

AnaEE Infrastructure for Analysis And Experimentation on Ecosystems

Grant Agreement Number: 312690

SEVENTH FRAMEWORK PROGRAMME

**CAPACITIES
RESEARCH INFRASTRUCTURES
COMBINATION OF CP & CSA**

Milestone MS19

Workshop on scenario building and technology transfer guidelines

Abstract: The Central Hub and Service Centres will distribute AnaEE services to a variety of users, platforms managers and stakeholders, while coordinating activities and allowing economies of scale. The three Service Centres (Interface & Synthesis Centre, the Data & Modelling Centre and the Technology Transfer Centre) will also perform foresight and transfer activities on behalf of the entire infrastructure. They will provide AnaEE central and local facilities with consistent and organized foresight regarding new ecosystem science challenges, technology know-how and societal change vision. These Centres will also organize the transfer activities of AnaEE. The outputs will be scientific prospective, technology innovation and solution and recommendations with regard to societal challenges.

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Duration: 42 months

Organisation name of lead contractor: FEM

Contributors: Claus Beier (NIVA), Francesco della Porta (CNR), Francesco Fracaro (FEM), Jacques Roy (CNRS).

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PU Public (must be available on the website)	<input type="checkbox"/>
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RE Restricted to a group specified by the consortium (including the Commission Services) (precise to whom it should be addressed)	<input type="checkbox"/>
CO Confidential, only for members of the consortium (including the Commission Services)	<input type="checkbox"/>

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1. Purpose of the workshop

The original purpose of Workshop M19 was to establish the guidelines for AnaEE technology transfer services in preparation of Deliverable *D.5.3. Technology scouting organizational rules, including I.P. guidelines*. In fact, M19 describes both the SCOUTING ORGANIZATIOAL RULES section of D5.3. , and the STRUCTURE section of *D.5.4. Job descriptions and structure of the Technology Transfer operations*.

Technology Transfer is a two way process: on the one hand it consists of connecting inventors of new methods or solutions with potential users or developers. On the other hand, it consists of providing researchers with descriptions of specific needs or requirements, often in the form of a 'missing piece' along the path for developing new methods or solutions. In either direction, Technology Transfer activities make use of foresight techniques. Scenario Building exemplifies one of many foresight techniques used to reckon and guide the activity of AnaEE; for instance, by anticipating the need for new experiments, identifying promising applications in the civil society, and commercializing the results.

When the DOW was written, in 2012, it was assumed that the typical item AnaEE might transfer to *civil* applications was for the most part hardware technology (e.g. *sensors*) originally developed for its own experiments.

28 months into the Project, it is now clear that the transfer of knowledge from AnaEE towards the civil society consists of much more than *better hardware* such as sensors: it also includes (i) new knowledge about ecosystems that will directly feed new management practices developed and implemented by companies and by local communities; (ii) anticipation of future societal challenges and needs in the domain of competence of AnaEE, as well as (iii) guidance towards the implementation of decisions and solutions.

Consequently, AnaEE needs to develop foresight and transfer methodologies and activities for application to technology, but also to science and policy.

These conclusions stem from the expansion of AnaEE scope of responsibilities to activities taking place before and after the experiments as such. As early as possible, AnaEE should identify, in cooperation with the scientific community and the stakeholders, which will be the most relevant experiments to be conducted by the infrastructure. AnaEE experiments should be prioritized according to pressing societal needs as well as to their intrinsic scientific value, and their results should be described in formats useful to decision makers.

It follows that foresight and transfer methods employed in the technology transfer process will currently be used also to identify the most pressing ecosystem challenges, to prioritize experiments accordingly, and to guide policy and decision makers in the implementation of solutions.

In light of the above, the scope of activity of this Workshop was expanded from Technology Transfer to Foresight and Knowledge Transfer. Foresight and Knowledge Transfer activities will be the responsibility of three AnaEE central structures:

- (i) The Interface & Synthesis Centre (described in section 3.2),
- (ii) The Data & Modelling Centre (section 3.3), and
- (iii) The Technology Centre (section 3.4)

It should be noted that Foresight activities will not be the only purposes of the three Centres. For example, the Technology Centre will still be responsible for Platforms technology harmonization, as well as for Technology commercialization, while the Data and Modelling Centre will still be responsible for all Data storage, management, Model development and delivery activities.

