is not because you have an urgent problem, but more because the organisation wants this co-operation and contact". (Supervisor: Morten Elle as cited in* (S. Brodersen & Jørgensen, 2003)*)*

Science shops are ill suited for solving urgent problems, as they depend on finding interested students, and are restricted by the academic calendar. However, some requests are very specific and real problems, but with few other places to receive free aid requesters can be patient. In

addition to the varied clientele, not all members define themselves by the name of science shops as mentioned in the introduction, and in some interviews it was stated that they met someone who operated a science shop activity without knowing it (Science Shop initiator, 2014) i.e. it is more kindred spirits and ideology than a specific model or concept. The most basic simplification of the members is actors who do participatory community based research (Steinhaus, 2014; Teodosiu, 2014). In short, there is no formal regulation or criteria to fulfil to be defined as a science shop and accepted as a member of the network. However, in connection with a meeting about establishing the Living Knowledge network as an NGO, some members voiced their concern about the lack of requirements, as it could potentially let extremist groups join or apply for support, and they would have no grounds on which to refuse them (Dorland, 2014a).

3.1.3 Structures and Activities

3.1.3.1 Activities and Structures within the framework of Living Knowledge

The focal point of the network is the Living Knowledge webpage and mailing list. The webpage acts as an archive for past projects and a way to find project partners. This archive contains materials from all the EU projects, among them a toolbox for starting new science shops, as well as knowledge from many of the projects carried out by the individual members. The mailing list acts as an informal member list, and the electronic newsletter disseminates information between them (Michael Søgaard Jørgensen, 2014b). The network also publishes a popular magazine. Norbert Steinhaus at Science Shop Bonn (Wila Bonn) handles these various activities, and is the coordinator of the Living Knowledge contact point.

Another continuous activity of the Living Knowledge network is the Living Knowledge conferences that take place every 2nd year, often as part of the different EU projects. These events take place on the border between the local initiatives and the Living Knowledge network, as different local Science Shops take turn hosting and organising the events, sometimes funded by EU projects running within the Living Knowledge framework.

Besides these day-to-day activities, there are the EU projects and the activities they entail, like facilitating and mentoring new science shops. The members also mentor and in other ways help new science shops besides the coordinated actions within the Living Knowledge framework. In short, there are five activities within the framework of Living Knowledge (Michael Søgaard Jørgensen, 2014b):

Mailing list	Informal membership list of Living Knowledge
Electronic Newsletter	A short newsletter with research, calls, and events of interest, varying frequency
Printed Magazine	Articles giving an impression of various facets of science shop work as well as disseminating experiences, varying frequency
Conferences	2-yearly event held by various local initiatives
EU projects encompassing varying actions	Supporting new science shops
	Documentation of Science Shop operation and impact

	Influencing policy-makers

In relation to influencing policy-makers, PERARES included a work-package (Objective 6, WP7) trying to uncover how this can best be done. The science shops here used their own medicine, and produced scientific documentation in the form of a state-of-the-art report on HEI (Higher Education Institutions) policy on community engagement, as well as analyses on economic efficiency, models on best practice, value afforded researchers etc. These activities are mostly aimed at higher education institutions. The activity also shared insight inside the network on how best to become embedded at universities (Emery, Kendall, & Frewer, 2014).

3.1.3.2 Activities of the local science shops

Beyond the general innovative changes most often facilitated by science shops mentioned in the introduction, the individual projects may produce knowledge and facilitate social innovation in society in different ways. An international study of science shops, INTERACTS, showed that the conditions of the involved actors and their understanding of research shape the knowledge production that takes place in cooperation with science shops. In some situations, existing knowledge is transferred to the CSOs by the science shops; in other situations, it can be characterized as knowledge supply, i.e. scientists and/or students produce new knowledge, which is then transferred to the CSOs. Knowledge production can also take place as co-produced knowledge i.e. knowledge is produced through a mutual process between the CSO, scientists and/or students and science shops. This form of knowledge production implies that lay people's knowledge is considered just as important as scientific knowledge (Michael Søgaard Jørgensen et al., 2004). According to Irwin (1995: p. 155-166) and Bellamy (2006: p. 258) as cited by Brodersen & Jørgensen (2012), science shops make a valuable contribution to CSOs by:

1. Providing technical assistance or knowledge to CSOs;
2. Providing mediation between CSOs and scientific structures;
3. Facilitating 'self-help networks', i.e. establishing contact between CSOs experiencing the same problems;
4. Raising societal problems among students and scientists at the universities;
5. Impacting research agendas to meet societal needs;
6. Empowering CSOs to 'put science into perspective'.

The CSOs themselves argue that co-operation with science shops contributes to their efforts to impact and effect policy making, because they become able to bring scientific knowledge and alternative solutions to the attention of politicians and initiate public debates. The CSOs further argue that through co-operation with science shops they become aware of research possibilities and limitations. In some cases, the CSOs also acquire the capacity to use scientifically grounded methods when carrying out investigations themselves (Michael Søgaard Jørgensen, 2003; Michael Søgaard Jørgensen et al., 2004).
The impact for CSOs can in more general terms be summarized as (H. A. J. Mulder, Jørgensen, Pricope, Steinhaus, & Valentin, 2006):

- Media / public attention
- Influence on policy
- Contribution to new products, services and organisational capability

Some science shop specializes in specific areas like work environment, legal advice, or water treatment etc., depending on the scientific focus of the university or the involved scientists. When a new science shop starts it search for civil society organisations to identify knowledge needs. Later a science shop might have different information activities to make civil society actors aware of the possibility of having a project carried out through a science shop. Sometimes formal or informal agreements about cooperation are made.

Another aspect of science shops is their role at the university. Science shops have many benefits for modern higher education curricula by providing (Mulder et al. 2006):

- Case-examples in established courses
- Projects in established courses
- Projects as part of curriculum
- Theoretical and/or methodological courses
- Restructuring curricula

Several actors also point out that it can save money and time for instructors and supervisors, who otherwise have to find partners and define their own projects (S. Brodersen & Jørgensen, 2003; Grigoroudis, 2014).

3.1.4 PERARES and Local Initiatives

The recent EU project PERARES was started within the framework of Living Knowledge and is a good example of the kind of impacts Living Knowledge can have through international collaboration between the partners and the local initiatives that can be started up. It is also a good example of contemporary activities of the Living Knowledgenetwork. During PERARES, ten new science shops were opened or accepted into the Living Knowledge network.

Name & Location	Description	Status	Relation to Living Knowledge
Heschel Centre (Science Shop initiator, 2014)	An individual actor, initially independently of the centre, has tried to start a science shop and anchor it at an NGO, the Heschel Centre.	Unsuccessful due to lacking resources - no funds after PERARES, no collaboration with universities i.e. no access to students and little research capacity.	PERARES funded the individual through the centre during the project which resulted in workshops and presentations at seminars and conferences and might have inspired other science shop activities in Israel.
Grenoble Science Shop – ADReCA (ADReCA, 2014)	An NGO initially trying to work by the Dutch model, anchored outside the universities in the area, but trying to collaborate with all of them.	Unsuccessful as the universities did not buy into the idea, and no funding have been found following PERARES. Currently they are trying to restart with a new business model.	PERARES funded 2 employees for 3 years who tried to anchor the Science Shop in Grenoble. It also allowed several workshops to be held.
Dublin Institute of Technology (Bates, 2014)	A more traditional science shop anchored as a community engagement centre (SLWC – Students	A very successful centre with 800-900 students engaged in community projects at the time of the interview. Some minor	The centre predates PERARES, but received mentoring and support, which allowed new things to happen and events to move faster.

	learning with communities) at the university.	setbacks due to budget cuts, but the centre is now sustained by reliable funding.	
European University Cyprus (Efstathiades, 2014)	A science shop of the Dutch model. A former dean of the business school took advantage of the national context that requires universities to serve society, and the Science Shop has been established as a permanent entity at the university.	A successful shop. Currently around 10 projects are running, but more are in the pipeline.	Some of the academic staff had expressed an interest, and they were contacted by the coordinator of PERARES and successfully became part of the project. PERARES provided the necessary funding for running a pilot and the Living KnowledgeLiving Knowledge Network gave legitimacy to the concept.
Technical University of Crete (Grigoroudis, 2014)	A science shop of the Dutch model at the university currently run on a volunteer basis by two lecturers.	A successful pilot but a permanent source of funding following PERARES has not been secured due to the financial status in Greece. However, the actors claim that it can run without funding.	Some of the involved actors have been partners in earlier Living KnowledgeLiving Knowledge projects, but in the form of an NGO outside the university. In PERARES they tried using the Dutch model by anchoring at the university and using students as labour.
Teadusturg - Estonian Science Shop (Hector, 2014)	A NGO tried to start and operate a science shop relying on university collaboration, but have had a turbulent start, and it is currently being merged into Tartu university.	Currently no funding has been found. Initially anchored as a NGO outside any universities, but a new actor has anchored it at Tartu university changing it to a Dutch type science shop.	The science shop and the Living KnowledgeLiving Knowledge network are seen as an opportunity to find partners and funding for community research activities. At the time they were attempting to join different project proposals as partners.
IntHUM/FOIST - (Andrea, 2014)	A special constellation where the Science Shop is established as an NGO outside the university due to political reasons., but operated by university employees	The research laboratory FOIST is from the 1970'ties and a permanent part of the university, so the Science Shop has a more or less stable foundation as long as the actors keep interested in the project.	One of the purposes of IntHUM, their Science Shop NGO, is to participate in international projects like PERARES.
Department Science and Society - University Lyon (Lorans, 2014)	A department of Science and Society, at a confederation of 11 institutions, established a Science Shop as a small entity, 1.5 staff positions, based on a model from their mentors in Groningen (Netherlands)	Have financing for 10 projects a year. In France, they are legally obliged to pay master students to do the projects a part of their education. The projects are fully integrated into the curriculum.	Saw the opportunity to learn from other initiatives, and was looking for a receipt how to start a science shop, and so was excited about the toolbox and other materials as well as personal mentoring.

As can be seen from the table PERARES and Living Knowledge served 3-4 distinct functions:

- PERARES has provided funding for actors trying to set up science shop initiatives, enabling them to conduct pilot projects, workshops, and other activities.
- PERARES also provided mentoring and documentation, which were only emphasized as useful by some of the new initiatives
- Living Knowledge is seen as a umbrella enabling science shops to make project proposals and apply for funding
- Living Knowledge gives legitimacy and strength to the concept of science shops – it has however not been possible to evaluate this aspect beyond the cases mentioned above

The original thoughts, that the Living KnowledgeLiving Knowledge Network could make it easier to establish science shops by improved documentation and evaluation, have shown to depend on the social context as the contexts and possible models are too different to use standardized documents and protocols. To have an impact, mentoring visits and personal contacts seem also necessary.

3.2 Aspects of 'innovation' and 'change' of the transnational network

The Living Knowledge Network is not involved in projects independently of the members, i.e. the members like Science Shop DTU is participating in EU projects within the framework of Living Knowledge, and also has their own activities independently of the Living Knowledge Network. The only active role of the Living Knowledge Network, beside the EU projects, is in the form of knowledge dissemination through its newsletter, magazine, newly social media, and the Living Knowledge conferences. The members can use it as a forum facilitating discussions and knowledge exchange; external actors can use it to get assistance for setting up a science shop initiatives. The focus is empowering civil society, but the projects are carried out by the local initiatives, so the question here is how the Living Knowledge network is empowering and helping its members to facilitate innovation in civil society.

3.2.1 Relation with social innovation

The science shops are examples of social innovation, and the Living Knowledge Network is a reservoir of their experiences. Cooperation between university and civil society was not new in the 1970'ties, but creating an open door to universities where civil society actors could request aid was an innovation. The ability to anchor issues experienced by society as research and new courses is another innovation of equal importance. Lastly, the educational effect on the students through exposure to problems in civil society has been observed to have a great personal impact on their career and personal life.

The Living Knowledge Network, and the website that is the focal point of the network, is mostly an archive. The social innovation of the network itself is how it enables science shop cooperation at an international scale, and actively transfers knowledge and experience between the members, while documenting the results for others to use.

The archive and documenting role result in social innovations as new science shop initiatives get into contact with older science shops that can act as mentors. In this way, the network creates relationships that can foster social innovation. The tool-box and other materials on the Living Knowledge webpage might not foster social innovation alone as some kind of personal contact and mentoring often are needed.

3.2.2 Relation with system innovation

The science shops interact primarily with three systems, the educational system, the research system, and civil society.

- Research systems: Forming science shops can enable interactions with individual researchers and with national research councils or other bodies facilitating research grants, like the Living Knowledge Network has allowed the local initiatives to jointly apply for EU projects (.
- Educational systems: - Also here it is very context specific, but it is common that science shops integrate with the educational system and award ECTS-credits or other types of acknowledgement for conducting science shop projects, either through courses, bachelor- or master theses. Several science shops succeeded in anchoring research areas and courses at the university by enticing professors to supervise science shop projects, offering courses themselves, and by other means.
- Civil Society: Forming new relations between actors in civil society and the university, which in several cases continue to grow and blossom beyond the framework of the science shops.

Examples of these types of system innovation will be explored in greater depths in the case studies of the local initiatives.

The Living Knowledge Network itself was created especially to act as an interface with existing systems like the EU Commission, national governments, and international organisations and groups to enable the community to apply for funding and projects. The whole timeline of the Living Knowledge Network is a string of EU projects. The network has with only a short exception from 2008-2010 had EU funding for its whole life. Currently though, as PERARES finalised in the end of 2014, there is a stasis where the members are discussing the future path, and discussion are taking place about establishing Living Knowledge as a legal entity i.e. an NGO. Such a development would be another system innovation, a step along the same path, allowing the community to apply for funding and calls to proposals only open to individual organisations.

3.2.3 Relation with game-changers

As Living Knowledge has lived largely of research funding from the European Union, changes in their policies, politics, and priorities have had a large impact on the network. During the final days of PERARES a lot of energy and time were spent on discussing new project possibilities, especially in relation to Horizon 2020 (Dorland, 2014a). The possibilities can change rapidly as new politicians and commissionaires come and go in Brussels, and an important person for getting

future funding did not show up during the PERARES presentation at the European parliament due to the early inauguration of the new commission.

The overall challenges to society and Western society in general are also game changers for Living Knowledge and its members, like the financial crisis and the growing old demographic. The financial crisis especially proved detrimental to anchoring new science shop initiatives during PEREARES, and made the PERARES funding that much more crucial. The increasing segment of older people might also effects the requests received at science shops i.e. more healthcare related projects. This is not game-changers currently having any effect at the international level of Living Knowledge, unless applicable EU calls for projects of relevance turns up, but these aspects are of some relevance for local initiatives.

An interesting observation is that Living Knowledge was inaugurated around the time when the decline of science shops in the old science shops countries gained speed, and the funding from international projects may have saved them, for a time at least. This will be discussed in more detail in the local initiatives.

3.2.4 Relation with societal transformation

In some ways the Living Knowledge Network has facilitated a societal transformation, at least at the European level, as the EU Commission started to see CSOs and science shops as an important aspect of the Framework Programmes for Research and Technological Development and now Horizon 2020. Already FP6 had a specific call for science shops named "Science Shops: research for local civil society" (European Commission, 2005), a theme which continued in FP7 where some calls specifically name science shops or similar organisations:

> *Evaluation will treat positively those proposals which propose actions liaise with existing Science Shops, science museums / centres or encourage the development of new Science Shops (or similar organisations)* (European Commission, 2008)

The framing of the issues also went from being "science for society", to "science with society", to "science with and for society" in Horizon 2020, slightly developing and changing the focus. In Horizon 2020 science shops are again mentioned as one of the targets groups for research calls (DIRECTORATE-GENERAL FOR RESEARCH & INNOVATION, 2016). The Living Knowledge Network may not take all responsibility for this development but it certainly played a role.

