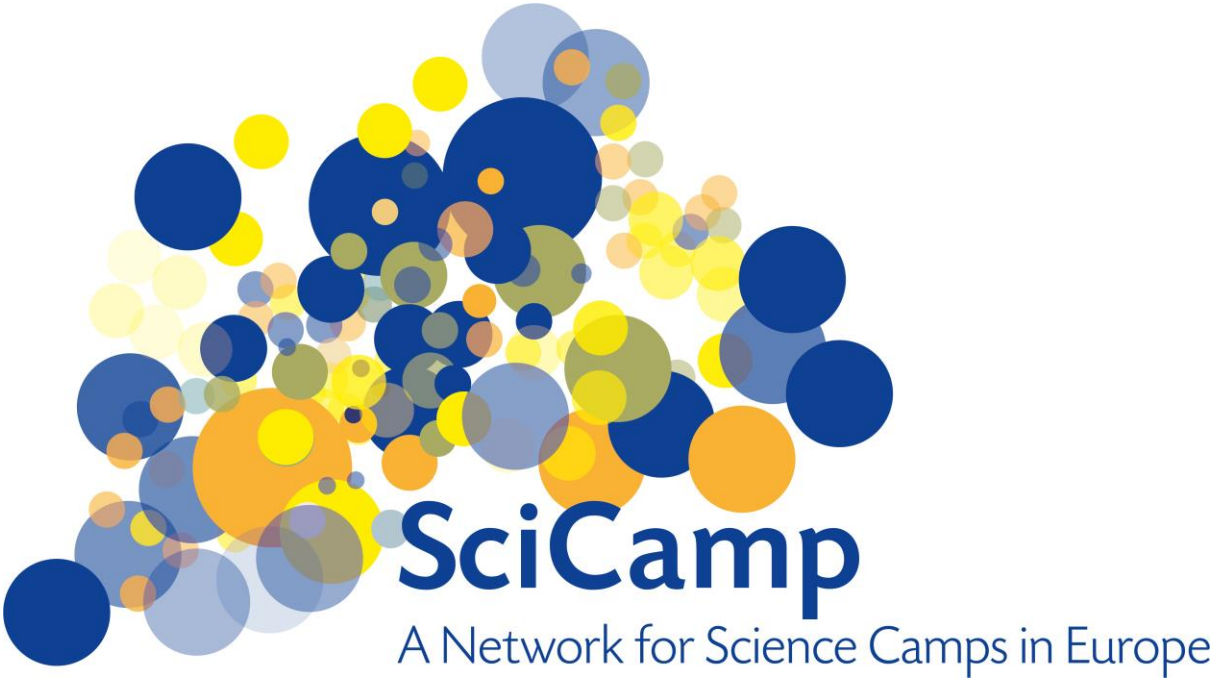

SciCamp

A Network for Science Camps in Europe

Best Practice Report

Lifelong Learning Programme

Project information

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1. Introduction

This report is a deliverable of the Work Package 3 delivered with the project proposal, where the Consortium provides an explanation of the best practices in collaborations with companies and stakeholders, and the tool delivered for the workshop on best practices that will be held in the Deliverable 3.2.

Collaboration with local companies (especially SME), regional academic institutions, and other stakeholders of science camps is a crucial part of the success of the camps. On the one hand the stakeholders share the interests of the camps and – being sponsors – control the financial operations and the outcomes. On the other hand the camps need partners in “reality” of the scientific and engineering field to test their approaches, to show practice and to have persons to be invited to the camps functioning as models and as discussion partners.

How these partners work together, what expectations they individually have and what visions they share is not always clear. Very often time is lacking to share the aims. By examining existing science camps or other activities like competitions, the SciCamp consortium has wanted to evaluate those methods, which are most rewarding. Beside this it has been also interesting to get information about hindering facts and misconceptions of the stakeholders. Making these points open and enabling a discussion, helps existing and further out-of-school STEM activities to organize and optimize their work.

Making the results of the exploitation in the workshop of 2015 and the results of our discussions open to the public will foster an EU-wide development of out-of-school activities in STEM-Education. It also provides models for schools to orientate in their collaboration with stakeholders like companies or industry. It can also influence the collaboration between schools and institutions of third phase of education (academic or vocational training) to help more young people to decide for a career in STEM-professions.