However, foresight and anticipation methods shall become a core competence of AnaEE; they will be employed to manage and improve multiple aspects of the distributed research infrastructure.

2. Agenda of activities

The M19 workshop was organized on February 19 and 20 in Trento by Francesco della Porta (CNR) and Francesco Fracaro (FEM). In attendance were Claus Beier (NIVA) and Jacques Roy (CNRS). Other attendants from FEM included Alberto Mattedi and Dr. Loris Vescovo. A seminar on Foresight was kindly provided by Dr. Rocco Scolozzi of the University of Trento.

2.1. The Workshop Agenda

Fondazione E. Mach Building PRC floor 2 room 6202

Thursday, February

19th

08:45 review of the Agenda: setting priorities, clarifying objectives

09:00 **defining the Technology Transfer goals:**

- a) technology fallout from experimental equipment and procedures to 'civil' applications,
- b) commercialization of findings from experimental results,
- c) supporting entrepreneurial initiatives (see below: ESFRI questionnaire 4.3.),
- d) coaching societal and political decision makers (about applying appropriate methods)

11:00 **outlining the AnaEE Technology Transfer processes**

13:00 lunch break

14:00 Dr. Rocco Scolozzi: Scenario building and other foresight methods applied to technology scouting, ecosystem accounting, and community resilience

16:00 **reviewing AnaEE Technology Transfer foresight methods**

Friday, February 20th

07:50 meeting at Hotel Accademia and transfer to FEM

08:45 **designing the AnaEE Technology Transfer organization**

10:30 wrap up of the MS19 Workshop and follow-up actions

11:00 **Call for expression of interest: the format of data output**

13:00 lunch

14:00 Finalizing format data output review for the call

3. Foresight activities by three AnaEE Centres

3.1. overall picture

In order to provide credible services, AnaEE must be involved with the proper, currently and anticipated most pressing set of scientific and societal issues. Its platforms must be equipped with updated know-how and latest generation tools, capable of managing data and information and providing relevant inputs to solutions. At all times, AnaEE should strive to demonstrate and reassure users about the reliable and updated state of its technology.

Figure 1 in the following page is a schematic representation of AnaEE's FORESIGHT acquisition and TRANSFER activities.

The horizontal axis in Figure 1 describes the SCIENTIFIC steps from the needs, expectations, and questions of the users and society to the solutions, information and answers provided by AnaEE.

The successive steps are i) the declination of the grand challenges which can or should be relevantly addressed within AnaEE, ii) the implementation of the experimental and modelling activities and ii) the synthesis at different levels of digestion of the obtained results. On the left-most side are the interactions organised by AnaEE with scientists (science directors, IPCC and IPBES representatives), policy makers (government and EU representatives) and grand challenge related industries (e.g. agriculture and environment companies ...). The central part of the scheme contains the AnaEE core activity consisting of technically and scientifically developing and managing the experimental, analytical and modelling platforms and making available the resulting data. The rightmost side represents interactions organised by AnaEE with researchers who used AnaEE or who did complementary experiments or modelling. It might also include scientists from other scientific areas and directions such as social and societal science and with stakeholders developing policies and implementing the solutions and recommendations proposed by AnaEE (e.g. science directors, IPCC, governments and policy makers, industry).

The vertical axis describes the FORESIGHT activities which feed the AnaEE core activities. The results of these core activities feed the TRANSFER activities delivering updated and improved AnaEE outputs such as scenarios, technologies and analyses.

These steps are represented by the three horizontal zones. The top green rectangle represents the processes whereby AnaEE keeps abreast with the most pressing scientific challenges, takes advantage of the most current and updated technologies, and of futuristic societal visions. The central white zone contains the AnaEE core activity (technological development, experimentation, modelling, data management). The bottom green rectangle exemplifies the concrete outputs of AnaEE at each of steps on the horizontal axis: papers on scientific perspectives, technological innovations and suggestions, solutions or answers to stakeholders.

