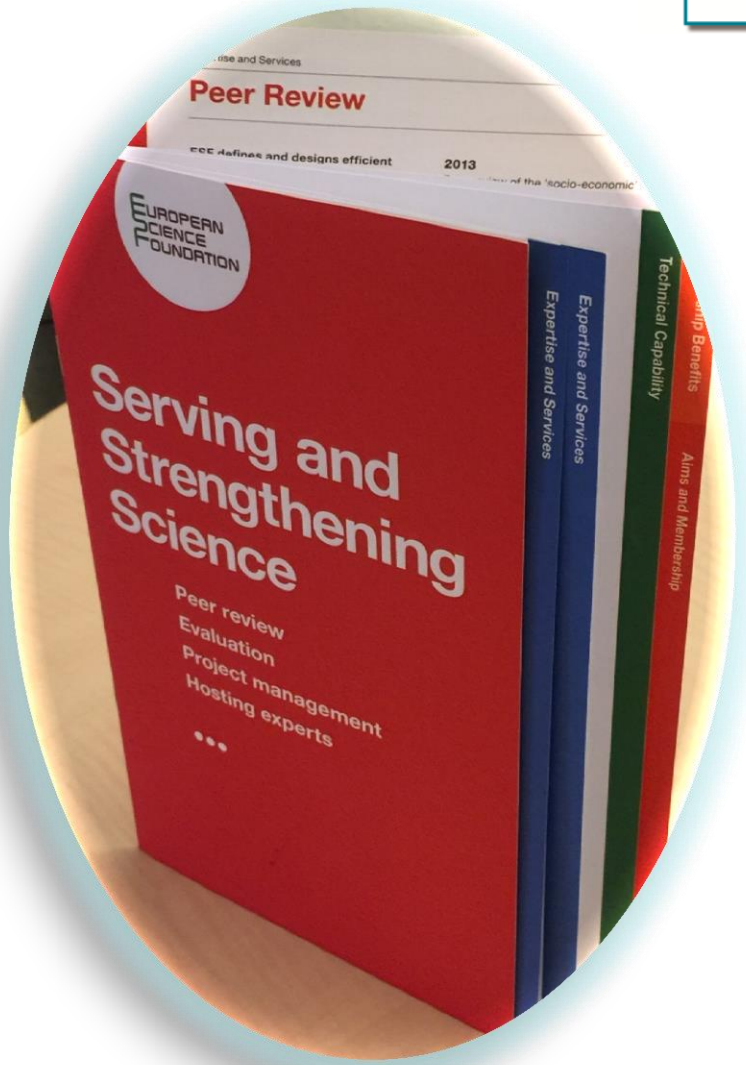
ESF-ESSC to SSB
April 2016

Athena Coustenis
Jean-Claude Worms
Nicolas Walter

HIGH-QUALITY SCIENCE SERVICES FOR EUROPE



SCIENCE CONNECT

A NEW FOCUS

- After 42 years of stimulating European research through its networking and coordination activities, ESF has undergone a **major change of focus**
- We now concentrate on activities designed to **support and sustain** the funding and conduct of scientific research across Europe
- The aim remains to **promote scientific developments through collaborative actions** with the emphasis shifting to helping research funders carry out their decision making processes