This report gives an overview on aims and strategies to collaborate with stakeholders, regional companies and academic institutions.

2. Results of the questionnaires

Answers of the Organizers

1. **Does your Science Camp collaborate with local companies, regional academic institutions and other stakeholders? What kind of organizations are they?**

A1. We collaborate with the Regional Government and we subcontract some private companies.

A2. yes, we do collaborate with companies, research and academic institutions, as well as with schools other educational institutions and media. We also work with other governmental institutions and associations of teachers and science communicators.

A3. Yes, our Science Camp collaborates with those organizations. The specific collaboration changes a bit from year to year. That depends on the thematic orientation of the Camp in the specific year and the place. For example in our Workshop about “Flying”, the workshop participants visit a local air craft factory and the local sport airport. The Workshop “climate change” visits a photovoltaic field factory or a wind turbine. Furthermore our Science Camp in the North of Germany uses the rooms in a University of Applied Science. There we could use also the laboratories and get tours and lectures from the staff. The coordination of that Science Camp in the North of Germany goes together with the Ministry of Education of the state “Schleswig-Holstein”, who care about the applications. Our Science Camps in the middle of Germany took place next to the University of Halle, where we also visit laboratories and get lectures. The overnight stay there is organized together with society who cares about social problems and education. We get special conditions to offer a lower price for the Camp.

A4. The science camp works in collaboration between a voluntary organization and a University. The camp is further more sponsored by companies. The companies do not have any influence at the Science Camp.

2. **Which is their role?**

A1. The regional Government funds the Science Camps. The subcontracted companies offer activities to the youngsters.

A2. Teachers and researchers participate in the preparation of programs and are engaged in providing scientific and educational content to participants. Sponsors provide the necessary resources and media help us announce the camp and raise awareness on its values and importance.

A4. Donation of money

3. Do you have sponsors? Do they have any control of the outcomes or the financial operations?

A1. The Regional Government funds the camps, so yes, the organizers have to present the proposal at the beginning and account for the camps at the end. Therefore it has control of the outcomes and the financial operations.

A2. Yes, we have sponsors. They do not control the outcomes, we just inform them on the results and the feed-back of participants. They are informed on the financial plans in advance and later they get the report.

A3. Since we make Science Camps in different locations and states of Germany, we have different models of funding. In the North of Germany, the Ministry of Education funds our Camp. In the middle of Germany the University of Halle pays indirect for the hours, we work for the preparation and the execution of the Science Camps. Furthermore, last year we got funding from a local bank foundation and funding from the University itself. This year we get funding from the Bayer Science and Education Foundation to conduct two Camps this year. All the sponsors do not have control of the outcomes and only indirect control of the financial operations. Since we send in a financial plan to apply for money, the sponsor insists in following this financial plan.

A4. We have sponsors, they do not have any control of the outcome

4. Is your science camp linked to a STEM centre or individual professional scientists? What are their roles? (For example help developing the programme of the Camps, visiting the youngsters, participating in discussions…)

A1. The content of the camps are designed inside the company, we have some scientists in the team. Besides, there are some other scientists that participate in some specific activity (entomologist, geologist…). The students receive a visit of a very well-known scientist too.

A2. Yes, our camp is situated in the research center - archeological site. Scientists participate in programs, participants spend the whole day with them (also free time).

A3. Our Science Camps are linked to the Working Group of Prof. Dr. Martin Lindner at the University of Halle/Wittenberg, Germany. STEM is one of the focuses of the working group, which have very good contacts to local, regional and national companies and networks in STEM education. Within the lectures and University classes, the University students are involved in organizing the Science Camp, evolving the Camp program and are supervisors.

A4. Individual professional scientists. Their role is to help developing the science camp and teaching.

Questionnaire for researchers and other collaborators

1. How do you participate in the Science Camps? Explain how you interact with the youngsters.

A1. I plan, organize, evaluate and run the Science Camp. During the Camp itself I am responsible for one out of three scientific workshops. I also planned my workshop. It is an inquiry-based workshop, relying on self-responsibility. I supervise, motivate and observe the children. Additionally I am also responsible after the “Learning time”, for supervising them during any eating time, excursions (trips to farms and factories) and their free-time program. Finally, we make them go to bed.

