

Feasibility Study

Exploring three themes for further collaboration between ESA and Ecsite

October 2015

Outline

1. Overview	3
2. Assessment of Existing Resources	5
3. Lessons Learned from the Rosetta Kit development	6
4. Market research: Survey among members of the Ecsite Network	7
5. Project briefs	16
6. Distribution and communication strategy by Ecsite.....	20
7. Monitoring and evaluation	21
8. Conclusions and recommendations.....	23
ANNEX I: List of organisations participated in the survey	25

Contact details

Antonina Khodzhaeva
akhodzhaeva@ecsite.eu

1. Overview

1.1. Study background

The European Space Agency (ESA) and the European Network of Science Centres and Museums (Ecsite) have identified common aims to **increase European citizens' awareness of the European space endeavour** and its impacts on their lives, and to stimulate a wider interest in science and technology related to space.

After **successful cooperation** of the Ecsite Space Group and ESA in development of the **Rosetta Kit** about the Rosetta mission in 2013-2015, the collaboration will continue and **new projects will be developed**. Space has a tremendous role in the sustainable development of natural resources base, monitoring the state of the oceans and atmosphere, extending our knowledge about life on Earth and beyond. In this context in 2015-2016 the Space Group will be working to develop collaborative projects around the theme "Space for Life". As agreed at the last Space Group annual meeting in Greenwich in November 2014, representatives from museums and science centres decided to explore working together on three themes until the end of 2016:

- Monitoring Oceans and Atmosphere from Space,
- The International Space Station: Living and working in Space,
- Is there Life out there?

A feasibility study is necessary to ensure possible project development options are identified and the preferred projects within the three proposed themes meet the criteria and needs of the ESA, as well as potential users – members of the Ecsite network.

1.2. Study objectives

The present study will **provide** the representatives of ESA with **sufficient information to enable an informed decision** to be made on the preferred projects and justify acceptance, modification or rejection of the proposed projects within the above-mentioned three themes for further development and implementation.

The study will deliver the following:

1. A short **overview of existing projects, exhibitions, educational activities and events** regarding the three themes to identify different approaches and provide an informative and descriptive overview of methods, which are already being used to explore these topics;
2. An analysis of the **relevance** and **readiness to implement and use** the outcomes of the projects, an **identification of possible options** to address the three themes as well as the **demand** for these three themes/concrete projects/tools among members of the whole Ecsite network through an **online survey**;
3. A list of **science centres and museums**, which are **willing to lead** the development and implementation of the projects, as well as other museums and science centres willing to **collaborate** in development and implementation of the projects;
4. A description of themes and possible **projects**, reflecting their **key aspects**, main **message**, **target audience** and ways and **formats** to address themes, based on the outcomes of the pre-conference workshop "Space for Life" held in Trento, Italy in June 2015¹;
5. Recommendations for the **further steps** for project development and implementation.

The study will focus on the following issues:

¹ A detailed report on the pre-conference workshop is available [here](#).

1. How the proposed projects within the three themes respond to the demands of target science centres and museums;
2. How the proposed projects are coherent with the objectives of ESA;
3. The number and type of science centres and museums, which could be interested in developing and implementing the proposed projects within three themes;

1.5. Work plan

Table of contents of the current study was approved by ESA representatives on 9 July 2015.

Agreed steps to conduct the feasibility study:

Activity	Deadline
Conduct research on the state of the art	August-September 2015
Identify lessons learned from Rosetta Kit project	September 2015
Develop online survey to distribute among Ecsite members	August 2015
Conduct online survey to distribute among Ecsite members	August-September 2015
Analyse the results of the online survey distributed among Ecsite members	August 2015-September 2015
Develop project briefs regarding the themes to be implemented in science centres and museums including target audience, key message, key aspects etc. (based on the outcomes of the workshop in Trento, Italy)	September-October 2015
Using lessons learned from the Rosetta Kit project identify possible evaluation and monitoring approach of the projects' progress	September-October 2015
Finalise the study	October 2015

2. Assessment of Existing Resources

The aim of the following section is to provide a short overview **of existing projects, exhibitions, educational activities and events** regarding the three themes. This section gives an informative and descriptive overview of methods, tools and resources, which are already being used to explore three proposed themes. The resources proposed in this section can be further linked with the project to reach multiplying effect.

2.1. Monitoring Oceans and Atmosphere

Project example	Description
AstroEdu	"...an open-access platform for peer-reviewed astronomy education activities. (...) astroEDU is a platform for educators to discover, review, distribute, improve, and remix educational astronomy activities."
Zero Gravity	"In the "Zero Gravity" exhibition you will find spectacular and previously unpublished space images together with a rundown of the current and future space missions of the European Space Agency (ESA) in fields such as observation of the Earth and meteorology, satellite communications and navigation; launchers, manned flights and space laboratories, and the exploration of the solar system and deep space."
Meet our Neighbours	"Meet our Neighbours! – an astronomy tactile experience' produced a set 13 tactile images of the main celestial objects of the Solar System for visually impaired children from the ages of 6 to 12 years old and their educators."
Universe in a Box	"An educational kit to assist teachers and educators in bringing astronomy and space sciences to 4–10 year old children around the world"

2.2. The International Space Station: Living and Working in Space

Project example	Description
Mission X: Train like an astronaut	"Mission X: Train Like an Astronaut is an international educational challenge focusing on fitness and nutrition to encourage students to 'train like an astronaut'."
Space Academy:ISS simulator	"Space Academy recreates through the movement simulation three stages in the preparation for the space launching until the International Space Station. Guided by the voice and the image of the Spanish astronaut Pedro Duque, visitors cross the space laboratory, the launching elevator and the airlift that allows the access to the space flight simulator."

2.3. Is there Life out there?

Project example	Description
Cheops Mission files 3D printers	"Print your own personal 3D model of the ESA space telescope CHEOPS. You can download the construction manual and the data files (.stl) for your 3D printer. Have fun with the construction of CHEOPS!"
Race to Mars computer game	"Race To Mars is a turn-based, space company simulation game. Become the head of a newly created "New Space" company whose goal is to establish a colony on Mars. You begin as a start-up and develop cutting edge aerospace technologies to reach orbit. Flying beyond the vicinity of Earth, blaze the trail into space and leave the competition far behind on your way to victory."