SERVICES

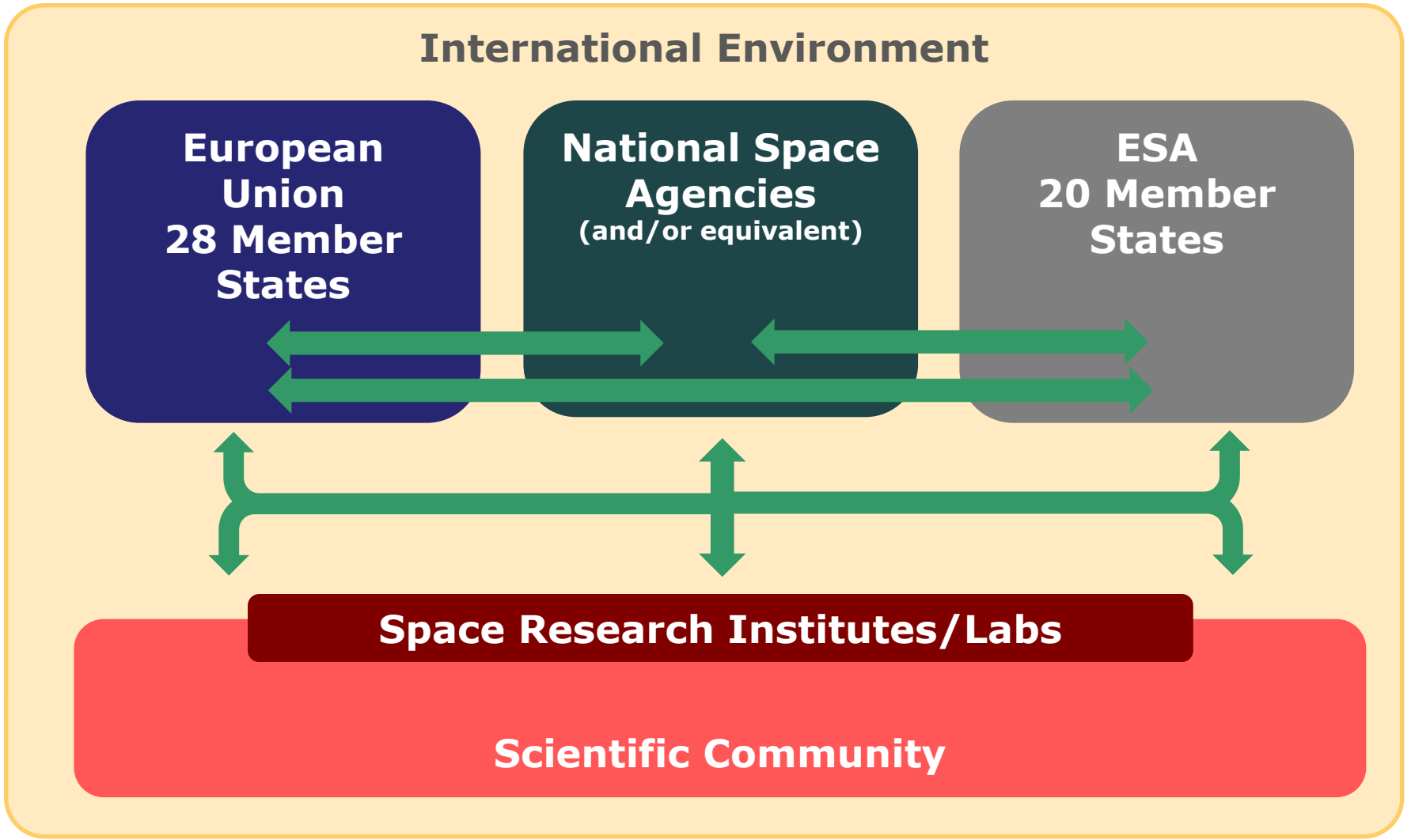
- **Peer review**
  Identify the best research while optimizing the use of internal resources of the clients
- **Evaluation**
  Achieve excellence and maximize the impact of research policies and programmes
- **Expert Boards & Virtual Institutes**
  Provide effective hosting platforms and structures
- **Programme/Project Management**
  Help our partners maintain their focus on research
- **Career Tracking**
  Provide high-quality information on supply and demand for doctorate holders and their mobility

Hosting Scientific Expert Boards and Committees

Composed of high-level independent researchers or research managers to provide targeted expert advice in areas of science, policy, infrastructure, environment and society in Europe:

- Nuclear Physics European Collaboration Committee (NuPECC)
- **European Space Sciences Committee (ESSC)**
- Marine Board (EMB)
- Committee on Radio Astronomy Frequencies (CRAF)
- Materials Science and Engineering Expert Committee (MatSEEC)

Europe's Space Sciences Context



ESSC Mission Statement

*“ The mission of the ESSC is to provide an **independent** European voice on European space research and policy. It is the ESF’s expert body on space research ”*

European Space Sciences Committee

- **ESSC is funded by 17 organisations (space agencies, research councils) from 13 European Countries**
- **ESSC is supported by a secretariat of four staff**
- **ESSC is composed by 27 experts across four panels**
  - ***Nominated ad-personam***
  - ***Large turn-over at next meeting***
- **Two plenary meetings/year**

