

Case studied: Science City Tartu, Estonia  
Date of field work: September to December 2012  
Modules used: "Modules A3, B1, B2 and C3"  
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## **1. Abstract**

Case study Tartu as scientific city was carried out from October to December 2012. In total three modules (two focus groups with ordinary citizens, semi-structured interviews with stakeholders, document analysis and one focus group with relevant actors) were applied.

Ordinary citizens associated the term 'science city' with local science communication institutions. They referred to three groups of people characterizing science city: scientists, tourists and students. Citizens found science city as positive by nature and preferred place for living and working. They regarded new Science Centre Ahhaa as one of the most popular local institutions.

Stakeholders described three types of added-values emerging from the communication of science and technology: raising awareness of citizens on science, raising popularity of natural sciences, awareness of public expenditures. Interviewees believed that citizens perceive themselves as belonging to an innovative society.

They noted that science communication institutions like Ahhaa, have led to increase in tourism and activated local economy. They expressed criticism that science communication initiatives are financed as project-based that is not sustainable financial measure for follow-up projects. Interviewees stressed that institutions dealing with science communication have worked out new courses for students and citizens.

Major objective of policies is to advance the position of Tartu as internationally competitive education and research campus. In future knowledge-based economy is expected to prevail. However, document analysis revealed that Estonian public is still moderately informed about usefulness of science and scientists.

Actors considered Tartu as favourable environment with networks that can be useful for themselves or their institutions.

## 2. Introduction

The current study investigates the impact of initiatives and policies related to science communication (SCIP) in Tartu. Tartu has been chosen into the case study as the most representative science cities in Estonia. Tartu is a city with two public universities – the University of Tartu and the Estonian University of Life Sciences – and eight scientific centres of excellence. The major part of Estonian researchers and members of the academic teaching staff works in Tartu. There are also numerous science museums operating. Tartu has tradition of science museums since the beginning of 19<sup>th</sup> century. In the May 2011 newest and salient enterprise, Science Centre AHHAA was launched. Science events and festivals like Night of Scientists take place regularly. Different internationally operating high-tech companies like Skype employ people in their Tartu branches.

Tartu, with its population of 97,600 (Population Census data from 2011) in an area of 38.8 square kilometres, is the second largest city of Estonia. Tartu, lying 185 kilometres south of Tallinn, is also the centre of Southern Estonia. Since 2001 Ministry of Education and Research operates in Tartu.

Eurobarometer series of surveys on the life sciences (Gaskell et al 2010) portray Estonians as eager adherents of technological optimism in European context. Results of the entrepreneurship study in Tartu (Rämmer 2011) point that local entrepreneurs see the image of the city of Tartu as the most attractive aspect of investment climate.

Historically Tartu has been prominent university town. After foundation of the University in 1632 it educated mostly specialists for local needs until Estonia was part of Swedish Kingdom. In the 19<sup>th</sup> century it was one of leading universities in Russian Empire. The University constituted itself bridge between Russia and Germany: being Russian state university, German was the language of instruction. Many prominent scientists like Karl Ernst von Baer (founding father of embryology) and Wilhelm Ostwald, (Nobel Prize in Chemistry) studied and taught at Tartu University then. After gaining independence in 1919 when it became national university and under Soviet rule it keeps high reputation among Estonians. For Estonian public Tartu has continuously reputation as “University Town”. Nowadays Tartu is internationally prominent science city. Scientific institutions in Tartu represent practically all Estonian research areas and specialities. Results of the researcher mobility study (Murakas et al 2007) reveal that scientists themselves tend to be convinced that best way for being updated with the newest developments on their speciality in such a small country like Estonia that is locating on the crossroads between the East and the West is to stay internationally open.

### 3. Methods

The current study focuses on Tartu as a science city and investigates the impacts of science communication initiatives and policies (SCIP) on the citizens, actors and political sphere. According to the PLACES Impact Assessment Toolkit four given modules were applied (see Table 1). In the case study, qualitative methods and document analysis were employed to collect information about influences of SCIP. Focus group interview method was chosen for public and actors' spheres because it allows interviewing multiple individuals simultaneously and enables to gather shared discourses which emerge during group discussion.

**Table 1. Modules and method used in the study**

Dimensions	Module	Study method
Public Sphere	Module A3	Focus groups (n=2) with ordinary citizens
Policy Sphere	Module B1	Semi-structured interviews (n=6) with different stakeholders (5 personal interviews and 1 group interview)
	Module B2	Document analysis
Actors' Sphere	Module C3	A focus group interview with relevant actors

#### *Sample design and procedure of interviews*

*Public sphere.* The aim of focus group interviews was to investigate views and estimations of citizens on Tartu as a science city and impacts of living in Tartu on their life. Next criteria were followed in sample formation: a potential participant should have lived in Tartu for some time; he/she has at least secondary education, and he/she has not working experience at the universities or research institutions nor engaged in organisation of science communication activities. The focus groups were designed so that both groups would include equal number of males and females. Two focus group interviews were conducted, 6 to 7 persons in each group. Altogether 13 individuals (7 men and 6 women) participated in the interviews. The age of the participants varied from 25 to 42 years, the average age was 35.

*Policy sphere.* The objective of interviews with stakeholders was to assess impacts of SCIP on policies, quality of life, education and socio-economic effects in Tartu. In the choice of interviewees certain criteria were taken into account. Into interviews were invited stakeholders working or having a position in institutions related to science communication, research and science policy making in Tartu. The sample included 7 experts whose names and affiliations are presented below:

Tiia Teppan (Deputy Mayor of the Tartu City Government; her responsibilities are education, culture, science and youth work);

Raimond Tamm (Deputy Mayor of the Tartu City Government; his responsibilities are development plans, urban planning);

Terje Tuisk (head of the Department of Science Communication, Estonian Research Council);

Pilvi Koik (board member, Science Centre Ahhaa);

Villu Päärt (editor-in-chief of the science e-magazine “Novaator” of the University of Tartu).

Kalev Tarkpea (Head of the Department of Coordination, Institute of Physics, Faculty of Science and Technology, and mentor manager at the Office of Research and Development, University of Tartu);

Evelin Loit (Senior research fellow, Head of Department, Department of Field Crops and Grassland Husbandry, Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences).

