

ExpeER
Distributed Infrastructure for EXPERimentation
in Ecosystem Research

Grant Agreement Number: 262060

SEVENTH FRAMEWORK PROGRAMME

Capacities

Integrating activities: Networks of Research Infrastructures (RIs)

Theme: Environment and Earth Sciences

DELIVERABLE D1.2

Deliverable title: Report from the WP1 Workshop, Kubus Leipzig, 21-24 February 2012

Abstract:

This report provides an overview of the outcomes of the WP1 workshop at the ExpeER annual meeting held at the Kubus, Leipzig, Germany 21-24 February 2012. The first part includes the documentation regarding workshop organization such as agenda, list of participants, and objectives and how the latter were met. Summaries of the main presentations and discussions are presented thereafter. Some of the main topics discussed concerned the questionnaires sent out to site managers to gather information on individual sites, and the radial graphs generated with the help of these questionnaires; but also possible fields and topics for cooperation between different sites were discussed. The report concludes with a list of necessary future actions for WP1 that emerged in the course of the workshop: (i) questionnaires need to be revised and changed to allow a more accurate characterization of individual sites, (ii) fact sheets, published on the ExpeER website, need to be modified accordingly; (iii) radial diagrams have to be adjusted. This report forms the basis for outlining the roadmap described in T1.3.

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Organisation name of lead contractor: Bioforsk

Contributors: Knoth de Zarruk, K., French, H.K., Macdonald, A., Milcu, A., Roy, J., Forsius, M.

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Glossary


TA: Transnational Access

HIES: Highly instrumented experimental site

HIOS: Highly instrumented observational site


1. WP1 Workshop Organisation

1.1 Workshop agenda



Experimentation in Ecosystem Research

EXPEER Annual meeting 21 – 24 February 2012, Leipzig, Germany



WP1 WORKSHOP: Analysis of current resources and roadmap for the EXPEER integrated infrastructure
Wednesday, 22nd February, 2012 9:00-17:00

Workpackage leader: Helen French, Bioforsk

Objectives&expected outputs:

Objectives of the workshop:

1. Improve knowledge and communication links between EXPEER partners
2. Form the basis for subsequent updating on:
 - a. technical and operational capacities, e.g. instrumentation
 - b. improved control systems
3. identify synergies and potential gaps in terms of:
 - a. instrumentation
 - b. methods
 - c. models
 - d. scientific questions
 - e. Ecosystem coverage

Expected outputs: A revised version of D1.1 to include:

1. Agreed common areas for improvement for HIOS and HIES facilities
2. Identify some core parameters to be measures as each site to link with WP2
3. Identify future strategies to minimize common threats

Expected inputs:

- Prior to the meeting all TA site managers will be expected to have read Deliverable D1.1. and to have checked their own and e.g. Rothamsted's Excel sheet, or others that seem relevant based on report D1.1.
- Interactions with WP2.
- From WP9: requirements from a modeling perspective, data requirements
- From WP7 and 8: new technologies – in view of present measurement schemes outlined in TA information spread sheets (hence someone from WP7/8, need to check what are weaknesses)

Timing:

Program of the WP1 workshop on February 22nd:

9:00 Welcome and summary of Deliverable report D1.1

9:15 Presentation of EXPEER ecosystem coverage, gaps and future needs. Questions and discussion

9:45 Sites Radial Diagrams presented in D1.1 (fig. 5.5), purpose and perception

10:00 Analysis of measurements, instrumentation, services at sites
 Manipulations / Meteorological parameter / Atmosphere / Autotrophic organisms / Heterotrophic organisms

10:40 Coffee break

11:00 Analysis of measurements, instrumentation, services at sites (follow-up)
 Hydrological parameters / Soil arrays / Soil properties / Technical services

11:30 Group discussions on further improvement of sites (along each axis of the diagrams)

12:30 Lunch

14:00 Summarizing group work, Discussion

14:45 Scientific questions to be addressed across sites, introduction

15:00 Discussion on emerging scientific questions to be answered from work at TA sites – possible synergies

15:30 Coffee break

16:00 Cross links between Ecotrons – Analytical Platforms - HIES/HIOS

16:30 Workshop conclusions and what to implement in the next deliverable and beyond: a roadmap which promotes complementarities, synergies and upgrading

