

# **Action plan for the European Astrobiology Centre**

## **Fourth draft**

### **Aim and scope**

This paper presents the draft of an Action Plan for the establishment of a European Astrobiology Institute (EAI). It contains proposals for its future aims and activities as well as a draft structure including governing bodies and a time plan for the set-up of the institute. The Action Plan has been approved by the 'Interim Board' consisting of members of the main stakeholders in European Astrobiology that has been set up in autumn 2017. Nevertheless, the final decision about the structure, aims and activities of the EAI will rest with the General Assembly of the future institute.

### **Abstract**

The European scientific landscape is undergoing a fundamental transition from one that is based upon discrete disciplines (physics, chemistry, biology) to one that is focussed on research questions. Astrobiology, the scientific discipline that studies related issues concerning the origin of life and the possibility of life existing on other celestial bodies, has the potential to be a flagship in European interdisciplinary research providing an ideal example of the need to develop new structures and methodologies to address major scientific questions that cannot be achieved by an individual discipline or even the scientific community in a single country. Europe is fortunate to have the necessary skills, facilities (including field sites) and people to take the lead in international astrobiology research. Ensuring this leadership potential is realised should therefore be of high priority for the EU. The establishment of a European Astrobiology Institute (EAI) will provide the perfect forum for creating the necessary structures and environment while also developing the skills base of the European Astrobiology community.

### **Rationale**

Astrobiology, the study of the origin of life and the possibility of life existing elsewhere in the universe has been central to the human quest for knowledge since antiquity but it is only with the advent of the Space Age that mankind has been able to explore these issues in a scientifically rigorous way. New exciting discoveries such as extrasolar planets (which imply that our solar system might be less unique in the galaxy than previously assumed), life under extreme conditions and, quite recently, the existence of hydrothermal systems on the Kronian satellite Enceladus have fuelled speculations about extraterrestrial life. The detection of complex organic (even chiral) molecules in the interstellar medium, star-forming regions and protoplanetary disk also raises the question of a possible extraterrestrial origin for the basic molecular building blocks of life.

It is clear that addressing "big questions" such as the origin of the basic molecules necessary for the emergence of life on Earth, the co-evolution of the biosphere and the geosphere on our planet and the influence of cosmic events on it (e.g. changes of the solar luminosity, meteorite, comet and asteroid impacts), as well as the possibility of extraterrestrial life cannot be tackled by one branch of science alone but requires intensive multidisciplinary cooperation. However, multidisciplinary and interdisciplinarity also imply challenges and even risks. Firstly, scientists have to "learn" the language of other disciplines, which might result in misunderstandings and misconceptions, at least in the beginning. Secondly, interdisciplinary fields require the training of a new generation of scientists who are able to work across borders and disciplines, a task for which the structure of the European higher education system remains ill-prepared. Indeed, new, multidisciplinary research fields often face difficulties in establishing themselves within the frequently very traditional curricula of universities. Thirdly, there is an

inherent risk of pseudoscience entering such multidisciplinary fields, especially when the subject is vast (and not many researchers can claim full expertise on even parts of the subject) and enjoys a great interest of the general public (such as in astrobiology). Over-hyped scientific results which have been widely publicised in the media (sometimes even by leading research organisations) that later turn out to be questionable and even wrong not only endanger the standing of new disciplines but also the reputation of the whole scientific community in the public eye. It is therefore important to create structures to ensure impeccable scrutiny of the relevant research results disseminated to the scientific community and announced to the general public.

All of these issues are relevant to the development of Astrobiology and can be addressed and overcome by the founding of a European Astrobiology Institute that will promote and safeguard the high quality of all astrobiology-related research in Europe. Furthermore, the strength of any scientific community is, in the long run, determined by its ability to train and recruit the best scientists and the most promising researchers. Excellence tends to attract other excellence and, by establishing contacts with eminent researchers and scholars outside their own field, early career scientists (and not only those) can extend their own scope of research. This, however, depends on the existence of efficient fora and structures to foster this kind of interaction. The NASA Astrobiology Institute (NAI) is a good example of an entity that has succeeded in creating a lively research community. Therefore, a European Astrobiology Institute can build on the NAI experience to develop Europe's astrobiology research. It should also be noted that experience both in Europe and the US shows Astrobiology has proven successful in attracting more women into science.