The activity of foresight and transfer will be organised and performed by the three supra-national services centres: The Interface & Synthesis Centre, the Data & Modelling Centre, and the Technology Centre. Their role is described in section 3.2, 3.3, and 3.4. Together, they fulfil the FORESIGHT and TRANSFER mission of AnaEE. However, foresight is not their only purpose. The AnaEE VISION document describes the overall function of Centres as follows:

The coordination and integration of these national platforms will be achieved through supra-national centres which will ensure international access, improved measurements and data harmonization, technology development, links between data and models, open access to raw data and syntheses. They will also allow researchers to network and provide an interface with key stakeholders. (AnaEE Vision, p. 2)

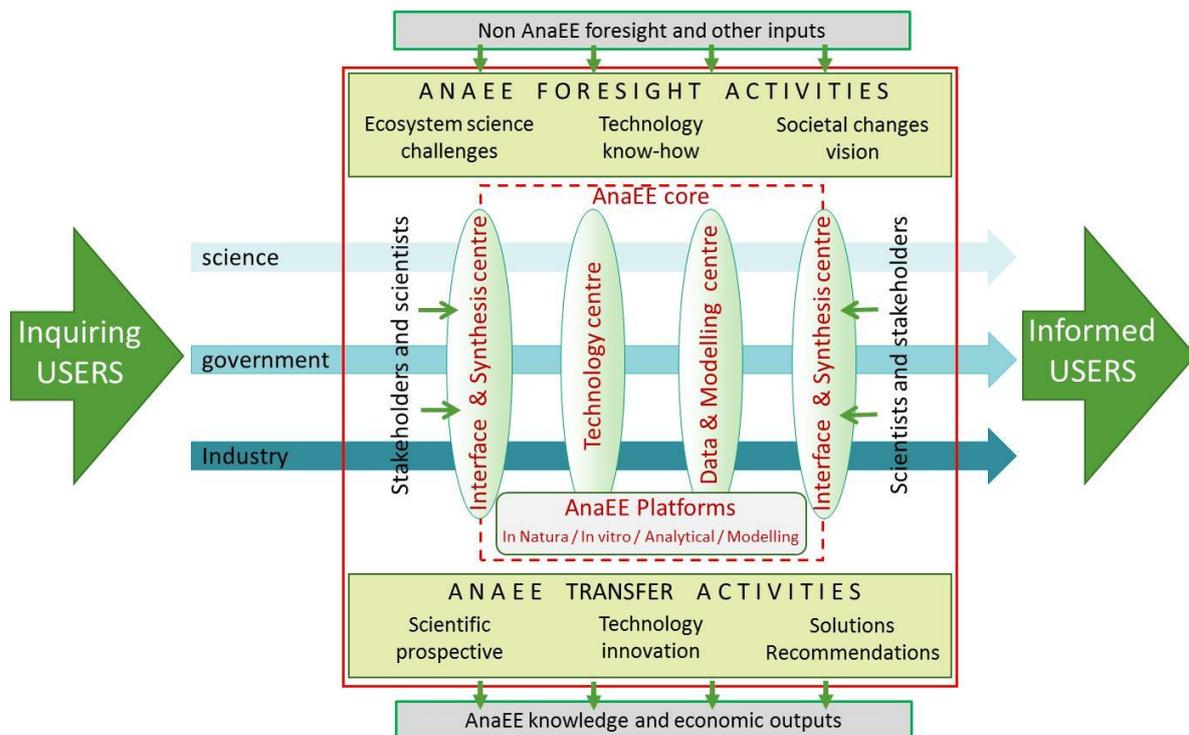


FIGURE 1: the FORESIGHT and TRANSFER activities of AnaEE

3.2. The Interface Centre

The Interface Centre maintains an open dialogue between AnaEE and its key stakeholders upstream and downstream.

The Upstream dialogue is directed towards the international scientific community involved in recommending priorities for research to government bodies such as the European Commission and national governments. The Interface Centre supplies those ecosystem scientists and policy makers with summaries and interpretations of the most relevant results of experiments conducted at AnaEE. Its output consists of new scenarios, challenges updates and recommendations for future strategic directions. The cumulative body of knowledge produced through AnaEE will thus find a regular, consistent conduit towards the main influencers of European environmental policy.