3. Lessons Learned from the Rosetta Kit development

The Rosetta campaign is a project focused on the Rosetta mission that enables museums and science centres to easily join the communication campaign about Rosetta's mission by using ready-to-use materials and receiving regular updates about the mission. A kit of ready-to-use material was produced by Ecsite and science centres and museums members of the Space Group in collaboration with ESA in 2013-2015.

The Rosetta campaign aims at extending communication about the Rosetta mission across Europe following key moments of the mission and involving European science centres and museums. The material available in the kit is flexible, affordable, and can be easily adapted in different languages and various museum settings. The kit comprised a set of complementary tools: events, exhibition, and learning activities. The campaign especially followed the most important milestones of the Rosetta mission: the wake-up of Rosetta (January), Rosetta in orbit with the comet (August), and Philae's landing (November).

The collaboration on the development of the Rosetta kit was a first time experience for Ecsite and ESA and proved to be beneficial for all partners involved. Rosetta Kit campaign is a unique project that is worth looking back at and identifying useful lessons learned from this collaboration. This section summarises key lessons in 4 main categories that were identified during the evaluation of the Rosetta Campaign² and can be considered when developing and implementing new projects.

Nr	Category	Potential area for improvement	Lessons learned
1	Pilot development	The package of events was more difficult to apprehend. It was difficult to decide how the events could be organized. Museums are very independent and a lot depends on their own decisions and habits. Educational activities and exhibitions are easier because they are concrete. ESA also organized its own international actions like contests and it was difficult to propose something on top of it. Events should probably be worked together and deeper. It could be nice to try in a different way.	It is important from the beginning to have clear objectives regarding the desired outcomes: what we want to do? who is the target audience? Why would we develop this activity?
2	Collaboration	Not enough collaboration during the development phase to test the tools in different countries. This is something that should be done in the future because it would help the adaptation of material to other science centres and improve the flexibility of the activity.	Organize a phase of test in different countries for a project, to improve the adaptation of material to different cultures and countries. It is important to fix a role for each of the involved institutions to be able to plan and work efficiently.
3	Financial engagements	For the Rosetta campaign, it took a long time to take decisions regarding financing of pilots. This time could have been used better to plan the projects. Science centres themselves invested a considerable time on the development of the tools. The amounts provided by ESA would otherwise not have been sufficient. Future projects should be financially autonomous.	ESA-Ecsite should be earlier on and clear regarding the financial engagement on projects before starting.
4	Evaluation	No evaluation has been planned at the beginning of the project and leaders didn't evaluate their projects either. At the end of the Rosetta Campaign, in 2014, a short evaluation has been created to receive all data that helped producing the present report.	Evaluation is something that needs to be included in the project from the beginning. Need to consider the possibility to implement evaluation by users (museum visitors, participants).

² This section is based on the report "Coordination, development, and communication by Ecsite of three pilot projects of the Rosetta campaign" 2014

4. Market research: Survey among members of the Ecsite Network

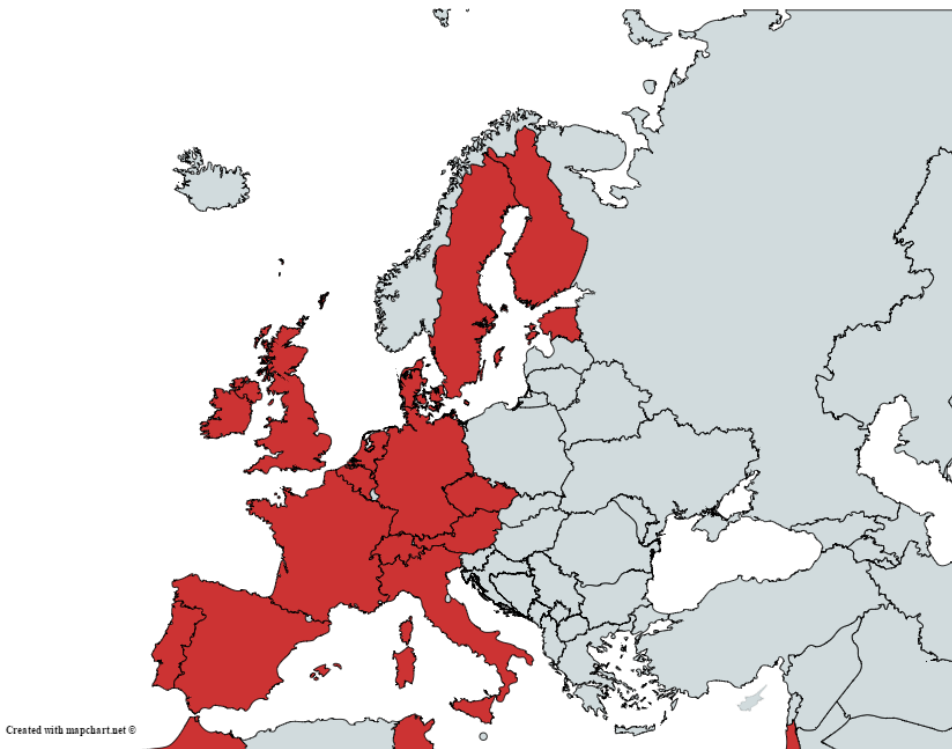
This section provides the brief analysis of the **relevance** and **readiness to implement and use** the tools to be developed under three themes, an **identification of possible options** to address the three themes as well as the **demand** for these three themes/concrete projects/tools among members of the whole Ecsite network, as well as members of the Space Group through an **online survey**.

General overview

41 responses: 28 answers received from non-space specialized science centres and 13 answers from space-related organizations from 20 countries in Europe and beyond including Australia, Israel, Morocco.³

Knowledge about Rosetta Kit: 12 have heard about the kit and using it, 20 participants would like to receive additional information about it.

Survey participants located in Europe



Relevance of themes

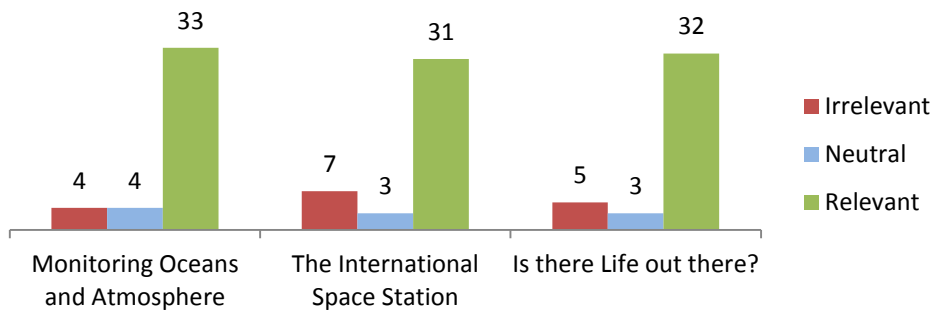
- Please rate how relevant each topic for your institution (For example, if you already have (or planning to develop in 2016-2017) any exhibitions or activities on the similar topics at your institution).

