

Report

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e-science and technology infrastructure for biodiversity data and observatories

The LifeWatch Service Centre Plan

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The LifeWatch Service Centre Plan

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Annex B: Full list of Service Centre functions

Annex C: User requirements questionnaire and conclusions

Annex D: Communication Plan (Sier, 2009)

Annex E : LifeWatch Access Policy

1. OVERVIEW

1.1 LifeWatch: introduction and scope

The main purpose of LifeWatch is to serve the biodiversity and ecosystem research community in its work on the understanding and rational management of our ecosystems for use by policy makers, resource managers, the private sector and the general public. To do this the LifeWatch infrastructure will provide capabilities to analyse, model and simulate with integrated biodiversity and ecosystem data from many diverse sources to address the huge gaps we have in our understanding of life on Earth. Its innovative and flexible design will also enable the community led development of on-line facilities for data access combined with advanced models, algorithms and computational capability. LifeWatch will provide resources and services to data and model users, data providers and for general networking. An overview of these resources can be explored through “LifeWatch: the Guide” (Box 1) which is available on the LifeWatch web-site at <http://lw.ceh.ac.uk/>.

1.2 The Service Centre: main functions

The Service Centre provides the interface with all the stakeholders of the LifeWatch community and will be the first point of contact for all enquiries concerning LifeWatch. It is the “connector” between users of LifeWatch and the capabilities it provides.

The Service Centre is designed to meet the needs of multiple user groups from different domains and areas of interests (see Section 2).

The Service Centre assists in deploying the services provided by LifeWatch, including those enabling discovery, visualisation and download of data and applications for analysis, synthesis, modelling and product development.

The Service Centre organises communities of common interest in the LifeWatch infrastructure by ensuring that the needs of user communities are recognised and met. To do this, the Service Centre will be staffed adequately to provide an accessible human interface with the LifeWatch user community. It will also offer web-based tools to facilitate self-service, social networking and social learning approaches.

1.3 Service Centre: outline structure

In line with other components of the LifeWatch infrastructure, the Service Centre will have its centralised and common facilities, as well as distributed LifeWatch Centres (see figure 1).

The central and common facilities are part of the LifeWatch legal entity (the LifeWatch ERIC), and are responsible for the strategic development of the Service Centre, for monitoring and evaluating user requirements and for managing links with the activities of the distributed LifeWatch Centres.

The distributed LifeWatch Centres will also offer a variety of national, regional and/or thematic service facilities. In some cases individual countries may choose to develop and operate national level Service Centres. In other countries it may be necessary to establish links to a wider range of existing facilities serving sub-sets of the biodiversity research community (eg in the UK it may link with the National Biodiversity Network). These regional components are not necessarily part of the LW legal entity and may be covered by national in-kind contributions to LifeWatch and will be managed accordingly.

Box 1. LifeWatch: the Guide (<http://lw.ceh.ac.uk/>)

LifeWatch is a complex project with a simple aim: to support research and understanding of natural ecosystems through improved access to a wide range data, models and expert knowledge. [LifeWatch: the Guide](#) has been developed to explain simply what LifeWatch expects to offer users. The online guide, available from the main LifeWatch website, provides an overview of how LifeWatch will work in practice. It shows how we anticipate users will be able to perform common tasks such as searching for data, working with models and other digital resources, or networking with other users. It also presents an overview of some of the Service Centre support functions that we expect to offer, such as training and support for obtaining funding.

At this stage, the guide is not a detailed manual to LifeWatch, but as the tools and services develop, the guide will provide greater detail on using LifeWatch.

The screenshot displays the LifeWatch website interface. At the top, the logo 'LIFEWATCH the guide' is visible alongside the tagline 'e-science and technology infrastructure for biodiversity data and observatories'. A navigation menu includes 'Home', 'Overview', 'Tasks', 'Case studies', 'Access', 'Contribute', and 'Network'. A search bar is located in the top right corner.

The main content area is titled 'LifeWatch: the guide' and contains the following text:

LifeWatch is an ambitious project to create a state-of-the-art facility supporting biodiversity research. LifeWatch will provide access to a wide range of biodiversity datasets, modelling and analysis tools. It will also support the creation of a network of users, enabling them to share resources and collaborate on projects.

LifeWatch: the guide takes you through how LifeWatch will work in practice. It shows you common tasks you may perform, presents prototype tools and explains how the LifeWatch infrastructure and Service Centre will support you, the user.

There are three ways to start using the guide:

- Overview** - Start by learning about LifeWatch and exploring an interactive overview of this Guide. Quickly get a feel for the what is covered and jump to sections of interest
- Tasks** - Go straight to this section of the guide and discover how you can use LifeWatch to perform common tasks such as searching for data or using a model
- Read examples demonstrating potential uses of LifeWatch**

Below the text, there is a grid of images showing various users interacting with the system.

Overlaid on the bottom of the screenshot is a 'LifeWatch Catalogue' slide. The slide features the LifeWatch logo and the text: 'Search tools. This short sequence of slides will walk you through the main search options that are expected to be available in the LifeWatch resources catalogue. Use the arrows below to navigate through the slides.' The slide also includes a 'Page 1 of 7' indicator and a green arrow pointing right.

In the background of the slide, a screenshot of a search interface is visible, showing a search bar, a map, and various filters.

1.4 Service Centre: partnerships and collaborations

There are many other existing biodiversity related organisations which offer some degree of “service” support relevant to biodiversity ecosystem research. These are reviewed briefly in [Annex A](#). But the scope and scale the LifeWatch Service Centre is unique – no other facility will provide access to such a comprehensive and integrated range of biodiversity and ecosystem data and information sources on such a wide-scale and linked to analytical and modelling capability.

The LifeWatch Service Centre will not duplicate existing services but will collaborate with existing web-services and Service Centre type facilities that currently operate at national levels or for a particular part of the biodiversity research or policy community (eg GBIF).

LifeWatch supporting facilities (European or global) such as GBIF, LTER-Europe, the MARS marine research stations consortium and others are not part of the LifeWatch legal entity. Operational relations between LifeWatch and these facilities will be established through bilateral agreements.

The LW Service Centre will also develop and maintain links with similar Service Centres outside Europe as part of a broader aim to develop a global biodiversity and ecosystem data and information facility (eg ILTER) and will contribute one of the systems for the Global Biodiversity Observation Network (GEO BON).