17:00 End of workshop

1.2 List of participants



Partner n°	Country	Partner	Participant full name
1	France	INRA	Abad CHABBI
3	Israel	BGU	David BLANKMAN
4	Norway	Bioforsk	Helen FRENCH
4	Norway	Bioforsk	Ingvar Hage
4	Norway	Bioforsk	Katrin Knoth de Zarruk
5	Italy	CNR	Cristina Martinez
5	Italy	CNR	Franco MIGLIETTA
5	Italy	CNR	Giorgio MATTEUCCI
5	Italy	CNR	Paola ROSA
1	France	INRA	Emilie GULDNER
6	France	CNRS	Jacques ROY
9	Austria	EAA	Michael MIRTIL
10	Poland	ERCE	Kinga KRAUZE
12	Switzerland	FiBL	Paul MÄDER
15	UK	Imperial	Alexandru MILCU
17	Germany	Jülich	Harrie-Jan HENDRICKS-FRANSEN
17	Germany	Jülich	Heye BOGENA
18	Germany	KIT	Rainer Gasche
20	UK	NERC	Nicolas BERTRAND
21	UK	Rothamsted Research	Andy MACDONALD
22	Slovakia	SL TANAP	Peter Fleischer
24	Finland	SYKE	Martin FORSIUS
25	Germany	TUM	Carsten Mueller
26	Belgium	UA	Hans DE BOECK
26	Belgium	UA	Ivan NIJS
27	Romania	UB	Mihai ADAMESCU
27	Romania	UB	Sergiu Cristofor
28	Germany	UFZ	Jutta STADLER
28	Germany	UFZ	Stefan KLOTZ
29	Finland	UHEL	Albert Porcar-Castell
29	Finland	UHEL	Jaana Bäck
31	Italy	UNITO	Carlo GRIGNANI
32	Italy	UNIUD	Giorgio ALBERTI
34	Serbia	UNS	Ante VUJIC
34	Serbia	UNS	Sonja Trifunov

1.3 Workshop objectives

The objectives of the workshop were

- (i) to improve knowledge and communication links between ExpeER partners
- (ii) to form the basis for updating technical and operational capacities, and for improving control systems
- (iii) to identify synergies and potential gaps in terms of instrumentation, methods, models, scientific questions and ecosystem coverage

Expected outputs of the workshop included

- (i) agreed common areas of improvement for HIOS and HIES facilities
- (ii) the identification of core parameters that can be used for all sites
- (iii) the identification of future strategies to minimize common threats

Overall, the objectives outlined above were met and the workshop provided a good platform for site managers to meet each other. Participants were asked to split up into smaller groups e.g. based on the type of research site (agricultural, forest, etc.), which gave them the opportunity to present their experimental site, the focus of research conducted, and future plans to a more specific audience. In this way, possibilities for collaboration and synergies between different sites could be explored. Questionnaires and radial diagrams were discussed and necessary improvements were defined by different groups, which were then presented to all workshop participants. Details concerning the changes of questionnaires and diagrams will be finalized in a phone meeting between WP1 partners. See sections 2 and 3 for a more detailed description of presentations, group discussions and future actions.

2. Main presentations and discussions

In this section, the presentations outlined on the agenda are presented in note-format. The presentations can be found in the ExpeER Intranet under "Meetings and workshops" → "First annual meeting".

2.1 Helen French, WP leader, Bioforsk, Norway

The presentation focused on the advances made in WP1 so far, which are compiled in deliverable D1.1. This included the following points: Methods, questionnaires, fact sheets, and visit to sites.

The overall aim of WP1 is to give a detailed description of all ExpeER facilities in form of fact sheets and reports, which will also facilitate the work of other WPs within ExpeER. A questionnaire on site characteristics (adopted from EnvEurope, Life Environment Project LIFE08 ENV/IT/000339, in collaboration between the partners in WP1 and other ExpeER partners) was filled out by site managers of each ExpeER site. This has to be regarded as an iterative process; due to incorrect or missing information, and maybe due to unclear instructions concerning the completion of the questionnaires, the content of some fact sheets must be updated.

The progress of WP1 to date was discussed in three main sections, as follows:

- (i) The collection of information from all ExpeER sites
- (ii) The description of analytical sites and ecotrons,
- (iii) The use of radial diagrams to characterize the sites (see deliverable D1.1).