3.2.5 Relation with narratives of change

Talking about the narrative of and in the Living Knowledge Network is a complicated affair, as it as mentioned is a conglomeration of affiliated local initiatives, whom are very spread out geographically and diverse culturally. The webpage defines the network thus:

> *The international Living Knowledge Network (LK) is set up for people interested in building partnerships for public access to research. Members use the network platform and its tools for documentation and to exchange information, ideas,*

experiences and expertise on community-based research and science and society relations in general (Living Knowledge, 2015).

This quote can be taken as a form of consensus on what the network does or should do. It may however be an idealised picture of what they hope to accomplish, and the manager of the webpage doubts that the platform (webpage) is used without personal contact to Living Knowledge members. There is complete consensus though between the different informants and the webpage on the aims, building partnerships for public access to research. Comparing the different documents produced during the lifetime of the network, there has been little change in this self-understanding of what science shops do. Many science shops have closed down though, for example some Dutch and Danish science shops, or changed into other types of organisations, like project markets or career centres for students, for example the Science Shop at the University of Oslo and Roskilde University in Denmark. The specific science shop strategy has in some instances also changed in response to the changes in national or local context, which will be discussed in details in the analysis of the Science Shop DTU.

3.3 Aspects of empowerment and disempowerment of the transnational network(ing)

3.3.1 Governance

3.3.1.1 Internal governance

As noted the Living Knowledge Network is not a legal entity but a loose affiliation of partners. There is a contact point of the network, which one of the partners is running on a voluntary basis in periods with no project funding. The contact point is likewise also running the webpage, the newsletter, and the magazine, also on a voluntary basis outside of project periods. The different EU projects have been coordinated by different local initiatives, and the responsibility for different work packages have been divided between the partners.

3.3.1.2 External governance

How science shops relate to the different external structures like CSOs, research councils, government institutions etc. differs between science shop models. In relation to the client at one extreme, there is the project market model that does little to no advertising and does not actively engage the clients in a dialog to define an appropriate research question for a student project. Such project markets are completely passive and merely acts as structures where other actors can engage in an attempt to find partners. The other extreme, is science shops that have an "impact seeking" approach (S. G. K. Brodersen & Jørgensen, 2012):

Science Shop besides acting as mediator between CSO and university maybe also need to get involved in the interpretation of the data and facilitation in relation to

the use of the results when the CSO tries to obtain influence on the issue in focus.
(Michael Søgaard Jørgensen, 2014)

I.e. the role of such science shops goes far beyond market and matchmaking activities. Such science shops also try to define appropriate research projects suitable for bachelor/master thesis or one-semester courses based on requests, which is often a time consuming process, and the actors i.e. students, supervisor, CSO's, often need help in starting up and/or facilitating the projects. Not all science shops use the impact-seeking approach but what can be termed the mediation approach (S. G. K. Brodersen & Jørgensen, 2012), which lies in-between the two extremes, but closer to impact-seeking than project markets. This mediation approach neither helps CSOs to interpret and use the results nor actively conducts research based on CSO requests, but mostly mediate requests from CSOs to students and supervisors at the university. to the difference from project markets is that they are proactive in finding supervisors and students as well as defining appropriate projects in collaboration with the requester. Many of the Dutch science shops adopted the mediation approach in order to survive (H. A. J. Mulder et al., 2006).

In relation to policy makers, especially higher education institutions (HEI) and research councils who are the principal founders for national research, there are different models. PERARES through two of their work packages produced documentation and guidance for HEI's and research councils on how they can increase research with and for civil society organisations (Steinhaus et al., 2013). This resembles the same model that science shops use to empower CSO, through scientific documentation. The method has gained some good results especially in the UK, where the key research funders are now encouraging research that shows evidence of public engagement and public benefit (Steinhaus et al., 2013). However, implementation at policy level does not ensure translation to practice, and CSOs and other initiatives need to grab the opportunity.

One of the interesting aspects here is the legitimacy the Living Knowledge Network can give to new initiatives. The contact point coordinator was a bit doubtful if its existence alone can empower new local initiatives, but he for instance wrote a letter of support upon request to a new Eastern European initiative they could show their principal (Steinhaus, 2014). The contact point coordinator also explains how he and the Science Shop coordinator from Groningen are invited to speak with the EU Commission and other international and local entities, because they are seen as spokesmen for an active international network i.e. it opens up possibilities for projects. Interviews have not been conducted with members of the EU Commission or other international entities, so it is hard to evaluate the importance of Living Knowledge seen from a policy maker perspective.

3.3.2 Social learning

Social learning is at the core of the theoretical understanding and aim of the Living Knowledge Network, as the members believe and use participatory research methods to achieve their aims of helping civil society organisations and other partners. The science shops themselves in general try to reflect and evaluate projects – what did we learn, were the needs of the CSO fulfilled, are further projects needed etc. – and in this way get deeper insight into research needs and societal impact. Over time, such experiences may lead to new research areas or courses at the university. The learning processes also materialize in the Living Knowledge newsletter, magazine, and reports. Some of the EU projects are also specifically aimed at producing documentation, like the Tool Box

for starting new science shops available at the Living Knowledge webpage. Another aspect is the social learning facilitated among the actors working with and in the science shops, like the students and CSOs. It is an important aspect in most science shops that there is a learning outcome for the students in question, where CSOs sometimes but not always have a learning outcome depending on the type of project (Michael Søgaard Jørgensen, Bang, & Lorentzen, 1995; H. A. J. Mulder et al., 2006).

However, as direct experience is so important for social learning, it is hard for the Living Knowledge as a network to facilitate it, as it mostly orbits around the Living Knowledge webpage and the mailing list. It is a challenge to facilitate social learning, and currently the contact point coordinator tries to embed social media like twitter on the webpage in order to create more dynamic experience (Steinhaus, 2014). The Living Knowledge network does try to facilitate social learning through mentoring of new science shop initiatives, especially in relation to EU Projects like PERARES, and this activity has met with success (Emery et al., 2014; H. A. J. Mulder, 2014). The conference held within the network may also facilitate social learning, but the focus at the conference is more as advertising and visibility for the network, and creating new relations and partnerships with actors outside the science shop community, besides the traditional function of research dissemination (Dorland, 2014b). The artefacts, like the Tool Box, that are the result of social learning processes need to be accompanied by mentoring and personal contact to be effective, as experienced from the new initiatives started in PERARES, see section 3.1.4,. As such, how effective or how big an impact the social learning have had also depends on the available resources i.e. human resources for mentoring, time available for facilitating student projects, time for actively feeding experiences into the newsletter and magazine etc., which will be discussed in the next section.

3.3.3 Resources

3.3.3.1 Resources and funding model for the local Science Shops

Access to resources is in general one of the biggest challenges for science shops, and the reason why the Dutch model is prevalent as it provides easy access to three types of resources:

- Free labour in the form of students – often "paid" with ECTS points/credits.
- Free access to supervisors/professors.
- Financial support from the university in the form man-hours/salary, office space, infrastructure etc. for the science shop facility and staff

Especially the access to students is crucial for the success of new science shops, as illustrated in an interview with a new science shop on Crete, where they initially tried to start a science shop at a research centre at Heraklion outside the university:

> *Projects are not possible, researchers have no students, so it is more difficult to complete some projects, it's critical. In Crete, we are a technical university, so students to get the diploma they have to submit a last semester thesis. This means that, what I am saying to people, ok, you have to work with a subject, why the subject cannot be that one [a science shop project]* (Grigoroudis, 2014)

There were three informants in the interview, two professors from the technical university in Crete, and a researcher from the centre at Heraklion. The researcher had tried to start a science shop years earlier as part of the TRAMS project, but eventually gave up, as it was hard to conduct any projects without access to students. The professors take advantage of the educational system in Greece where students have to conduct a bachelor project to graduate, and then convincing them to do it in the context of the science shop. In this way they are currently running the science shop without funding, as they say that the same they save on finding relevant projects are well worth it, and they expect that the science shop can be embedded at the university without necessarily requiring separate funding.

This is a classic example of how Science Shops get access to resources, much a-kin to the way the local initiative in Denmark operated, and many others. It relies on the local context, how the educational system is i.e. does it contain projects as part of the education, can ECTS-points or others accreditation be granted and so forth. The NGO model used by the science shop in Bonn is having full-time employees or consultants conduct the projects, and get funding through paid services and grants from the German or European foundations and projects, like PERARES or TRANSIT. Besides Science Shop Bonn, this model has mostly met with limited success through.

An alternative model tried in Grenoble lies between the two, as they tried to rely on university resources i.e. students and supervisors, while being an independent organisation outside the university. In Grenoble, there is a hub of different universities, and the idea was that the Science Shop could work with them equally when located outside a specific university. However, it proved hard to get any students to work on projects, as they could not be granted credits, and no reliable source of funding has yet been found in 2014.

3.3.3.2 Empowerment from Funding through the Living Knowledge network

The Living Knowledge Network itself relies on the labour and human resources of the members, as it possess no financial or human resources on its own. As it is not a legal entity, it is currently not able to have staff, money, or an office. The resources the Living Knowledge Network provides to the members are generally access to funding possibilities and knowledge through its function as an archive, but the funding is to many of the members especially new initiatives very significant and can be the difference between survival and extinction:

> *And we really did not really realize what they were giving us in terms of such a gift you know, I mean I was on the end of the job* (Bates, 2014)

Here for instance the Science Shop at DIT in Ireland was getting close to the end of their funds, but eventually with the help of PERARES developed their Science Shop and was secured a reliable funding from the university. They might have found other ways to secure funds, but beyond survival the PERARES funding also allowed them to learn from the Living Knowledge network:

> *Obviously, the funding enabled a whole lot of other things to happen. So not nearly all of the things that has been done since then, would have happened if we had not got the funding, not just for the money point of view, but also talking to people, and learning from people what they have already done* (Bates, 2014)

This stresses the importance of the mentoring aspect and personal contact, the webpage as an archive seems not to be adequate to help new science shops on its own. An independent evaluation of PERARES concluded much the same:

> *it was the Intangible human capital; the commitment to the values of community based research and structured working events to facilitate interaction between practitioners enable a peer based approach to problem solving, demonstrated through the exchange programmes was shown to be of equal if not greater value than the tool/resources themselves* (Emery et al., 2014)

Therefore, the funding seems to have some permanent impact, and does not just finance a temporary activity without any lasting effect in society. However, the amount of funds available still has a large impact on activity level:

> *The first year we were in operation, we counted them, and we had around 800 students [working on projects], but within two years we had increased that to 1300 students. […] we are now down to 900 students, because when you take away one fulltime staff member, the numbers drop off a cliff* (Bates, 2014)

So in short, funding does have permanent effects; even activity level does depend on continued funding. The intention behind PERARES though was to help new initiatives starting up and finding their own sustainable business model, and not to provide permanent funds for them.

3.3.3.3 Empowerment from the Living Knowledge platform

As mentioned, the resources the Living Knowledge Network provide to the members are generally funding possibilities and knowledge through its function as an archive, which is all it needs to do according to some of the members:

> *It is good that we have those things achieved and I think it is good that we can find partners to write with […] and for me this is enough, it does not have to do more than that.* (Science Shop DTU staff, 2014)

However, a problem in the network is that people are not voluntarily feeding their information and experiences into the network. This may be due to lack of resources on the side of the members, or lack of a formalized way to feed the information into the network. The contact point coordinator who also operates the newsletter and magazine explains how hard it is to get the members to contribute:

> *We face this general problem in other networks, even in our own organisation. No one delivers voluntarily, it always have to be asked to put something in.* (Steinhaus, 2014)

The coordinator always receives positive feedback on the newsletter and magazine, and the members are happy to receive the information, even if they are not actively providing it. As mentioned, the webpage is also meant as an information resource for actors interested in creating new science shop initiatives, based on documentation from earlier EU projects, but it is unclear how many directly uses the information available. Of those new initiatives interviewed during the case study who have used the Living Knowledge network, as DIT in Ireland, it has been the

mentoring that was most valuable, not resources on the webpage even if they were helpful to some degree. One of the older members, InteMEDIU Bucharest, mentions that they have used some of the archived documents in connection with their mentoring; but in general it seems more a way to keep track of what is going on in case you need to find partners, and identify opportunities for participating in projects. In the view of the contact point coordinator the webpage mostly functions as advertising:

> *And the people who contacted Bonn science shop, or contacted me, most of them at least, already knew about science shops and their activities from reading the website, from reading the newsletters, from having a magazine, so its advertising, its promotion for the science shop idea, for the idea of community based research. I do not know if you really can, I never asked that, but I do not know if you can really use it as is* (Steinhaus, 2014).

As advertising, which is a kind of resource strengthening visibility and legitimacy, it seems to be effective as the conferences held during PERARES had many participants and a lot of attention, and there have been new science shop initiatives starting outside the PERARES project as well. In conclusion, the role of the webpage seem to be rather passive and little used by new initiatives beyond sparking interest. The coordinator of the contact point however regrets the current view of the webpage as mostly a historical archive and advertisement:

> *We are now trying to reorganize it [the webpage] to be a bit better, so navigation becomes a little bit more easy, so you get to the information more easily than at the moment. I think this is an important tool for checking what is going on, probably not so much on activities that are at the start, but activities that has taken place, not that much for communication, but more as an archive. We try to change that a bit, to get more updated information on the website, by linking for example Twitter to it.* (Steinhaus, 2014)

The contact point coordinator seems to be aware of how the webpage is used, trying to reorganize it and incorporating Twitter to make it more alive and up-to-date. If this can enable more use of the webpage and further empower new local initiatives is an interesting development.

3.3.3.4 The Living Knowledge conferences

The 6th Living Knowledge conference in 2014 in Copenhagen, hosted and organised by the former Science Shop DTU staff and a research assistant, is a good example of the function these conferences serve for the network and the resources they provide. Of the 150 presentations at the conference, there was a sizeable portion of science shops, CSOs, NGOs, and other actors directly related to the Living Knowledge Network and its members, but also a large attendance of unrelated actors, which is one of the most important characteristics of the conferences (Dorland, 2014b). In this way the conference like the Living Knowledge webpage also serves as advertising and dissemination of experiences, but the conference reaches a different audience, allows for two-way communication in a different way, and provides visibility and legitimacy to the projects and activities of the Living Knowledge Network:

> *The Bonn conference was getting, let me say, high-level actors and bigger networks to cooperate with science shops like Excite, Athena. The European*

> *commission was really convinced of what was happening there […] also the conference in Denmark was important because Living Knowledge in cooperation with Bonn Science Shop and my person was invited to be on the steering committee for a conference on Science in Society during the Italian presidency*
> (Steinhaus, 2014)

Furthermore, at the conference in Copenhagen, high level talks started about future funding possibilities in the next Framework Programmes for Research and Technological Development (called Horizon 2020), as well as other options (Dorland, 2014b). The conference in short serves as an active manifestation of the Living Knowledge network, where is otherwise may have seemed merely a mailing list, thereby convincing the EU commission and other actors of the validity of its activities.

3.3.3.5 Evaluation of the expected benefits

Quality control, research dissemination, and standardization of documents are to some extent also functions of the network. Quality control of the EU projects to a large degree depends on the requirement from the EU in projects funded by them, or otherwise by the universities where the science shops are anchored.but in the network experiences with local quality control of science shop projects has been exchanged. The tool box on the website enables local use of standardized documents, but is has have not been mentioned in one interview.Research dissemination does happen on the Living Knowledge conferences and the Living Knowledge magazine to some degree, but is not sufficient for researchers, as researchers also need to publish in an accredited journalto receive "credit" from their host universities. The idea of developing the Living Knowledge magazine into a peer reviewed journal has not been implemented.