The Downstream dialogue is directed towards the implementers of policies and the communities affected by those decisions. Its function is to provide interface with user groups, in particular policy makers, citizens and industry at national and local level.

Ecosystem Science Challenges

Task:

- Identifying future modelling and data needs, e.g. new scientific areas, questions, drivers of interest, ecosystem services (link to the Interface Centre, see 3.2. above)

Means

- Link to “interface centre” to capture new scientific directions
- Brain storming sessions and expert panels with separate and mixed stakeholder communities to challenge future needs and use of results: Scientists on data storage, modelling capabilities, data-model integration and visualisation needs; Private companies on data and model needs and use of results; decision makers on decision support needs.

Solutions & implementation

Tasks

- Identify decision support need
- Identify future improved stakeholder interactions

Means

- Brain storming events with stakeholders
- “Out-of-the-box” events with scientist, stakeholders and artists to sketch future possibilities

3.3. The Data and Modelling Centre

The Data Access Policy of AnaEE is defined in Deliverable D5.2. *Quality Policy Vision and Mission*. The Data and Modelling Centre is described in that document as follows:

Experimental results may be presented singly as raw data, or in aggregate form within models, papers, research studies, or other forms of communication with stakeholders or the

civil society at large, as well as with other data hubs in Europe. AnaEE goal, right after the preparatory phase, is to set up an AnaEE data hub that will interface with the various platforms' site databases as well as with the existing centralized data hubs in Europe (i.e. Nitro Europe, ElixIR) The AnaEE data hub shall provide a ONE STOP SHOP service to researchers, governments, industry, and the civil society. (D5.2. p. 2)

D5.2 also describes the operating principles of D&M Centre as an INFORMATION ACCESS POINT.

The D&M Centre will be responsible for consistency of data output within the organization of AnaEE platforms, ranging from the application of Standards and data management practices, to ensuring confidentiality and data ownership.

Finally, the D&M Centre will be responsible for the access of services provided by Modelling platforms. They include:

- developing existing models to include new or improved process descriptions
- developing new models to model and analyse results in new scientific areas or at new scales
- developing new computational, visualisation and decisions support tools
- developing improved data-model integration tools and methods

The foresight activities will relate to these work areas and will embrace all three vertical axis in the foresight model.

Technology know-how

Tasks

- Identify new modelling principles
- Identify new modelling and data technologies for better integration, more efficient generation of results, lower costs etc.
- Identify new data, database, computational and visualisation tools

Means

- Expert panels with data- and modelling experts, big data and e-technological developers

3.4. The Technology Centre

The Technology Centre is responsible for all activities regarding (i) stimulating the development of innovation (ii) ensuring the technical excellence across platforms, including adoption of innovation (iii) commercializing AnaEE innovative technology.

The Centre activity is mentioned in the DOW as comprising a demand-PULL and a supply-PUSH direction. More recently, those activities were described in D5.2 as follows:

AnaEE will pursue both demand-driven research (by identifying solutions to specific technical needs) and supply-push dissemination of innovation (by identifying users for innovation generated internally). Such practice of gathering information about users' needs within industry will provide insight for the development of technology foresight services. Similar insight shall be obtained by building relationships with modellers and anticipating their data requirements. (D5.2, p. 7)

The Centre might be organized along three services: Technology Foresight, Knowledge commercialization, and Platforms Harmonization. Together, they form the TECHNOLOGY WATCH services, a highly synergistic set of competences that maintain the know-how, promote innovation, and ensure technical update within the AnaEE infrastructure and among its industrial partners.

Technology Foresight consists of identifying future needs and meet them with innovative solutions. Roadmaps will track issues where progress is more urgent. Active scouting will be performed to identify components that may fill an empty space in the roadmap. Conversely, newly created technology will be studied for potential applications. Technology foresight will help defining new challenges as well as

Knowledge Commercialization requires a set of competencies (legal, technical, IP, business) that are typical of any Technology Transfer Office. One degree of complexity is added by the distributed nature of AnaEE infrastructure. Central coordination will be required, in particular, to manage intellectual property rights, negotiate patent licenses, and technology licenses in general, and provide general legal and contractual guidelines. The Technology Centre will rely on individual platforms to support the development of local SMEs and start-ups, and to negotiate consulting agreements with local industries.