Classification criteria and definitions of different sites such as ecotrons, highly instrumented experimental sites (HIES), and highly instrumented observational sites (HIOS) were explained. Thirteen countries are participating in ExpeER with 28 field sites in different ecosystems including forest, grassland, agricultural land, peat land, wetlands and coastal area.

The approach used for the development of questionnaires, diagrams and fact sheets was explained. The latter are available as pdf files on the ExpeER webpage (intranet).

Committee members have already conducted several site visits with the purpose to gather information that may not be apparent from the fact sheets such as accessibility and security (i.e. can equipment be left safely at the site during an experiment) of individual sites.

It was concluded that ExpeER already covers a broad range of climates and ecosystems, and that the representing sites have a good capacity for certain types of measurements. However, it was also pointed out that there is a need for improvement in terms of ecosystem coverage, site security and communication between different sites.

Because of insufficient information provided by site managers concerning instrumentation and spatio-temporal resolution of measurements from the sites, it is difficult to draw any conclusion about the consistency in choice of methods across the sites. Some of the sites with most complete information and advanced instrumentation were highlighted during the workshop to inspire upgrading of instrumentation and to provide more complete and detailed information about the sites.

2.2 Andy Macdonald, Rothamsted Research, UK

The approach for the site radial diagrams was explained. The diagrams are based on categories and sub-categories that can be found in the questionnaires. They provide a visual impression of the character of the work conducted at each site and identify the emphasis of the work and possible areas for future improvement. However, they are not meant to be used to assess the quality of a site.

Several diagrams and excel sheets of different sites were shown to explain their purpose and meaning. High and low scores of certain characteristics at different sites were pointed out.

Certain categories have high scores in many sites such as technical services and meteorology. Biodiversity and manipulations are underrepresented. This may be areas to focus on in the future.

2.3 Jacques Roy, CNRS, France

The presentation tried to give an overview of the research topics addressed through the ExpeER sites. It focused on difficulties and gaps concerning site descriptions and ExpeER members/coverage.

➤ Differences between HIES and HIOS

HIES are characterized explicitly by on-going experimental treatments on specific plots, with a database covering all these plots. Certain sites provided insufficient information in the questionnaires on this aspect that it was therefore difficult to classify them as HIES or HIOS. Seven sites may be not be in the most appropriate category. A discussion with site managers is necessary to solve this problem.

➤ Categorization of ExpeER sites:

Five categories were proposed for the experimental sites:

- Biodiversity experiments (2 German sites)
- Climate change experiments (5 sites)
- Ecological Agriculture (3 sites)
- Rotation agricultural systems (3 sites)
- Forest and grassland management (4 sites)

A categorization for the observational sites should be proposed

➤ Other European ecosystem sites not included in ExpeER

ExpeER sites in comparison to other already existing sites in Europe → should more sites be included in ExpeER? **Conclusion: More research is necessary on the types of already existing research.**

Example 1: Climate change experiments → INCREASE program, CarboExtreme not included in ExpeER

Example 2: CO₂ experiments cannot be found on any ExpeER site (according to questionnaires)

Example 3: Ecological agriculture; ExpeER sites at Apelsvoll, Therwill and Beano. But: Experiments are not sufficiently described in ExpeER files. This type of information is important for transnational access to interest other people in ExpeER sites.

It was concluded that to improve the visibility of ExpeER and opportunities for transnational access the description of experiments at different sites needs to be improved, and that some guidelines on this may be helpful. European sites involved in European programs but not in ExpeER should not be ignored.

2.4 Alexandru Milcu, Imperial College, UK

The presentation outlined possible misinterpretations of the character of individual sites (types of measurement, focus of the site, etc.) due to radial diagrams drawn with obviously incomplete site information.

Example Jena (diagram axis “Autotrophs and heterotrophs”): Established long-term experiments to test the stability and resilience of communities to variations in climatic conditions are conducted on this site. Measurements are hypothesis driven (Important in this case: accurately capture community structure and functioning at high spatial and temporal scale.). Very detailed data sets exist, but Jena rated zero for biodiversity. The Jena site manager should be invited to revise the site details spreadsheet to see if important information was excluded.

2.5 Martin Forsius, SYKE, Finland

The future tasks of WP1 according to the DOW were presented including the list of deliverables for WP1, including a report (D1.1), a workshop (D1.2), a roadmap for European ecosystem research infrastructure (D1.3) and an assessment report on the added value of ExpeER for research (D1.4).