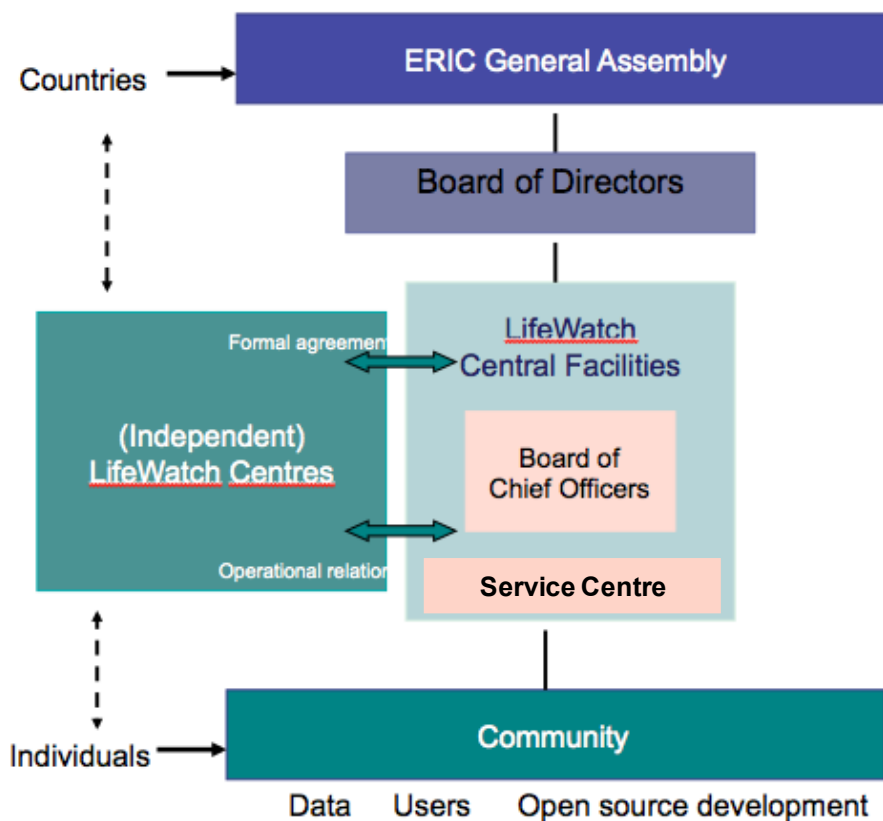


Figure 1: The Structure of LifeWatch showing the relationship between the Service Centre and the main internal and external parts of the organisation.

2. USES AND USERS

2.1 Stakeholders and users

The Service Centre is designed to meet the needs of the main user groups. These user groups are summarised in Table 1.

Table 1. User Groups and audiences for LifeWatch communication activities. Table adapted from Sier (2009). Audience groups have been split into those whose role is essentially as a user of the services and data and those who are primarily contributors to the infrastructure (non-user).

Audience	Sub-grouping	Priority rating* for establishment phase.	Notes
<i>Primarily a non-user role</i>			
LifeWatch resources (of services, data, tools or other resources)		•••••	LW relies on having resources and services to integrate for its users
Funder/supporter		•••••	Essential for sustainability and growth
Generic user (the wider public)		••	Considered as non-users until targeted services and resources are provided. Public support is important, and materials should serve the educated public
<i>Primarily a user role</i>			
Researcher		•••••	The primary user of most services
Education sector	Teacher	••••	Assume Higher Education Sector is primary educational target. Building a user base amongst students and young researchers is needed for sustainability
Education sector	Student	••••	
Policymaker		••••	Policymakers in a user role are probably of lesser priority until services and resources specifically tailored for them are developed
Commercial sector		••••	A potential income stream if provision of data and services to this group is charged
Public administrator		•••	Medium priority until tailored services/resources are developed
Conservation manager		•••	Medium priority until tailored services/resources are developed
Communication sector	Journalists, writers, broadcasters	•••	Good if influential writers are supportive, but will most likely base their support on evidence of success (i.e. the experience of other groups and value for money)
Communication sector	Museums, science centres	••	Their target audience is the general public, not regarded as a priority at this stage

2.2 Value of the Service Centre to the user communities

The main benefits of LifeWatch will be different for each category of user:

- (i) for research scientists: the main benefits will be through collaborative working with other scientists in virtual laboratories enabling ease of access to quality assured data and models;
- (ii) for data providers: LifeWatch provides facilities for connecting data and models with a broad range of data users and potential collaborators;
- (iii) for general users: LifeWatch provides quality services targeted at the research / education / policy / commercial sector;
- (iv) for organisations: LifeWatch is an important, large scale European initiative, with many benefits including: furthering an organisation's research, raising an organisation's profile, improving European research, improving the science-policy interface, finding new applications for data, tools and knowledge, serving the next generation of European scientists; and
- (v) for funders/sponsors: LifeWatch provides an informatics framework to promote common standards in environmental informatics and develop and promote security and re-use of data and information. It will also reduce the duplication of effort currently associated with the management of data and the collation of data for new research projects.

2.3 Access to the infrastructure

The rationale for establishing research infrastructures is to promote innovation and a better competitive position by offering new capabilities for researchers. In this regard, it is crucial for the ESFRI and the EC to promote excellence by enabling access to the infrastructures for the best researchers by various means. The EU regulation for establishing research infrastructures (ERIC) requires infrastructures to meet the condition of open access and provide (independent) selection procedures and criteria.

Many research infrastructures such as LifeWatch are offering their capabilities mostly through the Internet. The LifeWatch Service Plan indicates that users may also want to work with LifeWatch staff on developing specific capabilities (i.e. modelling algorithms) for their project. Capacity for such services is always budget limited but for LifeWatch it is very important to promote such access since this is a very strong driver for innovation and improvement of LifeWatch capabilities.

Defining the LifeWatch access policy, including user registration aspects, is a priority for the early construction phase. As funding countries increase and as the added value of collaboration is more evident, access policies will be reviewed on the basis of science, IT, LifeWatch developments and users' requirements. (See Annex E)

2.3.1 LifeWatch Aims and Access Principles

The principles of access under which LifeWatch will operate are listed below.

- Access to search, browse, and explore data and tools shall be completely free of charge and open to all, with no requirement to register or to provide any user information.
- Access to data that has been contributed to or is accessible through LifeWatch shall be open and free, in accordance with OECD guidelines, EC policies and the Berlin declaration.
- Access to data that has been contributed to LifeWatch under more restrictive agreements shall be possible according to those restrictions and will require appropriate enforcement mechanisms (such as authentication, charging, licensing for commercial use, etc.). Enforcement mechanisms require knowing who the user is.
- Consumption of resources (e.g., to put details of discovered datasets into a basket for later use, to carry out modelling tasks, to store results, etc.) requires some knowledge of the user (even if only to be able to allocate resources to them).