*Actors’ sphere.* The main goal of interview with actors was to examine how involvement in the city of science initiative has influenced them. The requirements for the selection of actors were that their daily work duties should be related to science initiatives and/or communication activities in Tartu. Nine persons agreed to attend in the interview but eventually five of them could not participate because of inappropriate time, busy work schedule or illness. The sample consisted of next four persons:

Helle Jaaniste (coordinator, astronomer, Old Observatory Museum)

Helin Haga (project manger, Science Centre Ahhaa)

Neeme Kärbo (project manager, Tartu Science Park)

Ursula Tubli (chief specialist, Department of Research Policy, Ministry of Education and Research).

All potential participants were sent an email with introduction of the aim of the project and information about conducting the interview. The focus group interviews with citizens and actors lasted about 80 minutes. Duration of interviews with stakeholders was between 35 and 75 minutes. Focus group interviews were carried out in a separate room of the university and individual ones in the interviewees’ workplaces. Interview questions, which have been given in the Toolkit, were translated into Estonian and supplemented with some questions (e.g., questions for experts about terminology of science communication and the personal role of the participant and his/her organisation in science communication). See translations of interview questions in Annexes 1-3 and interview invitations in Annexes 4-6. The interviews were tape-recorded and transcribed verbatim. Participation in interview was voluntary for everybody and remained anonymous for ordinary citizens. The quotations of the interviewees are presented in italics and quotation marks in the analysis.

*Document analysis.* The purpose of document analysis was to analyse documents related both to objectives of science policies and existing evaluations and commentaries on science in society. Here two types of documents were inspected, (a) those that set out plans, proposals and purposes for science policies at city and regional level, and (b) those that display the results of scientific culture initiatives and policies. For the collection aforementioned documents web search from homepages of Tartu City Government, Science Centre Ahhaa, universities, science museums etc. was carried out. At first the analysis focused on development plans, action programs and strategies of science policies and initiatives. Then keywords as science (in Estonian ‘teadus’), science city (‘teaduslinn’), science culture (‘teaduskultuur’), science museum (‘teadusmuuseum’), science festival (‘teadusfestival’), science event (‘teadusüritus’), and science communication (‘teaduskommunikatsioon’ and ‘teaduse populariseerimine’) were used to find relevant documents. For the next documents containing possible previous evaluations and commentaries on science in society were collected.

## 4. Results

### 4.1. Tartu as science city and its impact on ordinary citizens

*The meaning of 'science city'.* At first, the interviewees associated the term 'science city' with specific science facilities, science communication centres and non-formal education centres located in Tartu. They mentioned, for example, the University of Tartu, Science Centre Ahhaa and Youth Centre "Lille House". However, some participants thought in more abstract way - they did not consider science city to be certain institutions but rather an environment that contributes doing science and research and realisation of new ideas. This city would be a science-friendly place with innovative local authorities where many science communication events, festivals, exhibitions, and conferences are held and where creativity and thirst for knowledge are valued.

*"It is a city where, at the government level, one keeps him/herself informed of the latest science achievements and useful things are tired to apply."*

The participants referred to three groups of people that characterize a science city more than in any other cities. These groups are scientists, tourists and young people (students). The most of interviewees named the presence of university as an important aspect of a science city.

*Positive and negative connotations of science cities.* Generally, the participants found science city as positive by nature and see it is a preferred place for living and working. Science city was perceived as offering citizens' diverse opportunities to educate and spend their leisure time. It attracts a number of qualified and innovative people, which in turn means a fast and efficient development of science and business.

*"When they [scientists and educated persons] get together, then there will be created synergy. Then 2 plus 2 is not 4, but even 5, 6 or 7. If there is a critical mass of "the sharpest pencils" or "the brightest brains" together, then added value will be produced already."*

However, some negative aspects were mentioned during the interviews concerning science cities. One of them is unemployment among people with higher education due to overproduction of professionals in certain (narrow) specialities. Therefore some of them will have to retrain or leave the city. Another opinion indicates to a reverse situation where increase of science-based business and activities can be resulted in the lack of human capital which may hinder the progress of science and technology.

*"For example, there aren't available free people in the (labour) market who are competent and want to engage in science."*

The participants also talked that the excessive concentration on science related fields might lead to mono-functionality and insufficiency in other branches of economy (e.g., service sector). Introduction of new technologies can bring about a gap between generations. For instance, older people are less able to cope with ICT devices and digital services than younger, thus there is a need to consider different age groups in elaborating and implementing new technologies.

*Tartu as a science city.* Although we started the interviews with a general question about the meaning of science city without referring to Tartu, the participants started to talk about institutions in Tartu. Questioning about possible science cities in Estonia the interviewees could mention, the first response was Tartu. Though some interviewees, particularly those who were born in Tallinn, presented Tallinn as a competing city in some aspects (like emerging university), but according to the dominant opinion, Tartu is still a leading science and education centre in Estonia. They emphasised that there are many science-related institutions in Tartu, but the

oldest university (University of Tartu), modern Science Centre Ahhaa, the Ministry of Education and Research, and the Old Observatory have a symbolic meaning.

*"We [Estonians] always have such a polarization of power versus spirit [that is represented in the images of Tallinn and Tartu]. In Tartu, we have always seen more such spirit and science. In addition, the University of Tartu belongs to the Coimbra Group and is among 1% of the best universities in the world."*

The interviewees compared Tartu with other towns in Estonia, declaring that the ratio of scientists and science objects per citizen is the highest in Tartu. Moreover, there have been organised more science communication activities than in other towns. The advantages of Tartu are its small size and compactness, so that people can notice science institutions, museums and events easily and visit them.

*Influence of Tartu as a science city on the participants.* The interviewees admitted that living in Tartu has affected them in several ways. Primarily, they pointed out educational aspects. The University of Tartu attracts students from all over Estonia but it is the first option for young people living in Tartu and surrounding areas. Thus the participants found that living in/moving to Tartu has motivated them to attain higher education.

*"Obviously, if I have not lived in Tartu, then going to university wouldn't be so convenient and natural. There is a modern expression in Tartu such as lifelong learning. I seem that it is self-evident. If a person has a will and wisdom and a little ambitions, then there are no limits to study."*

The proportion of intellectuals is high in Tartu; therefore, it is quite likely to belong to a social network with a researcher or scientist. The respondents argued that communicating with such people have made them interest more in science and participate in science events. In addition, they found that Tartu has influenced their choice of profession and offers better job and career opportunities.