Many science shops do not conduct research themselves and the EU projects have not formally been funded as research projects. Michael Søgaard Jørgensen (MSJ) from Science Shop DTU is seen as the most representative of the research aspect of the movement (Steinhaus, 2014), just as Norbert Steinhaus is seen as representative for the international network and Henk Mulder for the EU projects (Steinhaus, 2014).

Despite the role of the various artefacts on which the Living Knowledge websites manifests itself, like the webpage, newsletter and magazine, there are some failures:

> *So for instance, I can remember some years ago, it suddenly dawned on KU [University of Copenhagen] that there was this Living Knowledge Network right, and they thought that it was fantastic… But that's a bit… we obviously did not succeed very well in the network [with spreading awareness of their existence]*
> (Science Shop DTU staff, 2014)

So, the advertising and visibility of the Living Knowledge network seem to have been insufficient in some instances. The Science Shops at University of Copenhagen were a mostly student run initiative though, and without a permanent staff it might require luck or serendipity for anyone to stumble upon the Living Knowledge Network, unless it takes a more proactive role in advertising its existence. As it is currently an actor needs to actively search for the network, subscribe to its newsletter, or join a conference to learn about it. The most active advertising is when local members leave the magazine in common places at their faculties, word of mouth, or bring it for

events they participate in, besides the call for papers for the conferences that are announced widely in academic circles (Michael Søgaard Jørgensen, 2014a; Steinhaus, 2014).

The biggest lack of resources for the local initiatives though, as mentioned several times, is insufficient or lack of funding. However, it can arguably not be the role of the Living Knowledge Network in its current form to supply permanent funding for the local initiatives. The network to some degree empowers the science shops in applying for funds and can through projects supply temporary funding, but not fund permanent operation.
At the micro-level, individuals undoubtedly have an influence on the success of the various local initiatives. Individuals' financial and personal resources, their ability to access social capital and their willingness to take risks influence opportunities for success. For instance, on Cyprus, the former dean of the business school was the initiator of their science shop, and he likely had more personal resources and influence than an external actor or a student would have had (Efstathiades, 2014). This seems rather simple logic, but there are more complicated aspects in making actors invest in the idea and their chances of success, empowering them, and thus making new initiatives successful. For instance, aspects of personal life like job security, economy and career, might deter actors from investing their time in new initiatives.

3.3.3.6 Summary and evaluation of the Living Knowledge resources

The Living Knowledge Network in short seems to provide resources in five different ways:

- As a face to the outside world doing advertising and giving legitimacy to the concept of science shops by increasing visibility, attracting new members, and enabling relations with other networks and organisations.
- As an archive for past projects and experiences of the science shops, keeping the members acquainted of current and past activities, and thus making it easier to find partners and to gain knowledge.
- As a contact point and archive for actors interested in setting up science shops and/or finding guidance and mentoring.
- Providing temporary funding through projects enabling survival, development, or establishment of local science shops.
- Access to more intangible human capital – personal mentoring and contact.

The overview supports the initial impression that the Living Knowledge webpage, newsletter, and magazine are playing roles in empowering the local initiatives, but funding and mentoring of science shops, enabled by EU projects like PERARES, play a more active role, and has been crucial for some local initiatives.

3.3.4 Monitoring and evaluation

EU Projects require a lot of monitoring and evaluation, but as the Living Knowledge Network is not formally coordinating the projects since this is the responsibility of one of the local science shops. The external governance during the EU projects relates mostly to auditing and other requirements set forth by the EU Commission and eventual host universities for receiving project funding. For

instance, Science Shop Groningen coordinated PEREARES and received the funding and distributed it to the project partners. Outside the EU projects there is no monitoring or evaluation, and the Living Knowledge Network have no board or council apart from the different ad hoc Living Knowledge conference committees and their peer reviewing of conference abstracts.

4 Local initiative: Videnskabsbutikken at DTU

4.1 Development in the local initiative

Videnskabsbutikken at DTU is the Danish name for Science Shop DTU, which as explained previously is a concept developed in the Netherlands where citizens and civil society organisations (CSO's) can request help in the form of research from universities. Videnskabsbutikken at DTU, henceforth called Science Shop DTU, is one of several Danish adaptions of the concept, which differ in their interpretation and implementation of the Science Shop concept. The activities of Science Shop DTU can be divided into two broad areas, how the science shop tried to facilitate innovation in a general sense in its context, and the types of innovation and projects that were conducted in specific partnerships with CSOs. There was a general tripartition wherein Science Shop DTU tried to facilitate innovation (Michael Søgaard Jørgensen, 2007, 2014a):

- The university – Reinventing the university by opening it up to civil society and making scholars involve themselves in civil society issues.
- The students – Teaching students participatory research methods, getting them in touch with "real life" problems, and maybe affecting their future career.
- Civil society – Solving societal problems or empowering civil society through different means to face their challenges.

As explained by Jørgensen (2014), who was the coordinator and principal actor in Science Shop DTU during its lifetime, the means to solve societal problem or empower society through the science shop encompassed three types of projects (M.S. Jørgensen, Auf der Heyde, Kistnasamy, & Hende, 2002; Michael Søgaard Jørgensen et al., 1995):

- Documentation – Producing scientific documentation meant to empower CSOs, like documenting pollution in local lakes for an environmental CSO in order to give them arguments in a political debate.
- Knowledge production – Increasing the CSO knowledge of specific topics, and increasing their competences and abilities to address problems independently in the future.
- Perspective change – Development of new perspectives on how a problem can be solved. Affecting a change at CSOs, for instance by supporting an organisation in its substitution of normal food with organic food.

The different ways these types of projects enable social innovation will be discussed in more details in section 4.2.These six aspects mentioned above broadly encompass the activities of Science Shop DTU during its lifetime. The bullets on university and students could likewise be expanded, however, it is harder to generalise the interplay between the science shop and the university and students as the relations changed several times, as will be explained in the remainder of this chapter.

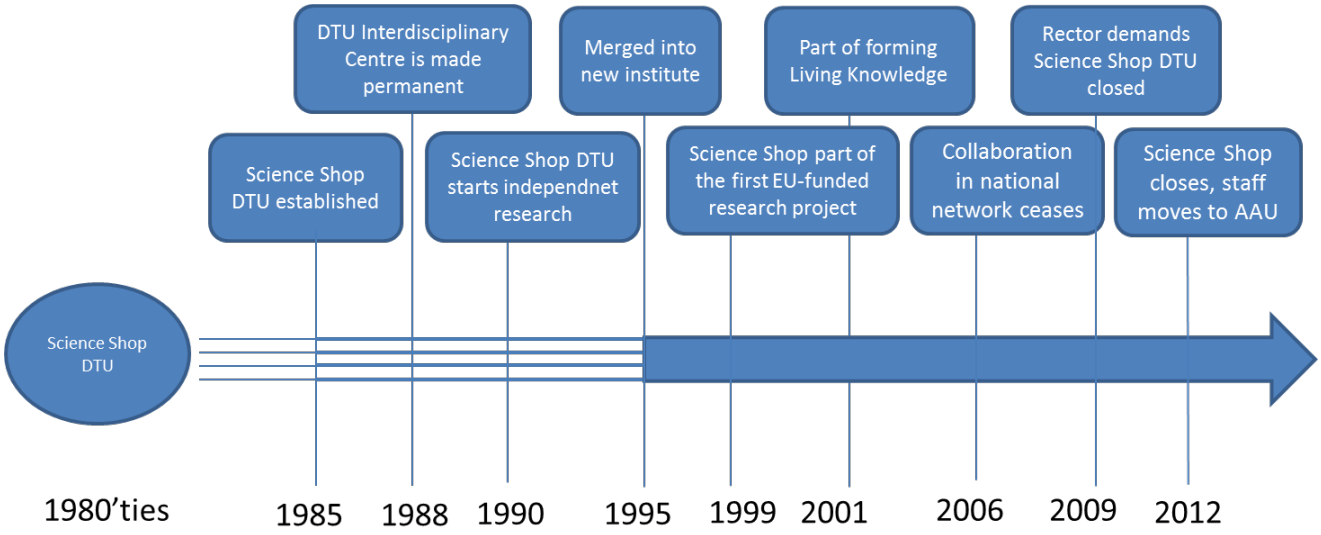
4.1.1 Historical origin of Science Shop DTU

Science Shop DTU started in 1985 as a response to a demand from both citizens and CSOs, as well as left-wing student activists and university scientists, to give citizens and CSOs a voice, and access to and impact on scientific and technological knowledge (S. G. K. Brodersen & Jørgensen, 2012). The manager of Science Shop DTU, Michael Søgaard Jørgensen (MSJ), refers to a request in 1984 by a labour union in regards to how the equipment, competences, and employees from a shipyard closing down might be used trying to save or create jobs (Michael Søgaard Jørgensen, 2014a; Kristensen, 2014). Even though no solution was found to the request, it led to a discussion at DTU to have a more formalized open door for such organisations as labour unions to enter the university, which ultimately led to the creation of Science Shop DTU.

Another informant, who was a student at that time, is focusing on the student initiative aspect of Science Shop DTU. There were a group of ideologically motivated students wanting to work with and for civil society, who during the early phase went on a study trip to visit the Dutch science shops, financed by DTU. This group had initially wanted a purely student managed initiative, as the group wanted it to be a Science Shop for the students where they could get into contact with and help CSO's. However, this was never feasible, as management demanded a leader of the initiative, which together with concerns about anchoring at DTU and securing legitimacy of the science shop led to a different model (Kristensen, 2014).

The Science Shop DTU initially got funding for two positions, divided between a part time coordinator, employee part time secretary and student assistantassistants. During the test phase, the first three years, a Danish model of the concept was developed inspired by, among others, to so-calledprogram studies in some Dutch science shops, with the aim of also anchoring the Science Shop and the issues in society at the university in the form of courses and research. Michael Søgaard Jørgensen (MSJ) would be the main actor, and started as coordinator of the shop a few months after the inauguration.

The Science Shop worked undeterred until the late 90'ties, despite various organisational changes at the university, but despite the long tradition for citizen involvement and democracy in science and technology in Denmark, it seems like both Denmark and the Netherlands reached a turning point with the transition to the 21st century. We see a shift in university policy that emphasizes commercialization of science and competitiveness (Jamison 2008, p120). According to Jamison (2008) this is causing a significant deterioration in scientists' academic freedom and universities' autonomy, which can be observed and will be discussed in the Danish case study. Eventually this indirectly led to the demise of Science Shop DTU in 2012.



Figur 1 - Science Shop DTU timeline

Year / period	Important activities/changes/milestones in local initiative ***Science Shop at Technical University of Denmark (DTU)***	Important changes in context
1984-1985	Dialogue with civil society stakeholders about cooperation with the university. Formation of internal preparatory group aiming at external cooperation and internal interdisciplinary cooperation	Danish Board of Technology formed
1985-1988	Science shop formed as 3 year experiment with administrative staff at DTU DTU Interdisciplinary Centre starts methodology course and urban ecology course Science Shop DTU start to develop their own model based on inspiration from the Netherlands and own experiences	Parliamentary proposal about science shops at Danish universities rejected Local and national initiatives within urban ecology in Denmark Science shops started at several other Danish universities
1989	DTU Interdisciplinary Centre made permanent as centre with science shop, research, teaching, and expanded with two fulltime scientific staff	
1990-	DTU Interdisciplinary Centre starts to conduct participatory research independently of requests	Danish public funding of organic food research

	from society. DTU Interdisciplinary Centre starts courses in preventive environmental strategy Interdisciplinary Centre starts research in organic food production	launched
1995	Interdisciplinary Centre part of forming a Department of Technology and Social Sciences.	University democracy at DTU changes to rector based university management Budget cuts at department including DTU Science Shop
1997	Science Shop DTU organises a Nordic conference on democracy and knowledge Science Shop DTU is starting to collaborate with science shops internationally	
1999	DTU Science Shop part of the first EU-funded research project about science shops	
2000	The Department of Technology and Social Sciences is merged into the Department of Management Engineering. Science Shop DTU continues as part of the new institute, permanent scientific staff is reduced to one.	Consolidation and budget cuts at departments
2001-	Science Shop DTU part of forming the international network of science shops, Living Knowledge	
2006	Collaboration on the national science shop magazine Anvendt Viden ceases	The other Danish science shops increasingly work with companies and public authorities
2007-	Local municipality of the university, Science Shop DTU, and local NGO start local climate cooperation	Climate projects launched in several Danish cities
2009	Rector demands DTU Science Shop closed. Vice rector accepts the activity is continued as part of the university's match making unit and stop using the Science Shop name	Other Danish universities merge their university's science shop with match making, project facilitation or career centers and stop using the science shop name
2010-	Decreasing activity, and there are no longer permanent students positions in the Science Shop	

	DTU. Science Shop DTU increasingly uses students from Design & Innovation for projects.
2012	DTU Science Shop researchers leave DTU and move to Aalborg university in Copenhagen. DTU closes community-based part of match making facility

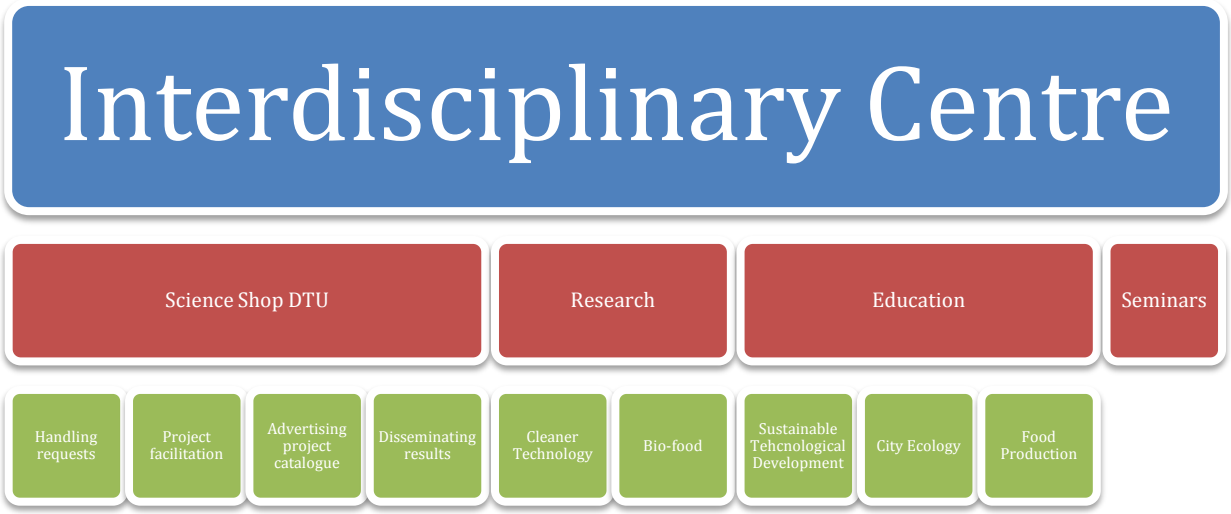
4.1.2 The Science Shop constellation

Science Shop DTU move several times around the campus on DTU, but there are largely three distinct constellations that dominate the lifetime of Science Shop DTU: the establishment era, the interdisciplinary centre era, and the institute era.

During the establishment era, MSJ was hired as administrative personnel as was the custom in the Netherlands. This was a rather short period of 3 years, where MSJ together with the board of the science shop developed a distinct Danish/DTU model for science shops, which emphasised the importance of having scientific personnel as permanent staff.

The interdisciplinary centre era started upon the permanent establishment of Science Shop DTU in 1989. The Interdisciplinary Centre was the umbrella organisation wherein Science Shop DTU was embedded, as shown in Figure 2, this report however regard the whole organisation as a science shop initiative. There were four activities in the centre; the science shop, research, education, and seminars (Michael Søgaard Jørgensen, 1987). The activities mentioned in Figure 2 below the four main areas are examples and not a complete list.