Interdisciplinarity

- **The four ESSC panels allow cutting across all/most domains of space sciences**
- **Members' interests declared**
- **Consensual positions and recommendations from ESSC are endorsed by representatives from various disciplines**

  → ***No bias***

  → ***Stronger positioning***

ESSC CHAIR: Athena Coustenis

Solar System and Exploration

•**Hermann Opgenoorth,** Earth sciences and space physics (**Panel Chair**)

•**Mahesh Anand**, Moon
•**Ester Antonucci**, solar physics
•**Athena Coustenis**, outer planets
•**Franck Montmessin**, terrestrial planets
•**Kari Muinonen ,** small bodies
•**Gerhard Paar**, robotics
•**Petra Rettberg**: astro/exobiology, biology

Life and Physical Sciences

•**Dominique Langevin,** fluid physics and foams (**Panel Chair**)

•***Sarah Baatout, biology***
•**Alexander Chouker**, integrated physiology
•**Berndt Feuerbacher**, solid state physics
•**Helen J. Fraser**, ices & physical sciences
•***Anne Pavy-Le Traon**, neurology*
•**Roberto Piazza**, colloids
•**Peter Preu, materials**
•**Hubertus Thomas**, complex plasmas

Astronomy and Fundamental physics

•**Stéphane Udry,** exoplanets, **(Panel Chair)**

•**Conny Aerts**, asteroseismology
•**Paolo de Bernardis,** Ir/sub-mm astronomy
•**Pierre Binetruy**, fundamental physics
•**Jordi Torra,** galactic astronomy & astrometry

Earth Sciences

•**Ian Brown,** glaciology (**Panel Chair**)

•**Heiko Balzter,** land-atmosphere interface
•**Laurence Eymard**, ocean/atmosphere
•**Andreas Kääb,** EO and satellite based glaciology
•**Maarten Krol**, atmos. Phys. & chemistry, climate
•**Pepijn Veefkind**, Sentinel algorithms and climate

ESSC Representation

International Environment

European Union

- FP7/H2020 Space Advisory Group (individuals)
- Horizon 2020 stakeholder consultations
- Direct interactions with programme executives

National Space Agencies

- Annual meeting with ESSC Funding Organisations
- UKSA's SPAC
- Swedish national committee

ESA

- Council at Ministerial level
- High-level Science Policy Advisory Committee (ex-Officio)
- Scientific advisory committees at programme level (ex-Officio)
- Meetings with programme executives

- COSPAR Science Advisory Committee (ex-Officio)
- UN Office of Outer Space Affairs (NEO Action Team 14)

- US National Academies Space Studies Board (ex-Officio)

Output and advice from ESSC

Agenda of the 50th ESSC plenary meeting, Paris, 7-9/12/15

Presentations by

- **Jean-Yves LE GALL**, CNES President
- **Len FISK**, COSPAR President
- **Alvaro GIMÉNEZ**, Director ESA D-SCI
- **Marc HEPPENER**, Chief Science Officer ESA D-HRE
- **Maurice BORGEAUD**, ESA D-EOP
- **Mark McCAUGHREAN**, ESA D-SCI
- **Fabienne CASOLI**, Deputy Director CNES-DSP
- **Oleg KORABLEV**, Deputy Director IKI
- **Jean-Louis FELLOUS**, COSPAR Executive Director
- **Chi WANG**, Deputy Director NSSC, representing Ji WU (by teleconference)
- **Michael MOLONEY**, Director SSB/ASEB, The National Academies (USA)
- **Nicolas PETER**, EC DG-GROW Space
- **Catherine CESARSKY**, Chair SSAC
- **Chris RAPLEY**, Chair HiSPAC
- **Berndt FEUERBACHER**, Former Chair HESAC

Panels/interactions with

- **Angela BRACCO**, Chair NuPECC
- **Jan MEES**, Chair EMB
- **Hans van der MAREL**, Chair CRAF
- **Wim van DRIEL**, Chair Elect CRAF


cnes
CENTRE NATIONAL
D'ETUDES SPATIALES

Overarching Science Policy Advice

- **High level pol**
  recommendat
  council at mi
- **High level pol**
  recommendat
  space scienc
- ***Pro-Active* sp**
  communicati
  recommendat
  institutions