A European Astrobiology Institute can be built upon previous astrobiology initiatives. The European Astrobiology Network Association (EANA) has existed since 2001 and has, since then, organised a yearly workshop (which is usually attended by >100 people) as well as an on-line web-casted training course on the subject. The EANA also runs a website where astrobiology-related events are listed. In recent years, new initiatives have emerged. An organisation of early career scientists (AbgradE) has been founded and holds events on a regular basis. Furthermore, the recent COST Action "Origins and Evolution of Life on Earth and in the Universe" (2014-18) has been important in bringing together researchers from different disciplines through organizing a series of well-attended workshops and meetings and providing funding for research visits of European scientists and students as well as training events. The different working groups of the Action have been active in discussing and pursuing new research avenues and organizing special workshops. Inside the COST Action, a working group exploring historical ethical and philosophical questions in astrobiology has recently completed a white paper on Astrobiology and Society in Europe.

Furthermore, the European Astrobiology Campus (EAC), launched as a Strategic Partnership under the Erasmus+ programme has developed a coherent and comprehensive training programme in astrobiology. One of its main activities was to continue and extend the successful series of summer schools organized by the Nordic Network of Astrobiology and the Société Française d'Exobiologie. These events not only offered the possibility to provide training to future European research leaders in astrobiology by world-renowned scientists at relevant field sites but also enabled the attendees to find future cooperation partners and to start own research projects based on the practical exercises performed during the summer schools. This not only opened new fields of research for early career researchers but also trained them in important transferable skills such as leadership, team building, expedition planning, dealing with local administrative requirements, applying for funding etc. Nevertheless, the training efforts were

not exclusively aimed towards students and early career scientists. In a multidisciplinary field, it is also important to “train the trainers” and to foster the development and exchange novel teaching methods. To this end, the campus co-organised a conference in Utrecht in July 2017 in cooperation with the Commission C1 “Education in Astronomy” of IAU (International Astronomical Union). However, the funding for both the COST Action and the European Astrobiology Campus has terminated in spring 2018 and autumn 2017, respectively. A more secure structure is needed that can support the field and act as a strong voice for the European astrobiology community in engaging decision makers, funding agencies, other stakeholders and, last, but not least, the media and the general public. Furthermore, as in all fields, research in astrobiology is dependent on access to proper funding. At the moment, there exists a cornucopia of different national, regional and European-level funding schemes Whereas this can *per se* be a good thing, it has become very difficult for individual scientists to overview all the available grants, and, thus financing opportunities for interdisciplinary research projects in astrobiology might have been lost. For a thriving research community, it is indispensable to approach funding agencies in a concerted and organized manner to make maximum use of available grants. A European Astrobiology Institute can ensure that all possible financing avenues are used by the community and that duplicate approaches are avoided. Furthermore, the EAI can approach research funding agencies in a proactive manner in order to include grants for interdisciplinary research into their programmes and schemes. The institute can also work to introduce astrobiology questions into the scientific programme of space missions at an early stage of planning. Furthermore, the EAI can be an information hub to facilitate access to large research infrastructures and field sites, with a centrally maintained and continuously updated information website run by the European Astrobiology Institute encouraging more scientists to use these facilities and to perform field work at astrobiologically relevant sites. Accordingly, and following recommendations in a recent European Framework programme consultation (ASTROMAP) to establish a more coherent approach to European Astrobiology research through establishing a transnational structure, we propose to create a European Astrobiology Institute (EAI). The principal tasks of the EAI will be discussed in the next section.

### **Tasks of the European Astrobiology Institute**

The principal tasks of such an institute should be the following:

- To promote, plan and implement multidisciplinary European research projects in all fields of astrobiology.
- To foster international collaboration in astrobiology inside Europe as well as with other international astrobiology communities
- To act as a forum to discuss new findings in the field through organisation of conferences, meetings, and on-line seminars and to disseminate new research highlights among the scientific community and the general public in an apt way after thorough scrutinising
- To form the kernel of a network for institutions, institutes as well as researchers to plan cooperative astrobiology projects
- To perform training, education, outreach and dissemination in astrobiology in Europe in a comprehensive, synergistic and collaborative way
- To collect and disseminate astrobiology-related scientific and programmatic information
- To initiate proposals for grants in order to obtain external financial support (e.g. EU projects)
- To engender debates on important legal and ethical issues in astrobiology and space research

- To interact with European transnational organisations (e.g. ESA) and European research agencies on programmatic issues and ensure awareness of astrobiology research with decision makers by
  - acting as a strong voice for the European astrobiology community.
  - approaching and informing decision makers in governmental and non-governmental organisations at a national, regional and European level in a coordinated manner in order to promote astrobiology research in Europe as transdisciplinary research activity.
  - contributing to the development of a common European Research Area and research policy in the field of Astrobiology.
- To formulate and continuously update a long-term astrobiology research strategy for the European Research Area.
- To collaborate with astrobiology networks and institutes inside Europe and beyond

The EAI should thus be undertaking research tasks as well as ones concerning promotion of research. They are described in detail in the following section.