Figure 2 - Science Shop Constellation



MSJ became a tenure track scientific employee based on the experiences and model development during the test phase. This was one of the main changes from the original concept, as science shops in the Netherlands mostly relied on administrative personnel (Michael Søgaard Jørgensen, 2014b).

This meant that Science Shop DTU was directly linked to research, and could do research in its own right, instead of only facilitating research questions from society to actors of relevance at the university. The most crucial aspect of this model is that Science Shop DTU had the resources to define research questions from the requests, and anchor prevalent themes as research areas at DTU by taking them up as incubator (Michael Søgaard Jørgensen et al., 1995) and later implementing it in courses.

The establishment era as mentioned also developed a specific constellation, with an Interdisciplinary Centre as an umbrella organisation for Science Shop DTU and other activities. The intention was for the science shop to be directed at the students, the Interdisciplinary Centre was directed at research and teaching and being active in relation to the employees – professors and supervisors. The centre also enabled cooperation between institutes, and enabled experience and research from the Science Shop to be anchored through courses held by the centre or an institute. This constellation changed several times during the 90'ties and 00'oes, with the eventual demise of the Interdisciplinary Centre in 1995 when the institute for Technology and Society is created, and Interdisciplinary Centre is merged with this new institute. The merger was a strategic consideration, as the rector at the time suggested it to secure the science shop for the future, as a small independent entity could easily be shut down.

This starts **the institute era** and is viewed as a weakening of Science Shop DTU:

> *You can say that the research activities become more integrated into the institute, and the Science Shop feels a bit like an add-on* (Michael Søgaard Jørgensen, 2014a).

The research is after the merger seen as part of the institute and not taking place in Science Shop DTU i.e. it seems this is a weakening of Science Shop DTU, even though the move is meant to secure the initiative for the future, as the rector of the time commented (Michael Søgaard Jørgensen, 2014a). One of the issues is that the border between work at the institute and the science shop is not visible, which implies that the institute director and other actors do not necessarily associate the teaching and research of MSJ and the colleagues from the former Interdisciplinary Centre with Science Shop DTU.

> *We continue with creating new courses, and we also conduct research, and we continue to a great extent to have a democratic and participatory perspective, an action research perspective, but there is not necessarily a connection to requests in the Science Shop* (Michael Søgaard Jørgensen, 2014a).

Another effect was that the research group and environment around the science shop was shattered. Earlier Science Shop DTU were located together with other initiatives, and close to institutes they worked closely with, but this environment ceased to be, and the physical separation had an impact on the research environment (Kristensen, 2014).

4.1.3 Development in society and university contexts

The societal development in Denmark is a very large topic and far beyond this case study to analyse, but societal changes had a large impact on Science Shop DTU in the form of available resources both at the university and in society, which in general have been decreasing. To create

an overview of how this situation have changed over time, the initial context will be described, as well as a summary of critical changes and what kind of impact they had, the main discussion however will take place in section 4.3. The developments can in general be divided into four areas:

- Decreasing resources
  - Time: The requirement facing academics in the form of publications and teaching have steadily increased, leaving less time for free research and social activities.
  - Funding: The funding allocated to staff at Science Shop DTU from the university decreased continuously, but through the projects related to the Living Knowledge network funding increased in some periods.
- New public management and commercialisation of Universities
  - The new university law moved the power from the senate[3] to the rector, making support for Science Shop DTU in upper management more important.
  - The focus was increasingly moved to commercialization of research and partnerships with companies, as mentioned earlier, which decreased interest for social initiatives like science shops.
- Changing of ideologies, focus and priorities
  - The other science shops in Denmark slowly abandoned the tenets of the science shop movement, and were in the end disbanded or converted into career & projects centres and project markets.
  - Over a few years' students in environmental and energy engineering, areas Science Shop DTU were initially specialized in, diminished.
  - The focus in society and politics increasingly moved away from disadvantaged groups
- Changes among CSOs and volunteer workers
  - Some of the supervisors at the university experienced a change among their partners in society; they were more reluctant to enter into projects.
  - Some of the informants active in CSOs tell a story of how there is less time for doing volunteer work these days, and it is hard to find enough people.
  - Professionalization of CSOs also make them less willing to work with science shops, or decreases the need for the resources they can get from science shops.

Several of these points, especially discussion of ideologies and change in CSOs, may be subjective and based on the specific informants from the different areas, but there are interviews from both external and internal informants agreeing on the above point in relation to the development in society and the university. These points will be discussed in more depth in section 4.2 and 4.3, and here only serve to give an overview of how the context changed during the lifetime of Science Shop DTU.

4.1.4 The Science Shop model and purpose

The stated purpose by Science Shop DTU is:

[3] The senate was composed of 50% academics staff, 25% administrative staff, and 25% students.

> *To give grassroots access to knowledge and resources at the institutes for higher education as well as renewing inside the university through creation of research and education based on civil society's knowledge needs and the obtained experiences* (Michael Søgaard Jørgensen et al., 1995)

This purpose is more expansive than the official purpose of science shops given on the Living Knowledge webpage and various documents. This stems from the fact that Science Shop DTU is a larger entity than the traditional model, as it through the Interdisciplinary Centre acts as an incubator for new research and teaching areas.

4.1.4.1 Organisation and operational model

During the first three years, Science Shop DTU develops its own model, inspired by the Dutch example. The ideology and focus is kept i.e. they only serve civil society, only requestors with no resources on their own, and only none-for-profit projects. Science Shop DTU was also inspired by the program studies in the Netherlands (Michael Søgaard Jørgensen, 2014a), and planned to anchor the activities at the university in the form of new courses and research. The largest change from the Dutch model is the formation of Interdisciplinary Centre, see Figure 2 p36, that also entails the employment of scientific staff and research activities instead of administrative staff and mostly project facilitation (Michael Søgaard Jørgensen, 2014b). However, there were also Dutch science shops that had other functions than merely mediation and administration. In order to give an impression of the daily work and activities of Science Shop DTU the typical procedure for the daily work is interesting (Michael Søgaard Jørgensen et al., 1995):

- A client approaches the science shop
- The request is accepted or denied – typically at a weekly meeting
- The request is registered in the project catalogue
- Problem statement – the most crucial stage, as it is the fundament for the subsequent work. This can lead to different types of projects.
    - Short memorandum
    - Student project – facilitated through:
        - The project catalogue – initially released biannually
        - Announcements in the university newsletter
        - Contact to lecturers with relevant courses
        - Notices put up around campus
    - Research project
        - Can be research done by university staff
        - Financed by foundations, grants, research councils etc.
- Research phase – the science shop is following the projects to make sure it follows the agreement from the problem statement phase or is adjusted in cooperation with the civil society group requesting the project.
- Application of the results – Upon completion the science shop holds an evaluation meeting. Results are discussed; making sure the civil society group is satisfied with the form in which the results are delivered. The discussion also focuses on if subsequent projects are needed, or the problem is fully satisfied.

This is the original procedure written down and formalised after the establishment era. Besides the delivery to the civil society group, the report might be given an ISBN number and sold. For instance, a project on water savings in households was sold in 500 copies to organisations, libraries, schools and individuals (Michael Søgaard Jørgensen et al., 1995, p. 38).

The employment of scientific staff gave the Interdisciplinary Centre the possibility to act as an incubator and develop new research areas based on topics in the client requests. Interdisciplinary Centre was created to handle this aspect, incubator for research and courses, where Science Shop DTU focused on handling requests and facilitating projects. As it was initially the same staff doing research as facilitating projects in the Interdisciplinary Centre, the science shop activities led to the formation of research areas and courses. New courses and research areas emerged especially during the first half of the timeline.

Besides the aspect of research, the Interdisciplinary Centre enabled the staff to have a career as an academic, as can be seen from (Michael Søgaard Jørgensen, 2014a; Kristensen, 2014; Science Shop DTU staff, 2014) who all started out the academic careers at Science Shop DTU. Other science shops operated mostly by administrative personnel, or NGO type science shops, may also offer a career, or at least a permanent job, and the actors of relevance often have an altruistic attitude, but it is an important aspect that their personal lives and job should work together.

The use of the word "shop" was originally chosen due to the demand oriented nature of the initiative i.e. society come and shop/request research at the university. Science Shop DTU and the Interdisciplinary Centre, following the successful establishment at DTU, started to conduct research on their own initiative. However, as explained in 4.1.2, the Interdisciplinary Centre was merged into an institute in 1995, and the border between the different activities became less formalized.

4.1.4.2 Focus and ideology

Science Shop DTU had from the start a very strict ideological focus, they only accepted projects that somehow helped civil society, and only when the requester had inadequate resources to pay for or initiate research on their own.

> *We had this fundamental interest, or conviction, that the trade unions did not have the influence they should have. Therefore, we would consider them, so to say, eligible.* (Michael Søgaard Jørgensen, 2014a)

This stance in general also excluded local authorities, unlike InterMEDIU in Romania, because local authorities in Denmark generally have more resources available:

> *We had this general attitude to local authorities, well, a local authority would have money, so you could imagine that they could make their own research (Jørgensen 2014).*

Around 2000 DTU defined a new strategy and objectives, focusing on the applicability of the research and activities at the university, and internally in Science Shop DTU, they started to discuss how they should relate to this change. One aspect of this change was a focus on the "good stories", and Science Shop DTU started to cooperate more with the university newspaper, showcasing some

of their projects, and through this trying to ensure their anchoring at DTU. The science shop was increasingly under pressure, so in 2007 MSJ took advantage of the environmental focus among local authorities due to the upcoming COP15 in 2009, and engaged in a climate partnership with Lyngby-Taarbæk Municipality despite their status as a local authority. However, it was a demand that the municipality involved a local NGO, and only projects somehow relevant for citizens were accepted (Michael Søgaard Jørgensen, 2014a, 2014b).

In short, Science Shop DTU kept their focus during its lifetime, with some flexibility in relation to clients, as long as it served the tenets of focusing on and helping civil society.

4.1.5 Project types and activity level

It is hard to create an overview of the project types and the activity level at Science Shop DTU because it ran over 25 years, with varying activity level, and there has not been made any aggregated evaluation of the projects over the years, and the format of yearly reports and content have changed. To create an overview of finalized projects the physical as well as the digital achieve would have to be combined, which was deemed unfeasible. However, to give an impression of the activity and types of projects an overview have been created for the years 2008-2009 in Table 3.

Table 3 - Overview of projects

	Project topics	2008	2009
New projects on file	Traffic	4	1
	Environmental	3	10
	Food	3	3
	Design	2	1
	Noise	3	
	Sustainability	4	5
	Disabled	4	1
	Evaluation	1	1
	Renovation		1
	Sports	2	1
	Total	**26**	**24**
Finalized projects	Environmental	4	6
	Disabled		3
	Traffic		1
	Food	2	
	Noise	1	
	Total	**7**	**10**

This activity level, around 10 finalized projects a year, is representative for the new millennia. In comparison, during the establishment era from 1985-1987 Science Shop DTU received 223 requests, of which 37% were finalized or running at the time, 27% forwarded to other organisations, 30% still on file, and the remaining 6% requests shelved (Michael Søgaard Jørgensen, 1987). The many project proposals during the later years that were not picked up by

any students, in 2008-2009 it was around half, made the coordinator of Science Shop DTU feel bad (Michael Søgaard Jørgensen, 2014a). The science shop could have become more visible to the students, doing advertising in various ways, but as commented by the institute leader:

> *"The Science Shop may need to become more visible towards the students. But given the available resources for the Science Shop, the question is whether the Science Shop at all is capable to manage more requests from both clients and students". (Head of Manufacturing Engineering and Management: Leo Alting as cited by* (S. Brodersen & Jørgensen, 2003)*)*

In other words, they could have raised awareness among the students, but it would have been hard to facilitate more projects. Brodersen (2014) also comments that they could have advertised much more widely in society and gotten more requests, but they would not have been able to handle them. This is a common problem, as illustrated by Bates (2014) in 3.3.3.2, whose activity level fell markedly as funding decreased. The activity level varied drastically over the life of Science Shop DTU though, in the form of staff, finalized projects, research and courses facilitated etc. In the later years, there may have been more research projects than science shop projects.

During the establishment era, there was in total around two fulltime staff divided between a permanent employee, some hours for a secretary, and various student assistantassistants. During the interdisciplinary centre era, the first half of the 90'ties, there were 10-15 people at the centre. 2-3 people were working exclusively on organic food production; there were two senior fellows in cleaner technology and sustainable development, as well as various PhD stipends and student workers financed by grants from external actors or seed money from DTU. After the Interdisciplinary Centre was merged into the Institute for Technology and Society, some of the other academic employees moved physically to other parts of the new institutes depending on their speciality, reducing staff near the physical location of the Science Shop to the original two full-time staff plus student assistants. Eventually the budget for these student workers was also halved, reducing the capacity to handle requests and facilitate projects. Finally around the turn of the millennium one of the full-time positions were cut as well. During the new millennia the use of student assistants were discontinued and the money spent on partly financing a full-time staff, Søsser Brodersen. The Living Knowledge network through various EU projects helped fund Søsser's position in Science Shop DTU, enabling her to stay with the science shop.

4.2 Aspects of 'innovation' and 'change' of the local initiative

4.2.1 Relation with social innovation

Science Shop DTU, like its predecessors in the Netherlands, was a social innovation in that it opened a door to the university for civil society. Several institutes or individual professors already had relations and worked with civil society (Elle, 2014), but it all depended on networking and knowledge of how and where to contact the specific institutes and researchers. Science Shop DTU opened the door widely and made it easy and straightforward to contact the university. This led to opportunities for new relations especially with students, of which several has become permanent and separate from Science Shop DTU and are still effective today (Lisbeth, 2014), despite the demise of the Science Shop.

In addition, Science Shop DTU was also an innovation compared to its predecessors in the Netherlands, because it expanded the activities through the Interdisciplinary Centre to include research and education. This was possible partly because the coordinator in the science shop was changed from an administrative to academic position. This helped the science shop in anchoring the problems experience in civil society at the university in the form of research and education. In the early period for instance, courses on cleaner technology and organic food were developed based on this interaction with society (Michael Søgaard Jørgensen et al., 1995; Michael Søgaard Jørgensen, 2014a). A more peripheral link is how the experiences have spilled over into education programs. Especially Design and Innovation, in the late period, where several of the supervisors as well as the staff at the science shop taught and facilitated projects to students (S. Brodersen, 2014).

The traditional alternatives to Science Shop DTU would be work done by researchers, teachers, and CSOs. As mentioned researchers and teachers already did conduct some social work (Elle, 2014), but for the part of society unrelated to their interest and outside their personal network, it was hard to get into contact with the university. CSOs may also try to address some challenges experienced by civil society, but these actors may have limited resources especially in the area of research. The other Danish science shops could be regarded as competitors, but most of them had their own focus areas, like Science Shop KU that had a shop each for law, natural sciences, and sociology. Some of them might have overlapping areas with Science Shop DTU, but they did not have the same capability to anchor the issues experienced in society at the university as research areas or courses.

4.2.2 Relation with system innovation

Science Shop DTU interacted with mainly three national systems, education, research, and civil society. To view "society" as a system is a bit of a simplification, and the science shop mostly engages with CSOs, grassroots, and disadvantaged groups.

In relation to research at the university, the science shop aimed to open up for civil society, and secondly to renew the university by developing new research and teaching areas based on the needs perceived in society. The science shops at DTU and RUC fit well within the educational system and structure at the university i.e. there were available resources aplenty in the form of students who were obliged to conduct projects as part of their education. Especially the opportunities for projects as part of educations were important.

Outwards the science shop tried to foster innovation in society by giving CSOs access to or producing scientific knowledge in collaboration with CSO's. This is an ideological motivated purpose, to help civil society and especially groups with little or few resources in their democratic struggle. Among the structures and systems in society, the Danish unions and the housing associations were common clients, as well as various local and national environmental groups.