- User registration will be required for anything beyond exploring what is available and accessing open data (as described above). User registration will be voluntary and linked to specific benefits for users that are only possible when registering. For example, registered users could receive messages to notify them that new data, software or other capabilities of their interest (as indicated with their registration) have been included in the infrastructure.
- LifeWatch will aim to adopt a similar model to that used by Amazon. In Amazon, you have to register to place an order but you don't have to register to browse/search/explore the products and place them in a basket. Registering lets you come back to your basket later on as well. This usage of resources is free-of-charge to the user because ultimately it benefits the provider (Amazon). Acquiring information for LifeWatch users (for example which country they come from, their representing institute etc) will be possible by voluntary filling of information requests and surveys.
- User registration should be simple and built-in with progressive steps to sign-up to more stringent controls. For example, to 'create a basket', a username and password will be needed. As the user wishes to progressively undertake more sophisticated activities, they should have to progressively provide further details.
- User registration will be required when a user wishes to subscribe to special services (i.e. newsletters, information on temporary networks being formed for a specific research theme, etc). The subscription could be connected to a fee.
- User registration will be required for sections reserved only for members, containing e.g. training material, policy documents, results of horizon scanning activities etc. Access to these should be reserved to organizations and institutions indicated by the funding member states.
- According to the Data Protection Directive and provided that the users have given permission for their anonymous data to be collected through their use of the portal, it should be possible to use information from users' registration and draw the profile of the LifeWatch users with their preferred data or services (with the aim to design marketing services for example). However, due to restrictions, collection of information should be minimized.
- User registration will be required to publish data.

2.3.2 User Types

As of now, 3 types of LifeWatch users are identified: users wishing to use data and services/tools, users wishing to publish data, users wishing to make services/tools available. The roles they may perform (data use, data publication, etc.) will be assigned to them according to agreements made with LifeWatch.

Users can be:

- individual persons, who may access LifeWatch services and resources free and in a reliable way from any part of the world. Specific demands from the users will be examined, accompanied by appropriate financing of the developments;
- Universities, registering for all their staff and students with an institutional subscription;
- similar infrastructures embedding LifeWatch capabilities to their own portal;
- computers using LifeWatch capabilities in their routine services; or
- companies building products for their users based on LifeWatch capabilities and others.

2.3.3 Short term access of individual researchers or research groups

PhD students, postdocs and experienced researchers will often have special requirements for doing their work in a LifeWatch virtual laboratory. When these requirements cannot be met through the normal open Internet-based LifeWatch capabilities, it may be possible that the Service Centre Front Office will enable physical access to the capabilities. Since the human resources available to the Service Centre will be limited, to enable physical access, a procedure will be developed covering the selection process and bench fees for potential applicants.

3. THE DESIGN PLAN FOR THE SERVICE CENTRE

The main SC functions are grouped in 7 main components:

- i. the front office;
- ii. the user platform/interfaces;
- iii. partnerships and collaborative networks;
- iv. training and capacity building;
- v. the co-ordination of distributed services;
- vi. the strategic development of LifeWatch Services; and
- vii. management, co-ordination and contracts related to the SC.

Under each of these components there are a number of separate construction issues. These are briefly described in Sections 3.1 to 3.7. The inter-relationships between the components and issues are illustrated in Figure 2.

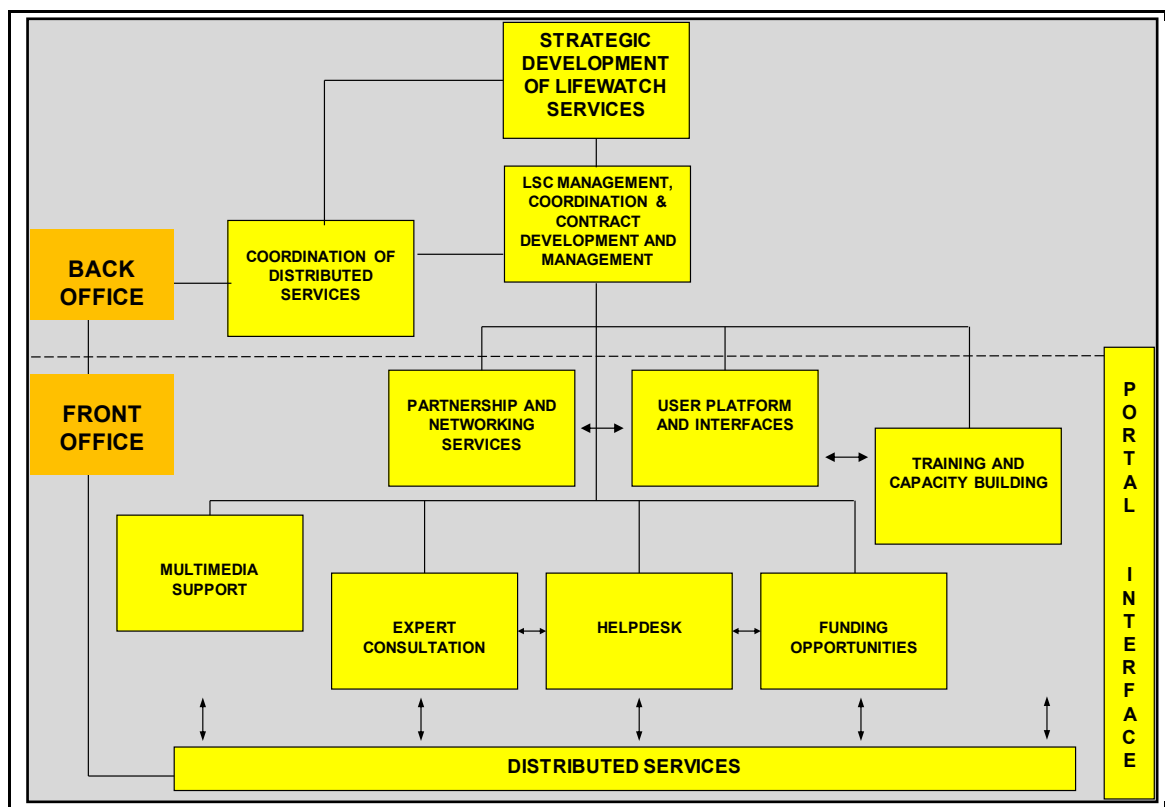


Figure 2. Outline structure and functions of the LifeWatch Central Service Centre.

3.1 The Front Office

The front office provides the first point of contact with users either through the LifeWatch Portal or by direct contact (e.g. telephone or email). It consists of four parts covering: the “helpdesk”, expert consultation, multi-media support and funding opportunities.

3.1.1. The [Helpdesk](#) [SERV-4¹]

The helpdesk provides on-line and off-line (person to person) assistance in all aspects of the LifeWatch infrastructure including:

- general information on LifeWatch;
- IT support;
- guide to services and functions of LifeWatch, including access to data and other resources;
- support services (funding, contact with experts, information on legal aspects at EU and national level, policies);
- information on legal aspects of data use (licences, copyright etc); and
- information on funding opportunities.