A2. First of all, I try to serve as the anchor point for the group and the individuals. I feel it is important for them to have a central “authority” to go to with questions about everything from procedure and organization to early questions about the content and their job in the workshop, at least in the beginning. They have usually never met each other before and all they bring with them is their interest, so my job is to get them to interact with the material at hand to find out what they want to work on and to get to know each other at the same time. My goal is to enable them to work and research in groups autonomously. To do that, I typically introduce the whole group of my workshop to each of the major elements they can start with, and help them decide on what they want to do. Then I go around and visit each of the groups to get them started and see if there are any problems, and that is typically what I do for the rest of the time. To answer questions, get to know them and make them get to know each other but otherwise let them do the work on their own, I always try to be everywhere at once but nowhere too much. If I notice that some of them are not participating or otherwise involved, I try to animate and help them where I can.

A3. I have cared for the young people in developing their ideas in the field flying. Together we have crafted and shared our findings. In the evening I tried to finish with games.

A4. In total I participated in four consecutive summer holidays at the Science Camp. The first time in 2010 as a normal participant and from then on as a tutor, facilitating the different workshops. As a facilitator my role is something in between the actual “workshop instructor” and the participants itself. The idea is that I can contribute with experiences from the workshops of the years before especially when participants get stuck, lose concentration of focus, or get discouraged by failures in the experiments. Here I can try to give some inputs which are either knowledge and experiences I gained in the workshops of recent years, pre-knowledge I might have due to the few more years of education (we as tutors are usually one or two years older), or simply ideas I come up with spontaneously as a product of my curiosity just as the participants themselves. Thus I understand myself as someone who brings the small groups of participants forwards in their research project without giving them the feeling that “someone from above” told them what to do or intervened. In the ideal case that maintains their natural curiosity and motivation. Generally each of us tutors did choose one of the particular workshops in the beginning which we would accompany most of the time. This decision was either taken due to some deeper

knowledge in that area or simply due to curiosity of the tutors themselves. Throughout the four years I participated in 2 different workshops. But in the end the interaction and exchange between the different workshops which are run parallel is quite flexible, for tutors as well as for participants. Which is great not only to get to know other participants and make new friends but certainly also because you will always find a project in one of the other workshops which is investigating a research question which you have asked yourself at some point meaning that just by walking around and inspecting the projects of the other workshops you get the opportunity to learn a lot you might have been interested in. As tutors we also attended most of the excursions and field trips we either chose due to the workshop we chose or again simply due to our curiosity. Some field trips were the same each year giving me the opportunity to try some new ones. If not joining the field trips the spare time was quite useful to tidy up the labs a bit which became quite messy already after a few hours of research and experimenting. With that we were able to help the workshop instructors a bit by taking over some work. When it came to implementing and enforcing rules upon the participants especially in the evenings around the accommodation it was actually a bit tricky to find a good balance. On the one hand we are clearly not supposed to represent any authority, on the other hand trying to keep some order among the participants can be a great help to the instructors but also to keep the atmosphere in the camp positive and sociably. This is only possible if the tutors show sensitivity and find a midway, which by all means has to stay on-eye level with the participants meaning that in the ideal case just by acting as a role model or by “encouraging” - not ordering, severe disruptions and disturbances are avoided.

A5. I listened to the wishes of the young people and monitor their operations and possibly trying to help with any questions or given them with small ideas a thought. I've edited both tasks with the youth as also discussed the results of the experiments.

A6. I have last year participated in the Science Camp in Hall, where I as a supervisor, contact person, bus drivers and aid in the collection of raw data for doctoral thesis worked. I was for the part about "flying" and was thus responsible for most of this group of students. And I have given them suggestions or had access to advice.

2. Which are you expectations about the project? What is your aim participating in the camps?

A1. When I entered it was just the aim to gain experience in the work with children and in „letting go“ as a teacher. This is because scientific inquiry changes to focus from teacher oriented to students oriented. Later it got a part of my PhD project, within which I now planned my own workshop and evaluate the whole Camp.