The participants regarded that there are quite a common recreational activities in Tartu that provide knowledge of science. They mentioned new Science Centre Ahhaa as the most popular institution of that kind in Tartu and even in Estonia. The centre is a popular place for people at all ages, especially for children and families offering educational and useful entertainment. Ahhaa is also rapidly developing important tourist attraction. Different science communication institutions play central role in the citizens' everyday life. The participants have visited the Old Observatory, Tartu Environmental Education Centre, Zoological Museum, and Ice Age Centre. They liked these institutions because they offer interesting exhibitions, courses and lectures. From science events they considered the Night of Scientists Festival and Tartu Hanseatic Days with its science exhibitions as outstanding. The interviewees liked going to museums and events with friends and family because they saw these visits motivating and such experiences gave them an opportunity to discuss about exhibits and change impressions. Many participants have organised themselves visitations to museums and brought acquaintances and family members.

The participants expressed proud of Tartu as there are universities, the science centre, museums, a lot of hobby circles and activities. They pronounced Tartu's slogan 'City of good thoughts' as representing that there is a pleasant atmosphere for learning, working, implementation new ideas, and for living at all. In sum, it can be said that living in Tartu has influenced citizens' daily life and choices, impacted on their attitudes towards science, made them more intellectually curious and inspired to participate in science centres and activities.

## 4.2. Stakeholders views on impacts of SCIP

*Impacts of SCIP on initiatives and policies.* The participants described three types of added-values, which may emerge concerning communication of science and technology. At first, communication of science will help to raise awareness of citizens thereby they will be able to make informed decisions and improve their quality of life. Secondly, science communication activities will make natural sciences and technologies more popular among young people. The more they will prefer these specialties while admission to the university, the better offspring will scientists get in the future.

*"The more we will have people who study these specialties, the more we will have labour force that will be able to develop new and innovative solutions in this field. And considering the fact that Estonia is such a small country then our advantage of competition can never be a soft discipline. This should be a thing based on knowledge so we can compete in the world."* (Koik)

Finally, communication of science and technology achievements serves to inform the taxpayers about the use of money and to influence their attitudes to make them to favour in elections candidates whose platforms comprise financing of science and technology.

The interviewees stressed that local authorities have played important role in the process of fostering a culture of science and technology in Tartu. The city government has initiated and coordinated science communication activities and made investments in infrastructure. The participants mentioned that the construction of Science Centre Ahhaa and Tartu Environmental Education Centre have been initiated and partly financed by local government. In addition, the local authorities have supported financially non-formal education (e.g., robotics and space hobby circle), activities of the Tartu Science Park and the Research School of the University of Tartu, (international) scientific conferences held in Tartu, different Olympiads of science and technology etc. Among remarkable science fostering policies were also mentioned the nomination of scientists for Citizen of Honour of Tartu and rewarding pupils for good performance in the Olympiads. Establishing Science Centre Ahhaa was regarded as major achievement among the most effective policies in Tartu which contributes development of culture of science.

Public participation in debates and taking into account their views in final decision process about science and technology related issues was regarded deficient in Tartu and Estonia at all. The interviewees told that citizens have been informed about future developments of city. However, majority of interviewees can't bring example where public had a voice in final decision making. Deputy Mayors mentioned that some scientists and experts have been engaged in debates on the elaboration of development plans.

*Impacts of SCIP on quality of life.* The interviewees agreed unanimously that science and research institutions, science communication centres and activities have influenced the cultural identity of Tartu. Particularly, they found that the University of Tartu and Science Centre Ahhaa are institutions with symbolic meaning, which have essentially shaped the reputation of Tartu. Due to the activities of aforementioned and other science and technology institutions (e.g., Science Park, Estonian Genome Centre, IT companies), the participants believed that citizens perceive themselves as belonging to an innovative society which values highly new science initiatives. Lots of science communication activities (science cafe, tea party with scientists, stellar observations etc.) held in Tartu make the citizens feel themselves as a part of local tradition of science and technology. As a positive sign the participants noticed is

increasing interest of young people in science and their active and enthusiastic participation in science communication events.

*“There are quite a lot these opportunities, including science festivals, where the citizens could feel that they are a part of all these. There is a corner with science exhibition in many public events. Science is on the picture.”* (Tuisk)

The participants argued that the media has begun to report more science news. They listed like the Estonian Research Council has organized several media conferences; there have been more broadcasts on science and technology in public and private TV channels and radio stations; scientists have been invited to comment social problems and occurrence of natural disasters in media. In the future, media, especially online-media will be become more attentive to science news. The interviewees explained the increase of media interest by growth of demand (people would like to read more articles on science), as well as improvement of journalists' competency dealing with scientific topics. The participants noted that students of journalism have been trained to write on science and technology and PhD students have been taught to communicate their research results in more simple and understandable way for common people.

*Social and economic impacts of SCIP.* The activities related to SCIP have had direct and indirect social and economic impact on Tartu city and citizens. Concerning building new institutions, carrying out projects and organising events, many temporary and permanent jobs have been created. For example, the Science Centre Ahhaa provides jobs about for 70 individuals. Spin-off companies of the University of Tartu, Science Park and IT companies deserved positive attention by the participants as innovative and profitable businesses bringing new jobs and partnerships with universities and schools. New interactions through science communication activities have also come about between science centres and museums, NGO-s, universities, schools and media. Particularly, the Science Centre Ahhaa has cooperated with many educational, research, and technology institutions in Tartu. The participants predicted increase of public and private interactions henceforth. Especially schools would be more interested in cooperation with universities, companies, and science communication institutions.

According to the interviewees, science communication activities in Tartu, precisely Science Centre Ahhaa, have led to increase in tourism and activated local economy. Although the primary interest aroused after opening of the Ahhaa in 2011 has abated, the ongoing renewal of expositions, organisation of events, and advertising to foreign markets will keep the number of tourists on the rise.