In order to support its front-line services the helpdesk is responsible for:

- preparing protocols on how to provide assistance and answer to requests and questions;
- preparing and managing standard answers ('frequently asked questions');
- updating the helpdesk services;
- planning and managing periodic meetings with helpdesk personnel in the distributed Service Centres;
- launching new methods/technical tools at the distributed offices;
- escalation of requests/questions that cannot be dealt with by the helpdesk directly; and
- issue tracking.

Questions that cannot be answered directly (e.g. technical or scientific, regional) will be re-directed to appropriate experts or to distributed LifeWatch Centres. The helpdesk will also provide a key element in the LifeWatch strategy for communication with users and a direct means of collating information on the needs of the user community. Because of its importance to user communities, the helpdesk is one of the main construction priorities for the LifeWatch Research Infrastructure.

Examples of Service Centres with help-desk type functions can be found at the European Community Biodiversity Clearing House Mechanism (<http://biodiversity-chm.eea.europa.eu/HelpDesk/>), at the UK's National Biodiversity Network (<http://www.nbn.org.uk/Help/Help-Desk.aspx>) and at the European Commission Cordis website. http://cordis.europa.eu/guidance/helpdesk/home_en.html.

3.1.2 [Expert Consultation](#) [SERV- 5], [SERV-35]

The LifeWatch Service Centre will organise a broad community of experts serving as:

- (i) A pool of expertise giving assistance to users with questions and enquiries that cannot be dealt with by the helpdesk. Experts will be available at regular intervals to answer questions from the user community, filtered through from the helpdesks, the forums and from other sources. The Service Centre will also use a team of experts in the main fields of biodiversity to guide and answer requests from users. Experts will be managed through a system similar to the DMOZ "Open Directory Project": <http://www.dmoz.org/Science/Environment/Biodiversity/Consultants/> .
- (ii) A formal panel or set of panels that meet periodically to exchange information and guide interdisciplinary initiatives.
- (iii) Groups of experts will also manage a specific section of the website dealing with vocabularies and glossaries. Each expert will be responsible for his own field of expertise and will validate the new or updated information inserted by the user community.
- (iv) The experts will help introduce new technologies and innovative methods/tools and will check the scientific validity of the services offered by the infrastructure. They will also

¹ *SERV-4 is the reference to this construction issue in the LifeWatch Construction Plan.*

help review material produced (brochures, news, documents), training courses and the selection of fellowships.

The Service Centre will manage a list of experts, where registered users will have the possibility to insert their own profile and consult the list to find users with the expertise required to perform a specific activity. Sources of expertise relevant to LifeWatch might be maintained, for example, through something like the “Open Directory” which provides lists of experts and consultants in particular fields.

Advice will also be generated “bottom-up” through the use of social networking tools enabling communities of common interest to share their questions and answers (see Section 3.2.2).

3.1.3 Multimedia Support and Education [SERV- 14]

The multimedia service will take care of the identification, implementation, management and innovation of multimedia services. It will help to draw new users into LifeWatch by informing them about the infrastructure and its related activities. Multimedia tools will have two functions in LifeWatch.

First, they will be used by the Service Centre to offer the user community many additional types of information on biodiversity outside the usual concepts of digital data. These will include:

- images and photos on habitats and species;
- videos on habitats and species;
- amateur images and videos;
- sound recordings (e.g. birds and insects);
- cartographies, e-maps; and
- advice on digitisation of specimen data from natural history collections.

Secondly, multimedia tools will be used to promote general education activities designed to improve the public understanding of biodiversity and ecosystem science. This will involve the conceptualisation and deployment of multimedia representations of LifeWatch data, models and products for non-scientific audiences. Examples of similar multi-media services are provided by National Geographic and the United Nations Environment Programme and at <http://animals.nationalgeographic.com/> and www.unep-wcmc.org.

3.1.4 Funding Opportunities Office [SERV-3]

The funding opportunities office will carry out a series of tasks including support for users on potential financial instruments and mechanisms at global, European and national level.

The Service Centre will maintain the most up-to-date information on financial opportunities for the LifeWatch infrastructure either directly or through links to other sites such as:

- <http://biodiversity-chm.eea.europa.eu/cooperation/funding>
- <http://www.nebiodiversity.org.uk/funding/default.asp>

The Service Centre will support the board of chief officers (see Figure 1) in the acquisition and management of (commercial and public) contracts, as well as the involvement in EU proposals and tenders.

3.2 User platforms and interfaces [SERV- 28]

The LifeWatch infrastructure is primarily a research infrastructure but it is planned to meet a range of other user needs. Engagement with stakeholders is therefore crucial to define the scope of the service provided, its method of delivery, as well as the nature of support from the Service Centre.

The Service Centre will establish and manage methods and procedures for interacting with key stakeholder groups. It will do this through a combination of top-down and bottom-up approaches.

- Top-down: through the establishment of a formal user-platform representing key European stakeholders, in particular from the world of science.
- Bottom-up: through the development of a range of social networking and participatory approaches enabling user groups to come together to address specific issues and needs. These groups may be short or long lasting according to needs.

3.2.1 Top down: LifeWatch User Platforms

Formal User Platforms may be established to provide a means of communication between the user communities and the LW-ERIC. The establishment of User Platforms will be at the discretion of the LifeWatch Executive Board.

User Platforms will be established to ensure that national and international users of the LifeWatch research infrastructure, especially from the European research community, have effective access to all infrastructure facilities. They will also provide advice to management on the prioritisation, development and resourcing of technical or non-technical services.

3.2.2 Bottom up: Social Networking and LifeWatch User Platforms

Experience from sociological surveys (e.g. of taxonomists in the EDIT project) indicates that it can be very difficult to define clear stakeholder groups and that user engagement with ill-defined communities can be ineffective. One way round this is to provide a service in which a community of users can self-organise to derive tangible benefits. An example of this approach, with very short cycles between report and response, is known as Agile: (http://en.wikipedia.org/wiki/Agile_software_development).

LifeWatch will apply a form of agile development to the Service Centre as a mechanism to build user engagement and manage user expectations. Thus it will focus initially on those stakeholders who are active users and allow this group to grow organically as potential stakeholders recognise the value LifeWatch offers them as an individual.

The Service Centre will facilitate the development of these user-led platforms by creating a working environment in which potential users and LifeWatch partners can cooperate. Potential users will be able to interact, make comments, suggestions, ask for information and help LifeWatch prioritise its future services. An example based on "Scratchpads" (<http://scratchpads.eu>) is given in Box 2. Another approach to enabling users to shape the development of the infrastructure could be based on the Apache Software Foundation (<http://www.apache.org>). Apache is a community of developers and users that provide support for open-source software projects based on a collaborative, consensus based development process.