### *Research activities*

It is important to define the main research areas of the Institute carefully. These should be as inclusive as possible in order to avoid leaving important or newly emerging “hot” science areas behind. Furthermore, they should be interdisciplinary to foster the formation of new communities and not just be continuations of existing ones. A preliminary list of research areas for the EAI includes:

#### **Formation of planetary systems and detection of habitable planets and moons**

- Formation of planetary systems
- Conditions of habitability
- Detection and detailed characterization (including structure, composition, atmospheres and habitability) of exoplanets

#### **Early earth environment and habitability**

- Physical, chemical and geological processes on Early Earth
- Co-evolution of Earth’s geosphere, atmosphere and biosphere
- Evolution of habitability of early Earth

#### **The pathway to complexity: From simple molecules to first life**

- Origin and delivery of complex organic molecules
- Prebiotic chemistry, synthesis of biopolymers and self-assembly
- Formation of first cells

#### **Early life and life under extreme conditions, and their signatures**

- First traces of life
- Early evolution of life
- Boundary conditions of life and life in extreme environments
- Tracing life in early and extreme terrestrial environments

#### **Biosignatures and methods for detection of life on other celestial bodies**

- Detection of life on other celestial bodies in the solar system
- Novel methods and technologies to detect life outside the Solar System

## **Historical, philosophical, societal and ethical issues in astrobiology**

- History of ideas about origins of life
- Views about extraterrestrial life in different cultures
- Search for life on other planets and moons: philosophical, societal and ethical issues

Research activities in these areas should be coordinated by Working Groups (WGs) consisting of active researchers in the field. The WGs should be engaged in the following activities:

- Planning, carrying out interdisciplinary research projects.
- Evaluating research missions and projects in order to improve and further develop astrobiology research in Europe.
- Hosting topical workshops bringing together scientists from different disciplines to discuss specific research areas.
- Participating in the planning and carrying out of the training, outreach and dissemination activities of the EAI.
- Encouraging mobility of researchers engaged in astrobiology by supporting research missions and raising funding for that end.
- Facilitating access to research infrastructures and field sites by acting as an information hub providing information and contact persons.
- Exploring the possibilities of virtual access to research infrastructures and field sites.
- Participating in the planning and carrying out of astrobiology-related space missions.
- Discussing and assessing research findings in astrobiology in their field.
- Providing expertise for the set-up, implementation and further development of the long-term research strategy for the EAI and the European Research Area.
- Functioning as a forum to discuss and plan new research and to encourage the creation of smaller research teams working on special innovative projects in order to promote interdisciplinary cooperation of scientists inside the EAI and beyond.
- Ensuring that protocols and rules protecting field sites are met and collaborate with environmental and heritage protection authorities to formulate and further develop such rules and regulations.
- Developing databases and interpretation tools for research in astrobiology and improving data management in astrobiology using novel tools.
- Engaging industries and citizen scientists into current and future research projects and developing strategies to augment their participation
- Organising regular on-line discussion fora on special themes inside astrobiology

Such actions also serve to attract world leaders into the field – including those who are not yet defining themselves as astrobiologists. They also keep the community lively and avoid inflexible structures. The number, focus and the themes of the different working groups should be adaptable to new developments in astrobiology.

### *Training*

Another crucial prerogative for the prosperity of a scientific community is the availability of high class training in the field. Due to the wide scope of astrobiology, the necessary expertise for a comprehensive training programme in the field is usually not present in individual research institutions and even in individual countries. Furthermore, astrobiology is not always yet understood as a discipline by Directors of Studies and other people designing curricula. Teaching astrobiology may also put some unprecedented challenges to the staff delivering its courses. Experience in previous training schools has shown that even very acclaimed and