Participants were asked, if they are already have (or planning to develop in 2016-2017) any exhibitions or activities on the similar topics at their organizations. According to answers, many organizations are already involved into working on three themes (in the survey measured as “relevance”):

³ For the full list of survey participants and their geographical distribution, please see ANNEX I: List of organisations participated in the survey

	Monitoring Oceans and Atmosphere	The International Space Station	Is there Life out there?
Irrelevant	4	7	5
Neutral	4	3	4
Relevant	33	31	32

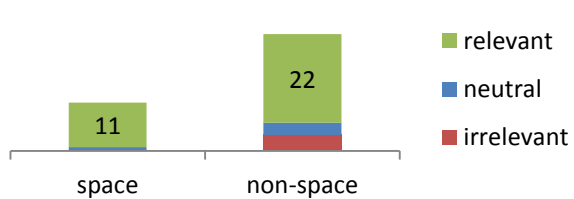
Relevance of each theme



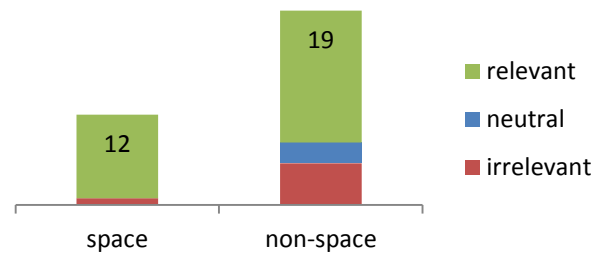
- **Conclusion:** majority of participants are already working on similar topics, thus, the three themes prove to be relevant for science centres and museums and are on their agenda.

Relevance of each theme according to specialization of each museum

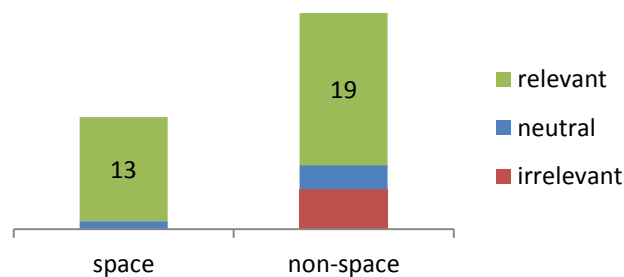
Relevance of theme "Monitoring Oceans and Atmosphere from Space"



Relevance of theme "The International Space Station"



Relevance of theme "Is There Life out there?"



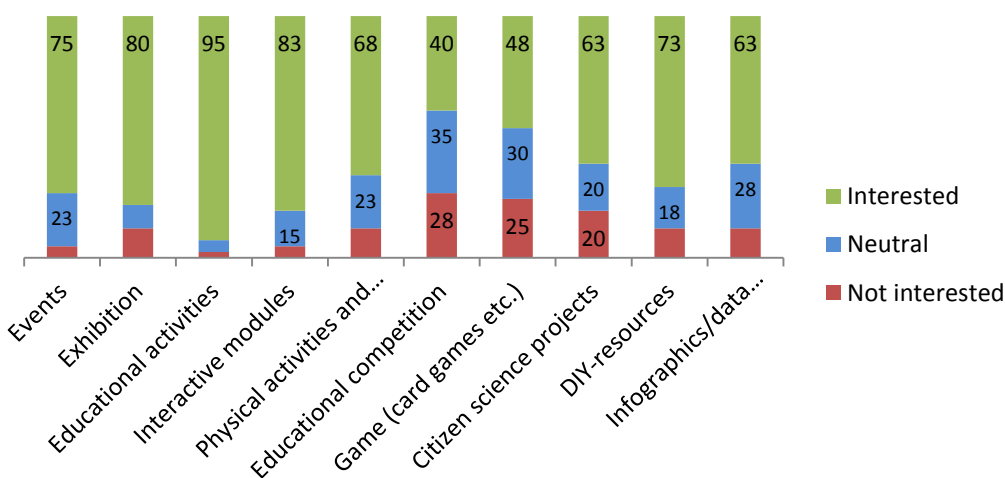
- Conclusion: the most relevant theme for non-space specialised museums is “Monitoring Oceans and Atmosphere from Space”, followed by “Is there Life out there” and “The International Space Station: Living and Working in Space”. Space-related organisation distribution among three themes is quite similar. It should be pointed out the difference in relevance among the three themes is insignificant both for non-space and space related organisations.

Tools and format

The tools that are most interesting to use for participating institutions (by number of participants):

	Not interested	Neutral	Interested
Events	2	9	30
Exhibition	5	4	32
Educational activities	1	2	38
Interactive modules	2	6	33
Physical activities and exercises	5	9	27
Educational competition	11	14	16
Game (card games etc.)	10	12	19
Citizen science projects	8	8	25
DIY-resources	5	7	29
Infographics/data visualisation	5	11	25

Interest in tools and formats among museums, %



- Conclusion: the most relevant tools to develop are educational materials (“inquiry-based”) with 95% of participants stating interest in these tools, followed by interactive modules (83%) and exhibition (80%). Several participants commented to use storytelling elements in the development of tools. Tools should be “interactive, but at the same time instructional”, “visually well presented” and “provide opportunities for different learning styles”.