A2. Since I have already led a workshop three times now, I have a general idea how things can work. Every year, there is a new group of individuals with new qualifications, interests and needs, but basically I expect to have a group of interested, savvy and able teens who only need a little direction and advice from time to time. They are usually not participating because their parents wanted them to but because they have fun occupying themselves with technical stuff, so it is usually

really fun to work with them. I basically try to get them to work and learn without noticing it.

A3. I expect that the children and young people get a chance to be free to look outside the school with exciting topics and the. Specifications without This free thinking and action should be trained, the fun factor should not be neglected. I myself have fun in the care of children and do not have a specific aim.

A4. My expectations changed throughout the four years participating quite a lot. While at the very first time I was mainly interested in the scientific side of the camp which would answer me a lot of question and give me the opportunity to try experiments, methods and material I would not have had access to, I more and more realized how much the camps are also about the people you meet there. The diversity of participants was from “geeks doing nothing else than sciences in their free time anyway” to “send on educational summer camp by my parents, but actually not interested”. Besides finding friends, friends I am still a lot in contact with, the mixture of different people gave me the great opportunity to see how different other peoples perspectives and approaches can be on various things, but especially of course on sciences. By this everyone can benefit in some way from each other. Participants who are more into sciences can be highly motivating and encouraging to those who are less interested, while those often ask the better questions breaking science down to things we encounter in our everyday life. Personally my main aim if I would be able to attend the camp one more time would be to spend one week of my summer break with interesting and impressive people doing something which enriches me but also gives me the opportunity to contribute to others, in the same way from which I benefitted a few years ago while attending the camp for my first time.

A5. The Science Camp is not to replace the school, but also offer young people the opportunity to perform with a lot of fun and their own work or own presented experiments. The Science Camp is intended to show young people that they themselves can achieve something and are also able to work through mistakes and learn from them.

A6. I have participated in the Science Camp, because I found the idea of a scientific summer camp very interesting and like wanted to know how such a thing can expire. Secondly, I hoped for a lot to learn, but to be able to professionally and pedagogically and take for my further cooperation with Pupils.

3. Which is the science vision you would like to transmit to the youngsters?

A1. I want to transmit, that doing science is fun, possible for everyone and different from what they perceive in school. But also, I want to transfer some aspects of the Nature of Science, as well as I want to recognize them, that math is an important part of science. I also see science as complex and a topic to discuss, which is not just right or wrong. Therefore it also has different implications for society.

A2. I would like them to abandon the image of science and scientists as something that is done by unworldly nerds with glasses and white coats in petri dishes and that they have to be really smart and study at a university to participate in, an image often reinforced in the media. They should rather embrace the fact that science basically surrounds us all the time and that it can be super-interesting and fun to ask why and how things work, and to find answers to these questions.

A3. Science has much to do with their own thinking. Not always a way to success. But the children should learn to give up immediately, but to pursue their further questions. Independence often leads to success.

A4. While science can be something very academic and high-minded which often seems to be a bit inapproachable for many, somehow everyone has a natural curiosity in sciences I belief, especially at the younger age where your predispositions might not have been pointed out that well yet. I think no matter how badly school ruined our taste for sciences at that point already, if the chance is given I think it is totally worth it to try and to embark on sciences. The summer camps give the perfect opportunity for that.

A5. Science should be fun and give you the feeling that you can achieve anything with their own work and discipline, what you yourself want and it also can help others.

A6. My personal goal was that the Pupils take a certain enthusiasm for science and also be happy to do research alone and always keep trying yourself to ask questions and try to answer this then.

4. What would you do to improve this experience/collaboration?

A1. I would like to have more material and maybe a better environment. Sometimes we sleep and work in the same place – but not every time. This is a pity. But at the same time it is nice to work in a university as a professional environment.

A2. Not much, really. From time to time, I felt like there could be one or two more “tutors”, experienced former participants, to help the new participants get started and to help establish a good working climate. On the other hand, it could be worthwhile to let each new group of participants develop their own dynamic.

A4. I belief the perception of the time on such workshops is always something very subjective, however I dare to say that I personally belief one or two days more could be quite beneficial as the conclusions and evaluations of the research projects usually happen on the last morning before the departure of the participants what in my opinion has a negative impact on their quality. Further the balance between excursions and field trips and lab time is crucial I think as otherwise the lab time becomes something like the “interruption” of a schedule full of field trips and excursions. This also has a quite negative impact I think on the quality of the time spend in the labs.