Specific tasks included:

- (i) identify key parameters for use at all sites (additional parameters depend on focus of site),
- (ii) evaluate site quality in relation to these parameters and group sites according to ecosystem/focus,
- (iii) create a searchable database of measured parameters (WP3)

Roadmap: web-based roadmap for infrastructures → action plan for future research and infrastructure development → Aim: reduce gaps

Assessment report: review of key research and policy needs, optimized use of European research facilities, → final aim: synthesis report for funding agencies and stakeholders

There will be an internal bulletin containing news from different WPs that will be published on the ExpeER webpage.

3. Actions, future work and collaborations

Several necessary future actions could be extracted from the discussions held at the workshop. They mostly concern the content and format of the questionnaires and the radial diagrams as well as cross sites interactions and collaborations on sites development and research programs elaboration.

3.1 Actions

In order for ExpeER to present each site as accurately as possible and highlight its strengths and focus, site managers need to provide as much information as possible. There is reason to believe that the current format of the questionnaires made it difficult for some site managers to fill in information. It was therefore an important step to discuss these issues during the WP1 workshop and collect feedback from site managers. It was mentioned that instructions on how to correctly

complete the questionnaires would be appreciated. In addition, some parameters are found repeatedly in different categories, and certain categories are much more detailed than others. Suggestions compiled during group work are presented in the following paragraphs.

3.1.1 Modification of questionnaires and fact sheets

It was decided that questionnaires and fact sheets are to be reviewed and modified as soon as possible. Workshop participants split up in groups to discuss the different parameters included in the questionnaires and whether these needed to be changed. The need for additional information from other workpackages, especially WP2, should be checked in order to avoid sending several, almost similar, questionnaires to site managers. WP3 should be included in this process for the perspective of feeding data bases: spreadsheets should be designed in a way to facilitate the export of data into a database. In the following, suggested changes resulting from the group discussions are listed:

Group 1 – soil properties and soil arrays

- Combine “soil properties” and “soil arrays”-categories into one category named “soil properties”.
- Remove chemical parameters from main categories. Instead, add an analytical category and include info on other categories where these are measured (e.g. pH, total C, total N etc.).
- Remove soil CO₂ flux by horizon.
- Remove hydrological sub-categories and move to “hydrology”-category.
- Indicate in column headings where information on soil layers/horizons can be added – e.g. ecological horizons (A, O etc.) and/or horizon depth (x-y cm).
- Include information on the number and extent (estimated % of area) of soil types within the TA research site.
- Include information on sampling frequency, with categories for guidance e.g. min-hr, hr-day, day-week, week-month, month-year.

Group 2 – meteorological data, hydrological data and atmosphere

- Decide on mandatory list for meteorological variables (independent of Eddy Covariance tower or not), time resolution at least, min/max and daily values, or 0.5-1 h resolution.
- Include micro-climate measurements such as throughfall, temperature at ground surface etc.
- Combine e.g. soil array and hydrology (e.g. soil water content and groundwater should be included in both).
- Sap flow (or under vegetation?).
- Mandatory: soil water content and groundwater level measurements.
- Atmosphere: add VOC, for each variable include flux and concentration. Move lamps to manipulation.

Group 3 – Biological parameters

a) Axis “Ecosystem”

- Workshop participants agreed that it is difficult to build an axis called “Ecosystem”. The number of ecosystem types such as forest, arable, grassland is not considered as a meaningful measure of the capability of a site. This could result in a misconception with sites

covering different ecosystems being judged as more useful than sites covering one ecosystem only. Again synthetic sites comprising several sites would be ranged higher. Table with crosses for each site may be more appropriate in this case.

- Sites with several ecosystem types should probably fill up as many questionnaires as ecosystem types for the sake of homogeneity and thoroughness of the information.

b) Axis “Autotrophic compartment”

- There should be separate assessments for crops and weeds for agricultural sites (could be included under “Special measurements” or “Specific species”)
- Include photosynthetic rate
- Include carbohydrate content
- Delete item biodiversity (possibly)

c) Axis “Heterotrophic compartment”

- More details needed: e.g. bacteria, fungi, rhizobia, mycorrhiza
- Delete term biodiversity (possibly)

d) Axis “Biodiversity”

- Include staphylinidae
- Include spiders

3.1.2 Radial diagrams

The radial diagrams were found to be a useful tool to visually describe the research focus at each site. However, the diagrams of some sites will need to be adjusted following the revised version of the questionnaires and additional information provided by site managers. It was suggested (i) to review the relevance of some radial axes, (ii) to possibly combine several topics on one axis, and (iii) to group diagrams according to ecosystem types.