SCIENCE CONNECT

Specific Scientific Advice

- **When specialist targeted independent advice is required**

- **Setting up of *ad-hoc* committees and panels**

- **Commissioned Studies**
  - ***Evaluation of ESA Microgravity Programme***
  - ***Strategic advice on planetary protection***

- **Pro-Active disciplinary foresight - Roadmaps**
  - ***Astrobiology and life in extreme environments***
  - ***Human space exploration***
  - ***Nuclear propulsion***
  - ***Technology development***

SCIENCE CONNECT

Horizon 2020 2018-2020 SPACE Work Programme Consultation

European Space Sciences Committee contribution

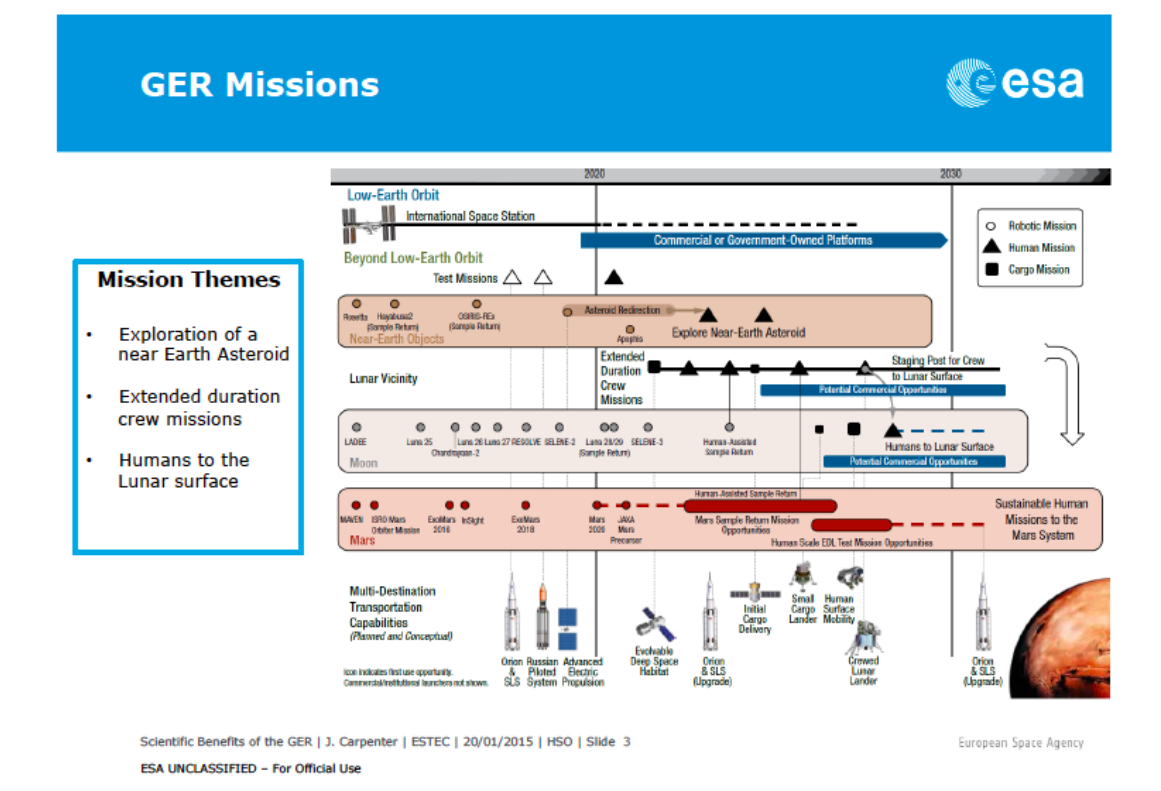
- Transversal issues on the future H2020 space call
  - Continuity, coherence and efficiency
    - ***Space Situational Awareness - Space Weather***
    - ***Scientific Research Enabling Human Space Exploration***
    - ***Astrobiology and Planetary Protection***
    - ***Space Data for Climate Models***
- International collaboration
- Recommendations on the H2020 thematic areas
  - Space Science and Exploration
    - ***Earth observations***
    - ***Copernicus program***
- The ESSC recommends increased and increasingly balanced support for space sciences in the H2020 programme
- The introduction of better visibility and continuity through the bi-annual work programmes is seen as strengthening the programme, its impact and efficiency
- The H2020 SPACE calls are critical for allowing out-of-the-box thinking by scientists and companies, without them having to fit into top-down space programmes, and for allowing projects to bridge fields across all of space science