Additional functions of the Centre include **harmonizing the AnaEE platforms** to the most performing techniques, and anticipate their future needs. The most competent specialists in defined techniques will be asked to supervise replication of particular solutions, and generate quality control procedures that will maintain homogeneous performances across all continental platforms.

An INNOVATION ACCESS POINT will be reachable through the AnaEE Portal, to both external and internal users. The portal content shall be monitored by the AnaEE Intellectual Property Officer, to prevent involuntary disclosure and breach of confidentiality towards users and other third parties.

The portal might also host an interactive FORUM where guest companies and scientists may compare demand and availability of technical solutions. In a successful scenario, private Industry will be the main user of the AnaEE Innovation Access Point.

3.5. Knowledge update events

Annual conferences might be jointly organized by the three Centres: a 2-day major science event, presenting experimental and modelling results might be followed by a 1-day data conference and 1 day technology presentation.

3.6. Summary table of the Service Centres foresight and transfer activities

SERVICE CENTRE>	DATA AND MODELING	TECHNOLOGY	INTERFACE AND SYNTHESIS
PRIMARY USERS	Researchers are the main target. Other users will also benefit from the service offered	Industry and experimental platforms are the main target. Other users will also benefit from the service offered	Government is the main target. Other users will also benefit from the service offered
FORESIGHT ACTIVITIES	Continuous upgrade of modelling tools, and new informatics technologies	*Outline technology roadmaps *Find paths to innovation	* facilitate upstream decision processes (funding agencies) * guide downstream implementation (administrators)
TRANSFER ACTIVITIES	Prioritize experiments Present researchers with new challenges	Prioritize innovation	Prioritize research policies , and verify implementation

4. Next steps

4.1. Design the Knowledge Transfer organization and guidelines

That Is Deliverable D5.4. scheduled for month 36 of the project.

4.2. Identify Knowledge Transfer Performance Indicators and align with strategic goals and KPIs

The following two tables provide sample direct and indirect indicators on the effectiveness of AnaEE in coping with its goals. Direct indicators measure user satisfaction by answering, for instance, to the question *does AnaEE satisfy the needs of researchers?* On the other hand, indirect indicators measure the impact of AnaEE on society and the environment by answering, for instance, to the question *is AnaEE contributing to meet a Grand Challenge?*

2. WHAT : KPIs for National Gov. and the EU

The image at with relationship ID (10) was not found in the file.

MACRO INDICATOR	purpose of the foresight exercise	Direct measure	Indirect measure
Addressing new scientific challenges with unique / innovative approach	Which challenges or areas of investigation are pressing needs ? Which pieces are missing ?	Which approaches are innovative ? Was the missing piece found ?	Was the challenge confronted by Gov. ? Was it solved ?
Strengthening European leadership	Which technology areas will benefit from European science and industry ?	Are European innovations adopted outside Europe ?	Are European innovations effective ?
Upgrade of an existing operational R.I. to ...	Which research areas offer opportunity for new specialization ? (matching of competencies and needs)	Was upgrading successful ? (measure of user satisfaction)	Was there a positive fallout on the local stakeholders ?
... pan-European or Global RI Mission	Which research areas offer opportunities for EU or Global coordination ?	Joint proposals, and new EU grants obtained	Contribution of sites to Databases Citations
Re-orientation of existing science sites to host new RI	What are the needs of distributed RI ? Are there competencies to match ?	Euros invested in upgrades or new RI components	Local fallout from science sites

2. WHAT : KPIs for other stakeholders

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MACRO INDICATOR	purpose of the foresight exercise	Direct measure	Indirect measure
Research: University PhD programs and theses	Which subjects of research are relevant to both research and society ?	Subjects of doctorates based on, or citing AnaEE d (the AnaEE PhDs)	AnaEE PhDs employed By University, Industry, or Government, by subject
Industry Local/ global	Which industries / companies will be interested in AnaEE experimental output ?	Industry –sponsored research contracts	% of GDP or employment from local green economy
Transfer through IP Licenses (or other contractual arrangement)	Which technology applications will benefit from AnaEE experiments ?	Patent registrations & Licenses issued by technology application	\$\$ royalties received by application; Real problems solved through AnaEE – IP
Education and training (local)	Which new specializations will be created through AnaEE research ?	Changes in curricula of professional schools	Career placement rate by professional schools. Youth unemployment rates
Local government / community	Local decisions supported by AnaEE research, coaching, or data	Government and community consulting/ coaching agreements	Repeated, ongoing cooperation with local Gov. and communities