*“The Science Centre Ahhaa, which has set a record for the number of tourists visiting, enriches economy of the city. When a group of tourist comes here from outside of Tartu, from Latvia, Russia, from other cities of Estonia. The Science Centre is like a magnet that pulls. But they do not come only to the Ahhaa, they go shopping, to catering. And the Aura Centre [swimming pool and water park] next to Ahhaa has increased its visitation thanks to the Ahhaa.”* (Teppan)

The interviewees were quite critical of financial support measures implemented for science communication activities in Tartu and also in Estonia. They considered project-based financing that has been dominated in conducting such activities less sustainable. It was suggested that new science communication initiatives may be financed as project-based but, this is not a reasonable financial measure for follow-up projects. Last ones especially successful and popular activities will need permanent funding to be continuous. The participants found that combined financial schemes

including both permanent and project-based financing would be effective as well like in the case of the Science Centre Ahhaa and Tartu Environmental Education Centre.

*The impact of SCIP on education.* The participants said that institutions dealing with science communication and/or research have worked out new courses for pupils, students and the citizens as well. They exemplified the school pupils have done their practices in the Science Centre Ahhaa and got lectures on Chemistry and Physics by academic staff of the universities. In addition, scientists from universities have supervised pupils in their research work. There has been an increase in visits of school pupils to science museums, centres and science events and it may become more frequent in the future. The participants believed that cooperation between schools, universities and science communication institutions will be increased henceforth and more courses will be offered for pupils. Moreover, the pupils may attend lectures at the universities in order to improve their knowledge and be more competitive in admission to university.

The interviewees talked that scientific laboratories of universities and technology companies are interested in visitation of students and citizens. Some laboratories have organised open days for public such as the Estonian Genome Centre, the Institute of Technology, and the Institute of Chemistry of the University of Tartu.

*“For example, when I organise a conference, then I’ll call to Genome Centre and ask whether we could come to visit. There have been even hired persons in Genome Centre who will do guided tours and offer courses for interested people.” (Koik)*

Almost all research and science communication institutions located in Tartu have produced interactive and digital learning materials for school subjects (e.g., in Science and Chemistry), compiled worksheets for guests, organised games (e.g., game of planets), exhibitions and other activities related to science and technology. For instance, the Estonian Research Council has financed the production of two TV programmes as “On the top of pyramid”, which introduced science and technology achievements, and “Rocket 69”, which was specially targeted to young people. The participants emphasised the contribution of the Research School of the University of Tartu in organising nationwide Olympiads in various subjects to pupils.

#### **4.3. Document analysis**

*Objectives for science in society.* At first we are analysing documents concerning to the objectives of science in society initiatives and policies at city level. We did not find separate documents stating explicitly objectives for science in society. However, different science in society initiatives can be formulated in different development plans and strategies. Majority of them are converged in the Development Strategy Tartu 2030 (Tani 2006). The elaboration of strategy was initiated by City Council of Tartu in 2005 and five thematic expert groups were involved, citizens were invited to express their opinions about the future of Tartu on the homepage of the City of Tartu and at the conference “The Vision of Tartu 2030” workshops in September 2005.

Objectives of this strategy consider the future of Tartu as oriented to the development of science and technology. Tartu is seen to function as innovative leader of Estonian knowledge-based society. Central political aim is to keep the leading position of intellectual capital of Estonia and to ensure status of Tartu as regional centre. The desired future image of Tartu is expected to be basing on the values favouring innovation, openness, participation, cooperation and the future-oriented mentality.

Explicitly mentioned target groups are people getting educated in Tartu: Estonian engineers and other specialists who have studied in Tartu, internationally recognized researchers, PhD and post-doc students.

Thus the role of Tartu is expected to be creative city of knowledge as biggest employers of Tartu are expected to be educational and research establishments.

Central economic objective is entrepreneurship. As Estonia is itself small then knowledge-based economy is expected to prevail, future enterprises must be vital and internationally competitive. Modern support structures for entrepreneurship enable to work out and implement new technologies. Entrepreneurs are expected to contribute into establishment of experimental and licensing laboratories, independent expertise centres and spin-off companies. Tartu is seen to be an attractive destination for tourists with its modern infrastructure. The Estonian research results are acquainted to the wider public by the Science Centre AHHAA that is a science cultural establishment introducing people with science-based mentality and the work of researchers.

Development plan foresees the importance of public participation in the decision-making process. Rising importance of voluntary organizations and expanding cooperation between the public and private sector is also expected. Inhabitants are expected to think in terms of local and wider identities. Tartu is seen to be caring city of socially active inhabitants where quality of life, care and participation in the life of the society is guaranteed to all inhabitants regardless of their status.

Major objective of policies is to keep and advance the position of Tartu as internationally competitive education and research campus. Strategic directions state the importance of involvement of teachers and researchers in future policies that are draft to encourage partnerships between public and private sector and the active involvement of its citizens in shaping the urban environment. Universities in Tartu are expected to make a considerable contribution to the development of the innovation system. One of important objectives is the creation of the support system for those leading researchers who deal with fundamental and applied research having an industrial potential.

Tartu is expected to be internationally open network of educational establishments. One of educational objectives is establishment of an international gymnasium for the talented young people. On the level of postgraduate education considerable expansion of Master's and PhD studies in cooperation with foreign higher schools is planned to carry out. Another aim is to promote extensive international exchange of students between universities, applied higher schools and research establishments.

Educational objectives also stress the importance of the access to life-long learning for all inhabitants. Tartu is seen to be a centre for continuing education and requalification that involves educational establishments of different levels. Special attention is paid to the development of further education in entrepreneurship. Such objectives are intended to assure economy in Tartu at the high-technological level. Relevant measures presuppose creation of the system of cooperation for roundtables and quality circles between enterprises, research institutions and local municipalities.

*Commentaries on science in society.* There are no previous explicit evaluations about efficacy of policies on science in society. However, some commentaries can be found. For example local centres of excellence issue press releases on their activities that are sometimes published in media as well.

Obstacles of science communication issues were inspected comprehensively in University of Tartu journal *Universitas Tartuensis* (Sakova and Sõerunurk 2009). They interviewed prominent scientists and science journalists involved in the field. Scientists noted that science is not self-popularising, it is not possible to promote image of science publishing articles in peer-reviewed scientific journals only. They argued, that Estonian public is still moderately informed about usefulness of science

and scientists. They admitted, that students' scientific association did good job in the initiation of young scientists' careers. They saw the source of problems is in East-European and Estonian media's tendency to prefer sensational news. They explained that media stories stress quite often attractive, but second-rate aspects of research, and it can reduce scientists desire to communicate with media.