ESSC and HESAC (April 2016) on nuclear power and human exploration

- ESSC is very supportive of the the development of **nuclear power** sources and propulsion for European space missions, which was discussed and also promoted by ESA's Human and Exploration Science Advisory Committee (HESAC) (e.g. deep space missions and long-term in-situ operations in dark areas)
  - **241 Americium production from separated civil Plutonium is currently progressing very well in the Europe : 4 g and first americium oxide pellet is now available**
  - ESSC Secretariat at ESF is involved in EU-funded activities in the domain of advanced (nuclear) propulsion for space (MEGAHIT, DEMOCRITOS)
- Discussion on call for ideas to explore new partnership between ESA and the private sector, which is a very complex issue, was also brought forth to ESSC.
- Research Community Consultation Workshop on Future Utilisation programme, describing the fields of Life and Physical Sciences in Space using the International Space Station and other research platforms

ESSC and ISECG

ISECG Science WG: science benefits of and how to optimize the science return of the Global Exploration Roadmap (GER). Need to make the science community, policy makers and other stakeholders are aware of the benefits of GER missions → SAG to draft a Science White Paper in support of the GER. This WP was reviewed at an ISECG-COSPAR workshop on 10-11 February.



ISECG SWG's Scientific Advisory Group is co-chaired by Ben Bussey (NASA) and Jean-Claude Worms (ESSC-ESF)

International collaboration

Collaborations : COSPAR CSAC

- The Secretary of COSPAR CSAC is ex-officio member of ESSC and the ESSC Chair sits in the CSAC
- ESSC contributes to discussions centering on, e.g.
  - the 2016 Assembly in Istanbul
  - Strategy and relations with space agencies and other bodies like ICSU, IAF, ISL, GEO and UNESCO
- In relation to ESSC
  - Roadmaps and the coordination between agencies necessary to avoid duplication
  - Planetary protection
  - Space Weather and situational awareness

Collaborations : China

- Visits of the ESSC Chair and ESF Office in 2014 and 2016 to the National Space Science Center (NSSC), Chinese Academy of Sciences (CAS) and Chinese Academy of Space Technology (CAST) to seek potential collaborations with the Chinese Space Science Community (Wu Ji, Xue Cheng Zhang, Li Ming)
- Partners expressed the wish to identify common interests leading to possible cooperation opportunities in the future (young scientists platform/fora, foresight)
- Wu Ji or NSSC representative now attends our meetings regularly
- Exchange foreseen in May with CASC and MOST representatives in Paris to continue the exchange

Collaborations : SSB of the US NAS

- Long-term constructive interactions and international exchanges/information
- Joint reports and activities
- ESSC participating in SSB committees (SSW)
- Current projects
  - PPOSS activity under EC contract (planetary protection of outer solar system bodies). SSB Office is observer

Cooperation and collaboration in space discussed between SSB & ESF since 1976

10 joint reports over 39 years

SCIENCE CONNECT

Projects and Activities

Ongoing activities (ESSC Secretariat)

- Activities concluded in 2015
  - ASTROMAP (FP7 CSA) www.astromap.eu – ***major input for ELIPS' roadmapping – Published in Astrobiology Journal***
  - Mars special regions (joint ESSC-SSB study for ESA & NASA) – ***available online***
  - Framework Agreement with D-TEC on Planetary Protection matters
- Ongoing activities
  - MASE (FP7 CSA) www.mase-eu.org
  - DEMOCRITOS (H2020 CSA) http://democritos.esf.org/
- Starting projects
  - BIOWYSE (H2020 R&I)
  - PPOSS (H2020 CSA)
  - EUROPLANET (H2020 RI) http://www.europlanet-eu.org/

BIOWYSE (ISS and Human exploration)

Objectives

- EC Horizon 2020 (2016-1018) programme with 9 partners, including Thales Alenia Spazio – ESF coordinates
- Development and demonstration of compact, integrated solution (hardware & software) and operational method for preventing, monitoring and mitigating the microbial contamination risk in water systems and humid surfaces on-board ISS and in future human space exploration
- BIOWYSE will build a breadboard system to be tested in laboratory and field conditions (earth). No space validated hardware.
- BIOWYSE will design the system that can fly in space.