4.2.3 Relation with game-changers

There have been several game changers during the lifetime of Science Shop DTU both in the local and national context. Some have been challenges and threats to the Science Shop, while others have been opportunities. For instance, during 2008 the Danish government published a vision of a fossil free society (Rasmussen, 2008). This vision was taken up by the municipalities at the local level, which together with the COP15 meeting in 2009 in Copenhagen, created a favourable context for environmental projects and led to the environmental partnership with Lyngby-Taarbæk Municipality.

A game-changer of a more negative nature was the change of the university management from being an academic democracy led by a senate to be controlled by a principal, which eventually led to the decline of Science Shop DTU 15 years later. While this change did not pose any sudden threat or immediate change, it did remove allies from power and entailed a different political way of operating. For instance, there came a bigger focus on creating good stories about the role of the university, and a less diverse opinion of what activities the university should be involved in.

4.2.4 Relation with societal transformation

In the late 80'ties and early 90'ties the increased societal attention on organic food and pollution led to many requests to Science Shop DTU (Michael Søgaard Jørgensen, 1987), to which the science shop reacted by taking these areas in and "incubating" them, eventually offering courses on the subjects and anchoring them as research areas at DTU. This research area was headed by an earlier staff member at the science shop, and the researcher eventually moved to Aalborg University and became professor in the area, and heading a research group called FINe (Foodscapes, Innovation and Network) (Kristensen, 2014).

Another large societal transformation which influenced Science Shop DTU was Agenda 21 produced at the UN summit in 1992 in Rio de Janeiro. The action plan resulted in many local Agenda 21 centres in the Copenhagen area[4], and caused local sustainable development to be on the agenda. The Science Shop also had activities and partnerships in the area prior to 1992, but it caused increased awareness and funding to the areas of urban ecology, cleaner production and environmental management, although it is hard to determine the overall effect. Likewise, the COP15 meeting in 2009 increased attention on environmental issues, and enabled a partnership with Lyngby-Taarbæk Municipality in 2007 (Michael Søgaard Jørgensen, 2014a; Science Shop DTU staff, 2014).

4.2.5 Relation with narratives of change

There is a narrative about the Science Shops and their purpose for existing as discussed in section 3.2.5. The actors in Science Shop DTU have a slightly different understanding partly because of their alternative model focusing more on research. The major differences are:

[4] Miljøpunkt Nørrebro, which is among the informants, is one such centre.

- Science Shop DTU can contribute to research and curricula development at the university by acting as an incubator for a new scientific field – this however demand scientific staff (S. Brodersen & Jørgensen, 2003)
- Science Shop DTU has an impact-seeking approach, which means that they get involved in the interpretation of the data and facilitation in relation to the use of the results when the CSO tries to obtain influence on the issue in focus (S. G. K. Brodersen & Jørgensen, 2012).

These two characteristics are central tenets for Science Shop DTU. The use of the concept incubator goes all the way back to the early 90'ties (Michael Søgaard Jørgensen et al., 1995), and the idea dates from the establishment (Michael Søgaard Jørgensen, 1987), and is emphasized in various papers and reports continuously through its lifetimes. The concept builds on an understanding that a research area, based on request received from society, needs to be developed before it can be anchored at the university.

The concept of being impact seeking is rather new, conceptualized around the ending of the timeline, and contrasts Science Shop DTU with other science shops in decline among the old science shop countries, who have reverted to a more passive mediation-approach due to budget cuts and other challenges. The other Danish science shop also had mostly a mediation approach.

> *The other science shops' status as administrative units and the lack of scientific personnel might have implied that they don't involve themselves that much in the projects* (Fischer & Wallentin, 2002).

The other science shops of course also tried to make an impact, but the concept emphasises the active stance in relation to ensuring an impact, being sure the projects are having the desired effects.

These concepts are also the result of a continuous identity work where Science Shop DTU tried to define what the core of what they do is. MSJ in several interviews mentions how they especially in the early period try to define this core of their initiative (Michael Søgaard Jørgensen, 2014a). From what can be seen from the various reports and papers covering the timeline, Science Shop DTU and/or MSJ have become increasingly more active i.e. impact seeking, by starting new activities and projects on their own initiative. Here it becomes hard to distinguish Science Shop activities and the research activities carried out by MSJ as part of his job, but MSJ essentially see all of his research and projects as based on societal needs i.e. as science shop activities. This discussion also reflects the importance of intangible human capital, as the evaluation report on PERARES also pointed out (Emery et al., 2014).

4.3 Aspects of empowerment and disempowerment of the local initiative

4.3.1 Governance

The internal governance is defined as inside the specific science shop and the national science shop network, and the university is seen as part of the external governance.

4.3.1.1 Internal governance

Science Shop DTU had firmly defined procedures and processes for handling requests, results, making yearly reports and so forth available for all to see in their handbook. The day to day handling of requests was done by student workers, but once a week the science shop had a meeting where all requests were evaluated and a course of action decided upon (Michael Søgaard Jørgensen et al., 1995; Michael Søgaard Jørgensen, 2014a; Kristensen, 2014). In some rare instances, a decision was made immediately, before the weekly meeting, if the case was deemed urgent. All in all the procedures and processes were very flexible and the handbook more guidelines than rules of operation. The staff also shared office space so requests were discussed continuously as they came in, and the academic staff was aware of the daily development. In the start the interdisciplinary centre staff and the science shop had meetings together, but as the science shop grew and got more request, this was increasingly separated due to the length of the meetings. This changed somewhat during the lifetime of Science Shop DTU though, as MSJ in the last decade got more and more duties and projects unrelated to the science shop requests, more work were taken over by students and the other staff member, Søsser Brodersen.

The free and flexible internal governance of Science Shop DTU, combined with the active knowledge sharing, may have helped foster innovation, in the way that projects can be treated individually and thus ensure a higher success rate. It should be noted that other actors like DTU Match and the student office, did generally not realize how much work is required to make requests into projects suitable for students, as well as "selling" the projects (Michael Søgaard Jørgensen, 2014a). DTU Match took in request and published them on their webpage, but did not actively engage either students or requestors.

An interesting aspect of the science shops at KU and RUC is that they seem to act almost independently and with little continuity. They seem to develop their policies and strategies by themselves, and they unlike Science Shop DTU do not relate to Living Knowledge, and do not keep focus on a specific mission or goal. This can have problematic consequences, as shown by the following example: Earlier, the KU Science Shop for social science focused on helping NGOs and other non-profit organisations. However, following the initiative of one or two of its four student assistants, the KU Science Shop for social science in 2001 also began to invite companies as well (Fischer & Wallentin, 2002). Starting to work with companies is a radical change compared to the science shop model, and that students can initiate such a change on their own without agreement or consensus with other actors' stems from the fact that there is no permanent staff or other factors providing continuity in the initiative, maybe lack of intangible human capital. This change also partly led to the demise of the national Danish science shop network:

> *And in the end we had to close it down, because back when we made Anvendt Viden [the national network newsletter/magazine] I insisted that it focused on the CSOs, and RUC came with their company projects, and KU came with public authority projects, and I could not stand for it. So after long consideration between Michael and me, we agreed that we could not do it anymore* (Science Shop DTU staff, 2014)

Op until the last half of the 00'oes there had been loose cooperation in the national network, centered around the magazine Anvendt Viden, but also by exchange of projects if they seemed more suited to the other universities' expertize. The point is that there was little internal

governance in the national network, and unlike Science Shop DTU the science shops at KU and RUC did not have a handbook – formalized procedures, processes. Had these two science shop had stronger internal governance they *might* have developed differently.

4.3.1.2 External governance

Science Shop DTU tried to obtain influence and impact on society and the university, described as the tripartition in 4.1 on p32, with little change over its lifespan in its goals of affecting education, research, and civil society. Namely, supporting civil society's fight for influence has been a central tenet of Science Shop DTU (Michael Søgaard Jørgensen et al., 1995; Michael Søgaard Jørgensen, 2014b). The activity level and effort have varied though with the available resources, and scaling the science shop and its activities has provided challenges. Generally, it has depended on funding and time-constraints how many student-projects could be started and facilitated as discussed in 4.1.5 on p41. In short, Science Shop DTU could have advertised more broadly both in society and among students, but may not have had the resources to pick up more projects.

Of formal structures, Science Shop DTU interacts with the educational system and thereby the ministry of education, as it disseminates research through courses and awards ECTS points for projects. There is also interaction with the ministry of science as the Science Shop has initiated research projects through the times. The university per se is also a formal structure external to Science Shop DTU, and is the main source of funding for the permanent positions, as well as various PhD stipends and seed money received over the years.

If looking at how Science Shop DTU in itself has felt empowered, the first development was the success in making the coordinator an academic position. This development empowered the research activities and the ability of Science Shop DTU to anchor issues experienced by civil society at the university – making the science shop an incubator.

Novelty and impact for the university
A number of enabling factors and conditions for obtaining long-term impact on curricula and research was identified through the case studies analysed in the SCIPAS project (Hende & Jørgensen, 2001) and the interviews with former supervisors and students (Michael Søgaard Jørgensen, 2014a; Kristensen, 2014):

- Science shops can influence strategic university decisions, either through participation in the decisions or through alliances with scientific staff or university management with influence on strategic decisions;
- Personal resources for networking and own initiatives at the university and towards citizen groups. This can be in terms of science shop staff with scientific qualifications, grants for scientific staff, Ph.D. grants etc.;
- Gives students the possibility to get into contact with society and conduct projects in a real life setting, increasing their knowledge and experience on project work.
- Science shop staff also working as teachers and/or researchers gives the opportunity to develop own courses and research activities;
- Visibility of the achievements and the competence of the science shop make the university administration and the scientific staff aware of the potential in involving the science shop;

- Scientific staff gets involved in science shop activities due to social and/or scientific interests;

IMPACT BOX – Examples of impact at the university

Technical University of Denmark (Kristensen, 2014) **– Students and organic food production**
A former student, and later staff &andsupervisor at the university, relate the impacts of Science Shop DTU:

> *There were many students who defined it [the science shop] as that oasis on DTU, where you were actually allowed to do something exciting and new.*
>
> *So, this link to reality that many talked about, it was a hot topic among students back then, you could not get it anywhere else but Science Shop DTU in the start.* (Kristensen, 2014)

Kristensen (2014) while a student worked in and did projects with Science Shop DTU on organic food production, which is one of the reasons that the science shop got its eyes up for this new societal development. Kristensen (2014) upon graduation continued work in the area, got a PhD stipend, and thus was part of anchoring the issue as a research and teaching area at DTU. Today Kristensen (2014) is a professor at Aalborg University in the area of food science. This case illustrates the interaction between the science shop, students, and society, and how the science shop could empower students development, while at the same time incubating research at the university.

Novelty and impact related to civil society
The case studies analysed in the INTERACTS project show that science shops provide several types of functions as part of the interaction between CSOs and research. Some functions are mostly related to mediation between CSOs and researchers or students at a university, and the novelty and innovative aspect related to CSOs are (Michael Søgaard Jørgensen et al., 2004):

- Providing easy access to the resources of universities
- Mediation between the knowledge need of the CSO and the researchers and/or students as part of the project planning
- Acting as knowledge repository ensuring continuity and progress from project to project
- Acting as antenna for new societal topics, which are not yet addressed by CSOs or authorities

The knowledge production itself takes place in a number of different ways with respect to CSO participation (Michael Søgaard Jørgensen et al., 2004):

- Knowledge transfer to CSOs, where existing knowledge is transferred to the CSO by the science shop
- Knowledge supply, where researchers or students produce new knowledge, which is transferred to the CSO
- Participatory knowledge production, where the knowledge production take place in co-operation between students or researchers and the NGO. Depending on the Science Shop

model, the Science Shop itself might be mediating and guiding the interaction or it might participate in the research itself.

IMPACT BOX – Example of impact on civil society

A local housing association (Elle, 2014) **– Long-term impact of a project**
One of the supervisors for a science shop project recalls his experience:

> *The local department board said it was fun to hear the young people [the students], but it was evident that they were amateurs who did not really know what they talked about, and they had no sense of the economic consequences… they were really upset [the students]. I had to give them a treatment afterwards… but then I came back to the area 10 years later. And I could recognize an implemented plan. So everything they claimed as deeply unrealistic, academic rubbish that had no reign on Earth, I could recognize as implemented* (Elle, 2014)**.**

It is rare that a project is followed up upon, and especially with such a timeframe, and it shows how hard it can be to initially estimate an impact. In this case the knowledge of the CSO was increased, despite their own claims, through participatory knowledge production.

4.3.2 Social learning

Social learning manifests in several different forms. Foremost in the form of courses and practices at DTU, where participatory research is a cornerstone in science shop projects and in the courses developed from the science shop. Besides teaching students about the research methods and how to collaborate with civil society, many projects and results have as mentioned produced new knowledge in collaboration with society, or led to new research areas being started at the university. Therefore, the most visible impact at the university is the different ways Science Shop DTU have anchored new research areas and courses at DTU (cleaner technology, organic food production etc.), feed by the experiences from the science shop projects.

A range of manifestations materializes themselves through the science shop websites, the magazine Anvendt Viden, the yearly reports, the DTU newspaper, as well as all the reports produced through the EU projects, as some of these reports are specific case studies based on the Danish science shops.

Another form of social learning is happening inside the CSO's and other organisations doing projects together with Science Shop DTU. Some projects aim to facilitate a learning process in CSO, maybe so they can do research on their own in the future. This learning is taking place in collaboration with Science Shop DTU, and typically manifest in a report, but sometimes also in models, presentations, leaflets and other artefacts. Besides the physical artefacts, and how they might impact and change the CSOs over time, they might also learn from the collaboration/project process in itself.

A different aspect of empowerment and innovation is the effect such projects have on students. The experience of "real life" projects and experience in some case profoundly affect students and their education and subsequent careers. This is a hard subject to say anything definite about, but two informants have been interviewed (S. Brodersen, 2014; Kristensen, 2014), which started as students and student assistant and eventually ended up as researchers in the areas incubated by the science shop.

IMPACT BOX – Examples on social learning

Miljøpunkt Nørrebro (Lisbeth, 2014) **– Learning to facilitate student projects**
The CSO here explains how their relationship with Science Shop DTU taught them how to take in students and use them in projects

> *I will say, another thing that the science shop have created the foundation for, is that we have been matured to work with students, to take people in, and we have talked with many others about it [their experience with students and how to handle it]* (Lisbeth, 2014)

Several permanents relationships with course coordinators or other institutions were created through Science Shop DTU that are still running despite the demise of the science shop itself. Likewise, the CSO now also cooperates with other higher education institution, even though they point out that they have not found a substitute for Science Shop DTU and the academic quality of the projects they had.

Miljøpunkt Nørrebro (Lisbeth, 2014) **– Disseminating knowledge**
Another project also helped caretakers in the local housing associations in their work

> *And there was made a lot of materials and excursions for the caretakers so they could learn to calculate it [on waste], see what happens with the waste. It was really important for them that they could say to Mrs. Brown, do you know, listen, that paper is going to become like this and this [explanation of the waste management process]* (Lisbeth, 2014)

In short, the local caretakers were empowered through the knowledge disseminated in the project.

4.3.3 Resources

The principal resources are human resources and funding as it enables Science Shop DTU to operate. Human resources also encompass students and coordinators, which at some level are "paid" with ECTS-points and empirical data for academic papers. Lastly, there are the resources that Science Shop DTU make available to CSOs, in the form or research, legitimacy through scientific documentation, manpower in the form of students, knowledge from earlier projects etc.

4.3.3.1 Funding, labour, and ECTS-points – Resources at the university

Science Shop DTU for most of its lifetime had a budget with around two full-time employees and some student assistants. Funds from public research funds, as well as seed money and PhD stipends from DTU, were used at various points in time to fund projects. From around the new millennia the Living Knowledge network also helped funding projects through the EU projects. In addition, initially the university looked with sympathy on social work.