Science journalists noted that Estonian science journalists are self-made persons, they pulled oneself up by one's bootstraps in defiance of editorial offices. As journalists' educational background is usually different of reverberated scientific topic then it turns out to be barrier. They stressed that great deal of stories are translations or non-checked press releases. In their opinion it is important for journalists to keep good relations with their sources due to the smallness of Estonia. Thus it is difficult for journalists to pressure reluctant scientist. They suggested that useful way for the popularization of results could be briefings where Estonian top scientists themselves could talk about their own current topics, international developments and major issues.

#### **4.4. Impacts of SCIP on actors**

*The participants' role in science communication.* The project manager of Science Park has duty to introduce activities of scientists to entrepreneurs and to promote partnerships between them. The daily work tasks of the specialists from the Observatory and Science Centre Ahhaa are closely related to science communication, including organisation of hobby groups (astronomy circle), science cafes, stellar observations, giving lectures on science etc.

During the focus group interview, the participants described impacts of their engagement in science communication in Tartu directly on themselves and effects on their institution.

*Impacts on the participants.*

a) Tartu offers favourable living, studying, working, and development environment for the participants contributing their career choices.

*"Tartu has offered me many opportunities and there is enough attractive environment for work, life and interaction."* (Kärbo)

b) Development of competency. The participants said that they have developed their communication skills, improved knowledge, and broadened the mind by their activities. For example, they have enhanced skills to talk about science and their work to visitors and other people using simple and understandable terms and definitions.

c) Enlargement of personal networks.

*"I think that through my job I have got a lot of interesting information that I could not notice otherwise. But thanks to the work, I read more about science and I'm interested in it more. And I have a lot of good contacts both in Estonia and abroad."* (Tubli)

d) The participants have experienced positive feelings due to their work. Especially the interest of visitors and partners and their positive feedback has made the participants enjoy their work. The participants recognised that their work is interesting and diverse.

*Impacts on their institution.*

a) Getting feedback and attention. The interviewees talked about positive public attention to and media coverage of their institution's activities. They added positive feedback from partners both in Estonia and abroad. Particularly, the Science Centre Ahhaa has earned lots of approval; however, the project manager of Science Park

admitted that they have got positive feedback and recognition rather from partners outside of Estonia than from people of homeland. In Estonia, the meaning and function of the Science Park is somewhat unclear, therefore companies, research institutions and media cannot associate with them.

*"Entrepreneurs see us as a unit of the university and the university sees us as an incomprehensible company. The state sees us as a big business at all. We have such an identity issue. Thus journalists cannot also communicate with us."* (Kärbo)

b) Network enlargement between actors and other relevant agencies. All participants reported formation of new partnerships inside and outside of Estonia due to their own and colleagues' activities. The collaboration between actors and other institutions (e.g., companies, universities, schools) has led to new projects, initiatives and development of new research topics.

c) Economic benefits. The participants talked about the direct economic benefits which consist in visitation of science communication events by tourists making a profit. However, the benefits may be also indirect and difficultly calculated in the monetary value. Precisely, the participants expect to change their area or speciality more attractive to young people and funders by science communication activities and thereby will recruit new employees and conclude partnerships in the future.

d) Increase of prestige and promotion of public image of research area/speciality. The interviewees talked that their/their institution's activities have raised the prestige of their speciality and institution. In particular, the specialist from the Observatory said that her institution and speciality (astronomy) have had a good reputation in Estonia as well as in the international level for long time. But the project manager of the Science Centre Ahhaa indicated that in public Ahhaa is regarded as a popular and avowed amusement park rather a serious science communication centre that the staff of Ahhaa wishes it would be.

## 5. Conclusions

Case study Tartu as scientific city was carried out by researchers from University of Tartu in the period from October to December 2012. In total three modules (two focus groups with ordinary citizens, semi-structured interviews with stakeholders, document analysis and one focus group with relevant actors) were applied.

Focus groups with ordinary citizens revealed that they associated the term 'science city' with local science communication institutions. Ordinary citizens referred to three groups of people characterizing science city: scientists, tourists and students.

Citizens noted that the meaning of science city is positive by nature and Tartu is preferred place for living and working. They regarded new Science Centre Ahhaa as one of the most popular institutions in Tartu. Citizen expressed worries that overproduction of professionals in certain specialities could produce unemployment among people with higher education and thus some qualified people must leave the city. Ordinary people mentioned also easier access to the education.

Stakeholders described three types of added-values emerging from the communication of science and technology: raising awareness of citizens that leads making informed decisions, raising popularity of natural sciences among youth and raising awareness of public expenditures. Interviewees believed that citizens perceive themselves as belonging to an innovative society. They noted that science communication institutions like Ahhaa, have led to increase in tourism and activated local economy. The participants believed that cooperation between schools, universities and science communication institutions will be increased. Interviewees stressed that institutions dealing with science communication and research have worked out new courses for students and citizens. They expressed criticism that science communication initiatives are financed as project-based, but this is not sustainable financial measure for follow-up projects. Interviewees stressed that institutions dealing with science communication and research have worked out new courses for students and citizens.

Document analysis pointed that major objective of policies is to keep and advance the position of Tartu as internationally competitive education and research campus. The desired future image of Tartu is expected to be basing on the values favouring innovation, openness, participation, cooperation and the future-oriented mentality. In future knowledge-based economy is expected to prevail. However, document analysis revealed that Estonian public is still moderately informed about usefulness of science and scientists. Sometimes it is difficult for media to distinguish paramount aspects from second-rate aspects of research, and that can inhibit successful science communication.

Relevant actors, whose work duties were related to science initiatives and/or communication activities in Tartu, considered Tartu as favourable environment. They mentioned that their own and colleagues' activities led to the formation of new partnerships inside and outside of Estonia. Such networks appeared to be useful for themselves or their institutions. Some of them complained that sometimes their activities remain incomprehensible for the wider public and thus companies, research institutions and media cannot associate with each other as effectively as one can expect. Others worried that sometimes public tends to see that kind of institution as popular and avowed amusement park rather a serious science communication centre.

## 6. Recommendations

The participants were dissatisfied with financing mechanisms of science communication activities considering it unsustainable and restraining development.

