AnaEE
Infrastructure for Analysis and Experimentation on Ecosystems

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DELIVERABLE D2.1

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Abstract:

The services AnaEE will deliver to its various users have been defined. We elaborate on the added value that the distributed infrastructure AnaEE would bring compared to the current spread of platforms; we suggest tools to deliver services efficiently and with the highest added value. The survey results (Annex II and III) helped the elaboration of the AnaEE Strategic Vision. Beside setting the societal context of AnaEE, the experimental approach to be followed, the services to be provided, and the complementarity with other infrastructures, a scheme of AnaEE has been defined A data base of >1000 AnaEE potential stakeholder has been installed and their characteristics and expectations will be analyzed through questionnaires. A first analysis related to the scientific users (117 responses received as of October 2013) of AnaEE has been performed. A detailed analysis of these responses is provided. The adjustment other workpackages workplan was provided through the participation of all workpackages to the workshops and writings of WP2, and in particular at the Venice meeting in October 2013.

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PRELIMINARY CONCEPT DEVELOPMENT FOR ANAEE VISION

In this section we summarize the results of Paris workshop (January 22, 2103) and the Instanbul workshop (April 17, 2013) and the following activities of WP2.
The following list represents services that AnaEE could/should deliver:

1. Access to infrastructures
2. Harmonisation
3. Data access
4. Modelling
5. Development of front edge techniques
6. Analytical services
7. Science development and Integration
8. Promoting interaction of users groups
9. General coordination.

For each service we elaborate on the added value that the distributed infrastructure AnaEE would bring compared to the current spread of platforms. A series of tools are suggested that would allow delivering in an efficient way the described services with the maximum added value.
Furthermore, in ANNEX I the anticipated level of integration (supra-national, national, distributed) of these tools is provided.

Section 1. ACCESS TO INFRASTRUCTURE

Explicit definition of the service:

AnaEE is a distributed infrastructure that will provide open access and use by academic, private business and stakeholders of a set of unique and integrated platforms to study by means of experiments a wide range of terrestrial and aquatic ecosystems. AnaEE will be an incubator for the definition and construction of new experimental platforms such as to keep in pace with technology, research development and public policies.

Type of users

Public and private research teams

AnaEE added values

1) AnaEE will boost environmental research across a wide range of representative, contrasted and complementary ecosystems, including latitudinal, altitudinal and human perturbation gradients;
2) It will also allow conducting experiments across a range of spatial and temporal scales and therefore to scale–up and down from processes to patterns. For example, platforms within AnaEE will allow addressing simultaneously research programs at a few mm3 and during a few days up to several hectares studied during decades and continental scale by combining sites.

3) It will promote and disseminate standardized experimental protocols techniques and data bases
4) AnaEE will stimulate the development of national or international research projects and will contribute to increase the funding of such projects.
5) The integration of distributed platforms within a unique open access infrastructure will also help standardise, facilitate and optimize access across Europe with a subsequent cost reduction.

Tools

To achieve these goals, we propose the following set of tools:
1) A permanent committee will be in charge of the elaboration of access rules (e.g., constitution of local committees, project selection, access fees, yearly campaign of calls for projects when possible, etc.)
2) The description of all platforms within AnaEE as well as of access conditions will be available through a website including standardised metadata on each platform. This website should be the unique portal for all the platforms within the infrastructure. As much as possible the access conditions must correspond to a same philosophy across platforms and countries.
3) A task force will be in charge of accompanying the development of new platforms to fulfil best the needs of the European network.
4) A grant system and/or call for projects will be set up to allow for research visits to the platforms.

Section 2. HARMONIZATION

Explicit definition of the service

Harmonization in AnaEE includes i) harmonizing experimental, analytical and statistical methods; ii) harmonizing experimental research protocols and processes; and iii) calibration and standardization of operation, quality and data structure of measurements and instruments. Some or all of these may be required/optional for AnaEE sites.