Box 2. Examples of User Platforms for data providers based on Scratchpads

Scratchpads (<http://scratchpads.eu>) were conceived in the EDIT network (<http://www.e-taxonomy.eu>) to provide a rapid web presence for taxonomic information. Their primary function was data mobilisation. They proved popular and successful gathering in their first two years of operation well over 1,100 registered users (data contributors), who created 100 discrete sites with over 130,000 nodes (pages). Of these 13,511 were publicly accessible taxon pages. The sites get an average of 250 visits per day (maximum 3,000). For current information see <http://dev.scratchpads.eu/scratchpads/stats>.

Technically, Scratchpads are a content management system (Drupal) which has been optimised for use by the taxonomic community. They are successful because they are unbranded, so communities create their own sense of identity, and data remain the property and responsibility of those that created them. The Drupal core is supplemented by modules (or plug-ins) that carry out specific functions.

Scratchpads can serve LifeWatch as one means of enabling data providers to publish data to the internet. The technology used to build them has demonstrably provided a low-cost prototype environment that engages users.

The Scratchpad team has secured funding for a new project (ViBRANT <http://vbrant.eu>) which will extend the scope beyond taxonomy into the broader field of natural history. LifeWatch is collaborating with ViBRANT to use the core and extensions that are used by the Scratchpads and add modules to extend the scope towards the ecological community. Where modules do not exist, they will be written. Technically, modules are easy to write to achieve particular objectives, so they are an excellent prototyping tool.

3.3 Partnerships and networking services [SERV-19]

The success of LifeWatch will depend on the development of strong partnerships and user communities. Since the users of the infrastructure will come from a diverse range of research domains and other stakeholder groups, LifeWatch will need to develop flexible mechanisms for encouraging the development of partnerships and user groups and to enable it to respond to emerging opportunities.

3.3.1 Support for collaborative and social networks

The Service Centre will support partnership and networking in the scientific community by providing mechanisms for establishing formal user groups and for establishing temporary collaborative networks (TCNs) or social networking. It will offer the breeding environments in which single persons or organizations can join formal user groups, temporary collaborative networks or simple working groups. It will enable the development of compatible and interoperable sources of information and will facilitate the sharing of physical, human and technological resources. The service will structure the scientific community and will give it new opportunities for large-scale projects and data capture mechanisms.

Additional services will be offered through the organisation of:

- on-line conferencing;
- on-line temporary working groups;
- development of partnerships and associate schemes to expand the scope of LifeWatch; and
- develop and management of links to related initiatives in Europe.

Collaborative Networks

LifeWatch has ambitious aims for the development of communities of interest and collaborative networks. The vision is that in ten years, all organizations active in different biodiversity domains in

Europe will be part of some sustainable strategic networks, which will act as breeding environments for the formation of temporary collaborative networks aimed at performing specific tasks either at the level of geographical regions, countries or the entire continent².

This is based on the concepts of Temporary Collaborative Networks (TCNs) and their Breeding Environments (BTCNs). A BTCN is a “strategic” alliance of Biodiversity Organizations (BOs), and External Organizations (EOs), that adopt long term cooperation agreements and common operating principles and infrastructures. Their main goal is to encourage participation in goal-oriented collaboration with other TCNs. In general, BTCNs provide the following set of benefits to their members:

- a means of attracting large number of BOs and their related EOs together within the BTCN;
- increased and improved collaboration;
- stronger relationships and trust among BTCN members; and
- a means of supporting self-development and enhancement of BTCN members.

BTCNs will provide the possibility that the organizational setup of the LifeWatch collaboration infrastructure can be strengthened through an association of European BTCNs.

3.4 Training and capacity building

The LifeWatch Training and Capacity Building Programme (TCBP) described below is aimed at providing the research and other user communities with the skills and opportunities to make best use of the infrastructure. It will provide LifeWatch specific training to user communities enabling them to perform state-of-the-art research using LifeWatch services. The overall aim of the TCBP is to address the following:

- to facilitate access to scientific resources by developing the capacity of the end user community (e.g. to provide data or models) and familiarize user communities with the LifeWatch Services;
- to develop suitable eLearning techniques to further develop data services and their applications;
- develop a special competitive fellowship programme to stimulate and foster bright young researchers to explore original ways of performing research via the infrastructure’s facilities.

The TCBP includes both internal and external training activities. The internal training will be aimed at creating a common understanding of the technical problems related to the implementation of the LifeWatch services and the development of new capabilities. This form of training is mainly expected during the early stages of construction phase and will be facilitated via workshops and e-learning material. The external training will be targeted at the research community and other key user groups (including the wider public). It is aimed at spreading awareness about the technical capabilities of Lifewatch and providing the skills to use them.

Developing training packages for target communities with common interests can attract a wider end user community. This end user community may include industrial clusters which may result bringing in contributions from other researchers and research themes which had not originally identified in the project.

To deliver these training activities the TCBP will consist of four parts covering:

- an E- learning programme;
- a fellowship programme;
- central training activities; and
- distributed training activities (e.g. member state training).

² Virtual Collaborative networks supporting LifeWatch R&D infrastructure in biodiversity domain, UvA COLNET, D. 5.2.a

The first three elements represent the major cost elements for LifeWatch as these will be delivered entirely by LifeWatch. The final element (member state training) represents a minor cost element as it will remain primarily the responsibility of the Universities and Research Institutions at the member state level and funded by them with the endorsement of LifeWatch.

The organisation, coordination and management of the training and capacity building activities will require support activity at the Service Centre. This support will also be responsible for consulting user groups on training needs.

3.4.1 The [LifeWatch e-Learning programme](#) [SERV-23]

This programme concentrates on preparing and collecting LifeWatch training material in the form of multimedia contents (hypermedia such as hypertext, audio, video, etc.) and ensuring its long-term preservation and accessibility through World Wide Web. Material will be targeted at specific user groups (Table 1) and developed in partnership with existing training providers to provide:

- basic ICT training giving an introduction to the ICT technologies being used in the LifeWatch system;
- conceptual level training to explain the purpose of the LifeWatch services, applications and tools and why these would be useful to them;
- hands-on tutorials with step- by-step guides on how to use the system and utilise its different features;
- basic introductions to biodiversity and ecosystem science; and
- state-of-the-art examples of best practice to stimulate activities pushed by new scientific research and policy frontiers within the scope of the LifeWatch. The LifeWatch Fellowship programme will be targeted at producing many of these examples.