Project Overview

- **EC FP7 programme (2014-2017)** – 11 partners incl. DLR – ESF coordinates
- **Isolate and characterise** anaerobic microorganisms from selected sites that closely match environmental conditions that might have been habitable on early Mars and **Study their responses** to realistic combined stresses in these environments
- **Investigate their potential for fossilisation** on Mars and their detectability by carrying out a systematic study of the detectability of artificially fossilised organisms exposed to known stresses
- MASE will also consider thoroughly the following cross cutting aspects: i) optimised methodologies for **sample management and experimental process,** and ii) optimised methodologies for **life detection**

MASE
Mars Analogues for Space Exploration

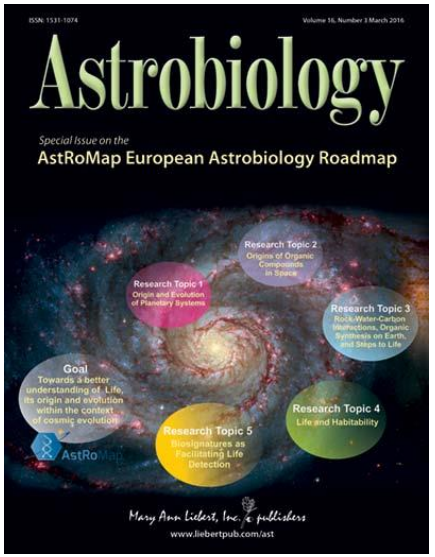
OBJECTIVES AND DELIVERABLES

- EC Horizon 2020 (2016-1018) programme with 7 partners, including COSPAR and DLR – SSB is observer and ESF coordinates
- Describe the state of the art and good practice for implementing planetary protection requirements, identify good practices and lessons to be learnt
- Identify scientific challenges, scientific requirements and knowledge gaps related to planetary protection of small and outer solar system bodies
  → Science White Book
- Develop a European engineering roadmap
- Review of the international outer solar system planetary protection regulation structure, process and categorisation, suggest improvements
  → White Book with recommendations to COSPAR
- Dissemination of knowledge (suite of seminars and handbook on how to deal with PP)

AstRoMap

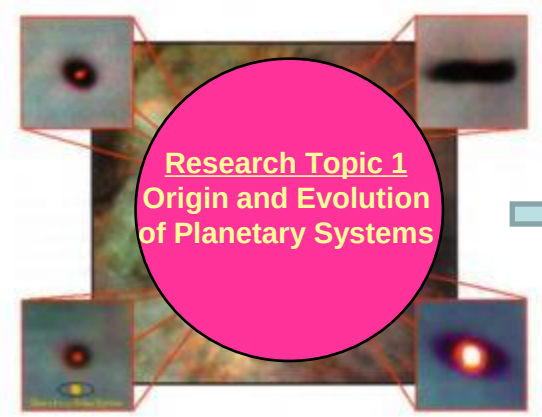
Objectives

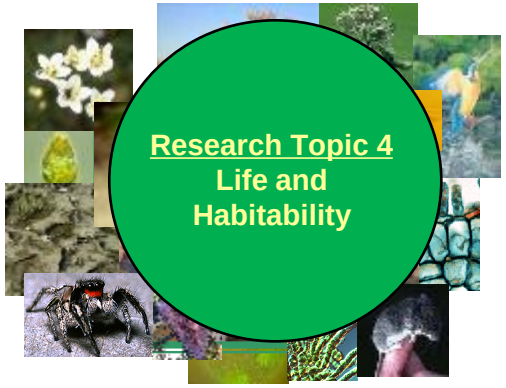
- EC FP7 (2012-2015) – 5 partners including DLR and EANA – ESF is coordinator
- Mapping scientific knowledge related to astrobiology in Europe
- Identify the main astrobiology issues to be addressed by Europe in the next decades in relation with space exploration
- Identify potential mission concepts that would allow addressing these issues
- Identify the technology developments required to enable these missions
- **Provide a prioritised roadmap integrating science and technology activities as well as ground based approach**