> *And it was evident that there were no problems in using ones work hours at the university to help grassroots and such. It was obvious that it was central in that contact [with society]* (Elle, 2014)

On top of that there were also less requirements for academics, for instance up until the mid 90'ties it was not mandatory for academics to publish scientific papers to keep their job:

> *In the institute for roads, traffic, and city planning, it was like this that the professor for city planning sometimes wrote an article in the journal Urban Planning* (Elle, 2014)

In addition, the other employees were not really engaged in writing articles. This meant that the academic staff had more leeway to manage their own time, and they could for instance set time aside for supervising science shop projects or other charity like activities, which in the current context does not give any "points" anywhere. This played together with a general discourse in society on helping disadvantaged groups:

> *So, there were these currents in society that made it advantageous for DTU to show that they could also do something in relation to these disadvantaged groups. And it is clear, it changed with the University Act where Bundgaards strong mand comes in and displaces Hans Peter Jensen, that this sentiment gets the knife* (Kristensen, 2014)

This however changed at DTU around 2000 and at the other universities in 2003 with the University Act. Up until around 2000 DTU was governed by a senate of academic- and administrative personnel as well as student representatives, among which Science Shop DTU had several supporters. Afterwards, the power was concentrated in the rector, which had little interest in science shop work. This led to the closure of Science Shop DTU in 2009 when the rector saw their sign when walking past, and was surprised that it was still operating, and demanded it closed by the institute director. The science shop survived in negotiation with the vice rector, but the episode showed how the new management constellation had weakened the initiative. This change in interest in the science shop and the areas it worked with may reflect a general change in society, as new students to the areas of environmental studies and energy lowered markedly over a few years (Kristensen, 2014), areas where Science Shop DTU had many projects, as can be seen in Table 3 p41.

The point here is that the resources decreased markedly over time, first by new requirement for publishing papers in the mid 90'ties, and later by the new university law and changing focus and priorities. For instance, if academic staff was to involve themselves as supervisors, it was important for some of them that the projects could be used for writing articles. Some of the same aspects apply for students, which now are encouraged to complete their education on time, and finding relevant student jobs at companies relevant for their future career etc. In addition, the

number of students in the areas where Science Shop DTU historically had many projects lowered markedly (Kristensen, 2014). And last but not least, the core funding for Science Shop DTU was gradually cut down.

So many projects were not picked up, more than half in the later years. MSJ, the coordinator of Science Shop DTU; expressed concern and/or regret that some projects were not picked up by students. Active efforts were made to "sell" the project proposals by presenting them at courses. However, as mentioned here and in 4.1.5 on p41, the science shop especially in the later period would not have had resources to facilitate more projects than they did. Therefore, even though students are essentially free labour, paid with ECTS-points, it requires some corresponding resources at Science Shop DTU to facilitate the projects. This also relates to the impact-seeking approach of Science Shop DTU, which is more time and resource consuming than the mediation approach.

The students were the alpha and omega if a project would be conducted or not though, and their enrolment was possible through the system innovation related to the educational system. From the very beginning in 1985 students were required to do projects as part of their education, and Science Shop DTU could as supervisors, or together with supervisors from other institutes, award ECTS-points for projects. Using students as the main resource for labour constrains the size and time frame for projects though, as projects mostly have to fit within the semester and course structure.

4.3.3.2 Resources made available for society

The resources made available to society by Science Shop DTU and science shops in general have been discussed several times. It is often in the form of research, legitimacy through scientific documentation, manpower in the form of students, knowledge from earlier projects etc. Science Shop DTU was especially well equipped to supply civil society with research, as the science shop had academic staff that could supervise projects and conduct research on their own, where other science shops in general had to rely on supervisors at the university external to the science shop.

IMPACT BOX – Examples on impact of resources provided to society

Miljøpunkt Nørrebro (Lisbeth, 2014) **– Scientific documentation**
A science shop project on evaluating the waste collection schemes implemented in earlier projects served as scientific documentation and strengthened the CSO as they used it at conferences and meetings and other events.

> *And now for instance Anders's report [a student] I have used a lot. I work very down to earth, and I have used it many times as the good example, and it has empowered us in some things… some assumptions right that we got research on […] when I was out talking with people about waste sorting, in the argumentation you have to be as thorough as we were, and why this model holds.* (Lisbeth, 2014)

Lyngby-Taarbæk City (Reinicke, 2014) – **Perspective change**
A science shop project about food for the elderly not only provided scientific documentation, but through a brilliant model and graphical presentation succeeded in changing the perspective for the employees cooking the food for the elderly.

> *They were awesome at disseminating their results, they made a poster, a food pyramid* (Hungryplanet.dk, 2015)*, and they made a physical model! And the funny thing was, as I remember it, that there was much consistency between the Danish Health and Medicine Authority's recommendations, their food pyramid, in comparison to how you can eat correctly CO2 wise. And I know that the people who cook the food for our elders they hang the posters up, talked about it, and tried, to the extent economy and time allowed, to get more CO2 friendly products in the food for the elderly.* (Reinicke, 2014)

4.3.3.3 Resources in and from society

Even though Science Shop DTU offered its services free of charge, it still required resources from a civil society group to participate in the form of time, information, and sometimes office space for the students (Michael Søgaard Jørgensen, 2014a). According to some of the informants the situation among CSOs has changed, there are less resources available then earlier:

> *And the grassroots organizations I have had contact with previously, it has been hard… previously there were more very resourceful people who lived the grassroots life. It is not like this anymore* (Elle, 2014)

Less and less people seem to devote their life to CSOs and doing volunteer work. This perspective is mirrored by one of the informants who recently retired from a CSO working mostly with waste collection (Lisbeth, 2014). She tells about how it became increasingly hard to get residents involved in the apartment associations, people in general just did not have the time and/or

interest. She herself had a very good view on the science shop projects and think that it helped many of their projects to survive in the situation where they have fewer resources:

> *I can see it here too [general decrease in resources]. Some of our projects survive because we have those resources [students from Science Shop DTU], because we can't lift them anymore [the projects], especially after we became fewer and fewer here.* (Lisbeth, 2014)

However, as mentioned it requires resources as well from the CSO to facilitate science shop projects, which become harder:

> *The problem really is if we have people op here to match, but it may not be necessary… but I can of course sit here and conclude something, but somebody will say "but Lisbeth, how would you ever get the time to do that".* (Lisbeth, 2014)

In short, there is little time to set up and facilitate such projects. The CSO still has a regular group of students coming at least once a year from a specific course to do projects for them, and there is a contact person who manages the relationship, but they do not seem to have resources for setting up new relationships. This development might be specific to this type or segment of CSOs working with housing associations and urban planning though, as other actors disagree and still think there are citizens invested in grassroots movements (S. Brodersen, 2014; Michael Søgaard Jørgensen, 2014a). A last aspect of development among CSOs and NGOs is professionalization:

> *I am not sure I agree with him [that interest for volunteer work is disappearing]. I still think it is there, but I think many of the larger NGOs are becoming professional… so they start running like an organization with fundraising and various other functions.* (Science Shop DTU staff, 2014)

What is meant here is that they become too busy and staff gets more defined tasks, which does not include a relationship with science shops, and they start having a budget with staff and fundraising.

4.3.3.4 Other resources

Through time the Science shop also interacted with other systems and structures, namely as the popularity of the Internet grew a website was established with a database where all projects and reports were available. Even before the digital database Science Shop DTU sometimes got request for the reports made in earlier projects (Michael Søgaard Jørgensen, 2014a). Lastly, Science Shop DTU also created a magazine together with the national network of Science Shops in Denmark called Anvendt Viden (Applied Knowledge), which was a representation of the innovations/impacts of the science shop work.

4.3.4 Monitoring and evaluation

There were in general little monitoring and evaluation of Science Shop DTU from upper management at the university. From the late 1990'ties management required Science Shop DTU to measure themselves on key indicators, which the science shop developed and included in their yearly report. In relation to university management there were little reaction to these yearly

reports, only in the last decade, in 2005, did management ask any questions about the number of projects done in the Science Shop DTU compared to the other science shops in the Copenhagen region. Internally the science shop evaluated all projects upon completion and published the reports, but there were no systematic evaluation of the projects after the initial completion of a project, for some years the Science Shop DTU also approached the involved civil society groups one year after a project was finished. From 1985 - 1995 Science Shop DTU also made their own statements of project activity in various reports. Due to digitalization and new IT-systems the visibility of the student reports became difficult around 2000, as all publications needed to be attached to a specific academic employee i.e. students could not enter the system as authors.

5 Local initiative: InterMEDIU Romania

5.1 Overview of development in InterMEDIU Romania

5.1.1 Origins of the Romanian Science Shops

The science shops in Romania stem from an international project together with the science shop at Groningen University in the Netherlands, financed by a grant from the Dutch Ministry of Foreign Affairs. A lot of the information of this early phase stems from the analyses done in INTERACTS and SCIPAS, two of the early EU projects within the Living Knowledge Network (Hende & Jørgensen, 2001; H. Mulder, Heyde, Doffer, & Teodosiu, 2001; Teodosiu & Teleman, 2003).

The project emerged from a simple question by a representative of the Ecolife NGO, in Bacau, Romania to Arie Fokkink, formerly of the Chemistry Shop Utrecht and actively involved in the project to start a science shop in Brno. Arie then started to visit Bacau University, and got support from the head of the biology department. This happened in 1996. In 1997, Arie involved Henk Mulder from the Chemistry Science Shop in Groningen, and they prepared an application to the Dutch Ministry of Foreign Affairs who at the time had a special fund for supporting transition in Central and Eastern Europe (MATRA).

The background for the situation at the time was the socio-political changes going from a dictatorship to a multi-party democracy, which was seen as one of the key issues for the involvement of civil society as potential clients. During the communist regime, many structures of civil society were destroyed. For instance, people were educated not to have comment on economic, environmental, social, or other issues, and conflicting attitudes would result in various consequences. A stronger civil society developed, and it was thought that science shops could help with this (Teodosiu & Teleman 2003).

The project was granted and started in 1998, and from 1998-99 four science shops were established. The target of the project was to unlock the knowledge that was present at universities, for solving societal problems, mostly related to environmental issues. The Romanian name is InterMEDIU, which build on the words intermediate and environment in Romanian. Most universities were also interested in developing international contacts, which made co-operation on projects feasible as well. Following the MATRA project that established InterMEDIU they also participated in SCIPAS, TRAMS and ISSNET, which were EU projects started within Living Knowledge. The outcome of these early projects is discussed in Chapter 3.1.

5.1.2 Recent Activity

The activity in Romania can be seen at three different levels, the local science shops (InterMEDIU centres), the national network (INRO), and international projects and cooperation like PERARES and Living Knowledge. The Romanian network is mostly focused on environmental protection research. In 2010, INRO had 32 members from more than 10 Science Shops (H. A. J. Mulder, 2014).

5.1.2.1 Romanian Science Shop Network (INRO)

All Romanian InterMEDIU centres are organized inside universities, and are not legal entities on their own. Their collaboration in national or international projects is carried out through the university administration. As individual entities, InterMEDIU Science Shops can for instance not apply for CSOs' grants, but the national network is an organisation with a legal status giving their members the opportunity to apply for grants as a CSO (H. A. J. Mulder, 2014). However, INRO seems to have been rather inactive recently.

InterMEDIU Bucharest tried to reinvigorate the network as part of PERARES with a meeting in 2012, especially to identify future possibilities for collaboration in national or international projects. For instance, a possible joint proposal submission to the program funded by Norway-Iceland-Finland on the period 2012-2014 was discussed in the national network (H. A. J. Mulder, 2014). As such, the purpose of the network seems partly to act as a face to the outside world for the community to get funding for research and other activities.

InterMEDIU Iasi is mostly interested in research cooperation with their colleagues in the network, due to the changing national context in Romania:

> *There have been so many developments in the least years, in terms of research funding, and in terms of research output, at the level of the Romanian universities, so most of our corporation in the last years have been, let's say, directed to research* (Teodosiu, 2014)

In other words, the money lies in doing research and publishing it in international journals and within this area, InterMEDIU Iasi is active in INRO, where they among other have a shared PhD project with another university. However, the informant calls the network a very loose one i.e. they do not really see their activities as part of INRO, they are just collaborating with their colleagues on research. This is not unlike the Living Knowledge network, which is mostly used as a communication and knowledge dissemination tool for the members.

5.1.2.2 InterMEDIU Iasi

InterMEDIU Iasi is a relatively active centre, but the centre does not make any distinction between science shop activities and the regular work for the university, it all takes place within the framework of the InterMEDIU centre, so it is hard to determine how active they are as a science shop. This stems from the fact that there are no resources, financial or otherwise, for doing science shop work in Romania, so the staff of the centre does it as much as they can within their normal jobs.

> *So all financing we had and all the activities that we have were supported by projects, and most of the activities that we have had the last 10 years, most of them have been voluntary. We did not pay some staff or students to do work especially for InterMEDIU* (Teodosiu, 2014).

That biggest problem for InterMEDIU Iasi is this lack of funding, they have problems with getting time to do any volunteer work:

> *The load we have, the working load, is very very high, really. And I cannot afford to delegate someone to deal with these issues, to build and to let's say formalize all this kind of requests or the website and maintain all kinds of links, because really, that is not possible, I mean we already do a lot of extra things, apart from the work* (Teodosiu, 2014).

This voluntary work is also to a large degree done by master students, who may get research credits for their work:

> *So for instance, I can use some of the students from my colleagues or myself […] they are recognized through credits, but it is an understanding between us that there is such recognition of the credits, and there is not too many formalities to recognize this kind of credits* (Teodosiu, 2014)..

During the last year, they have handled eight requests. Examples of science shop activities:

- Analysis of water samples for local authorities and organisations for free if it is just a single analysis, as they see it as part of their responsibility to society.
- A weekend course in environmental management and sustainability running over one month for NGO's and small companies.
- There are nine PhDs in the centre, of which 4-5 are doing participatory research as part of their thesis.

Especially the focus on participatory research is how the centre differentiates science shop activities. In addition, when talking of the impact the science shop has had, the informant relates how she has carried the participatory approach into her own work in the form of courses and research.

When asked about the Living Knowledge network the informant thought it more like a dialogue forumthan an active organisation i.e. it was mostly about talking, and too little action and projects. She felt that that network needed reinvigoration to draw in academics, much like the current situation with INRO.

5.1.2.3 InterMEDIU Bucharest

InterMEDIU Bucharest is another active centre, which seems more interested in INRO and more connected to the science shop concept, partly due to their recent involvement in PERARES. Inside the Intermediunet (INRO), InterMEDIU Bucharest offers information, consultancy and research in the field of environmental protection and management, as well as environmental education and training (Mulder 2014).

The Centre in Bucharest seems to have more focus especially on community educational activities, and one of their main activities is a yearly science symposium for high school students and teachers. In connection with PERARES InterMEDIU Bucharest also held three science fairs in smaller towns outside Bucharest, which were so successful that the towns have asked them to return. However, the staff funds all activities privately. Symposiums and science fair are done during the weekends, transportation with their own cars, and labour is a combination of students and family (Stanescu, 2015).

They have in connection with PERARES also helped starting a new type of science shop called Labworm. The objective of Labworm is to develop and promote science understanding bringing together young students from different schools, teachers and NGOs involved in their science projects, so they become closely related to the activities of InterMEDIU Bucharest.

5.2 Aspects of 'innovation' and 'change' of the local initiative

5.2.1 Relation with social innovation

The InterMEDIU is involved in several instances of social innovation. First and foremost InterMEDIU itself can be seen as a social innovation, just as Science Shop DTU was. InterMEDIU creates new relations between society and university, and educates actors within both parties in new ways of doing projects, creating new research areas, raising awareness of issues, helping civil society and university to renew and develop. INRO was also an innovation in Romania as there never had been a national organisation of academics spanning several universities.