proficient lecturers can face problems when having to address a multidisciplinary audience. Therefore, two workshops on Training and Education in Astrobiology have been organised. The last one took place in July 2017 with the IAU C1-Commission on Education in Astronomy and will continue to be held in the future (the next one is scheduled in Malaga, Spain in May 2019). A pan-European effort is therefore necessary and the training programme provided by the European Astrobiology Campus (in 2016 the Training School “Rencontres Exobio pour Doctorants”, organised by the Societe Francaise d’Exobiologie, France since 2007 received IAU recognition), the Nordic Network of Astrobiology and the COST Action “Origins and Evolution of Life on Earth and in the Universe” provides a base on which to grow a trans-European astrobiology curriculum. It is therefore suggested that the European Astrobiology Campus continues its work functioning as the training entity of the EAI and coordinate training activities of students in astrobiology. The European Astrobiology Campus should also act as a forum for production and exchange of state-of-the art training material, novel training methods and good training practices.

The above-mentioned summer schools, which included field work, have been very successful in launching scientific projects of students and early career scientists, The EAI could devise a mentorship programme for students and early career scientists starting their own research projects. Such a mentorship programme has been successfully implemented by the SAGANet astrobiology grassroots organization in the US.

To sum up, the European Astrobiology Campus (which will have the status of the EAI) should coordinate training activities of the institute by:

- Providing a comprehensive multidisciplinary European astrobiology training for students and early career scientists offering both basic and specialised training events (mainly in the form of summer schools) in the field as well as training in generic skills like proposal writing, planning of scientific projects. This should include:
  - Basic training schools in astrobiology
  - Specialised training schools in sub-fields of astrobiology (preferably involving field exercises)
  - Summer camps for undergraduates in order to get future researchers interested in the field at a comparatively early stage
  - Training schools with overarching themes like the Nordic-UHNAI training school “Water, Ice and the Origin of Life in the Universe”
- Holding workshops on astrobiology education and training.
- Promoting collaborative research activities of early career scientists including field work.
- Acting as a forum to foster exchange of teaching material, novel training, assessment methods and good practices between lecturers.
- Holding on-line courses in astrobiology.
- Maintaining a network for astrobiology training and providing training material for higher education in Europe.
- Developing secure funding for these activities (as with every activity, shoestring budgets are detrimental to quality).
- Providing a mentoring scheme for early career scientists in the field of astrobiology.
- Collaborating with the working group on Education and Training in Astrobiology inside the IAU.
- Production of training and education material for all levels
- Collection of astrobiology lectures available on-line ([astrobiovideo.com](http://astrobiovideo.com))

Training schools can also function as crystallisation cores for formation of new communities and teams of early career scientists (e.g. the FELDSPAR, PELE, and MAFIC projects). Early career scientists should be included in the planning of these activities as well as scientific meetings, as was done in the European Astrobiology Campus.

### *Education*

Training in astrobiology should not be confined to higher education but promoted at all levels of education. Indeed, astrobiology is especially apt to catch the interests of pupils at all ages and to motivate them to consider a career in science. Furthermore, astrobiology encourages learners to assume a holistic view of science. However, including astrobiology-related themes into the curricula of schools is often hampered by the lack of resources. Nevertheless, successful efforts have been made to translate astrobiology textbooks into other languages. A working group inside the EAI focussed on educational needs of the community could:

- Create and translate teaching material for school education at all levels.
- Exchange teaching practices.
- Collaborate with education institutions all over Europe.
- Provide training for teachers in astrobiology.

These activities will raise interest of learners into fundamental astrobiology-related science questions at an early stage of their education.

### *Outreach and media*

Very few areas of science are able to catch the interest of the general public as well as astrobiology does. Therefore, outreach and a coordinated, professional approach to media should be one of the key activities of the EAI. Carrying out outreach activities on a European level will deliver a larger impact of astrobiology research on the perception of the general public and ensure a more efficient use of resources. The EAI should perform outreach and media work in a coordinated way through:

- Leading the outreach activities of astrobiologists to the scientific community, industry and other stakeholders as well as the general public by producing and effectively promoting excellent outreach material in cooperation with entities engaged in Astrobiology research and education.
- Using the wide interest of the general public to coordinate and promote involvement of citizen scientists in astrobiology research projects.
- Carrying out projects on public education (in cooperation with museums, schools and adult training centres).
- Using networks of museums to efficiently promote outreach material.
- Developing contacts with the media and ensuring high quality coverage of astrobiology-related European research by offering a pool of experts with which journalists can contact.
- Focussing on the efficient and coordinated use of state-of the-art electronic media in astrobiology outreach
- Approaching the media in a coordinated and professional way and devising a strategy for media work in astrobiology.