Users:

Public and private research teams, education

Added value:

1) promoting high quality, long-term and carefully calibrated ecosystem experimentation
2) Available expertise to train the best European experts to do the harmonization
3) Access to a variety of RIs to check instrument precision and accuracy, and to test new methods and equipment in many ecosystem types and environmental conditions
4) Publication and spread of guidelines/manuals providing standardized methods and quality controlled data

Tools

1) AnaEE platform for comparison and diffusion of methods and protocols (sampling, manipulation, analysis) and best practices (metrology, quality assurance).
2) Standardization workshops and summer schools (non-permanent) for scientists and technical personnel
3) A centralized standardization task force or committee, giving recommendations of quality criteria, and warranting an AnaEE label for specific sites that fulfill AnaEE harmonization criteria. Workshops and travels will be organized regularly to promote some harmonization across platforms and countries.
4) A central calibration office which provides intercalibration services (e.g. round robin campaigns) for instrument or method calibration
5) Cooperation with existing standardizing organizations (BCR (Bureau Communautaire de Référence), ISO, International Scientific Unions (ICSU, IUPAC, IUSS...)) to promote more efficient use of existing standards

Section 3. DATA ACCESS

Explicit definition of the service:

The main services, in order of integration are:
1) Giving access and sharing AnaEE data,
2) Assuring the quality of the shared data,
3) Easy compiling of AnaEE data across platforms,
4) Archiving of and access to modeling results,
5) Promotion of the use of data generated by AnaEE.

Users:

Public and private research teams, NGOs, national and regional agencies related to natural resource management and environmental protection, academic institutions (to complement intermediate and advanced courses in ecology).

Added value:

1) Data format standardization across a large community (therefore ease of access/use)
2) Faster spread of quality assurance of the accessed data,
3) Metadata standardization to help proper use and discovery of the data
4) Providing the basis for integrated studies based on compilations of AnaEE data (i.e. meta-analyses),
5) Have a negotiation power through creation of a 'virtual community' for data infrastructure projects at the EU level (e.g. EUDAT)

Tools:

1) A quality assurance committee, which will supervise the design and implementation of procedures for data quality control before public access,
2) Creation of a central portal, which will use a seamless interface to acquire and compile multiple data sets from participating platforms (alternatively all datasets can also be stored/duplicate centrally),
3) A dedicated team (centralized or 'virtual' center) of data managers and engineers to maintain the database (actively managing the content and the database software)

4) Creation of training materials to help/instruct 'data producers' (*i.e*. experimenters of all kinds: in vivo, in vitro or in silico) to design and implement data management plans for their experiments.

Section 4. MODELLING

Explicit definition of the service:

1) PROVIDING DATA ANALYSIS AND DATA FUSION TOOLS FOR EXPLORING INDIVIDUAL OR COMPILED ANAEE datasets (statistical modeling). This includes the construction of toolkits based on open source software for analysis and visualization.
2) Providing an open source platform for mechanistic model building.

Users:

Public research teams, national and regional agencies related to natural resource management and environmental protection, academic institutions (to complement intermediate and advanced courses in ecology).

Added value:

AnaEE will provide the critical scientific and technical mass to:
1) The integration of data compilation (data base) with data fusion methods will multiply many times the use of the data for high-end scientific synthesis and process discovery at a multi-site scale.
2) Increased integration between modeling and experimentation tools
3) Increased integration of analytical outcomes into predictive models
4) Shared strategy among experimental and analytical sites with regard to research agenda from predictive ecology and ecosystem science

Tools :

1) Virtual (or centralized ?) modeling center, linking statisticians, computer scientists, software engineers, process-based modelers (+ numeric specialists?), and ecosystem scientists. This center will also have a support function for users (help desk / training center),
2) Computational resources for the most demanding applications (computation time on specific systems).
3) A committee (or workshop series) to work on appropriate data standards for computation/modeling applications (this committee will work in tight collaboration with the data base center of AnaEE).
4) Provision of 'community standard' datasets to train data mining methods or to serve as basis for model evaluation or inter-comparison.

Section 5. DEVELOPMENT OF CUTTING EDGE TECHNIQUES

Explicit definition of the service:

1) Promote innovation, development, implementation and evaluation of cutting-edge techniques

2) Promote the rapid evaluation and spread of new cutting edge techniques and methodologies (i.e. sensors, instruments, data capture and data mining.)
3) Implement a technical scientific watch (horizon scanning) for the latest state-of-the-art sensors and techniques
4) Provide training for engineers and technicians on cutting- edge techniques and methodologies.
5) Organize or give advice for the legal aspects of the transfer of novel techniques to the market place.