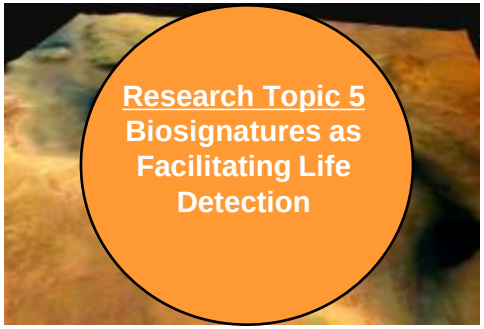


AstRoMap

AstRoMap







To better understand Life, its origin and evolution within the context of cosmic evolution

Future activities

- ESSC is finalising its Strategic/Operational Plan 2016-2019
- Consolidating Expert Boards position and activities in continuing ESF → joint session at last plenary
    - joint ESSC-NuPECC Working Group on radiation/hadrontherapy/nuclear medicine
    - joint ESSC-EMB WG on « exo-oceans »
- Preparing the ESA Ministerial Council 2016
- Strengthening existing partnership with our international partners and seek similar relation with other countries where possible
- Offering coordination between the various space science roadmaps at international level
- Next plenary meetings 17-20 May, Rome, and in September 2016

Exo-oceans

Studying the worlds in the outer solar system with possible subsurface liquid water oceans

- Concept for a joint working group between ESSC and the European Marine Board
- Would involve marine scientists (geo/bio), planetary scientists and astrobiologists.
- Objectives: provide recommendations on issues of common scientific interest and opportunity to foster collaborations between programmes
- International collaboration?

A research community and infrastructure for PLANETARY SCIENTISTS

www.europlanet-2020-ri.eu

Nigel Mason, Athena Coustenis
(coordinators)
ESF (N. Walter) is evaluation office

Europlanet :
a growing « business », an expanding community

FP6 2005-2008: 2 M€ - ISSI 90 k€
Coordination action -> only networking activities (NA)

FP7 2009-2012: 6 M€ - ISSI 240 k€
Research Infrastructure network -> **RI = NA + TNA + JRA**

The « fundamental equation » of EC RI networks!

H2020 2015-2019: 10 M€
Research Infrastructure network -> NA, TNA, JRA and services

Engagement with other H2020 Space projects (COMPET);
Eurocares/PPOSS; Upwards; MiARD;
EUSpaceAwareness ; Neoshield/ASTERIX

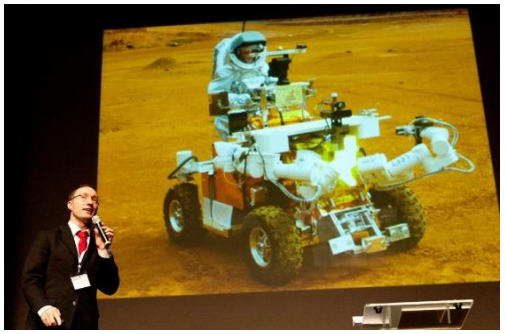
- Europlanet is Europe's permanent community consortium for planetary science. Any institute can join by signing the MOU
- It has its own annual conference: the EPSC
- It takes all actions to promote European planetary science
- It helps the community to seize all adequate funding opportunities

2015-19: Europlanet 2020 RI

- **Budget 9.945 million Euros 2015-2019,**

  start date 1 September 2015, to:

- **Support scientific meetings and workshops**
- **Foster Academia-industry collaborations through technology workshops**
- **Support and develop a unique Outreach programme including support pilot projects.**
- **Provide access to 5 field sites and 11 labs (open calls + peer review selection): TNA's**
- **Develop and run two new on-line services**
- **Fund the necessary developments through Joint Research Activities (JRA)**
- **INTERNATIONAL COLLEAGUES ARE WELCOME IF WITHIN A EU TEAM !!**



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