Tools can be developed in the variety of formats, although there are clear preferences for audio-visual and printable materials:

Audio-visual materials to download for tablets/computers/screens	38
Printable materials	32
Virtual and augmented reality formats	24
Projection systems/stereoscopic imagery	22
Immersive environment formats (for example, satsosphere etc.)	18
Other	7

- Conclusion: develop tools, which can be easily printed or downloaded for the use on tablets/screens

Development of themes and tools

Several organizations were interested to be involved into the development and implementation (ex. piloting):

Monitoring Oceans and Atmosphere from Space	8	32%
The International Space Station: Living and Working in Space	8	32%
Is there Life out there?	6	24%
Not interested in getting involved in the development or implementation	2	8%
Other	1	4%

List of museums, interested to be involved:

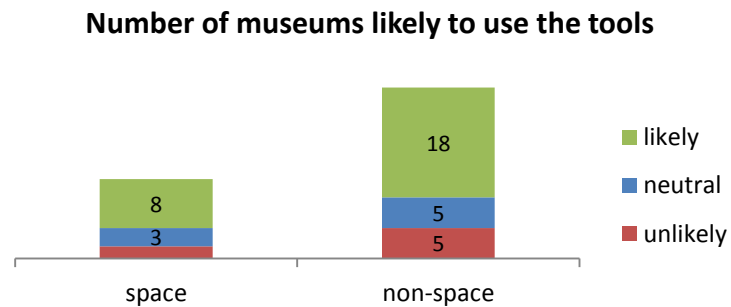
Contact person	Organisation	Country	Specialisation	Theme
Sieglinde Sumper	wissens.wert.welt - blue cube & kidsmobil	Austria	non-space	Monitoring Oceans and Atmosphere from Space
Anders Dahlstrup	Danish Museum of Energy	Denmark	non-space	Monitoring Oceans and Atmosphere from Space
Lukas Richter	VIDA! science centre	Czech Republic	non-space	Monitoring Oceans and Atmosphere from Space
Franziska Hütter	Universalmuseum Joanneum	Austria	non-space	Monitoring Oceans and Atmosphere from Space
Nathalie Cimino	PASS	Belgium	non-space	Monitoring Oceans and Atmosphere from Space
Achim Englert	Phänomenta	Germany	non-space	Monitoring Oceans and Atmosphere from Space
Isabel Borges	Planetarium Calouste Gulbenkian-Ciência Viva Center	Portugal	space	Monitoring Oceans and Atmosphere from Space
Tim Florian Horn	Zeiss-Grossplanetarium Berlin	Germany	space	Monitoring Oceans and Atmosphere from Space
Pia Bech Mathiesen	Universe	Denmark	non-space	The International Space Station: Living and Working in Space
Milene Wendling	University of Strasbourg	France	non-space	The International Space Station: Living and Working in Space
Tomas Meiser	Techmania Science Center	Czech Republic	non-space	The International Space Station: Living and Working in Space
Patrick Kiernan	National Museums Liverpool	England	non-space	The International Space Station: Living and Working in Space
Helin Haga	Science Centre AHHA	Estonia	non-space	The International Space Station: Living and Working in Space
Kim Gladstone Herlev	Experimentarium	Denmark	non-space	The International Space Station: Living and Working in Space
Chris Darby	National Space Centre	England	space	The International Space Station: Living and Working in Space
Jiri Dusek	Brno Observatory and Planetarium	Czech Republic	space	The International Space Station: Living and Working in Space
Philippe Guillet	Natural History Museum of Nantes	France	non-space	Is there Life out there?
Laurent Chicoineau	La Casemate (CCSTI)	France	non-space	Is there Life out there?
Stefano Giovanardi	Planetarium and Astronomical Museum of Rome	Italy	space	Is there Life out there?
Sebastian Marcu	Design & Data GmbH	Germany	space	Is there Life out there?
Frances McCarthy	CIT Blackrock Castle Observatory	Ireland	space	Is there Life out there?
Sylviane Blum	Center for Space and Habitability of the University of Berne	Switzerland	space	Is there Life out there?
Michelle Accardo	Cosmodrome	Belgium	space	the three themes + the next to come - we like to be involved in all - if we have to choose - we go for ExoMars

2.1. Detailed overview of the theme “Monitoring Oceans and Atmosphere”

- How likely would you be to use tools related to the topic "Monitoring Oceans and Atmosphere from Space"?

unlikely	7	17%
neutral	8	20%
likely	26	63%

Number of museums, likely to be using tools according to specialisation:



List of museums, likely to be using tools:

Nr	Organisation	Country
1	Scitech	Australia
2	wissens.wert.welt - blue cube & kidsmobil	Austria
3	Universalmuseum Joanneum	Austria
4	Cosmodrome	Belgium
5	PASS	Belgium
6	Techmania Science Center	Czech Republic
7	VIDA! science centre	Czech Republic
8	Universe	Denmark
9	Danish Museum of Energy	Denmark
10	Experimentarium	Denmark
11	National Museums Liverpool	England
12	University of Tartu Museum, University of Tartu	Estonia
13	Institut Pythéas (CNRS / IRD / Aix-Marseille Université)	France
14	Natural History Museum of Nantes	France
15	Zeiss-Grossplanetarium Berlin	Germany
16	CIT Blackrock Castle Observatory	Ireland
17	Planetarium and Astronomical Museum of Rome	Italy
18	Infini.to - Planetarium and Museum of Astronomy and Space	Italy
19	lunar space exhibitions	Morocco
20	Science Center NEMO	Netherlands
21	Space Expo	Netherlands
22	Planetarium Calouste Gulbenkian-Ciência Viva Center	Portugal
23	MUDIC-VBS-CV	Spain
24	Ciudad de las Artes y las Ciencias	Spain
25	Innovatum Science Center AB	Sweden
26	Monastir Sciences Palace	Tunisia

- Which groups of people would you expect to be users of these tools at your science centre or museum?

5 - 8 years, kindergardeners	10
8 - 16 years	28
Families, Parents, grandparents, and caregivers visiting with children	24
Schools, Teachers	29
Adults (visiting without children)	14

Additional comments (what do you like most/least about the theme?):

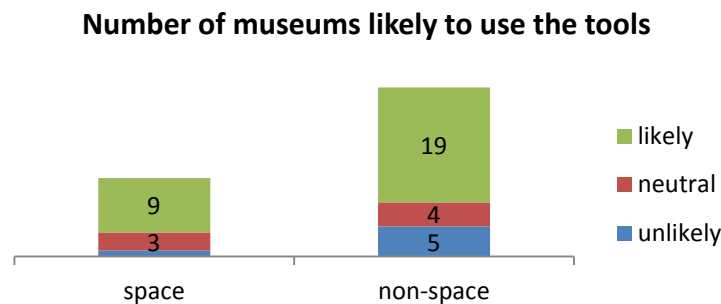
- o "These theme is fundamental to understand that Earth has limited resources, so people have to learn to use those correctly with a one long- period idea about the future."
- o "I like most that this theme allows to present the environmental issues related to the preservation of Earth in terms of "cosmic ecology". This will become more and more a trending topic in the coming years. I like least that currently we don't have any funding available to buy tools and kits for our museum and planetarium."
- o "How the oceans and atmosphere affect on climate change, what is the role of the forests in this system?"
- o "To able to show the science behind the subject and the relevance and importance of space based measurements is a great idea."
- o "The fact that we can study Earth from space. In this case there has been chosen for the topic of oceans, but as a fact any Earth related topic can be chosen. I think it is more important to have a theme about Earth observation in a wider sense."