A5. The cooperation between strangers is initially always been somewhat problematic, especially when it comes to very large groups. In smaller groups produced a greater sense of unity and a longer time together would provide more potential.

A6. My suggestions for improvement I can already apply setting it transferring this year in planning further camps. So we have found in our team that students more input need through us and we should make it so that the Learner something "feast" in your hand what they can take home with you so later, for example, once can check on the specified web pages.

5. What would you do to increase STEM engagement and vocations in youngsters?

A1. I would love to let them do their own projects, much more, than they do know. I would like them to plan at the first day, what they would like to do or engage in and then I would try to make this possible by material and involving different experts (also by making trips to see them). I would also like them to have a chance to talk to scientists about his life as a human working in sciences. Talking about things like frustration, how he or she came to make this specific job, how the work with the colleagues is, what the highlights of his working life is and so on. I do not believe that all students should get scientists. But I do believe that doing science can be fun for everyone. And that they should get an authentic picture of what scientists do. Not better, but also not worse than it is in reality.

A2. The practice of bringing the participants close to professional fields where science and technical issues are in focus, such as visiting an airfield, a wind power plant manufacturer or a farmer with a biogas plant, are sure to leave them impressed and foster any interest they may already have. Especially for those who already need to make decisions about their possible professional future, such as deciding between a scientific or linguistic branch in school, this hands-on experience is immensely helpful. This is even more important for girls, who are still unnecessarily underrepresented in this area. Other than that, I think simply being around others who are also interested in what they do at the camp helps a lot.

A4. I think the interaction between the summer camps and local firms and scientific institutions is already one of the best ways and steps which have been taken in this concern.

A5. I would make MINT especially more known in the social networks and try to make even more vivid at some schools visits by professors. The young people think that math and science are often uninteresting or too difficult and sign up for fear of failure is not at Science Camps at.

A6. Since I have been studying self-STEM subjects, I support this idea with great interest. My intention was that you always Pupils also aimed to show their daily life and I will try as many connections between the natural sciences to produce.

6. Which would the best way for stakeholders, regional companies and academic institutions to collaborate with the science camps?

A1. When they are a scientific company we could visit them and try to understand their scientific background / applied sciences. Maybe they could show how things work in little hands-on experiments. 2. We are always interested in local companies “just” being interested in supporting us material and moneywise. 3. Academic institutions as well as scientific companies can create and run their own workshop, of course with the help of our experiences. 4. Academic institutions may always look at what we do and what our concept behind the Camp is. As well as we are interested in getting to know other science Camps.

A2. It should be their own concern to draw the participants’ interest to pursue a career with them, so they should be open to the participants, invite them into their facilities and be prepared to amaze them (or otherwise capture their attention). In my experience, no place we visited has ever left a bad impression, no matter how they approached us. They should not expect any direct reward though (except for an expense allowance maybe), but rather see this as a long-term investment into their possible future staff.

A3. It would be good if materials, guided tours are offered of this page. Often there are also student laboratories that offer experiments and also would certainly be fun to the students.

A4. I think so far the balance between contribution from local firms and independent and not result orientated working was great. Academic institutions should, as they tried, use the opportunity to inform about possible academic prospects. This however has to happen on an age of the participants adjusted level. Otherwise it might be rather repelling.

A5. Society actors, local businesses and academic institutions can work together with the Science Camps, where they take over the cost of materials that are needed in experiments. Furthermore, they can also provide insight into their own world of work in order to teach young people the perspectives of science.

A6. The best way I still find it if it is possible to Pupils to make excursions to the above-mentioned institutions and to equal there firsthand collect information and impressions. For if the expense is disproportionately large, maybe you should try someone from the company to become an expert interview invite etc.

3. Conclusions for Best Practices

Even that the number of the answers is not very high, the similarity of them point to the same direction in all the examined Science Camps, as it can be seen in the following conclusions. Anyway, those conclusions should not want to suggest “better” ways to organize Science Camps, especially having in mind that the number of variables to organize is so high, and that they are organized in different contexts. Anyway, we think that it can be helpful to show different options that are used nowadays with success.