The above e-learning program could be delivered using a learning management platform such as DOKEOS open source. For quality control and relevance check, the selection of the material to be made available via eLearning platform would be done in consultation with the LifeWatch Scientific Committee and Product Management Board.

Examples of similar e-Learning facilities can be found at the following site on “Training in Biodiversity Information Management”, United Nations Environment Programme, World Conservation Monitoring Centre, http://www.unep-wcmc.org/capacity_building/is_train.htm and <http://www.ebi.ac.uk/training/index.html>.

3.4.2 [LifeWatch Challenge Fellowship programme](#) [SERV-24]

This element of the training and capacity building programme supports the LifeWatch community by providing fellowships in the form of sabbaticals and PhD scholarships. It will help early career and established scientists to engage in state-of-the-art research and development activities highlighted within the framework of LifeWatch.

The objective of the LifeWatch Challenge Fellowship programme is to enable the LifeWatch community to conduct research on current and emerging issues that can only be addressed through the LifeWatch development. This will not only result in state-of-the-art LifeWatch infrastructure but also help in the capacity building of institutions of different member states (such as pan European University Network) by, for example, enabling hosting of research fellows and/or conducting training courses.

Fellowships will be offered each year and categorised as follows:

- Post-docs or Sabbaticals for senior researchers;
- Sabbaticals for visiting researchers;
- Ph.D. studies for early-stage researchers;

- Fellowships for LifeWatch Conferences;
- Fellowships for LifeWatch Workshops; and
- Fellowships for LifeWatch Scientific Innovation (Summer/Winter) Schools

In the early stages of LifeWatch construction phase (i.e. the first product release), fellowships can be targeted at work supporting the technical development of the infrastructure. As the content of the infrastructure expands, the proportion of fellowships targeted at biodiversity and ecosystems research areas using LifeWatch capabilities will increase.

The fellowship programme will be organised in collaboration with various host academic and research organisations (e.g. research organisations, Pan-European Universities, etc).

A Scientific Committee will be established to oversee the LifeWatch fellowship procedures. The procedures will cover information about the type of access, eligibility of projects, budget calculations, application formats, selection process and admission protocols. The Scientific Committee will also be responsible for selecting research proposals through open international calls and may establish assessment groups to advise on specific thematic domains.

3.4.3 [LifeWatch Central Training Activities](#) [SERV-25]

This element will support more traditional methods by providing face to face training via, for example: i) summer schools - to provide LifeWatch infrastructure specific training courses with the objective to coordinate and manage LifeWatch training initiatives taken at the local level; ii) workshops - conducted on-demand in order to deliver specific/customised LifeWatch training courses; and iii) conferences - providing opportunity for the biodiversity and ICT communities to discuss state-of-the-art research frontiers.

This element enables the LifeWatch community to get familiar with the LifeWatch services and underpinning biodiversity research issues. The main level of delivery will be at local and national levels so that training is targeted at local needs. The service, if offered with a fee payment, could contribute to the sustainability of the Service Centre.

3.4.4 [Distributed Training Activities](#) [SERV-26]

Distributed training activities will be aimed at under- and post-graduate levels in universities across Europe to facilitate understanding of the biodiversity issues and encourage broader use of LifeWatch. Training will be delivered by local educational facilities using a curriculum or material that is developed in collaboration with the LifeWatch service Centre.

This approach will meet broad EU policy requirement aimed at educating European citizens, especially young graduates, about the use of e-infrastructures. According to e-Infrastructure Reflection Group (e-IRG): “... *investments in e-infrastructure education should be balanced to the investment that is going into e-infrastructure provision. This may be achieved by embedding e-Infrastructure education at undergraduate level, as well as developing curricula at postgraduate level to improve exploitation of e-Infrastructures ...*”³. Apart from direct training in the use of the e-infrastructure for biodiversity research, these LifeWatch training activities will serve a more general purpose by educating European citizens in the use of e-infrastructures. This will bring long-term strategic benefits to the EU because trainees will develop general problem solving techniques in the context of modern ICT and e-Infrastructure and become valuable for their employers.

To deliver these distributed training initiatives the LifeWatch Service Centre will:

- enter into partnerships with selected Member States training facilities offering franchise agreements whereby the university institutions can offer LifeWatch accredited training programmes, and thereby benefit from the LifeWatch brand and associated investments;

³ e-IRG White paper 2009

- engage with e-IRG (e-Infrastructure Reflection Group) and investigate and support the initiative for training and education in Pan-European Universities;
- identify suitable eLearning material, which could be included in courses at undergraduate and/or postgraduate training levels; and
- link training to opportunities for LifeWatch fellowships.

3.4.5 Partnerships for Training and Capacity Building

LifeWatch is a pan-European biodiversity infrastructure which has a fundamental role to integrate existing information facilities at the European level. The EU supports a number of pan-European training and mobility actions developed in partnership with existing university and research establishments throughout Europe. The training and capacity building programme will build on and support the further development of these existing training infrastructures. Gaps that exist in the existing training and capacity building provision will form the basis for discussion with EC and relevant training agencies regarding the provision of relevant training programmes. Dialogue will be established with these agencies on the future long term provision for biodiversity training and capacity building. According to this model it is anticipated that some training and capacity building elements will be developed and delivered by a LifeWatch central online training facilities.

The training and capacity building programme for Lifewatch at Member State (MS) level will be developed to be complementary to the EU level programmes. The development concept, however, will be defined by the focus on the MS rather than pan-European integrative requirements, and the need for delivery in a variety of different European languages, and in relation to MS biodiversity specifics. As with the European level, the MS level provision will build upon existing training facilities, including university and other training institutions. As with the European programme, LifeWatch will support the development of the MS training and capacity building according to a needs assessment. In contrast to the European level, training and capacity building at the MS level will be developed through partnerships with selected MS training facilities offering franchise agreements with university institutions so that they can offer LifeWatch accredited training programmes.

Partnerships for training may also be developed bottom-up using the social networking collaborative networking facilities. A case study adopting this approach is described in Box 3.

Box 3. Example of a User Platform to Support the Training Community

As a test of a bottom-up approach to developing “User Platforms”, a LifeWatch training and capacity building site has been developed using the development of Drupal based approach similar to Scratchpads described in Box 2.

The site provides an opportunity for stakeholders (training providers and users) from the education, research, policy making communities to contribute to the definition of the training and capacity building facilities of the future LifeWatch infrastructure.

The portal offers a means of electronic communication between those with a common interest in the development of training for Europe's biodiversity research and policy making communities. It also offers access to a social network of researchers and policymakers that will form the building blocks for the future users of LifeWatch.