### *Dissemination*

An important work area of the EAI will be the dissemination of its research efforts to the scientific community. As a new field of science, astrobiology has faced some difficulties in establishing itself in some more traditional branches of science. Astrobiology has frequently been seen as a “soft” research subject where critical scrutiny of findings was not implemented to the necessary extent. The EAI involving strong and well-reputed research institutions can act as an authority to ensure that high standards of research are maintained and important results are shared with the scientific community and the general public. Furthermore, the EAI can promote the creation of high-profile review articles and reference works in the field. The tasks of the EAI in the field of dissemination will be to:

- Ensure that results of the research projects carried out by the EAI are disseminated adequately in the scientific community.
- Encourage the production of high-level review articles.
- Ascertain that conferences and workshops organised by the EAI are adequately advertised and their results disseminated.
- Continue the work on important reference material such as the Encyclopaedia of Astrobiology.
- Organise web-streamed seminars by leading scientists in astrobiology, and also providing an interface (web-based tools) to collect and share already existing and currently broadcasted astrobiology lectures.

#### *Approach to decision makers and funding*

A coordinated approach to decision makers and a clear strategy to tap into all available funding sources is a prerequisite for the success of the EAI. This strategy should not only involve work in a reactive manner (i.e. applying for grants issued by national, regional and European bodies) but also in a proactive way by approaching decision makers and research support agencies to include research relevant to astrobiology into calls for funding schemes. The EAI should be engaged in:

- Promoting astrobiology research and ensure proper funding for astrobiology research and networking activities by
  - improving Europe’s programmatic landscape in Astrobiology.
  - securing funding for astrobiology in Europe
  - providing the tools for increased coordination and eventually supporting, managing and implementing collaborative research programmes.
- Coordinating the approach to funding agencies to finance the activities of EAI and astrobiology research in the European Research Area.
- Approaching funding agencies to ensure that research in astrobiology is included in calls for proposals.
- Informing decision makers in governmental and non-governmental organisations on a national, regional and European level in order to promote astrobiology research in Europe as transdisciplinary research activity.
- Striving to include astrobiology relevant research projects into the scientific programme for future space missions.
- Interacting with European Research agencies on programmatic issues and advising policy-makers in European bodies (EU, ESA etc.) and national governments on astrobiology – related issues in space policy including ethical and juridical questions arising in this context.

- Collaborating with astrobiology networks and institutes inside and outside the European Research Area (e.g.: US, Japan, Australia) in order to promote the field.

The EAI thus will thus strive to act as a strong voice for the astrobiology community in Europe.

#### *Liaison with industry*

Astrobiology, at a first glance, does not appear to be a subject that requires or encourages industrial participation. Nevertheless, astrobiology is intrinsically linked to the development of new techniques developed by industry. These range from enzymes used by extremophiles that are commercially employed in detergents and genetic investigations to space technology and mining industries. To efficiently exploit the possibilities of co-operations and synergies between research and industry in astrobiology the European Astrobiology Institute should create a strong team for the liaison between research and industry comprising of representative from both the scientific community and the industry. It should also be worthwhile to establish efficient communication channels to Space Agencies and Industry. We therefore propose to create a Working Group headed by an Industry Liaison Officer to foster links and cooperative projects between research and industry.

**In summary:** A European Astrobiology Institute will cover all aspects of astrobiology research on a European level, provide a comprehensive and research-oriented training programme for students at all levels, coordinate efforts in education and outreach in the field and approach all stakeholders, ranging from decision makers over industries to the general public in a coordinated manner. It will thus strive to make the European Research Area the world-leading community in astrobiology.

#### **General features and membership of the EAI**

We propose that the European Astrobiology Institute should be a consortium of institutions. Individual memberships of natural persons are not envisaged. Three different kinds of member entities may exist:

- Core organisations (National, Regional and European Research Organisations)
- Participating institutions (Higher education and research institutions and individual research entities or substructures of those)
- Affiliated groups (smaller groups of researchers inside an institution or other consortia interested in astrobiology research)

The Management Committee of the EAI (see below) will be responsible classification of participants into the above-mentioned categories. If participants are discontent with the decision of the Management Committee, they can appeal to the General Assembly.

#### *Core organisations*

National, Regional and European Research Organisations and consortia with a large membership and/or a large number of employees. Examples include ESA, ESF, CNRS, CNES and National Academies.