- To improve financing schemes of science communication activities so it will be assured sustainability.
- To enable permanent financing method for effective follow-up projects.

The results referred to low participation of public in debates on science and technology and people's lack of awareness of the opportunity to have a voice in final decision.

- To promote public participation in debates and discussion about science and technology by local authority.
- To inform citizens more about their opportunity to have a voice on important issues for the city development.

Public awareness on the usefulness of science can be enhanced through improvement of communication between scientists and science journalist

- To organize for the popularization of science briefings where Estonian top scientists themselves could talk about their own research and current issues.
- To educate competent science journalists.

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## **8. Brief curriculum of researchers**

Andu Rämmer (MSc) works as a Researcher and Lecturer at the Institute of Sociology and Social Policy at the University of Tartu. His main research interest is the formation of new ideas and widespread beliefs. In different research projects he has compared the educational and work values of school students, investment climate and adoption of new technologies by the public. He teaches courses on societal psychology, methods of social analysis, public opinion, social values, youth sociology, social capital and multicultural societies.

Kadri Soo (MA) works as a Researcher at the Institute of Sociology and Social Policy at the University of Tartu. His main research interests include juvenile sex offenders, adolescents' sexual behaviour, intimate partner violence, child abuse, and attitudes toward violence.

## 9. Annexes

### Annex 1

#### Interview questions for ordinary citizens (Module A3)

Alustuseks palun tutvustage ennast lühidalt.

1. **1A.** Millised mõtted teil tekivad, kui kuulete väljendit 'teadust väärtustav linn' või „teaduskeskne linn“? Mida see teie jaoks tähendab?
2. Mida tähendab teie jaoks üldse teaduse väärtustamine?
3. **1A.** Kirjeldage, missugune võiks olla linn, mis väärtustab teadust või kus väärtustatakse teadust?
4. Kas oskaksite nimetada mõningaid siinseid teaduse väärtustamise ja populariseerimisega tegelevaid isikuid?
5. **1A.** Mida positiivset ja negatiivset võib teadust väärtustava(te) linna(de)ga seostuda?
6. **1A.** Kas te teate nimetada Eestis mõnda sellist linna, kus väärtustatakse teadust?
7. **1B.** Kas Teie arvates võiks Tartu olla teadust väärtustav linn? Kui jah, siis palun selgitage, miks te nii arvate?
8. **1B.** Võite te nimetada teadusega seotud üritusi, asutusi, sündmusi vms, mis teeb Tartust teadust väärtustava linna? Miks just see sündmus, üritus, asutus vm?
9. **1C.** Kas midagi sümboliseerib Teie jaoks Tartut teadust väärtustava linnana? (Ülikool, teadusmuuseumid, teaduskeskus(ed)).
10. **1D.** Mida te arvate, kuidas teadusega seotud asutused, muuseumid, üritused vms kujundavad arusaama Tartust kui 'teadust väärtustavast linnast' või „teaduskesksest linnast“?
11. Kas Tartu linn teie arvates panustab inimeste kaasamise, teadusüritustest, -tegevustest vms osavõtmisse? Kas Tartu linn panustab teaduse populariseerimisse?
12. **2A.** Mida te arvate, kas teadust väärtustavas linnas elamine avaldab mingit mõju teie haridustasemele, õppimis- ja enesetäiendamisvõimalustele? Kuidas?
13. **2C.** Kas teadust väärtustavas linnas elamine mõjutab kuidagi teie igapäevast elu? Kui jah, siis kuidas?
14. **2B.** Kuidas te tunnete, kas Tartus elamine on mõjutanud mingil määral teie elukutse valikut? Kui jah, siis kuidas?
15. **2D.** Milliseid teadussaavutusi tutvustavaid asutusi te olete külastanud? Millise mulje need on teile jättnud?
16. **2D.** Kui levinud on teadust populariseerivates asutustes käimine koos sõprade või perega? Kas olete kutsunud endaga kaasa sõpru või pereliikmeid või korraldanud sõprade ja sugulastega külastusi teadust populariseerivatesse asutustesse?

## Annex 1

### Interview questions for stakeholders (Module B1)

Lugupeetud intervjuueeritav, tänan teid selle eest, et leidsite aega meie uuringus osalemiseks. Teie arvamused ja kogemused on selle üleeuroopalise projekti jaoks väga väärtuslikud. Laiemalt võttes oleme huvitatud teie vaadetest neljale teaduse populariseerimise algatuste ja poliitikate valdkonnale Tartus: sotsiaalsed ja majanduslikud mõjud, võimalikud mõjud elukvaliteedile, mõjud poliitikatele ja mõjud haridusele. Ühelt poolt oleme huvitatud teie kogemustest ja arvamustest Tartus siiani asetleidnust, teisalt tahaksime teada, kuidas teie arvates arenevad asjad tulevikus, näiteks praegusest 2020 aastani. Võime alustada oma vestlust laiematest sotsiaalsetest ja majanduslikest teaduse populariseerimise algatuste ja poliitikate mõjudest Tartus. Meil on selleks hulk küsimusi, mida on kasutatud Euroopas läbiviidud uuringutes. Kas võiksime nüüd alustada?

#### *(Poliitika)*

Soovin teile esitada mõned küsimused teaduse populariseerimise algatuste ja poliitikate mõjust Tartus.

1A) Milline **tulu** võiks teie arvates tõusta inimeste ja ühiskonna poolehoiust ja heakskiidust teadusele ja tehnoloogiale?

-Kas see võiks jääda tulevikus samaks või muutuda?

1B) Milline roll on Tartu **kohalikel võimudel** teaduse ja tehnoloogia populaarsuse edendamisprotsessis?

-Kas see võiks teie arvates edaspidi muutuda?

1C) Mida te arvate teaduse populariseerimisest, teadusmuuseumitest või teadust populariseerivatest üritustest ja festivalidest?

1D) Kas saaksite tuua Tartust näite, kus **avalikkuse seisukohti** on teaduse ja tehnoloogiaga seotud küsimustes **lõppotsuste tegemisel** arvesse võetud?

1E) Kas teie arvates on kujunenud **uusi partnerlusi** teaduse populariseerimise algatuste ja poliitikate raames kohalike institutsioonide **või** ettevõtete vahel? Võiksite te tuua ühe näite?

- On teil mõtteid, kuidas see võiks tulevikus aset leida?