On entering the portal there are opportunities:

- *for participation in discussion fora on different biodiversity related issues, based on self defining communities that link a wide range of experts to address the issues at hand;*
- *participation in specific groups and networking with peers; and*
- *linkage to other resources and associated infrastructures.*

LifeWatch will actively promote stakeholder engagement in the development of the training and capacity building programme via the site over the next year and provide feedback to all participating in the network and the development of this initiative.

The website is accessible through the link: <http://lifewatch.nhm.ac.uk/drupal/lifewatch/>

3.5 Co-ordination of distributed services [SERV-27]

The structure of LifeWatch (Figure 1) is based on central and common facilities as part of the legal entity (ERIC) working in collaboration with independently funded distributed LifeWatch centres. These distributed LifeWatch centres operate at national levels but are encouraged to provide “thematic” services with a broader European or international scope.

The LifeWatch Central Service is responsible for managing and co-ordinating the services provided by the distributed centres. The exact nature of this function will depend upon the number and diversity of the distributed centers, but the general functions will include:

- selection and agreement of standards of service provision;
- negotiations between LifeWatch and the distributed service centres;
- guide the rational distribution of services on a geographical or thematic scale;
- capacity building: help creating national facilities to fill gaps in servicing of user needs;
- internal coordination within the LifeWatch component e.g., technical construction, scientific network community engagement etc;
- help distributed service centres to become operative;
- manage central budget foreseen to finance distributed services;
- coordinate tasks among all distributed service centres;
- encourage cooperation and partnerships among distributed service centres; and
- co-ordination of training for providers of services.

3.5.1 Distributed Service Centres and Distributed Service Units

The distributed service centres will offer a variety of national, regional and/or thematic service facilities. Contributors will define the services to offer as part of the LifeWatch Infrastructure. Individuals or organisations willing to contribute to the LifeWatch infrastructure services will have to define: the type of the service; their motivation; the importance of the service to the LifeWatch user community; strategic value (its added value to the LifeWatch Infrastructure); financial conditions; duration (permanent or temporary); nature (i.e. technical, information); ownership; opportunities for networking and future developments in relation to potential integration with other providers of services and specify.

Distributed centres would be of two kinds:

- distributed service centres (DSC) providing general user support services; and
- distributed service units (DSU) providing specialised services covering a thematic area (e.g. a field of biodiversity research) or a LifeWatch related service area (e.g. training, IT development).

Most of these distributed centres will operate at national levels but some may be “thematic” with a broader geographical scope. National Service Centres may be incorporated within other functional units and may have limited resources. For example, in the model being developed for Sweden the initial priority is to develop the technical services (Box 4) and the service centre component is small.

Box 4. Example of a potential Swedish National LifeWatch Centre providing technical and support services.

Development of a Swedish LifeWatch infrastructure for integrated analysis of biodiversity data (2010-2014)

A consortium of the important providers and users of biodiversity data at Swedish universities, natural history museums and governmental agencies will develop a National Infrastructure for Biodiversity Data (NIBD), based on common standards, distributed databases, web services, and a focal LifeWatch Analysis Platform. At the Analysis Platform, all biodiversity data, as well as environmental explanatory variables will be accessible without transformations, and used to explore and analyse with R statistics, tools for spatial and temporal analyses, and modelling tools for prediction. Here, the researcher can also upload their own data and maps and take advantage of the tools as well as data from other sources. A link will also be developed to an interface for the next generation of the Swedish Species Gateway. The LifeWatch Analyses Portal will give opportunities to explore issues never reachable before, e.g. by easily combining data from several primary databases, life history parameters (enabling specific selections), with environmental data, applied to advanced analytical tools.

The proposed infrastructure will be based on systems architecture standardization, enabling access to all relevant scientific domains, including all major Swedish data providers from biodiversity and climate archives, observatories, as well as international databases. In this environment, data sets and analytical tools can be accessed and assembled by users into workflows to perform complex scientific experiments. Elaborate and data-intense assessments will include bioclimatic models of the geographical distribution of individual species, identification of high-priority conservation zones, estimation of biodiversity richness, predictions for invading species and disease vector migration.

The Analyses Platform will provide a number of user-friendly services for advanced assessments and predictions by researchers, but can also be used by governmental bodies and other stakeholders.

The different location of DSC/DSU in different EU Member States offers a series of advantages such as a more direct contact with the territory, which in turn provides for more opportunities to take into account different realities and needs. It will also facilitate the identification of the main target of the service and therefore more focused awareness raising and publicity initiatives. Collection of data and monitoring activities will also be facilitated. These will in turn increase the opportunities of financing of LifeWatch activities by Member States.

Distributed service centres: geographic distribution

The distributed service centres should focus on user support services. The typical services will be: a help desk on national/regional issues, public relations and communication, support in funding opportunities at national/regional/European level (see above). Each DSC can decide to provide additional services following users' requests.

Distributed Service Units: thematic differentiation

The Decentralised Service Units focus on specific fields of biodiversity research or on a specific LifeWatch service area. The subdivision of DSU in different fields of research or service should provide continuous updating of thematic services, guarantee the availability of LifeWatch focal point for thematic initiatives, for fellowship and partnership programs and, whenever possible, for advanced laboratories for experienced users.

3.6 Strategic development of LifeWatch Services

The Service Centre will monitor significant changes in IT, informatics, science policy and socio-economic conditions in order to promote robust services to meet any new requirements.

3.6.1 Short-term: assessments of performance, emerging trends and user feedback [SERV-20]

This activity will be responsible for evaluation of performance, based on international standards (multi-part standard ISO 9241) and national laws. It will involve:

- development and monitoring of infrastructure use and performance;
- user feedback on services;
- assessing stakeholder needs by gathering requirements from user communities;
- enabling people with disabilities to use LifeWatch; and
- enabling people from different cultures to use LifeWatch by supporting the use of different languages

3.6.2 Long-term: horizon scanning and scenario testing

LifeWatch must be resilient to future changes and capable of adapting to meet emerging and new requirements. The expected lifespan for the LW infrastructure is 30 years. During this time we expect to see many changes in science, technology, policy and society and LifeWatch must be able to evolve and adapt accordingly.

Horizon scanning and scenario testing techniques will be used routinely to ensure that LifeWatch and the Services it provides remain fit for purpose.

3.7 Management, co-ordination and contracts [SERV-29]

The Service Centre will be managed by a team responsible for: the management and co-ordination of central Service Centre staff and their activities; legal support; public relations and communications; and business development and marketing. A key function of the management team will be to maintain links with the LifeWatch executive office that will have overall responsibility for co-ordinating all LifeWatch activities. It is possible that the LifeWatch Service Centre and the Central Executives and

Administration will be co-located but this has not yet been decided and is likely to depend on funding arrangements.