5.2.2 Relation with system innovation

InterMEDIU like Science Shop DTU had two distinct focuses, inward to the university and outwards to civil society. One strategy for InterMEDIU to integrate into the university system in Romania was to make it possible for students to get credit and do projects as part of the curriculum. The Department of Biology of Bacau University introduced the optional course 'environment and society' for this purpose. Allowing students to write a paper, or even their diploma project or master's thesis, on a subject from InterMEDIU, or fill in an internship period with work for InterMEDIU were other options.

The start-up project with InterMEDIU was compared to a similar project in Brno (H. Mulder et al., 2001), and the InterMEDIU was more successful due to the successful integration into existing systems. The actors involved as contacts at the universities were at a higher level, principals and deans, and official agreements were signed with all participating universities. There were also InterMEDIU offices at all universities separate from each other, mostly set up as separate departments or independent units. The success also stems from how InterMEDIU was successfully aligned with strategies of the existing system (Teodosiu & Teleman, 2003).

For universities InterMEDIU was an interesting option because of the international contact and the innovative type of research. For the InterMEDIU staff the project served as a base for scientific publications and raised further technical questions that were approached by means of the research part of diploma of engineering theses. The supervisor of the project (InterMEDIU manager) used the project information and included it in the regular course of Water Treatment Technologies, taught to the 4th year students at the profile of Environmental Engineering (Teodosiu & Teleman, 2003).

Despite this successful integration, the InterMEDIU centres never received funding from their host universities. The management was very cooperative as long as there was international funding, and is still sympathetic as can been seen from the continued existence of InterMEDIU, but resources are in general very scarce at Romanian universities.

INRO is a legal entity and innovative in that it enabled the members to apply for both national and international funding for projects.

5.2.3 Relation with game-changers

The expansion of the EU, and the applications of the Eastern bloc countries to become members from 94-96, resulted in a set of requirements especially in relation to the environment that the countries could not fulfil at the time, and was a major influence for reforms and activity in that period. The financial crisis also hit Romania, but might have had less impact on the InterMEDIU centres as they did not receive any funding prior to the crisis anyway. However, the crisis may have hit the CSOs as they are less and less willing to work with the InterMEDIU centres (Stanescu, 2015).

5.2.4 Relation with societal transformation

A game-changer was the fall of communism and the process of becoming a multi-party democratic country. Although this process started in the early 90'ties, it is still on-going and the context for why InterMEDIU was relevant and interesting for some of the partners (Teodosiu & Teleman, 2003).

5.2.5 Relation with narratives of change

There seems to be a narrative of change related to post-communist development of civil society. The reports from the early period all stipulate this context, based on quotes from Romanian actors. Another aspect emphasized in the stories told by students and researchers are the international aspect, they wanted to be part of international projects, and be able to put it on their CV (see for example (Teodosiu & Teleman, 2003).

5.3 Aspects of empowerment and disempowerment of the local initiative

5.3.1 Governance

5.3.1.1 Internal governance

InterMEDIU is organised either as independent non-profit departments of the Universities (Iasi Technical and Galati universities) or managed by a specific Faculty (Iasi, Cuza and Bacau universities). Initially a board of supervisors (with members of the faculty council and university senate and members of the Dutch project team) was responsible for the general activity, as well as changes in statute or mode of operation. InterMEDIU perceived themselves as independent organisations situated between the public, local administration, and university. In addition, Two of the InterMEDIU units were either associated with or became their university's Centre of excellence (Teodosiu & Teleman, 2003).

It seems that the governance today is less formal, and a coordinator mostly runs the centres. In InterMEDIU Bucharest for instance the coordinator says that it is a very flat organisation, the members take care of the functions they are best at, and even though she is formally the coordinator there is no difference in practice between her and the other staff members (Stanescu, 2015).

InterMEDIU had adopted the Dutch science shop model of operation, but there were several differences that particularized them in the Romanian context related to the structure of civil society (level of organisation, involvement, openness for co-operation with universities), general perception on the possibility to influence public attitudes or specific policies, perception of governmental organisations about public access to information, reduced experience with voluntary work. The economic differences also led to the inclusion of companies and public organisations (such as the Environmental Protection Inspectorate) among the clients, a situation that differs from the Dutch and Danish science shop cases. In short, they had free reign from the university, and less restriction on types or partners than the Dutch and Danish science shops, and this empowered them (Teodosiu & Teleman, 2003).

INRO, the national science shop network, was created as a legal entity, and has a formal organisation with a board and an elected leader, which is InterMEDIU Iasi. However, there are few formal activities in INRO besides those relating to external structures. This is partly because the focus of the INRO coordinator has turned to research collaboration:

> *I would say it is a loose network. And you cannot formalize it very much, because as I mentioned before, there is a huge pressure on terms of research, you cannot involve all your kin only for doing this kind of activity* (Teodosiu, 2014).

In other words, it is unfeasible for her within INRO to set up larger projects focusing on research , which they are being forced to focus on, and she mostly cooperate with one of two of her colleagues for papers, projects, and sometimes a shared PhD, but outside the framework of INRO.

5.3.1.2 External governance

Relations with the university and educational system
The InterMEDIU centres mostly relate to the structures of their universities, initially at least, to fit in and take advantage of the education system. A example from the science shop in Brasov:

> *Some 25 students from five faculties, ranging from first year to PhD level, participated in research for the Energy and Environment Plan of Brasov. To achieve this, a matrix (spread sheet) was made of professors (with dates and number of students in courses and practical/thesis's periods), specialities (subjects, disciplines). This "supply" of knowledge could then be matched with the demand from the "client" (beneficiary). This seems like a very good way to start the integration process of science shop projects into the curriculum* (H. A. J. Mulder et al., 2006).

The science shop activities have also contributed to the on-going modernisation of the curricula and research by providing flexible modules of learning and project based learning, inclusion of science shop project results into the regular teaching activity (Teodosiu & Teleman, 2003)

INRO was formed to relate to the structures at national level that funds research activities as well as the international funding opportunities like the EU Commission. In the Living Knowledge network projects the InterMEDIU centres have mostly participated individually and not as part of INRO. INRO is in direct competition with CSOs and NGOs for funding opportunities, which have led to some hostility from their supposed client group (Stanescu, 2015).

Relations with society
Relations to the public through were managed in several different ways during the initial years (Teodosiu & Teleman, 2003):

- Mini-conferences were organised by InterMEDIU Centre, so as to communicate project aims and intermediate results:
- Meetings with the Environmental Protection Agency representatives;
- Mass-media meetings;

Communication with the media was not always as open and good as expected. The media had access to the report and representatives of all newspapers; local TV stations were invited at the public debate. The first presentation of the project in a local newspaper was not very objective and stipulated on key words that were considered important for selling the newspaper. Thus, objective evaluations and conclusions related to the study were presented only with emphasis on the toxicity of water, a fact that created some problems for participants involved in the project. The public debate, all the other articles and media coverage, benefited of objective presentations (Teodosiu & Teleman, 2003).

Another issue is the lack of interest in public participation in Romania, which some associate with:

> *…the transitional economic, social and institutional environments in Romania, where the main efforts were focused on solving immediate political instability situations and socio-economic issues, rather than restoring the communist-damaged social structure by promoting the civil society initiatives and*

> *encouraging it to actively participate in project development activities and participatory processes* (Teodosiu, Barjoveanu, & Kruijf, 2013)

This is quote is one of the experiences from a project from InterMEDIU Iasi. The paper goes on to point out that water-users, which were the relevant group in the study, have what they call a "minimal response behaviour" towards environmental issues, which together with a "chronic lack of transparency" at Romanian institutions and companies complicates the situation further. The coordinator from InterMEDIU Bucharest agrees to some extent, commenting that the public is not used to this type of participation, and reacts with a degree of suspicion, or does not take it seriously because "how serious can it be when it is free" (Stanescu, 2015). The InterMEDIU centre in Bacau notes that the involvement of civil society in environmental issues in Romania is not very strong, but they experiences a series of improvements in their attitude towards environment and decisions regarding environmental issues (H. A. J. Mulder et al., 2006). In short, there seems to be great need of science shop work, but it is very challenging to create partnerships and links with society, companies, public institutions, and CSOs alike.

Another challenge is that the InterMEDIU centres do not accept request from clients in the same way as many other science shop, as they have no funding, and so they cannot handle many request.

> *The load we have, the working load, is very very high, really. And i cannot afford to delegate someone to deal with these issues […] I mean we already do a lot of extra things, apart from the work* (Teodosiu, 2014).

This situation is not that different from DTU, when the department leader commented that they could probably get more requests and students if they advertised more widely i.e. opened the door wider, but he did not think they had the resources to handle more requests than they did at the time. The situation in Romania just seems even more pressed, with less resources, so they do not advertise and only take the request which are channelled by colleagues and the university. However, InterMEDIU Bucharest on request designed a weekend course on environmental management for NGOs, SMEs, and local authorities (Teodosiu, 2014).

5.3.2 Social learning

InterMEDIU facilitated social learning in several ways, primarily together with the participants, i.e. students and NGOs. In the projects, the students were taught new skills like teamwork, project-management, and communication, which at the time was not present at Romanian universities. The students also learned how to do qualitative research like interviews, and got experience with "real life" projects handling issues in society. An InterMEDIU manager also described that students are "sort of `social ferments´ outside the universities, they can make known by themselves their knowledge in their own community, especially when they are members of a local NGO" (Teodosiu & Teleman, 2003).

Some of the NGOs likewise learned how to cooperate in projects with other NGOs and/or governmental organisations, and used the results to obtain more influence. One report from a project on water quality was used by the Environmental Protection Inspectorate to contribute to the list of the ten annual priority projects for the county, and sent afterwards to the Water and Environmental Protection Ministry.

Lastly the researchers working as coordinators in InterMEDIU channelled their learning into the courses they were teaching, and thereby disseminated the social learning they had been through. As the Dean of one of the universities explained "The science shop activities contribute to an active presence of our Faculty, the development of its links with society and the identification of emerging research themes (suggested by community groups, other organisations)". According to the staff at InterMEDIU, students also "become more aware about environmental and social problems".

The personal and professional development of the participants - students, researchers, and civil society actors - has also been significant. Some students radically changed their career, and several commented in the early reports about the InterMEDIU experiences how positive the project experience have been, and that they have put it on their CV. At this time in Romania, there was little opportunity to be involved in international projects, and so it was of great significance for the students, and many of them improved their communication and English skills noticeably. At least one of the students also advanced to do a PhD in a related area.

5.3.3 Resources

There are several types of resources in play like money, human resources, and academic credits like ECTS-points, career/CV experiences etc. All universities involved in the start donated office space and furniture, as well as all other facilities normally offered to staff and students; all the rest of the expenditure came from the project budget. Contacts of the Dutch team members with rectors and deans were very important to ensure their support. In general, InterMEDIU had problems with getting adequate funding after the end of the MATRA grant, but InterMEDIU have obtained some project grants and established longer-term projects to generate income through, for example, the Centres of Excellence, by developing distance learning courses, and through small paid projects and analyses (consultancies). The main problem is to finance salary payments (the core financing); small expenditures for exploitation are more easily covered from individual projects.

The main human resources needed are students for doing projects, and faculty member to act as supervisors and staff in InterMEDIU. Students seem to be abundantly available, but voluntary work is a new concept for Romania, but they managed to overcome this issue by entering voluntary work for Science Shop into curricula within an optional course Environment and Society (H. A. J. Mulder et al., 2006). Volunteer work can also be "paid" by providing experiences valuable on a CV:

> *Even if I had to work more when I came back from The Netherlands, in order to recuperate my laboratory and design assignments and to prepare the lectures that I have missed, I was never sorry for that, the participation at this international project was really a chance for me" (BS, student in* (Teodosiu & Teleman, 2003)*).*

The student still seem willing to participate, as an international project is good on their CV and will give them job opportunities, as this type of experience was rare in Romania. This characteristic might have been specific to the early case studies, as the later projects after the end of MATRA fund might more often be local projects. Information on how to prepare a project proposal or project management are not subjects in the curricula and therefore these opportunities are valued by

students, because there are many grants and foundations in Romania they can apply for. The staff on faculty also get points internally in the university, and bonus payment, for working in InterMEDIU (Teodosiu & Teleman, 2003).

The reports represent knowledge and were also used by the clients. A Water Works Company used the report as documentation for the necessity of improving the quality of drinking water and modernisation of water treatment facilities and also for the necessity to include these in all the local development strategies (Teodosiu & Teleman, 2003). This corresponds to one of the ways Science Shop DTU empowers CSO by providing knowledge.

As one of the NGOs who initially contacted the Dutch science shops said, it was a completely new activity in Romania. The initial project changed the way this NGO worked, and even thought they had no further science shop projects, they had projects with governmental organisations and other NGOs. Another InterMEDIU project resulted in supplementary environmental protection course at some elementary and secondary schools, as well as camps during the summer. Other projects likewise in some cases resulted in new courses and research areas at universities.

5.3.4 Monitoring and evaluation

Some specific projects, which were involved in MATRA, were evaluated upon completion, but otherwise we have had no evaluation of later projects. And as the InterMEDIU centres receive no funding, and mostly run on volunteer basis and have flat structures, there is not monitoring and evaluation as part of their work.

6 Synthesis of case study

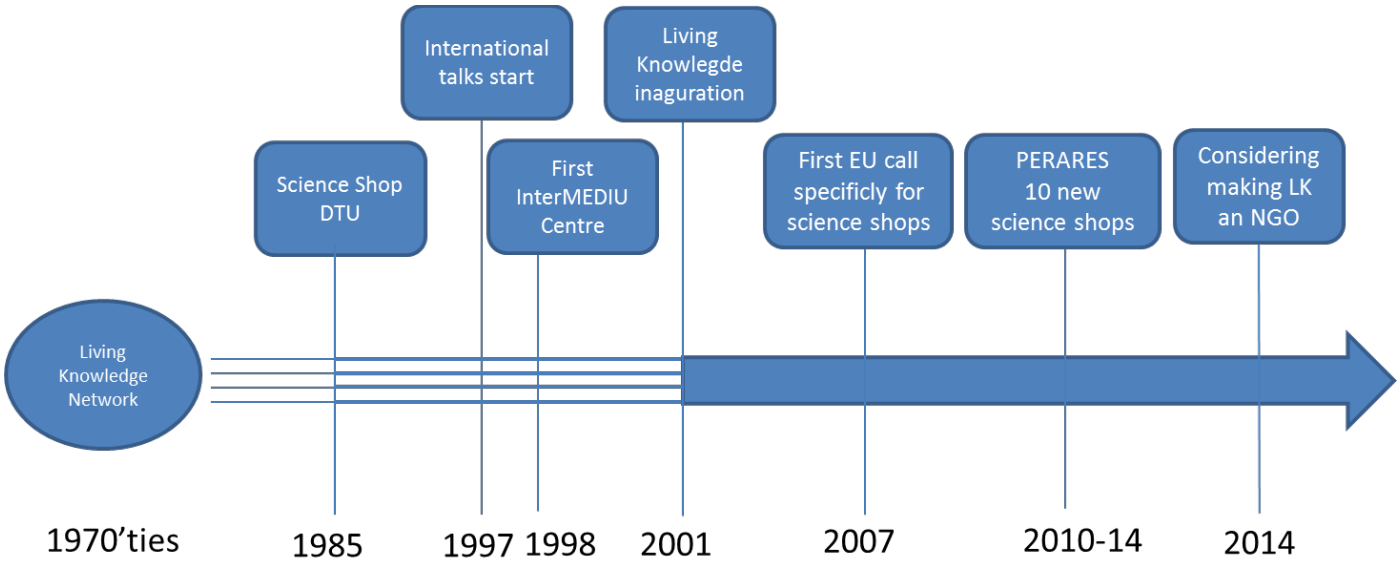
6.1 Condensed time-line

The science shop movement started in the 1970'ties and spread to Denmark in 1985. In the early years, there was some communication when the Danish initiative tried to establish their own shop model, but there were no collaboration on projects, and the communication petered out. Besides some visits and general conversations there was no activity internationally, at least not involving the two local initiatives during the first many years. Then in the late 90ties, contact is established between Science Shop DTU and the Dutch science shops. Around the same time, the Dutch ministry of foreign affairs finance a science shop project with Romania that leads to the establishment of the first InterMEDIU centre. The international interactions lead to the first EU project called SCIPAS, where both Denmark and Romania are partners, which eventually lead to the formalization of the science shop movement as the Living Knowledge network. After the inauguration there have been two waves of new science shops established supported by the projects TRAMS and PERARES funded by the EU.