1F) Millised võiks teie arvates olla **kõige efektiivsemad** Tartus elluviidavad teaduse ja tehnoloogia populaarsuse edendamise **poliitikad**?

#### *[Elukvaliteet]*

Räägime järgmisena teaduse ja tehnoloogia populaarsuse edendamise võimalikest mõjudest elukvaliteedile Tartus.

2A) Kuidas on lood **avalikkuse osalusega**? Kuidas on lood kohalike elanike kaasamisega aruteludesse näiteks keskkonna, jäätmekäitluse või energiavaldkonna seisukohalt olulistes küsimustes? Kas teie arvates on kujunenud selline olukord teaduse populariseerimise ürituste tõttu Tartus?

-Juhul, kui see nii on, siis kuidas ilmnevad avalikkuse osaluse tagajärjed Tartus?

-Kas teie arvates näeme Tartus edaspidi rohkem või vähem avalikkuse osaluse ilminguid?

2B) Kas teie arvates on teadust populariseerivad tegevused **mõjutanud meediat** (kohalikku ajakirjandust, sotsiaalseid võrgustikke jms.) Kas teie arvates on kohalik meedia hakanud teaduse ja tehnoloogia vastu rohkem huvi üles näitama?

-Kas teie arvates hakkab meedia tulevikus neile teemadele rohkem või vähem tähelepanu pöörama?

2C) Kas teie arvates on teadust populariseerivad tegevused mõjutanud mingil moel Tartu **kultuurilist identiteeti**?

-Kas te arvate, et (linna)elanikud tunnevad end innovatiivsesse ühiskonda kuuluvat?

-Kas te arvate, et nad tunnevad end lisaks ka osana kohalikust teaduse ja tehnoloogia väärtustamise traditsioonist?

-Kas teie arvates muutub see edaspidi?

2D) Võiksite nimetada veel võimalusi, kuidas teadust populariseerivad tegevused on mõjutanud linnaelanikke? (*Laske intervjuueeritaval rääkida kõigest, mis neil mõtteis mölgub.*)

*[Sotsiaalsed ja majanduslikud mõjud]*

3A) Millised võiksid olla teaduse populariseerimise algatuste ja poliitikate majanduslikud mõjud kohalikul tasemel? Kas teaduse populariseerimise algatused ja poliitikad on loonud uusi **sissetulekuallikaid** (need võivad olla grandid või sponsorlepingud, raamatute müük, plakatid jms või on hoopis raha raisatud)

- Juhul, kui see nii läks, siis kust see rahastus tuli?

- Mis teie arvates juhtub edaspidi, näiteks praeguse ja 2020 aasta vahel?

3B) Millised rahastuste skeemid on osutunud ühiskonna poolehoiu ja heakskiidu saavutamisel teadusele ja tehnoloogiale Tartus edukateks?

3C) Kas teadust populariseerivad tegevused on suurendanud **kohalikku turismi**?

-Kas see võiks teie arvates ka tulevikus nii olla?

3D) Kas teadust populariseerivad tegevused on **loonud** Tartus mõne **uue töökohta**?

- Kas teie arvates loovad sellelaadsed tegevused tulevikus uusi töökohti?

3E) Kas teadust populariseerivad tegevused ja üritused on aidanud leida kontakte, mis on viinud **uute koostöövormideni**? (näiteks avalike ülikoolide ja koolide ning tootjate vahel Tartu linnas)

-Milliseks kujunevad teie arvates uute kontaktide leidmise ja loomise võimalused ja edasine koostöö selles valdkonnas tulevikus?

3F) Kuidas seostuvad teaduse populariseerimise algatused ja poliitikad Tartus **infrastruktuuri tehtud investeeringutega**, näiteks uute ehitiste või teenustega?

Kas on veel mõningaid sotsiaalseid ja majanduslikke mõjusid millest me **ei ole seni rääkinud**? Kui jah, siis millised täpsemalt?

*[Haridus]*

Lõpuks, sooviksin esitada teile mõned küsimused teaduse mõjust haridusele Tartus.

4A) Kas teadust populariseerivad üritused on viinud **uute kursuste** väljatöötamiseni? Näiteks uute ülikooli kursusteni, algatusteni elukestvas õppes või nendelaadsete ettevõtmisteni?

4B) Kas **teaduslaborid** või **tehnoloogiafirmad** on pakkunud külastuse võimalusi linnaelanikele ja teistele asjast huvitatutele?

- Kirjeldage, mis moodi see toimunud.

- Kas teie arvates võiks see tulevikus muutuda?

4C) Kas teie arvates toimub varasemast rohkem **kooliõpilaste külaskäike** teadusfestivalidele või sündmustele õppekavade täiendamise eesmärgil?

- Kas see võiks teie arvates tulevikus kuidagi muutuda?

4D) Kas teadust populariseerivate tegevuste või ürituste raames on Tartus loodud mingeid uusi **õppematerjale**, DVDsid, näituseid, mängu või muud samalaadset?

4E) Kas teate nimetada veel teaduse populariseerimise algatuste ja poliitikate mõjusid haridusvaldkonnale Tartus? Milliseid? (*Palun laske taas intervjueeritaval rääkida, mis on nende arvates oluline.*)

Kas teil on veel lisada midagi tänase mõttevahetusega seoses?

Nüüd oleme puudutanud kõiki teemasid, millest tahtsin teiega rääkida. Tänan väga, et nõustusite osalema. Teie arvamused annavad olulise panuse Euroopa teaduse ja tehnoloogia populariseerimise efektiivsuse projekti.