Collaboration with local institutions and scientist (companies, universities, government…)

All the science camps that have participated in the questionnaires collaborate in one way or other with local institutions. That breaks the stereotype of Science Camps where youngsters live a group experience isolated in a lonely place. Nevertheless, the participating groups interact with universities, governments, local private companies, research and academic institutions, social societies, voluntary organizations… and sometimes they change each year depending of the orientation that takes the camp.

The role of the linked institutions can be very different, but they can be classified in two main categories:

- Support in the funding
- Support in the content development.

The support in the funding can be through direct public grants, sponsors or donations of money. In that case, some of the entities have an indirect control of the financial operations through final financial reports, and some others don’t have any control of the camps. Only in one case there is a control of the content, but it can be considered a formality.

The support in the content development can be realize through subcontracting trips or resources, helping in the preparation of the programs and activities, providing educational and/or scientific knowledge and offering communication actions for the visibility of the camps. In all the camps there are individual professional scientists or organizations participating directly in them. There is a wide variety of roles that the scientists can take in the camp: part of the team that develops the content, supervisors, consultants, responsible of one concrete topic, speakers, lecturers and teachers. When an institution takes part in the camp the most collaborating way is to offer a visit to the centre.

There is not a big difference from what the science camps do and what they ask to the collaborator stakeholders. The most interesting actions are related with visiting the research centres, interviewing experts, and doing customized workshops and using materials in the research centre. Besides asking for funding, it can be helpful to give career orientation and show opportunities of professional paths for the future.

Interaction with the youngsters

Staff that works in science camps assumes several roles, especially during the camps but also before and after. Very small teams form the core of the camps, and the main role is related to be the supervisor of the camp, but several and very diverse roles are taken too. We can say that the staff do whatever is need to have a successful camp: plan, evaluate, be the anchor point of the group, take care of them, be the facilitator, instructor and contributor of experiences, guide of discussions, bus driver… The suggestions to improve the camps are quite familiar for all the science camps organizers: more time, more material, more tutors. Besides the request of more resources, there is one interesting suggestion about keeping the contact and the work realized in the camps and extending it to the post-camp period.

It can be concluded that another of the aspects the organizers have in mind when they design the camps is to show real science and real scientists, moving away from the typical science content that has no relation with the society. That approach suggests an intention to work not only the science content and skills, but the knowledge about the nature of the science too. Related to vision of the science, some stereotypes about it are identified: the difficulty of studying science and the self-confidence, science as a boring subject, the diluted link between science and the society, or the science as a static amount of knowledge. Those stereotypes are well known in the academic world, but the difficulty seems to lie how to change them.