2.2. Detailed overview of the theme "The International Space Station: Living and Working in Space"

How likely would you to be to use tools related to the topic "The International Space Station: Living and Working in Space "?

unlikely	6	15%
neutral	7	17%
likely	28	68%

Number of museums, likely to be using tools according to specialisation:



List of museums, likely to be using tools:

Nr	Organisation	Country
1	Scitech	Australia
2	wissens.wert.welt - blue cube & kidsmobil	Austria
3	Technisches Museum Vienna	Austria
4	Cosmodrome	Belgium
5	PASS	Belgium
6	Technopolis, teh Flemish science centre	Belgium
7	Techmania Science Center	Czech Republic
8	Brno Observatory and Planetarium	Czech Republic
9	Universe	Denmark

10	Experimentarium	Denmark
11	National Museums Liverpool	England
12	National Space Centre	England
13	University of Tartu Museum, University of Tartu	Estonia
14	Science Centre AHHA	Estonia
15	university of strasbourg	France
16	La Casemate (CCSTI)	France
17	Zeiss-Grossplanetarium Berlin	Germany
18	Phänomenta	Germany
19	Technoseum	Germany
20	CIT Blackrock Castle Observatory	Ireland
21	Infini.to - Planetarium and Museum of Astronomy and Space	Italy
22	Space Expo	Netherlands
23	Planetarium Calouste Gulbenkian-Ciência Viva Center	Portugal
24	MUDIC-VBS-CV	Spain
25	Ciudad de las Artes y las Ciencias	Spain
26	Innovatum Science Center AB	Sweden
27	Swiss Space Museum	Switzerland
28	Monastir Sciences Palace	Tunisia

Which groups of people would you expect to be users of these tools at your science centre or museum?

5 - 8 years, kindergardeners	18
8 - 16 years	28
Families, Parents, grandparents, and caregivers visiting with children	29
Schools, Teachers	28
Adults (visiting without children)	21

Additional comments (what do you like most/least about the theme?):

- "These themes allow to speak, in a simple and interesting way, about Astronomy, Astrophysics but also basic Physics to people of different ages because the astronaut and the life in Space are able to draw the interest and fascinate."
- "Space travel is still the next frontier and many young people still dream about becoming an astronaut. There are also several ways in which research done on the ISS can improve people's lives on Earth."
- "We already give talks on Life in Space and incorporate a lot about the ISS in relation to how astronauts live and work. Any increase in background material or access to further ideas would really be useful. There nothing not to like! "
- "I like most that human storytelling (i.e. about the astronauts and their emotions) is a key element to raise interest in the activities on board the ISS. I like least that this topic may tend to underline ESA's outreach needs rather than the importance of living and working in space per se. "
- "Love the idea of being able to give visitors the chance to understand and 'experience' life on the ISS. The more real it seems to visitors the more, hopefully, they will support spaceflight and become interested in the subject. "

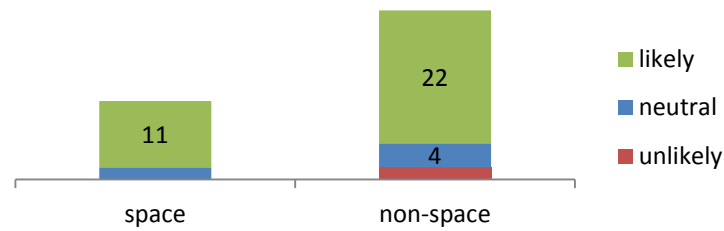
2.3. Detailed overview of the theme "Is there Life out there?"

How likely would you be to use tools related to the topic "Is there Life out there"?

unlikely	2	5%
neutral	6	15%
likely	33	80%

Number of museums, likely to be using tools according to specialisation:

Number of museums likely to use the tools



List of the museums, likely to be using the tools:

Nr	Organisation	Country
1	Scitech	Australia
2	Universalmuseum Joanneum	Austria
3	wissens.wert.welt - blue cube & kidsmobil	Austria
4	Technisches Museum Vienna	Austria
5	Cosmodrome	Belgium
6	PASS	Belgium
7	Techmania Science Center	Czech Republic
8	Brno Observatory and Planetarium	Czech Republic
9	Universe	Denmark
10	Experimentarium	Denmark
11	National Museums Liverpool	England
12	National Space Centre	England
13	University of Tartu Museum, University of Tartu	Estonia
14	Science Centre AHHA	Estonia
15	Science Centre Pilke	Finland
16	La Casemate (CCSTI)	France
17	Institut Pythéas (CNRS / IRD / Aix-Marseille Université)	France
18	Natural History Museum of Nantes	France
19	University of Strasbourg	France
20	Zeiss-Grossplanetarium Berlin	Germany
21	CIT Blackrock Castle Observatory	Ireland
22	Madatech - Israel national Science museum	Israel
23	Infini.to - Planetarium and Museum of Astronomy and Space	Italy
24	Planetarium and Astronomical Museum of Rome	Italy
25	Space Expo	Netherlands
26	Science Center NEMO	Netherlands
27	Planetarium Calouste Gulbenkian-Ciência Viva Center	Portugal
28	Ciudad de las Artes y las Ciencias	Spain
29	MUDIC-VBS-CV	Spain
30	Innovatum Science Center AB	Sweden
31	Swiss Space Museum	Switzerland
32	Center for Space and Habitability of the University of Berne	Switzerland
33	Monastir Sciences Palace	Tunisia

Which groups of people would you expect to be users of these tools at your science centre or museum?