3.7.1 Back Office Tasks

The back office will be responsible for the practical management of the Service Centre and its staff, liaison with the front office and distributed service centres, and the coordination of inputs from distributed Service Centres. The office will plan and manage periodic meetings with the representatives from distributed Service Centres. It will be also in charge of the general administration of all central and distributed offices and of checking the efficiency of offices' activities. The office will be responsible, among others, for the following tasks: office management and coordination; periodic results assessment; risk management; quality management; records management; asset management; equipment maintenance; liaison with hosts; and contract management.

3.7.2 Legal support [SERV-31]

The Service Centre will furnish support for contract negotiations, legal support for (commercial) contracts, participation in project proposals and in tenders, legal management of the distributed LifeWatch Centres and for all legal issues both at central and distributed levels. Among its main tasks will be support for legal aspects of data acquisition and data sharing and the use of tools and models (copyright, licences etc). It will provide data providers/users with a competent legal interface. Examples of similar services can be found at:

<http://www.nbn.org.uk/Guidebooks/Data/Managing-permissions.aspx>
<http://data.gbif.org/tutorial/datasharingagreement>

3.7.3 Public relations and communication [SERV-32]

The public relations and communications team is responsible for developing, updating and implementing the LifeWatch external communication strategy. The public relations activity is aimed at informing and attracting users to the LifeWatch research infrastructure and its related activities and acts as the first interface between users looking for support services and the LifeWatch research infrastructure.

The communication strategy (Sier, 2009) outlines a strategy for the communication and general marketing of the LifeWatch “brand”. It identifies communication objectives, target audiences, key messages and potential communication channels. Four high-level communication objectives are identified. They can be summarised as:

- raise awareness of LifeWatch services and resources;
- encourage potential users to become actual users;
- enable LifeWatch, managers and providers to learn from users and improve the provision of services and resources; and
- ensure the growth of the LifeWatch support base.

A range of key messages has to be addressed in construction, targeted towards the priority audiences outlined in Table 1. During the early years of LifeWatch, the priority audiences are:

- providers of LifeWatch ‘products’;
- funders and supporters;
- research users;
- education sector users (teachers and students);
- policy users; and
- commercial sector users.

The merits of different communication channels available to LifeWatch, either directly or in collaboration with external parties, will be considered in terms of their effectiveness at reaching the target audience groups.

Communication activities are evaluated at all stages of the 'plan-do-review' cycle.

3.7.4 Business development and marketing unit [SERV-34]

The business development unit ensures that the value of the LifeWatch infrastructure is understood at national and European levels and develops opportunities and programmes that could fund LifeWatch research and development activities. To do this it will:

- develop a business oriented marketing plan covering issues such as market analysis, product or service identification, branding and product/service promotion, giving full consideration to the wide range of stakeholders with differing needs;
- ensure the growth of the LifeWatch support base (e.g. funders, data and service providers) by demonstrating its added value at national and European levels;
- establish a good reputation for providing high quality products and services;
- put LifeWatch in a strong position in terms of attracting on-going support and funding and undertake fund-raising activities for the LifeWatch infrastructure; and
- develop direct marketing opportunities for products and services provided by Lifewatch (e.g. training services).

4. CONSTRUCTION PLAN AND RESOURCE REQUIREMENTS

4.1 Initiating construction

The first foreseen service activities will be managed through the early establishment of the LifeWatch Service Centre Management Team (see 3.7 above). Its initial tasks will be:

- (i) to plan and implement the delivery of the Service Centre functions based on user requirements and the capability of the LW infrastructure ; and
- (ii) to promote the development and co-ordinate the activities of Distributed Service Centres and Distributed Service Units.

An early task of SC management team will be to establish working relations with distributed components (see Section 3.5.1). This will involve identifying organisations willing to contribute to the LifeWatch Infrastructure and defining: the scope of the service, its strategic value (added value to LifeWatch Infrastructure) and its financial support mechanism.

The Helpdesk should be one main priorities for early construction because of its crucial role in communicating with users and collating information on the needs of the user community,

An outline construction plan and costings for the Service Centre is now available. The total costs over 6 years from 2011 to 2016 is estimated at about 48,000,000 euros (Table 2) of which about 50% will be for “in-kind” contributions for distributed Service Centres or training components.

4.2 Risks and Risk Management

There are a number of general risks associated with the establishment and management of the Service Centre. Early risks during establishment include:

- i) recruitment of suitably qualified and experienced staff;
- ii) over or under-estimation of user needs and demands on Service Centre;
- iii) lack of understanding of stakeholder and user needs;
- iv) lack of co-ordination with other parts of the infrastructure;
- v) communication – inadequate explanation of LifeWatch capability;
- vi) lack of co-ordination between the development of central and distributed service functions;
- vii) unnecessary duplication of services already provided elsewhere;
- viii) lack of interest in Universities in developing training opportunities;
- ix) failure to engage with the research community; and
- x) failure to engage with the data providing community.

Operational risks include:

- i) inadequate help facilities;
- ii) lack of quantity and quality of data and other tools to meet user needs;
- iii) technical failure of LifeWatch infrastructure: tools for data discovery, access and modelling do not meet user needs or expectations;
- iv) system too complex for most user needs;
- v) failure to keep pace with technical developments;
- vi) failure to keep pace with scientific or policy needs;
- vii) slow response times in response to user enquiries;
- viii) user difficulties in finding information;
- ix) training that doesn't meet user needs;
- x) inadequate issue and enquiry tracking procedures;
- xi) lack of expert support; and .
- xv) lack of funds.

Mitigation strategies have already been identified for most of these risks as part of the construction plan and a full risk management process will be implemented to ensure ongoing management of these and other emerging risks.

Table 2. Summary of Service Centre Construction and Operational Costs over 6 years (2011-2016).

SERVICE CENTRE COMPONENTS	COST OVER 6 YEARS
SERVICE CENTRE MANAGEMENT	
Staff Management	1.642.000
Legal office	521.000
Public Relations	902.000
Business and marketing	682.000
FRONT OFFICE	
Multimedia	1.539.000
Helpdesk	3.042.000
Expert consultation	3.586.000
Funding opportunities office	2.089.000
STRATEGIC DEVELOPMENT	
Performance and feedback	761.000
.....Research Themes	324.240
USER PLATFORM	
User platform	1.269.000
CO-ORDINATION OF DISTRIBUTED SERVICES	
Management of relationship between central and distributed services	15.883.333
PARTNERSHIPS	900.000
TRAINING and CAPACITY BUILDING PROGRAMME	
e-Learning Programme	965.200
Fellowship Programme	10.369.200
Training activities	1.212.000
Distributed training activities	1.890.000
TOTAL COSTS OVER 6 YEARS	47.576.973