19-20 February 2015

WPS Workshop on Foresight

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5. References

In the closing year of the project, REFERENCES to the DOW and to AnaEE documents generated by other WPs are made to verify convergence towards common goals

5.1. Workshop 19 is part of Task 5.2, foresight. Its description is as follows:

Task5.2. Foresight Task start date: M1 Task End date M30 Leader: NIVA Contributors: NIVA, CNRS, IT

Task description: Design technology foresight, long-term vision, and marketing studies

NIVA and FEM will design a technology foresight process for ANAEE (answering the question: how does ANAEE build its own long term vision?) A valuable by-product of ANAEE long term vision exercises is to predict the evolution and diffusion of specific technologies and innovations (TOP-DOWN); A purpose of the technology foresight process is to compare and confront visions with European manufacturers of instrumentation, electronics and information systems. ANAEE vision shall become a reliable source of strategic advice to the European Industry.

5.2. Workshop M19 should also feed two deliverables, D5.3 and D5.4:

D5.3) Technology scouting organizational rules, including I.P. guidelines: A broad description of means and ends adopted through the ANAEE organization in order to identify, foster, and communicate innovative ideas. Special emphasis will be given to the various forms of relationship with industry. This deliverable will be consistent with the results of TASK 4.2. (Intellectual Property Framework) [month30]

D5.4) Job descriptions and structure of the Technology Transfer operations: Organization charts, description of activities and professional background, and operational procedures for the Technology Transfer Office of ANAEE [month 36]

5.3. The Feb 4th, 2015 Steering Committee

The Steering Committee has indicated that MS19 should contribute to the design of supranational Central Hub and Service Centres (in particular the Technology Centre), as described in D7.1 (Jaana Back) and D2.2. (Jacques ROY); both documents are available on the AnaEE website. In fact, M19 is the first part of D5.4.

5.4. ESFRI questionnaire

Although most of the action takes place within three Centres that form part of the AnaEE centralized functions, foresight and knowledge transfer interest the national nodes and local platforms as well. This aspect was described in a recent questionnaire compiled by AnaEE for ESFRI (question 4.3. of the 2/2015 ESFRI questionnaire), here reproduced:

Q: 4.3 Is industrial capacity already in place (EU or international market) or does it need to be developed/installed in relation to the project (spin off companies, joint-ventures)?

*A: In terms of the potential of generating innovation and new technology, the AnaEE infrastructure will act as a booster at both regional level and continental level. AnaEE facilities will function as **regional hubs** offering experimental verification of novel solutions applied to natural resources and agriculture. Companies and entrepreneurs will be able to test and discuss their ideas and products. Data and test results obtained at AnaEE facilities will carry scientific credibility and international validity, because they will comply with AnaEE European quality policies; as such, they may be replicated in other facilities, they will be checked against current European regulation, they will be stored and retrieved. They will be checked against technology roadmaps, societal challenges, and policy priorities. In fact, the AnaEE **Central technology transfer offices** will organize those services on behalf of local facilities, thus generating high quality services, and economies of scale. The design of a Central technology transfer office is in progress. However, some of its policy components have already been delivered.*

5.5. Intellectual Property Framework Discussion Document

A further relevant contribution is the *AnaEE Intellectual Property Framework Discussion Document* issued by Chris Rawlings

5.6. Key Performance Indicators

Finally, the goals identified by this Workshop and assigned to various Centres in the AnaEE international organization were checked for consistency against the list of Key Performance Indicators (KPIs) created by the WP6&7 working group in London, December 2014. References are made, in particular, to section 0 (Background information) and section 5 (Knowledge Transfer). See also section 4.2. above.