5 - 8 years, kindergardeners	13	34%
8 - 16 years	32	84%
Families, Parents, grandparents, and caregivers visiting with children	32	84%
Schools, Teachers	30	79%
Adults (visiting without children)	21	55%

Additional comments (what do you like most/least about the theme?):

- "Most: the thoughts about what means life out there. And the connection with an upcoming mission (like Rosetta was). Least: too much of alien stuff."
 - "It is a really attractive topic to speak about science with a large range of public. It's also a great opportunity to combine various approach including artist view"
 - "It is a topic that is often more fascinating for adults who at first do not know they are interested in astronomy, so we can get new adult audiences more involved."
 - "With this theme we can encourage our audience to use their creativity and imagination to design the first human colony on mars - how to build, farm, travel and dress on Mars..."
-
- Conclusion: out of 41 participants 33 claimed they likely or very likely to use tools developed on the theme "Is there Life out there?", and 28 will likely use tool related to the "The International Space Station: Living and Working in Space" and equally (26) "Monitoring Oceans and Atmosphere from Space". Each of three themes appeals to different organisations. Thus, it would be necessary to continue developing three themes to reach different science centres and museums;
 - Conclusion: regarding the specialisation of museums, the most popular theme among non-space science centres and museums is "Is there Life out there?" with 22 participants representing non-space institutions claiming to likely use the tools. This theme proved also to be popular with space related organisations;
 - Conclusion: almost all participants wish to receive tools suitable for the following target audiences: kids 8-16 years old and families, visiting with children, schools and teachers. Thus, during the development phase, it would be essential to focus on those target audiences.

5. Project briefs

The following section presents the **science centres and museums**, which are **willing to lead** the development and implementation of the projects, as well as lists other museums and science centres that are willing to **collaborate** in development and implementation of the projects. For each theme a short description along with the target audience, key aspects and key message, as well as possible format is provided.

5.1. Theme “Monitoring Atmosphere and Oceans from Space”

Development leader

Ana Noronha, Ciência Viva, Portugal

Short description

This theme presents an opportunity to demonstrate in a dramatic and informative way the role that space science and associated technologies play in understanding the complex interactions between our planet's oceans and atmosphere for the benefit of mankind.

Target audience

General public, students, schools

Key aspects

The complex interaction between the oceans, atmosphere, the earth's rotation, its magnetic field and the sun create global phenomena on a grand: hurricanes, storm fronts, aurora, weather systems; weather patterns, ocean currents and temperature distribution; turbulent effects, wave formation, thermal effects, basic physics, wind speed, tides, seasons; ocean parameters and conditions that can be now monitored by satellites: temperature, colour, suspended matter, topography, currents; connection to daily life; from local to global issues

Key message

Role of space in monitoring oceans and atmosphere.

Format

- a) Exhibition with a storyline about aliens looking for habitable planets, discover ocean and atmosphere, start monitoring important parameters and discover intelligent life;
- b) Educational workshops and hands-on activities: there is a lot of available scientific content on climate change monitoring that could be further transformed into various educational tools.

Museums interested in collaboration (including participants of the Trento workshop)

Nr	Contact person	Organisation	Country	Specialisation	Theme
1	Sieglinde Sumper	wissens.wert.welt - blue cube & kidsmobil	Austria	non-space	Monitoring Oceans and Atmosphere from Space
2	Franziska Hütter	Universalmuseum Joanneum	Austria	non-space	Monitoring Oceans and Atmosphere from Space
3	Nathalie Cimino	PASS	Belgium	non-space	Monitoring Oceans and Atmosphere from Space
4	Lukas Richter	VIDA! science centre	Czech Republic	non-space	Monitoring Oceans and Atmosphere from Space
5	Anders Dahlstrup	Danish Museum of Energy	Denmark	non-space	Monitoring Oceans and Atmosphere from Space
6	Steve Pizzey	Science Projects Ltd.	England		Monitoring Oceans and Atmosphere from Space

7	Achim Englert	Phänomenta	Germany	non-space	Monitoring Oceans and Atmosphere from Space
8	Tim Florian Horn	Zeiss-Grossplanetarium Berlin	Germany	space	Monitoring Oceans and Atmosphere from Space
9	Rob van den Berg	Space Expo	Netherlands	space	Monitoring Oceans and Atmosphere from Space
10	Maciej Mucha	Copernicus Science Centre	Poland	non-space	Monitoring Oceans and Atmosphere from Space
11	Isabel Borges	Planetarium Calouste Gulbenkian-Ciência Viva Center	Portugal	space	Monitoring Oceans and Atmosphere from Space
12	Ana Noronha (leader)	Ciencia Viva	Portugal	non-space	Monitoring Oceans and Atmosphere from Space

5.2. Theme “The International Space Station: Working and Living in Space”

Development leader

Aude Lesty, Cité de L’Espace, France and Tina Ibsen, Tycho Brahe Planetarium, Denmark

Short description

This theme explores the daily life of European astronauts on board of the ISS. It aims to highlight the place and involvement of Europe in human spaceflight, to relay the news concerning European astronauts in the ISS, and to present the European science on board the ISS to wider publics.

Target audience

General public, families with children under age 12, school groups

Key aspects

Highlighting the place and involvement of Europe in human spaceflight; relaying the news concerning European astronauts in the ISS; presenting the European science on board the ISS to our publics

Key message

European astronauts are a community; let’s gather our forces to present them to our publics; each of us could make a portrait of its astronaut(s); a European vision of this team could be easily raised through collaboration.

Format

An innovative exhibition on the daily lives of astronauts on board the ISS “In an astronaut’s shoes”; The concept of interactive panels: Each panel will propose a little game or simple action in the modules identified. Examples of modules: Preparing for a Space flight!; Maintaining life on board - You are the Commander!; “Debriefing - Are you ready to go further?”