Users:

Public research teams

Added value:

1) Provide a relevant test bed for testing the validity, and robustness of the latest techniques across different systems
2) Promote better links with private companies (i.e. they would know where to come for testing and we would provide some sort of endorsement for their products)
3) Pool of technicians and engineers large enough to provide specialist teams for the various techniques

Tools:

1) Workshops to showcase new techniques
2) Technical knowledge shared via a technical forum (to be started now ?)
3) Provision of a (distributed, flexible) technical center to develop and test new techniques (new if required or focus efforts on an existing one)
4Provision of a pool of money to initiate the development of new techniques (depending on legal and funding possibilities)
5) Provision of a pool of money (or alternatively create a network with in-kind contribution) to allow technicians and engineers for specific training and spread of new techniques.

Section 6. ANALYTICAL SERVICES (TO BE FURTHER DEVELOPED)

Explicit definition of the service:

1. Access to sophisticated Analytical services
2. Development of new advanced analytical techniques
3. Collaboration with private companies to offer advanced analytical services

Users:

Public and private research teams

Added value:

1. Access to advanced/expensive/rare analytical methods
2. Standardization optimization (sharing) of expensive equipment
3. Multi analysis and multi-site analyses (integrated understanding)
4. Critical mass (enough samples to justify costs)

Outstanding questions and challenges

1. Definitions of relevant services
2. Avoid services to become the driver for science rather than the science driving the services
3. Consider alternative business models (for example collaboration with private companies to run the services rather than ANAEE being the facility owner might be a useful concept)
4. Procedures for shipping
5. Identify existing relevant platforms

Tools:

1. Central analysis service (low tech)
2. New specific laboratories/instruments with high throughput
3. Private business collaboration
4. Workshops and business fairs to identify service demands and services

Section 7. SCIENCE DEVELOPMENT AND INTEGRATION

Explicit definition of the service:

AnaEE will provide a continuous updated analysis of the gaps in existing European infrastructures in the field (according to ecosystem types, climate, type of infrastructures, new technological developments) that will be useful to national and European science managers to plan the construction of new platforms.
(this was point 3 of the section Access to infrastructure –with research teams as users-, but this point is more relevant to science managers than to individual research teams).
Representing the strongest experimental force in ecosystem research, AnaEE will organize prospective analyses with the whole concerned scientific community to develop the most relevant research projects (response to calls for proposals) and to propose the future most adequate research themes to be developed in regards of the research development and the societal needs (suggestions for new calls).
AnaEE will stimulate synthesis of data and research findings not only coming from its experimental and modeling platforms. But it will also organize integration and synthesis of these findings with results coming from the community at large and using other research approaches. This will provide synthesis useful for policy makers and general public.

Type of users:

National and European Science managers; funding bodies; policy makers; IPCC; IPBES; environmental agencies, NGOs, academic institutions, general public

Added value:

Integrated view of European infrastructures and European types of ecosystems and environmental conditions
Strong connections with many of the most successful research consortia in Europe

Tools:

1) Working group on developing new infrastructures (including at least one member of the scientific watch group and analytical platform group) ; existing infrastructures on the AnaEE website; biannual report on research gaps ?
2) Analysis and synthesis center (a single physical building or a distributed set of meeting places): a mean to organize temporary working groups (scientists, scientists and science managers or policy makers) on specific topics: data synthesis, project preparation, prospective analysis … Such a center could have a functioning similar to the NCEAS center in the US (but with a larger objective) and could have collaborative links with national more focused initiatives such as the CESAB in France or the Synthesis Center for Biodiversity Sciences planned in Leipzig.
3) Call for fellowships (individual or groups) to work a few days or weeks in this center on the mentioned topics.

Section 8. PROMOTING INTERACTION OF USERS GROUP

Explicit definition of the Service

1) Promote two-way regular communication between AnaEE and the users of its Services, or representatives thereof
2) Promote interaction within each group of users in order to gather homogeneous information about their needs
3) Promote interaction among various communities of users, in order to encourage cross fertilization of ideas, and broad consensus on AnaEE decisions

Users

AnaEE Users are the beneficiaries of Services listed in previous sections of this document. They will be described according to the Services they use, namely: users of experimental infrastructures; users of data, models and analytical services; disseminators and adopters of cutting-edge techniques. They will also be described as subsets of AnaEE stakeholders: researchers, educators, public administrators, companies, and society at large. (see: Stakeholders' map 2.1). A matrix services/users is provided:

AnaEE matrix of users groups and the services they require					
Services\Users	Researchers	Companies	Public administrators	Educators	Civil Society
Models, data interpretation	Y	Y	Y	Y	Y
Experimental infrastructures	y	y	Y	N	N
Analytical services	Y	Y	Y	N	n
Raw Data	y	Y	N	N	N
Cutting edge techniques	y	Y	N	N	n

Added Value

1) Promoting the interaction of Users Groups with AnaEE has the objective of obtaining feedback from homogeneous groups of Users about the worthiness and efficacy of the services, values, and tools described in this document. The AnaEE matrix of users groups and the services they require provides for an orderly organization of such feedbacks.
2) Feedback from Users and Stakeholders so organized, will serve three internal AnaEE purposes: (a) as input to direct quality and nature of future services, (b) as a means to generate long term relationships with key users (such as: funding agencies) , and (c) to feed the scoreboard, (deliverable 5.4) and track customer satisfaction through time.
3) Several departments within AnaEE are involved: Communication should maintain a current database of Stakeholders, accessible to AnaEE partners, other users, and other stakeholders. Individual departments (such as General Coordination, Technology Transfer, National Networks, as well as experimental facilities of diverse nature), should support interaction between users groups and AnaEE.
4) Coordination will be required across the departments involved, in order to provide Users (and stakeholders) with some of the following specific

Tools

Tools that aim at organizing communication with users might include:

1) Well organized, *ad-hoc* meetings with each category on specific purposes
2) annual conferences among users' subsets
3) public lectures, active involvement in conferences on the subject
4) a newsletter
5) a library of media or tools
6) database, software, and archive
7) an online presence such as a dial-up BBS or Internet website
8) swap meets
9) technical support
10) social events, funding

Incentives for users' groups will depend on the nature of users, and their relationships with AnaEE. They might include:

1) Decision supporting tools for users groups (for scientists, local and national governments)
2) Grants office services (for educators, SMEs, and scientists)
3) Fora for quality assessment (for scientists using AnaEE facilities (input), and users of AnaEE datasets and models (output)
4) Alumni Community, for former and recurrent users of AnaEE facilities, seeking fellowships or a job
5) Technology Transfer services for Industry interested in IP licensing or technology consulting
6) Symposia, summer schools, Regional and European dissemination activities
7) Fellowship money

Level of coordination

Interaction between AnaEE and the User Groups is multidimensional. Hence tools and services will be managed both locally and at centralized level. Specifically, for scientific Users, local SMEs and Education, services will mainly be governed at the level of individual facilities. On the other hand, Services provided to large companies, policy makers and the General Society, will be governed centrally at EU level, or in some cases at the level of national networks.

Section 9. GENERAL COORDINATION

Explicit definition of the service

Maybe it could be presented as a service for the international community and policy making because general coordination is not per se a service.
AnaEE will set up a central body that will potentially host the AnaEE legal entity and coordinate AnaEE as an integrated distributed infrastructure and ensure the coordination of:

- national hubs/nodes
- centralised platforms/tools (analytical and modeling platforms)
- funding (member fees, sponsorship etc.)
- users (or will this be done at national level?)

In particular the central Coordination will have a mandate:

- To manage the AnaEE implementation plan and related financial & human resources
- To manage/monitor the AnaEE 'Label' (for of quality accreditation based on defined specifications);
- To ensure effective communication internally within the AnaEE network
- To ensure effective communication between the AnaEE community and the funders/end users including public relations and related marketing activities
- To act as a flag to enhance the visibility of the whole AnaEE network

Users:

All AnaEE stakeholders: Public and private research teams, national and regional agencies related to natural resource management and environmental protection, academic institutions, science managers, policy makers

Added value:

1) A one-stop shop to AnaEE
2) High international visibility of AnaEE including the distributed sites
3) Professional management of the centralized services
4) Quality control of the whole infrastructure (distributed & centralized services)
5) Dedicated AnaEE personnel for finance, marketing, coordination tasks

Tools:

1) A central headquarters will be established to coordinate the AnaEE activities (national nodes etc.) and be the main reference for interacting with key funders & stakeholders (EC, Foundations, Ministries, Industry etc.).

2) Set up and monitoring of the AnaEE label for the individual sites/infrastructures & services

3) AnaEE headquarters will have a dedicated Communications & Lobbying officer to ensure the promotion and sustainability of AnaEE centralized services, etc.

4) The headquarters will put in place a permanent secretariat and management support.