Publishing these diagrams outside of ExpeER partners raises the concern that low scores on some axes may be taken as an indication of poor quality of the site, while it may just result from some sites being more scientifically focused than others. In addition, site managers should be able to review/correct their diagram before publishing them outside of the ExpeER network. WP1 partners will decide on how to proceed with these diagrams after the revision of questionnaires. Publishing the diagrams might require a few lines for each site synthesizing its specificity.

→ **Action 1:** Modify the questionnaire taking into account appropriate suggestions from above; send it to WP2 and WP3 coordinators for comments and final changes (export into database) before sending it to site managers for updating. Highlight areas that need special attention before sending it to individual site managers, and indicate the deadline (e.g. 2-3 weeks). The modified spread-sheet could be downloaded from the ExpeER website.

- **Action 2:** Modify fact sheets published on ExpeER website taking into account new information
- **Action 3:** Revise radial diagrams according to new information from questionnaires.
- **Action 4:** Publish revised/updated deliverable D1.1 (see also section 4.1)
- **Action 5:** Compile WP1-information in an easily searchable, web-based meta-database (in collaboration with other WPs)

3.2 Future work

D1.3)

Roadmap for European ecosystem research infrastructure: A web-based roadmap for the EXPEER infrastructures which presents an action plan for further research and infrastructure developments in order to reduce gaps and synergies to achieve the EXPEER integrated infrastructure vision.

D1.4)

Assessment report on research added value of EXPEER infrastructure: The assessment report will contain the following main elements: i) a synthesized description of improvements of EXPEER tools and products, ii) a review of key research and policy needs for optimized use of European wide ecosystem research facilities, iii) an assessment of the final situation on the EXPEER roadmap (based on Task T1.3).

3.3 Possible collaboration between sites

Site managers were encouraged to discuss and identify possible topics for collaboration. Coordinated research at sites with e.g. similar ecosystem types will allow comparing datasets and widening the research scope at individual sites when instrumentation or analysis can be shared. The following topics were mentioned during the work shop:

- 20 forest sites, many options for gradients – N-S, E-W, elevations
- Litterbag experiments
- Common modeling framework
- Successional change in land-use
- Several species versus environmental variations
- Climate change proxies
- Climate change impacts on crop production systems, especially in natural/semi-natural systems e.g. long-term grassland.
- Soil C and N cycling
- SOM fractionation – pools density fraction, size fraction, solubility, labile fractions – linked with climate change impacts.
- Nutrient losses to water – N & P

- Soil microbial diversity and soil processes/functions
- Soil Fauna (e.g. food web studies) - studies to link soil fauna diversity and activity to nutrient cycling are scarce.
- Paul Mäder indicated that a meeting on long-term agronomic trials in Switzerland will be organised by FIBL/agroscope and ETH in early 2014. He will circulate details when they become available. Interested EXPEER partners are invited to consider how they could contribute.

3.4 Concluding remarks

This report aimed at giving a quick overview over the WP1 workshop and future actions debated during group work and joint discussions. The workshop provided a useful opportunity for networking and discussions between numerous site managers and researchers; it contributed to one of the goals of ExpeER namely the facilitation of exchange and collaboration between different sites. WP1 partners were able to collect valuable feedback on the work conducted so far, and site managers contributed directly with suggestions concerning future actions and improvements in the site questionnaires and diagrams.

Overall, conclusions were consistent with those outlined in D1.1. In particular, the majority of sites have the technical infrastructure necessary to facilitate high quality ecosystem research, but there is scope for improvement at many sites relating to experimental manipulations, biodiversity studies, hydrology and soil characterisation. The still missing information in the questionnaire spread sheets is however hampering a deeper analysis of the strengths, weaknesses and potential synergies of the sites. A review process will be initiated and the revised documents form the basis for deliverable D1.3 'Roadmap which promotes complementarities, synergies and upgrading' as well as an expanded D1.1 report.