Museums interested in collaboration (including participants of the Trento workshop)

Nr	Contact person	Organisation	Country	Specialisation	Theme
1	Nellie Konijnendijk	Technopolis	Belgium	space	The International Space Station: Living and Working in Space
2	Tomas Meiser	Techmania Science Center	Czech Republic	non-space	The International Space Station: Living and Working in Space
3	Jiri Dusek	Brno Observatory and Planetarium	Czech Republic	space	The International Space Station: Living and Working in Space
4	Pia Bech Mathiesen	Universe	Denmark	non-space	The International Space Station: Living and Working in Space
5	Kim Gladstone Herlev	Experimentarium	Denmark	non-space	The International Space Station: Living and Working in Space
6	Tina Ibsen (co-leader)	Tycho Brache Planetarium	Denmark	space	The International Space Station: Living and Working in Space
7	Patrick Kiernan	National Museums Liverpool	England	non-space	The International Space Station: Living and Working in Space
8	Chris Darby	National Space Centre	England	space	The International Space Station: Living and Working in Space
9	Helin Haga	Science Centre AHHA	Estonia	non-space	The International Space Station: Living and Working in Space
10	Milene Wendling	University of Strasbourg	France	non-space	The International Space Station: Living and Working in Space
11	Aude Lesty (leader)	Cite de L’Espace	France	space	The International Space Station: Living and Working in Space
12	Marco Brusa	Associazione Apriticielo, Infini.to,	Italy	space	The International Space Station: Living and Working in Space

5.3. Theme “Is There Life Out There?”

Development leader

José Antonio Gordillo, City of Arts and Sciences Valencia, Spain

Short description

The search for life and its limits on Earth and other planets represent the most amazing adventure of the human being. Tools and activities related to this theme will be linked with the ExoMars programme of ESA, which will enable to connect this theme with the powerful cultural icon: Mars.

Target audience

General public, teenagers (12-16 years old), school groups

Key aspects

What is life?, biosignatures, living under “other” star, a second genesis on Earth, simple and complex life, searching for DNA, extreme life-life at the edge; everyday life people questions: pollution (in other worlds), microorganism and bacteria (bad or good for life, we need some of them to live, psychological controversy like life in a closed and very narrow space

Key message

Mars is a powerful cultural icon, connection with the ExoMars mission

Format

European educational competition with the topic “Building Mars, our future city; a big “Martian event” with the main European science centres connected; ExoMars in a form of a physical game, which everyone can download and play easily

Museums interested in collaboration (including participants of the Trento workshop)

Nr	Contact person	Organisation	Country	Specialisation	Theme
1	Michelle Accardo	Cosmodrome	Belgium	space	the three themes + the next to come - we like to be involved in all - if we have to choose - we go for ExoMars
2	Philippe Guillet	Natural History Museum of Nantes	France	non-space	Is there Life out there?
3	Laurent Chicoineau	La Casemate (CCSTI)	France	non-space	Is there Life out there?
4	Sebastian Marcu	Design & Data GmbH	Germany	space	Is there Life out there?
5	Thomas Kraupe	Planetarium Hamburg	Germany	space	Is there Life out there?
6	Frances McCarthy	CIT Blackrock Castle Observatory	Ireland	space	Is there Life out there?
7	Stefano Giovanardi	Planetarium and Astronomical Museum of Rome	Italy	space	Is there Life out there?
8	Sylviane Blum	Center for Space and Habitability of the University of Berne	Switzerland	space	Is there Life out there?
9	Guido Schwarz	Swiss Space Museum Supporters Association	Switzerland	space	Is there Life out there?
10	Jose Antonio Gordillo Martorell (leader)	Ciudad de las Artes y las Ciencias	Spain	non-space	Is there Life out there?

6. Distribution and communication strategy by Ecsite

The **overall objectives** of the communication and distribution activities are:

1. Build awareness and promote the use of tools, kits and resources, that are to be developed on three themes among Ecsite members and sustain their interest in space-related themes and topics;
2. To increase visibility of and access to the available ESA's resources and materials and information on the particular missions, with which projects on the three themes will be connected in order to expand the reach to new and hard-to reach audiences through Ecsite members;

Target groups - Ecsite members

1. Non-space related science centres and museums (ex. NEMO, Science museum etc.)
2. Space-related organisations
3. Other science engagement organisations

Implementation approach

The communication and distribution strategy will be implemented in three phases:

The **first phase** will focus on **raising and increasing awareness** among key target audiences on the ongoing process of collaboration and development of new tools and kits, possible dates of availability, building anticipation among potential users of resources, as well as connecting with ESA "news" (for example, launch of new missions etc)

The **second phase** aims to **actively promote and distribute tools**, when they will already be developed and launched. During this phase the main focus will be on increasing the knowledge of and number of science engagement organisations that are using these tools and resources.

During the **third phase**, efforts will focus on **collecting successful stories of implementation** of tools and kits and sharing them with the Ecsite community.

Communication channels

Ecsite has about 400 members and many partners that are willing to communicate about its activities in more than 50 countries. In total our members engage with over 40 million visitors a year.

Channel	Reach
Spokes magazine	7100 subscribers
Ecsite website	60 000 unique visitors per year
Facebook	1734 likes
Twitter	1970 followers
Linkedin	797 members
Ecsite Annual Conference	1000 participants
Space Group Newsletter	154 members
Space Group thematic web page	60 000 unique visitors per year Ecsite website
Space Group Annual Meeting	20 participants

7. Monitoring and evaluation

7.1. Monitoring

The **main objectives** of monitoring are:

1. Monitor work progress;
2. Contribute to mutual learning process, knowledge and experience sharing in order to maximise benefit for all parties involved;
3. Provide opportunities for feedback, especially users of tools, kits and resources;
4. Monitor uptake of the kits and developed resources by Ecsite members.

Implementation Approach

The evaluation and monitoring of the development and implementation of tools, kits and new resources needs to be planned in advance, which was also pointed out during the evaluation of the campaign on Rosetta kit.

Schedule of regular monitoring activities

Period	Activities
Weekly/monthly	Respond to and track requests regarding access to the kits, tools and resources.
Quarterly	Review and collect information on communication and distribution activities, collect information from science engagement organisations – users of kits on their activities involving kits and tools developed on three themes.
Biannually	Assessment of the status and progress toward communication and distribution objectives, planning further steps. Possible indicators for assessment: We assess comments, visitor traffic, and other analytics to identify trends, measure engagement, and see how the various channels are working together. The results of the biannual assessment could be presented during two Space Group annual meetings.
Annually	Review and revise monitoring and evaluation approach, communication and distribution strategy. Review target audiences, mission, objectives, and activities. Review resources and kits itself regarding possible updates.

7.2. Evaluation

The **main objectives** of evaluation are:

1. Support development and implementation of tools, kits and resources on three themes with accurate, information that guides decision-making to improve or change tools;
2. Evaluate number of science engagement organisations reached by the communication and distribution strategy, as well as number of citizens;
3. Provide opportunities for feedback, especially users of tools, kits and resources;
4. Ensure that the developed kits and resources meet needs and criteria of users – science centres and museums, as well as their visitors and participants of the activities and objectives of ESA.