In the old science shop countries (generally Northern Europe) science shops have been in decline. It is hard to pinpoint it to a specific time, but from around the late 90'ties where Science Shop DTU also started to feel budget cuts. This may in some cases relate to the decreasing number of student coming to the natural sciences, which was the case for Science Shop Groningen and Science Shop KU focused on natural sciences (Copenhagen University). It took speed in the early 00'ies and, and during the new millennia all science shops in Denmark closed down, with Science Shop DTU surviving until 2012. In the Netherlands, the same pattern has been observed, with several universities closing down science shops. The most recent development is considerations on establishing the Living Knowledge network as an NGO, allowing it to answer more calls for projects than previously. In addition, as mentioned there have in the new millennia been two new waves of science shops, some of them outside any EU projects or funding.

For some local initiatives, the Living Knowledge network and the EU funded projects may have meant the difference between death and survival. For Science Shop DTU it was not a necessity to survive, but it meant that a crucial actor, Søsser Brodersen, could be retained as staff in the science shop. Brodersen was important as she managed many of the science shop projects during the later years, and brought in new areas like design for disabled. In Romania the international funding, from before the Living Knowledge network was formally established, has been the sole reason they started, and the possibility for funding is the main reason for the continued existence of INRO.

The new science shop initiatives started during the most recent EU project, PERARES, all felt empowered by different aspects of the support they got from the Living Knowledge network. Funding and mentoring were the most important aspects. Some new initiatives needed the funding for running pilot projects or in other ways establishing themselves, while others found the mentoring and personal contact more valuable, and the money simply allowed things to move faster. A single of the new initiatives, in Lyon, was also happy over the documents and the toolbox available through the Living Knowledge website, but generally it seems that the documents are hard to use without mentoring. In Romania, the documents are used in connection with mentoring of new initiatives.



6.2 Aspects of 'innovation' and 'change'

6.2.1 Social innovation

The local science shops were all innovations in their context, opening the door to their respective universities. The local initiative in Denmark further innovated on the model, and succeeded in establishing Science Shop DTU/Interdisciplinary Centre as a research organization in itself able to act as incubator for new research (and teaching) areas based on societal challenges. This form of grounded research, starting research based on initiatives from society, was an innovation at the time. The core here is opening op for seeing civil society as partners in doing research and thus co-producing knowledge.

The InterMEDIU network is in a very different context where resources are very scarce, and they never found a reliable source of funding. The InterMEDIU centres still opened the door to the university, but on a much smaller scale, as they do not currently have the resources to handle many requests. However, the InterMEDIU centres have been successful in their anchoring of participatory research methods, at least in their own departments. The Romanian context also differs from the old science shop countries in that the civil society is not used to participate, and are sceptical towards free services. So bringing participatory methods into play is in itself also an social innovation in Romania.

6.2.2 System innovation

The Living Knowledge network plays a major role in system innovation, as it enables the local science shops to interact with authorities and organisations at the international level, like the EU commission, and through this constellation receive funding or other types or resources. The Living Knowledge network is currently evolving to the next stage, establishing itself as a legal entity, which would enable it to interact further with formal international structures like the European Union. The Living Knowledge network also enabled relations with global networks and organisations like GACER and APUCEN, although it is unclear what the effects of these relations have been. Living Knowledge, and earlier local Dutch and Danish science shops,have over some years helped starting or supporting science shops in South Africa, Malaysia, Thailand, South Korea plus other Asian countries.

The local initiatives share many characteristics, integrating themselves in the national education systems. How they interact with the national research systems, and how the relation to civil society works, is more context specific. Science Shop DTU are the most successful example in integrating with research systems, as discussed in a previous chapter, and successfully anchored several research areas at the university. It is also possible for other science shops to do likewise. None has so far in the same way acted as incubators for new research and teaching areas, but there are similar experiences from some Dutch science shops (Hende & Jørgensen, 2001). Experience have also shown that in general it is very hard to establish a science shop outside a university as an NGO, as it is more difficult to get access to students as resource, which is one of the most important resources in the traditional science shop model.

6.2.3 Game-changers

Some game-changers have been general and some more context specific. For instance, the new university law from the Danish context was a game changer for Science Shop DTU, but reflected a general tendency in Europe related to New Public Management, also related to the commercialization of the universities. This development affected most of the old science shop countries i.e. Denmark, Netherlands, Germany etc., where science shops have been in decline.

The Romanian InterMEDIU centres did not experience this game changer, as it was already occurring during their establishment. In addition, they never secured reliable funding, so they had nothing that could be taken away funding-wise. However, they faced the same requirement from university management and their government that they should publish papers to get international recognition, something that started in the mid 90'ties in Denmark. This has effectively robbed much of the time of the staff in the InterMEDIU centres.

However, new science shops have also started up during the later period (post-2000), but some are facing the same challenges as the old science shop countries when initial funding ends.

6.2.4 Societal transformations

In general, science shops have been good at reacting to societal transformations and doing projects in new areas like organic food and urban ecology. In addition, the movement has clearly affected some societal transformations that are directly linked to their aim of influencing policy makers, and CSOs have in many public institutions, especially at the European level, become part of the focus. One example is how Science Shops are named specifically in some calls for projects by the EU Commission, but there are also several national examples like the national co-ordinating centre for public engagement in the UK, directly funded by the Research Councils UK and Higher Education Founding Council for England. How successful this discourse has been differs between the countries, and the Danish and Romanian governments have not yet put any particular focus or funding into this area.

6.3 Aspects of empowerment and disempowerment

6.3.1 Governance

Of internal governance there generally is little either locally or internationally. The different local initiatives are headed by a coordinator, and sometime have a board or a council advising or governing the initiative. Often the initiatives would be subject to university management, but in the case of the two local initiatives in this report, there were few requirements about internal governance structures from university management. Some science shops have defined their procedures and processes on their own initiative. The Living Knowledge network have even less, the core being a simple mailing list, and the webpage managed by one of the local initiatives. There is no coordinator/leader or board governing the network. The different stakeholders meet at conferences or other events at their convenience, or have Skype meetings if relevant.

One of the biggest concerns is the core-funding for staff in the science shops, and the various structures like the Living Knowledge network and INRO all have as one of their core objectives to secure project funding for the science shop activities. The international network empowers through the funding it can get from EU projects. Another aspect though is influencing policy makers, putting science shops and CSO on the map when discussing research and engagement policies, which have been successful at the European level and in some countries like the UK. Living Knowledge cannot take all the credit for this societal change, but dialogue with policy makers have been part of the activities.

The activities carried out within the framework of Living Knowledge are very different from those carried out by the local initiatives. The role of the Living Knowledge network is mostly to empower the members in their work, through funding opportunities, knowledge exchange, legitimacy of the movement etc. The core of the science shops is as mentioned that a science shop “Provides independent, participatory research support in response to concerns experienced by civil society”, which the network does not do as an entity currently. As such, the network has a supporting role, and not a leading role, in relation to the local initiatives. However, the role in spreading new science shops has been an important role. It has been an aspect of two EU projects, and sometimes-

interested actors approach the contact point or one of the members, who then generally handle it personally, and do not involve Living Knowledge as a network.

Empowerment through validity and legitimacy is another cornerstone of the Living Knowledge network. In some ways, the legitimacy the network can give to local initiatives can be seen as a resource, but most of all it is a governance structure meant to target authorities at different levels. As one of the principal actors in the network commented, the 6th living knowledge conference in Copenhagen really convinced the EU commission and other actors about the activities within Living Knowledge (Steinhaus, 2014).

In general, the universities have become more open to society, partly facilitated by science shops, but a lot of this opening up is towards companies and not civil society. Many of the Danish science shops gradually changed together with the universities and became focused on projects with companies and developed into new entities unrelated to science shop work, or simply closed down.

6.3.2 Resources

As mentioned many times, the Living Knowledge network helps apply for funding from the EU Commission for projects. Another key resource is knowledge in the form of documentation, projects reports, and other forms of knowledge and experiences, which are archived at the Living Knowledge webpage. This knowledge is most valuable through personal mentoring from the science shop partners in the Living Knowledge network.

Another key resource, which may in some ways be more important than funding, is access to students and supervisors at the university. The Romanian science shops survive to this day without funding, but with access to students. Some of the new initiatives established during PERARES are failing, or having hard times, even though they received funding because they were established as NGOs and had no or little access to the resources at the university. Apart from this, one of the traditional roles of science shops have been to influence and teach students about participatory research and how to engage societal issues, which is hard as an NGO. In relation to students, the ability to award some form of accreditation, commonly ECTS-points, is also crucial, as students would rarely do science shop projects for free. However, the opportunity for projects in educations differs greatly from country to country.

Another aspect is “ildsjæle” which is akin to a firebrand in English i.e. individuals who burn for their cause, or by some academics referred to as intangible human capital. It is important to have individuals invested in the idea, and not just a contract labourer, especially as the local initiatives in the later years required someone to fight for their continued existence. However, it is important that there is some possible career in the future and the individuals can support their personal life. If initiatives are manned by volunteers or part-time workers there is little continuity, which makes an initiative vulnerable. Several examples in different countries have observed how the right persons were “lacking” at important times to ensure anchoring of new initiatives, or sustaining old ones.

6.3.3 Social Learning

Social learning takes place in many different ways, both at the university and in society. At the university, students and lecturers alike learn about participatory research methods, and students experience projects situated in real life problems. In society CSOs learn something about scientific research projects, how they are carried out, what is possible, how can projects be defined etc. In some cases they have learned how to do scientific research themselves, in other cases they learned how to work with student groups independently from the science shop. In the Romanian case it proved challenging just to get civil society to participate in research, which is a learning process that seems to be successful, albeit slow.

The knowledge generated has resulted in numerous artefacts, in the form of reports, pamphlets, papers, presentations, articles, which are all available to the public. From time to time there are requests from external actors to see some of these documentation, it is however very hard to judge how the achieve is used and what effects it have had.

6.3.4 Monitoring and evaluation

This aspect never played a big role for the science shop movement, either locally or internationally. The various international or national bodies who grants money require different forms of monitoring and evaluation, but in general there is little internal monitoring and evaluation in the local Science Shops or the international network. However, research about the benefits of science shops to universities were one of the early research themes within the Living Knowledge network in order to be able to argue for the importance of science shops for the universities. Generally, the societal context has developed in a way where universities controls funding more tightly and require more reporting, but the monitoring and evaluation required from Science Shop DTU from management did not go beyond a yearly report on some key indicators. The InterMEDIU centres receive no funding, so in turn have even less requirements to fulfil related to their university management. There may be contextual differences, but only during few of the interviews have the informants talked about monitoring and evaluation as either empowering or disempowering. Several informants mentioned though that it would have been nice if they had a procedure or process where they contacted civil society actors involved in science shop projects after a period of time, so impact could be tracked more easily.

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Annex 2: List of interviews

Name	Function/ Organisation	Email	Date & place	Language	Interviewer
Local Case 1					
Michael Søgaard Jørgensen	Koordinator/Science Shop DTU	Michael Søgaard Jørgensen <msjo@plan.aau.dk>	29/08/2014 10:28:00 AAU Copenhagen/Library	Danish	Jens Dorland
Morten Elle	Project Supervisor/Science Shop DTU	Morten Elle <elle@plan.aau.dk>	05/09/2014 11:20:00 AAU Copenhagen/Library	Danish	Jens Dorland
Søsser Brodersen	Full time employee/ Science Shop DTU	Søsser Brodersen <sbro@plan.aau.dk>	25/09/2014 09:30:00 AAU Copenhagen/DIST Lounge	Danish	Jens Dorland
Michael Søgaard Jørgensen	Koordinator/Science Shop DTU	Michael Søgaard Jørgensen <msjo@plan.aau.dk>	15/09/2014 13:11:00 AAU Copenhagen	Danish	Jens Dorland
Niels Heine Kristensen	Founder/student assistant/phd/supervisor	Niels Heine Kristensen <nhk@plan.aau.dk>	06/10/2014 13:17:00 AAU Copenhagen	Danish	Jens Dorland
Lisbeth	Miljøpunkt Nørrebro/Agenda21 center	lisbeth simonsen <lisbethvedel@gmail.com>	28/10/2014 10:00:00 Miljøpunk Nørrebo	Danish	Jens Dorland
Local Case 2					
Rodica Stanescu	InterMEDIU Bucharest	rodica_stanescu_ro@YAHOO.COM	29/09/2014 Brussels	English	Michael Jørgensen
Carmen	InterMEDIU Iasi		12-12-2014 Skype	English	Jens Dorland & Michael Jørgensen
Rodica Stanescu	InterMEDIU Bucharest	rodica_stanescu_ro@YAHOO.COM	08-01-2014 Skype	English	Jens Dorland
Michael Søgaard Jørgensen	Koordinator/Science Shop DTU	Michael Søgaard Jørgensen <msjo@plan.aau.dk>	08/01/2015 09:00:00 AAU Copenhagen	Danish	Jens Dorland
Michael Søgaard Jørgensen	Koordinator/Science Shop DTU	Michael Søgaard Jørgensen <msjo@plan.aau.dk>	09/01/2015 10:00:00 AAU Copenhagen	Danish	Jens Dorland
International					

Networking					
Meira Hanson	The Herschel Center	Meira Hanson <meirahanson@gmail.com>	29/09/2014 Brussels	English	Jens Dorland & Michael Jørgensen
Catherine Bates	Dublin Institute of Technology	Catherine Bates <catherine.bates@dit.ie>	30/09/2014 Brussels	English	Jens Dorland & Michael Jørgensen
Andreas Efstathiades	European University Cyprus	Andreas Efstathiades <A.Efstathiades@EUC.AC.CY>	30/09/2014 Brussels	English	Jens Dorland & Michael Jørgensen
Evangelos Grigoroudis	Technical University of Crete	vangelis@ergasya.tuc.gr	30/09/2014 Brussels	English	Jens Dorland & Michael Jørgensen
Davy Lorans	Chargé de projets Accès de la société civile à la recherche Service Science et Société, CCSTI du Rhône	Davy Lorans [mailto:davy.lorans@universite-lyon.fr]	01/10/2014 Brussels	English	Michael Jørgensen
Grenoble Science shop	Grenoble Science Shop - ADReCA		01/10/2014 Brussels	English	Jens Dorland
Hector	Teadusturg - Estonian Science Shop		01/10/2014 Brussels	English	Michael Jørgensen
Andrea	IntHUM/FOIST		08-10-2014 Skype	English	Jens Dorland & Michael Jørgensen
Norbert Steinhaus	Science Shop Bonn/Living Knowledge network contact point		08-10-2014 Skype	English	Jens Dorland & Michael Jørgensen

Annex 3: List of meetings and events attended

Events & Participant Observations	Date & Time	Location	Who?	Link
Living Knowledge Conference	8th-11th April 2014	Scandic Hotel Copenhagen	Conference participants	http://www.livingknowledge.org/lk6/
Final Consortium Meeting PERARES	29th Sep -1th Oct 2014	U-Residence - Brussels	PERARES Partners	