## Annex 3

### Interview questions for actors (Module C3)

1. Palun rääkige, millega teie tegelete /teie asutus tegeleb?
2. Mida tähendab teie jaoks teaduse populariseerimine või teaduskommunikatsioon? Milliseid mõisteid te kasutate antud tegevuse nimetamisel?
3. Milline on teie, teie asutuse roll teaduse edendamisel ja teaduse populariseerimisel (Tartus)?
4. Kuivõrd on teie/teie asutuse tegevused teaduse edendamisel ja populariseerimisel seotud Tartu linnaga?
5. Milline mõju on olnud minu tegevusel Tartule kui teadust edendavale ja väärtusavale linnale?
6. Milline kasu või mõju on olnud teile teie tegevusel Tartus kui teadust edendavas ja väärtustavas linnas? Kuidas on mõjutanud selline tegevus mind ennast?
7. Miks te just Tartus nende asjadega tegelete? Kui te ei saaks selle tööga/valdkonnaga Tartus tegeleda, siis kas te üldse selle tööga/valdkonnaga tegeleksite?
8. Milliseid võimalusi ja väljakutseid pakub Tartu teile teie ametialases tegevuses?
9. Kuivõrd te tunnete, et teie tegevuse resultaadid on olnud silmapaistvad ja tunnustatud?
10. Kas teie tegevus on toonud kaasa uusi koostööprojekti, uurimisteemasid või teadussaavutuste rakendusi? Kui jah, siis milliseid?
11. Kas te tunnete, et teie tegevus on arendanud teie oskusi ja pädevusi? Kui jah, siis milliseid?
12. Kas teie tegevusest on tõusnud mingit materiaalist kasu teile endale või teie asutusele (nt olete turustanud teie tööga seotud tooteid, teenuseid)?
13. Kuivõrd te tunnete, et on suurenenud teie eriala/ tegevusvaldkonna arvestatavus, silmapaistvus ja mainekus? Millist mõju on see avaldanud teile?

## **Annex 4**

### **Interview invitation for ordinary citizens (Module A3)**

Hea inimene!

Käesolevaga kutsume Teid osalema rühmaintervjuus, mis viiakse läbi rahvusvahelise projekti PLACES raames. Antud teadus- ja tehnoloogiasaavutuste populariseerimise uuringut korraldab Euroopa Teaduskeskuste võrgustik Ecsite, projekti koordineerijaks on aga Barcelonas asuv Pompeu Fabra Ülikool. Projekti eesmärk on uurida teaduse populariseerimist linnaelanike seas.

Projekti käigus viime läbi rühmaintervjuud linnaelanikega, et välja selgitada inimeste arvamusi teaduse mõjust nende igapäevaelule. Ühes intervjuus osaleb 6-8 inimest, see kestab 1 - 1,5 tundi ja toimub Tartu Ülikooli sotsiaal- ja haridusteaduskonna õppehoones Lossi 36. Intervjuud lindistame ja transkribeerime, nendes osalemine on anonüümne, seal antud hinnanguid ei seostata osalejate isikutega, kokkuvõtete tegemisel kasutame intervjuus räägitut üldistatud kujul.

Palun andke osalemisvõimalusest teada Kadri Soole (tel 7375936, e-mail: [kadri.soo@ut.ee](mailto:kadri.soo@ut.ee)) või Andu Rämmerile (7375931, e-mail: [andu.rammer@ut.ee](mailto:andu.rammer@ut.ee)).

Teie aktiivsele osavõtule lootma jäädes,

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## **Annex 5**

### **Interview invitation for actors (Module B1)**

Tere,

Kirjutan Teile seoses rahvusvahelise projektiga PLACES (Platform of Local Authorities and Communicators Engaged in Science), mille eesmärk on uurida teaduse populariseerimise ja poliitikatega seotud mõjusid Tartu linnale. Täpsemalt püütakse projektis välja selgitada, millised võiksid olla teaduse populariseerimisega seotud tegevuste sotsiaalsed, majanduslik, hariduslikud jms mõjud. Antud uuringut korraldab Euroopa Teaduskeskuste võrgustik Ecsite, projekti koordineerijaks on aga Barcelonas asuv Pompeu Fabra Ülikool.

Projekti käigus viime läbi personaalintervjuud ametnike ja spetsialistidega ning küsime nende arvamust teaduse edendamise, populariseerimise ja poliitikate mõjude kohta. Fookuses on Tartu linn. Intervjuu kestab ligi tund aega ning toimub intervjuueeritavale sobivas kohas (ühe võimalusena Tartu Ülikooli sotsiaal- ja haridusteaduskonna õppehoones, Lossi 36). Intervjuu helisalvestame. Lindistust ja transkriptsiooni me ei anna välja uuringu korraldajale ega uuringuga mitte seotud inimestele. Saadud informatsiooni kasutame raporti koostamisel.

Palun andke osalemisvõimalusest teada Kadri Soole (tel 7375936, e-mail: [kadri.soo@ut.ee](mailto:kadri.soo@ut.ee)).

Kõike head soovides ning Teie osavõtule lootma jäädes,

Kadri Soo

Teadur

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## Annex 6

### Interview invitation for actors (Module C3)

Hea inimene!

Käesolevaga kutsume Teid osalema rühmaintervjuus, mis viiakse läbi rahvusvahelise projekti PLACES (Platform of Local Authorities and Communicators Engaged in Science) raames. Antud teadus- ja tehnoloogiasaavutuste populariseerimise uuringut korraldab Euroopa Teaduskeskuste võrgustik Ecsite, projekti koordineerijaks on aga Barcelonas asuv Pompeu Fabra Ülikool. Projekti eesmärk on uurida teaduse kommunikatsiooni Tartu linnas.

Projekti käigus viime läbi rühmaintervjuu teaduse populariseerimisega tegelevate inimestega (sh inimesed, kes töötavad haridusinstituutides, mittetulundusühingutes, teadus- ja tehnoloogiamahukates ettevõtetes, uuringufirmad jm), et välja selgitada nende arvamusi teaduse populariseerimisest Tartu linnas ning selle mõjust linnaelanikele. Teie osalus uuringus on projekti õnnestumiseks väga oluline.

Ühes intervjuus osaleb 6-8 inimest, see kestab umbes 1,5 tundi ja toimub Tartu Ülikooli sotsiaal- ja haridusteaduskonna õppehoones Lossi 36. Rühmaintervjuu kavatseme läbi viia kas 06.12.2012 või 11.12.2012 kell 18.00. Intervjuud lindistame ja transkribeerime, seal antud hinnanguid ei seostata osalejate isikutega, kokkuvõtete tegemisel kasutame intervjuus räägitut üldistatud kujul.

Palun andke osalemisvõimalusest ja teile sobivamast kuupäevast teada Kadri Soole (tel 7375936, e-mail: [kadri.soo@ut.ee](mailto:kadri.soo@ut.ee)) või Andu Rämmerile (7375931, e-mail: [andu.rammer@ut.ee](mailto:andu.rammer@ut.ee)).

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