Implementation Approach

The evaluation activities will be planned in advance and will be implemented already at the stage of the development of kits and resources. They will be embedded throughout the every aspect of development and implementation of kits and tools. Evaluation will be conducted in four main phases, which are described below.

Schedule of evaluation activities

Phases	Activities
Phase 1	Development of evaluation framework for feedback collection including questionnaires for users of the kits – science centres and museums and for visitors of museums and participants
Phase 2	Implementation of the evaluation framework during the launch of the kits and tools; collection of evaluation data from science centres and museums
Phase 3	Preparation of the evaluation report, which could be presented during one of the Space Group Annual Meetings.
Phase 4	Review and revise evaluation approach.

8. Conclusions and recommendations

The following section summarises the results of the feasibility study and provides recommendations for further steps regarding the development and implementation of the projects on three themes. The main objective of the study was to collect sufficient information to enable an informed decision on the preferred projects and the three themes.

Relevance/demand/readiness to implement

Based on the results of the on-line survey conducted among the Ecsite members, all three themes proved to be relevant for space-related organisations, as well as for non-space specialised institutions. The survey also indicates that the theme “Monitoring Oceans and Atmosphere from Space” is the most relevant for non-space museums. However, when asked about the readiness to implement the tools, the themes “Is there Life out there?” arrived with the most votes (33).

Willingness to lead and collaborate on the projects

Three themes arrived at the equal number of museums willing to collaborate in the development and implementation – “Monitoring Oceans and Atmosphere from Space” (12 museums) and “The International Space Station: Living and Working in Space” (10 museums), “Is there Life Out There?” (12 museums).

Key recommendations

Section 5 focused on the current status of the projects proposed on three themes during the pre-conference workshop “Space for Life” held in June 2015. Based on the results of the pre-conference, it can be concluded that projects are currently on different stages of the development.

The results of the feasibility study suggest several **key recommendations** concerning possible tools, formats and selection of themes for the development and implementation of concrete projects. The recommendations are as follows:

1. Focus only on the development of one project at a time, as there are not sufficient resources to develop all three themes simultaneously;
2. Considering that all three themes cover ESA’s mission, it is possible to select for further development the theme “Is there Life out there?”, as the majority of science centres and museums participants indicated to be likely using the tools developed on this theme; The theme “Is there Life out there?” also arrived with the majority of the non-space institutions interested in implementing the tools;
3. Projects must be easily accessible, preferred formats – audio-visual and printable materials;
4. The most appropriate tools and resources to be developed are educational materials (“inquiry-based”), interactive modules and exhibition;

The overall conclusion is that Rosetta campaign proved to be a good approach to develop such kits and this approach can be further applied to the development of projects on three other themes.

8.1. Matching Feasibility Study's Results and ESA's Objectives

How the proposed projects are coherent with the objectives of ESA

Objective	Coherence
1. Raise awareness of ESA's missions	All three themes are closely connected to ESA's missions and activities. Thus, each of three themes if implemented will increase visibility of ESA's missions.
2. Promote access to ESA's resources	Ecsite's communication and distribution strategy will ensure promotion of tools and kits developed in cooperation with ESA. Tools and kits will include additional resources available at ESA, which will increase awareness and access to ESA's materials.
3. Reach non-space specialised science centres and museums	Whether this objective will be reached will depend on the approach taken during the development of tools and resources. In order to reach non-space science centres, this should be planned in advance at the stage of development and communicated clearly.

ANNEX I: List of organisations participated in the survey

Nr	Contact person	Organisation	Country
1	Rachael Hughes	Scitech	Australia
2	Franziska Hütter	Universalmuseum Joanneum	Austria
3	Sieglinde Sumper	wissens.wert.welt - blue cube & kidsmobil	Austria
4	Christian Klösch	Technisches Museum Vienna	Austria
5	Michelle Accardo	Cosmodrome	Belgium
6	Nathalie Cimino	PASS	Belgium
7	Patricia Verheyden	Technopolis, teh Flemish science centre	Belgium
8	Tomas Meiser	Techmania Science Center	Czech Republic
9	Jiri Dusek	Brno Observatory and Planetarium	Czech Republic
10	Lukas Richter	VIDA! science centre	Czech Republic
11	Pia Bech Mathiesen	Universe	Denmark
12	Kim Gladstone Herlev	Experimentarium	Denmark
13	Anders Dahlstrup	Danish Museum of Energy	Denmark
14	Patrick Kiernan	National Museums Liverpool	England
15	Chris Darby	National Space Centre	England
16	Janet Laidla	University of Tartu Museum, University of Tartu	Estonia
17	Helin	Science Centre AHHA	Estonia
18	Heikki Hepoaho	Science Centre Pilke	Finland
19	Laurent Chicoineau	La Casemate (CCSTI)	France
20	Thierry Botti	Institut Pythéas (CNRS / IRD / Aix-Marseille Université)	France
21	Guillet	Natural History Museum of Nantes	France
22	Wendling	university of strasbourg	France
23	Tim Florian Horn	Zeiss-Grossplanetarium Berlin	Germany
24	Sebastian Marcu	Design & Data GmbH	Germany
25	Achim Englert	Phänomenta	Germany
26	Dominik Essing	phaeno gGmbH	Germany
27	Mareike Munsch	Technoseum	Germany
28	Frances McCarthy	CIT Blackrock Castle Observatory	Ireland
29	Yariv Noyman	Madatech - Israel national Science museum	Israel
30	Simona Romaniello	Infini.to - Planetarium and Museum of Astronomy and Space	Italy
31	Stefano Giovanardi	Planetarium and Astronomical Museum of Rome	Italy
32	Marco Baccini	lunar space exhibitions	Morocco

33	Isabel Borges	Planetarium Calouste Gulbenkian-Ciência Viva Center	Portugal
34	Jose Antonio Gordillo Martorell	Ciudad de las Artes y las Ciencias	Spain
35	Fulgencio Bermejo	MUDIC-VBS-CV	Spain
36	Jerry Alrup	Innovatum Science Center AB	Sweden
37	Guido Schwarz	Swiss Space Museum	Switzerland
38	Sylviane Blum	Center for Space and Habitability of the University of Berne	Switzerland
39	Rob van den Berg	Space Expo	Netherlands
40	Wendy van den Putte	Science Center NEMO	Netherlands
41	Slimene Sedrette	Monastir Sciences Palace	Tunisia