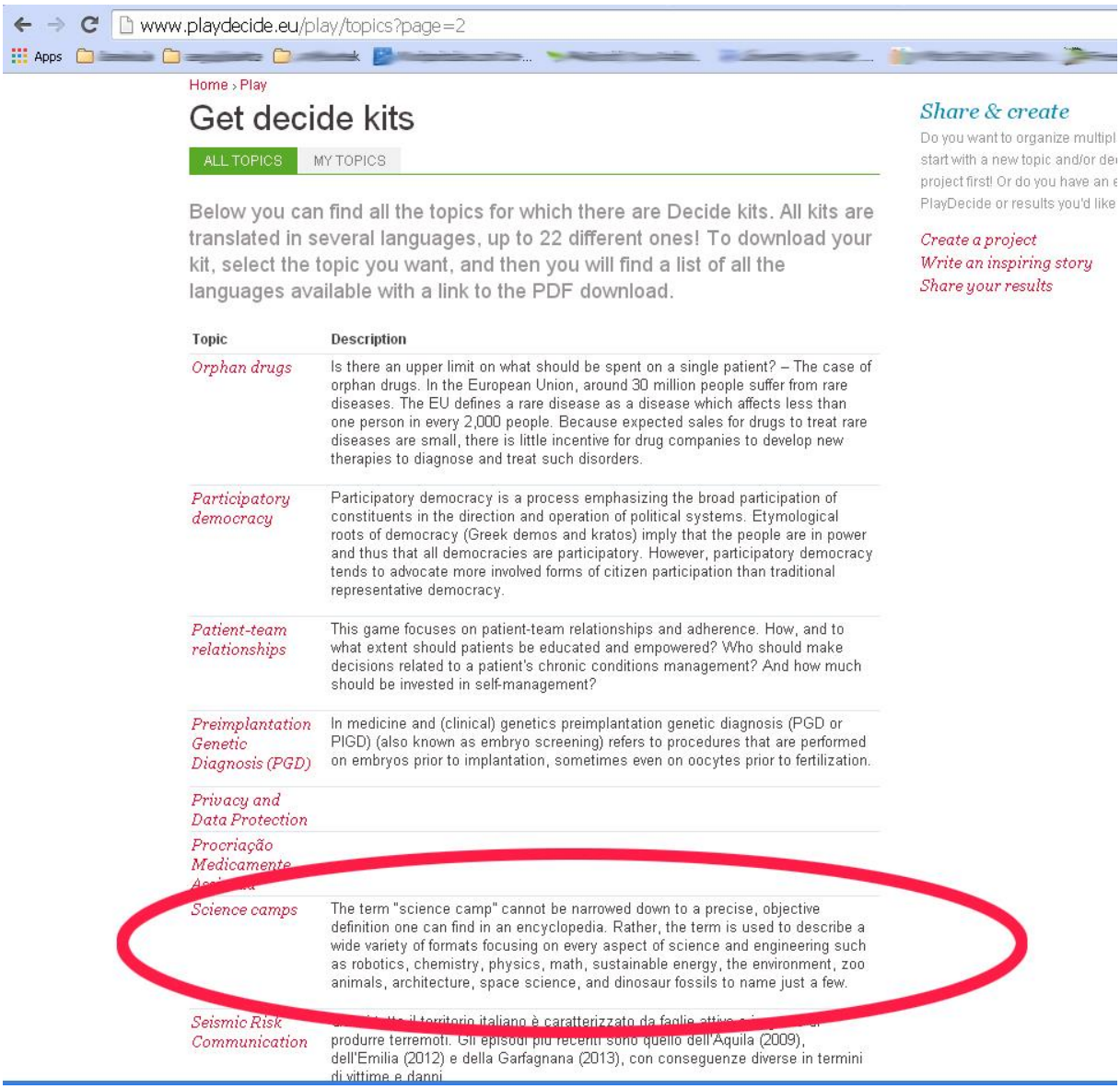
Asked to the staff about their expectations about the science camps, the main expectation is related with offering to the youngsters a joyful and fulfilling experience. The experience is perceived as a choice to perform, but putting special emphasis and giving much more space to aspects like having fun, trying different experiments, methods, materials, places and people, giving more space to personal relations, learning from mistakes etc. Besides, staff has expectations to improve their knowledge about different topics of education.

Finally, it is a very agreed that one of the best ways to increase STEM engagement and vocations is to link the youngsters with the real science, scientists and science centres, and as it has detailed in this document, all the science camps do. Managing the fear of failure, the perception that science is too difficult and autonomy to work in projects are some other clues that should be consider in the programs of science camps for their success.

4. Workshop

The workshop for D3.2 was celebrated the 7th of July in Usurbil (Basque Country, Spain). A Play Decide Kit was developed for that aim, and the kit, based on the results of deliverable 3.1., has been published in the official website. Thanks to that the SciCamp outputs will be open to everybody interested in the topic of Science Camp organisation, and it will be available during and after the end of the SciCamp project.