#### *Participating institutions*

Higher education and research institutions and individual research entities or substructures of those. This can include universities, individual research institutes and centres. All core organisations and participating institutions are entitled to send one delegate to the General Assembly. Their members and employees are eligible for all positions in the EAI (Chairs, Vice

Chairs, Working Group Leaders and Deputy Leaders) and refunds for attending meetings and other events of the EAI from funds stemming from the membership fees.

### ***Affiliated groups***

These are smaller groups of researchers inside an institution or other consortia interested in astrobiology research. Their members and employees are NOT eligible for Management Committee memberships and WG leader/deputy leader positions but can obtain refunds for attending meetings and other events of the EAI from funds stemming from the membership fees.

### ***Membership fees and funding***

The following membership fees are suggested by the Board:

Core Organisations (European and regional organisation (e.g. ESA, CNRS, National Academies)	EUR 8000,-
Core Organisations from EU Less Represented Countries and other non-EU countries ascribed a similar status by the EAI	
Management Committee	EUR 4000,-
Participant institutions (or internal structures representing institutions)	EUR 2000,-
Participant institutions from EU Less Represented Countries and other non-EU countries ascribed a similar status by the EAI	
Management Committee	EUR 1000,-
Affiliated group	EUR 500,-
Affiliated group from EU Less Represented Countries and other non-EU countries ascribed a similar status by the EAI	
Management Committee	EUR 250,-

Only affiliates from Member entities (core organisations, participant institutions and affiliated groups) will be eligible for refunds from financial means stemming from the membership fees. The only exception to this rule are refunds for invited speakers at meetings and lecturers at training events. If EAI gets additional funding from other sources the rules from the financing agency apply for that part of the funding.

EAI will be an organisation of institutions, and, consequently, no membership of individuals is planned.

### ***Financial year***

The fiscal year is the Calendar Year. The first fiscal year will be 2020. For this and the following years the membership fees stipulated by the General Assembly will apply.

### ***Admission of new member entities***

Before the first General Assembly, the Interim Board decides about the admission of member entities (Core Organisations, Participating Institutions and Affiliated Groups). The following admission procedures are suggested:

- Application for participation is sent to the Chair of the EAI
- The Executive Committee decides if the applicant organisation/group will be given the status of a core organisation, participating institution or affiliated group.
- The Management Committee decides about the admittance of the organisation.
- In case of negative decision or if the applicant entity is discontent with its status, the applicant

organisation has the right of appeal to the GA

- Cancellation of membership and desire to change the status of a member entity has to be filed in year's previous notice (the deadline 31 December of the year preceding the previous one, e. g. 31 December 2021 for a change getting into force on 1 January 2023)

Clear instructions will be given to institutions about the legal implications and commitments when they are asked to join. These will be summed up in a 1-2 page document will be produced to this end in good time.

### ***Leave of member entities***

Leave of member entities has to be announced at least one year in advance, e.g. in 2022 to be effective from 1 January 2024. Until the final leaving date the member entity has all the rights and duties in the EAI according to its status. This includes the duty to pay membership fees.

### **Structure of the EAI**

Clearly, the EAI needs an efficient, inclusive and democratic organisation. We therefore propose a structure for the EAI that should fulfil those requirements and this is outlined in detail below.

### ***Local Teams***

At each of the Core Organisations, Participating Institutions and Affiliated Groups local teams should be formed. The tasks of the Local team are suggested to be:

- Carry out astrobiology activities at their institution (scientific, outreach, training, dissemination)
- Ensure that members of their institution are aware of the activities of the EAI
- Approach decision makers at their home institution to promote astrobiology and the EAI
- Ensure that a delegate to the General Assembly is appointed by the institution

### ***Local Coordinator***

We propose the Local Coordinator to be appointed by the Local team. This person:

- Heads/coordinates the astrobiology(-related) research activities or possesses a mandate from the leader to represent the member institution in the EAI.
- Organises local activities (research projects, courses, outreach activities).
- Promotes astrobiology at the home institution.

### ***General Assembly***

The Participating Institutions as well as the Core Organisations will send one delegate to the General Assembly of the EAI. It will meet at least annually and its role should be to:

- Decide about the general policy of the EAI.
- Define the overall structure of the EAI.
- Elect the chair and the vice chair(s) of the EAI.
- Create and dissolve working groups.
- Elect Working Group Leaders and Deputy leaders (upon suggestion of the working group in question).
- Approve the Yearly Work Plan of EAI.
- Approve overall budgets of the EAI.

- Choose the Host Institution of the EAI.
- Discharge the Executive Committee of its financial responsibility.