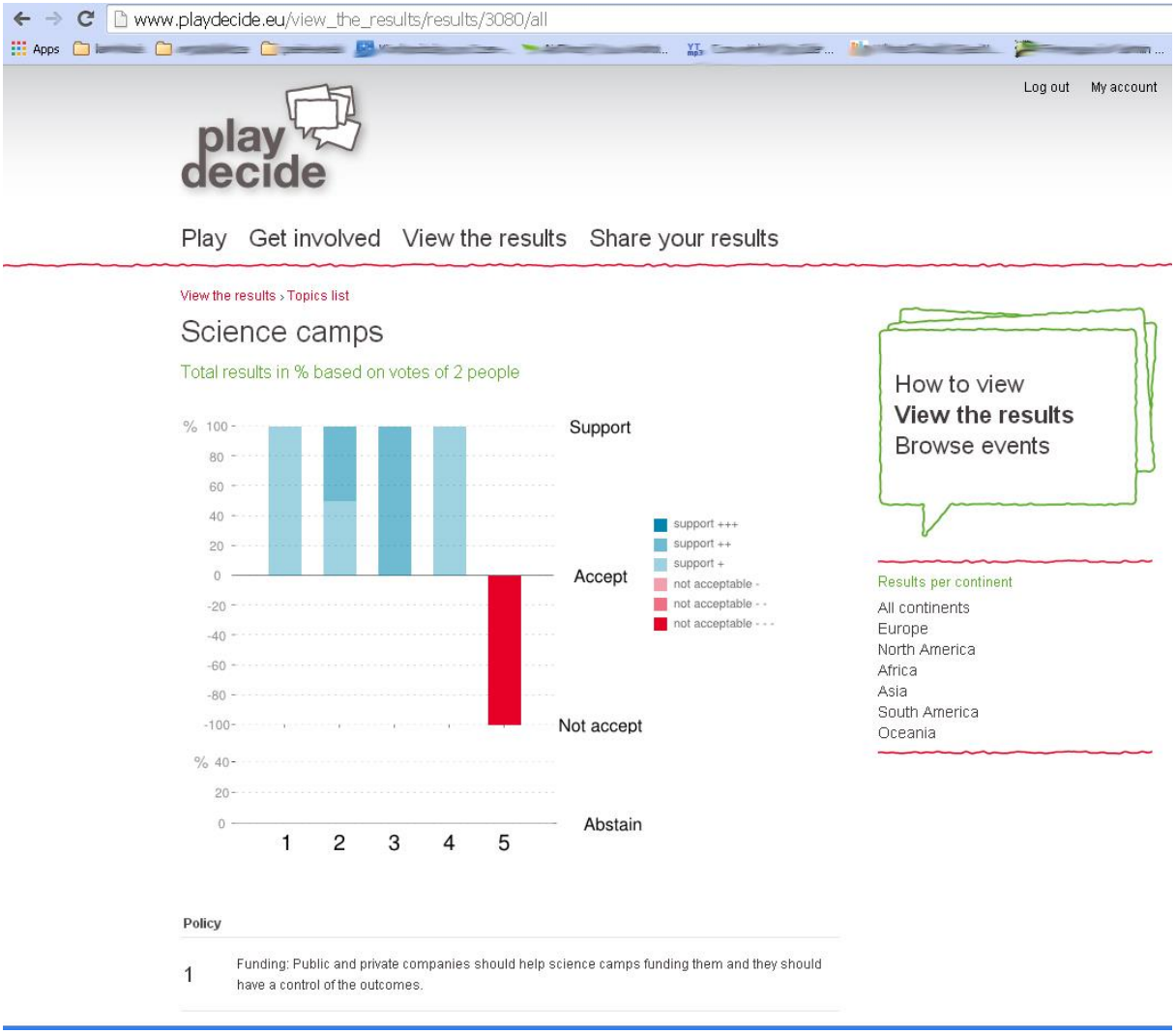
http://www.playdecide.eu/play/topics/science-camps



Besides, the conclusions and suggestions for policies that anyone who participates in the discussion could be uploaded to the website:

http://www.playdecide.eu/play/topics/science-camps

http://www.playdecide.eu/view_the_results/results/3080/all



5. Annex

Questionnaire for Science Camp organziers:

1. Does your Science Camp collaborate with local companies, regional academic institutions and other stakeholders? What kind of organizations are they?
2. Which is their role?
3. Do you have sponsors? Do they have any control of the outcomes or the financial operations?
4. Is your science camp linked to a STEM centre or individual professional scientists? What are their roles? (For example help developing the programme of the Camps, visiting the youngsters, participating in discussions…)

Questionnaire for researchers and other collaborators:

1. How do you participate in the science camps? Explain how you interact with the youngsters.
2. Which are you expectations about the project? What is your aim participating in the camps?
3. Which is the science vision you would like to transmit to the youngsters?
4. What would you do to improve this experience/collaboration?
5. What would you do to increase STEM engagement and vocations in youngsters?
6. Which would the best way for stakeholders, regional companies and academic institutions to collaborate with the science camps?

SciCamp Best Practice Report

More Information about Science Holiday Camps and our SciCamp project at our website www.sciencecamps.eu.