Every participating institution and core organisation has, the right to send one delegate to the General Assembly. Each delegate shall have one vote and cumulative voting by one person for 2 or more participating institutions or core organisation is not allowed.

#### *Working Groups (WGs)*

We propose two types of Working Groups: those working on scientific themes and those taking care of different activities like training, education, outreach, etc. They will form the backbone of the EAI and be led by a Leader and a Deputy Leader. We propose the following Working Groups be established initially:

- *Thematic Working Groups (Working on the scientific themes outlined above):*
  - Formation of planetary systems and detection of habitable planets and moons
  - Early earth environment and habitability
  - The pathway to complexity: From simple molecules to first life
  - Early life and life under extreme conditions, and their signatures
  - Biosignatures and methods for detection of life on other celestial bodies
  - Historical, philosophical, societal and ethical issues in astrobiology
- *Activity Working groups*
  - Policy and Funding group, coordinating EAI approaches to governmental and intergovernmental organisations and funding agencies led by a EAI Policy and Funding Officer.
  - EAC as affiliated organisation headed by the EAC Chair.
  - Field work, field site management led by Field Site Officer.
  - Access to European Research Infrastructures and Analysis Facilities led by the Research Infrastructure Officer
  - Outreach, medias and corporate identity (Website) group led by Outreach Officer
  - Dissemination and Intellectual Output group led by the Dissemination Officer
  - Industry Liaison group headed by the Industrial Liaison Officer

Each Scientific Working group should be led by a Leader and a Deputy Leader and appointed by the General Assembly. The officers mentioned above will function as leaders of the Activity Working Groups. WG leaders will be elected by the General Assembly and included in the Management Committee. The WG Leaders and Deputy Leaders should also be recruited from core organisations or participating institutions. WGs will be requested to submit a yearly report to the Management Committee. Working groups can accept members from organisations outside the EAI, but those people will not be entitled to any refunds stemming from the membership fees contributed by the participating organisations but might be able use funds from other grants obtained by the EAC.

#### ***Management Committee***

We propose that the Management Committee consists of the following members:

- Chair and Vice-chairs of the EAI
- Leaders of the Working Groups
- Finance and Administrative Officer
- A representative of EANA and AbgradE

We propose the Management Committee to meet at least 2 times every year. It is headed by the Chair of the EAI, or in their absence by one of the vice-chairs. It approves yearly reports of working and activity groups and is responsible for all decisions that are not explicitly allocated to other bodies. It also endorses or amends draft budgets from the Executive Committee and conveys a final proposal to the General Assembly. Furthermore, its task is to prepare meetings of the General Assembly including drafting its agenda and large conferences. It also drafts reports to funding agencies supporting EAI as a whole. Finally, it has the responsibility to compose yearly reports to the the General Assembly.

#### *Chair and Vice Chairs*

We propose that the Chair and 1-2 Vice Chairs will be elected for a 2 years period by the General Assembly. A re-election of the Chair and vice-chairs after this period is possible, but the tenure of the Chair is possible for maximally 3 consecutive terms of office and thus limited to 6 years. The Chair and the Vice Chairs also draft the agenda for Management Committee meetings.

#### *Finance and Administrative Officer*

The Finance and Administrative Officer is appointed by the administrating body of the EAI (the European Science Foundation according to the current plans).

#### *Executive Committee*

The Executive Committee consists of Chair, Vice Chair(s) and Finance and Administrative Officer. The Executive Committee decides issues concerning the day-to day running of the EAI following General Assembly and Management Committee decisions. It is also responsible for the running administration of the EAI on a daily basis and approves accounting of events and activities of the whole EAI. It also bears the responsibility for the handling of the finances of the EAI according to the budget stipulated by the EAI.

#### *Project Teams*

The General Assembly can create Project Teams working on special, more focussed research questions and projects. These can be temporary and can involve members of different Working Groups in order to bridge between the different WGs. Project teams can attract funding from other sources, e.g. through the ISSI international Team programme or other smaller scale schemes. They should appoint a Coordinator who reports regularly to the General Assembly and the Management Committee

#### *Role of the Host organisation*

We propose that the European Science Foundation acts at the Host Organisation of the EAI. The role of this body is to:

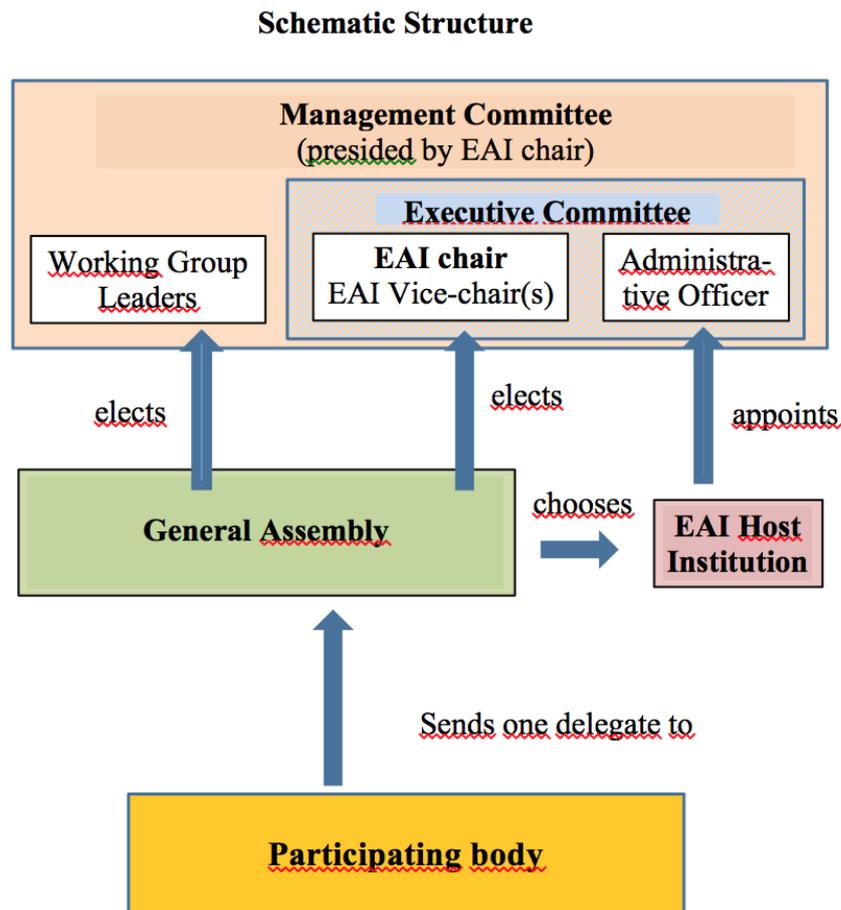
- Host the EAI Office
- Administer EAI work including financial administration and governance, communication, and external relations
- Document meetings of governing bodies of EAI
- Nominate the Finance and Administrative Officer
- Support the development of proposals for leverage of external funding
- Collect the yearly fees from the participant organisations
- Administrate expenses for meetings and other events

### Interim structures

An Interim Board consisting of representatives from some of the major research organisations in astrobiology has been set up.

### Schematic structure

A scheme of the structure of the EAI is displayed as follows:



### Activities

#### *Meetings/conferences*

We would suggest the following meetings:

- A major conference in spring every second year alternating with AbSciCon
- A general assembly joined with a smaller meeting in spring in the years in between
- smaller workshops on specialised themes
- 1-2 summer schools per year

### Time plan

We suggest the following time plan:

**Spring 2018:** Finalising the Action Plan. Preparation of the website and communication with the astrobiology community.

**Summer 2018:** Discussion of the EAI Action Plan with **the whole** Astrobiology Community. Amendments and extension if necessary

**September 2018:** Presentation of the EAI plans at the ESPSC meeting and EANA workshop

**November 2019:** Event with European Members of Parliament

**Autumn 2018 and Winter 2018/2019:** Recruitment of Institutions. Presentation events in different countries).

**May/ June 2019:** Launch of EAI and first General Assembly. Approval of plans for 2019 and 2020 as well as Statutes and Budget. Election of Management Committee, Chair and Vice Chair(s). First constituting meeting of elected Management Committee members.

**Autumn 2019:** Drafting of plans for 2021. Board and Management Committee meeting

**January 2020:** Assessment of number of contributions of participating institutions and core organisations for 2021 and estimate of budget for 2021 by ESF.

**Spring 2020:** Major EAI conference. Second General Assembly. Approval of reports, budget and Action Plan for 2021.

**Autumn 2020:** Drafting of Action Plan for 2022. Board and Management Committee meeting (face to face)

**Spring 2021:** Third General Assembly (ideally part of a workshop). Approval of reports, budget and Action Plan for 2022.

This scheme will then continue in an analogous way after 2021.