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1 INTRODUCTION

D7.1 is the first deliverable of the WP7 “Testing and User Evaluation” of the ATLAS project.

The ATLAS project aims to unify and integrate mechanisms for automatic annotation of important words, phrases and names, text summarization and categorization and computer-aided translation in a process of manipulating heterogeneous multilingual content in a common software platform and as a result to deliver three software-as-a-service solutions, which offer all the tools individuals and organizations need to manage their multilingual content.

The first solution, **i-Publisher**, adds a visualization layer to ATLAS and provides a powerful web-based instrument for creating, running and managing small and enterprise content-driven web sites.

i-Publisher will be freely available as an online service and will also be used by the consortium to build two thematic content-driven web sites – i-Librarian and EU DocLib. **i-Librarian** allows its users to store, organize and publish their personal works, to locate similar documents in different languages, and to easily obtain the most essential texts from large collections of unfamiliar documents. **EU DocLib** is a publicly accessible repository of EU documents, which provides enhanced navigation and easier access to relevant documents in the user preferred language.

The deliverable D7.1 “User evaluation plan” contains details about:

- the design of the user evaluation activity on the envisaged software solutions;
- the methodology, the necessary tools and the plan to conduct the user evaluation exercise;
- the Multilingual e-Content and e-Library Living Lab platform, its involvement and contribution to the project with the focus being on the evaluation related activities and tools.

The main objective of the deliverable is to define the User Evaluation Plan of the ATLAS project and as a result to assess the level of fulfillment of the user expectations.

Specific objectives include:

- Definition of the evaluation scope: what are we going to evaluate, what is the scope with respect to geographical distribution, what are the scenario to be trialled, etc.
- Organisation of the user involvement: what are the expected user types, methodology and timing of their involvement, local user groups and Living Labs involvement, etc.
- Description of the overall methodology to be followed: how the activities will be organised and conducted, what will be the methodological approach to the different evaluation challenges, processing of results, etc.
- Design of the statistical framework for collecting and analysing the user feedback: what will be the statistical indicators, what statistical measures will be used, the relevant thresholds, etc.
- Description of the use-case scenarios: which scenarios are relevant for our target user types, the objectives per scenario and the relevant system features under evaluation, etc.

- Setting up the detailed user evaluation timeplan: how many rounds should we deploy, what will be the timing of each round, round-specific evaluation scope, etc.
- Presenting the user evaluation instruments: what are the questions to be asked, the contents of the questionnaire, how can we maximise user access potential, etc.
- Description of the Multilingual e-Content and e-Library Living Lab – its mission, objectives and sequence of maturity phases, host institutions, infrastructure, partners, methodology, expected results, contribution in the project evaluation activities, etc.

The document contains seven main chapters:

Chapter 1, provides an overview of the “object to be evaluated” and presents the scope and objectives of the report.

Chapter 2, gives describes the methodological aspects of the user evaluation, including the methodology to be followed, the identified user group types, the means for significant interactive user involvement (Focus Groups and Living Labs) and the scheduling and organisation of the evaluation exercise.

Chapter 3, defines the various types of indicators (i.e. general, usability, satisfaction, task fulfilment) and the association between indicators and user group types.

Chapter 4, identifies the trials to be executed, along with the “precompiled” scenarios meant to drive trials per type of user.

Chapter 5, presents the environment that will become available for the users in order to access online the ATLAS evaluation instruments (i.e. interactive questionnaires specific to the user type).

Chapter 6, describes the establishment of a Multilingual e-Content and e-Library Living Lab (MLeCeL) and its contribution to the ATLAS evaluation.

Chapter 7, REFERENCES, presents sources of reference and the URL of the online user evaluation questionnaire.

Annex1, presents the Living Lab model, the unified and shared reference model and sequence of maturity phases for establishment of Living Labs, the role of Living Labs in Europe, etc.

Annex2, presents the MLeCeL LL Host Institutions, the establishment phases, the infrastructure, the web site and the proposed set of tools and services.

Used abbreviations

CMS	Content management system
UTS	User test scenario
UG	User group
PM	Project month
CWE	Collaborative Working Environment
UAI	User Acceptance Indicator
MT	Machine translation
URL	Uniform Resource Locator
ICT	Information and Communication Technologies
UER	User Evaluation Round
LL	LivingLab(oratory)
MLeCeL	Multilingual e-Content and e-Library Living Lab
FG	Focus group

2 METHODOLOGY

2.1 Overview of the user acceptance methodology

The ATLAS user acceptance evaluation determines the satisfaction the users will gain from their experience with the ATLAS online system. The criteria to be used for the measurement of the ATLAS user acceptance will include:

- the system’s usability which reflects the degree of the system being user-friendly and unambiguous;
- the clarity and completeness of the system results;
- the quality of the presentation of final results and the level of user satisfaction;
- the level of accomplishment of certain tasks performed by the user in the context of given exercises.

These criteria are embedded in a number of user acceptance indicators to evaluate the non functional parameters of the ATLAS system, such as:

- the system’s user friendliness and response clarity;
- the system’s ease of use;
- the system’s impact on certain user activities;
- the adequacy and completeness of the services and information provided by the system;
- the degree of user satisfaction from the use of the ATLAS system;
- the degree of fulfilment of common tasks using the ATLAS system.

The indicators are grouped into four main indicator categories:

1. Usability indicators
2. Qualitative (general) indicators
3. Satisfaction indicators
4. Task fulfilment indicators.

For measuring the indicators we plan to follow a positive style, meaning that the higher the value of the measurement, the better the user appreciation. We will use the 5-point Likert scale to assess the responses:

Grade	Degree / level of performance
5	Very High
4	High
3	Neither High Nor Low
2	Low
1	Very Low

Each user acceptance indicator will be converted to one question (plus placeholders in each question for user remarks in case of low appreciation) in order to form a user acceptance questionnaire. The questionnaire will be accessible online, through the ATLAS WEB Site, and will be used as the main tool to gather user feedback.

The consortium will set up a local Focus Group with members coming from different disciplines, market sectors, age groups, etc in the partner's countries. The focus group will ensure broader coverage of the main target user groups of the ATLAS system.

In addition, the Consortium has established a pilot Living Lab as an **environment which brings together all stakeholders** (such as end-users, researchers, developers, service providers, policy makers, and so on) **of an open innovation process aiming to create and validate digital products and services in real life settings**. The pilot Living Lab (LL) in “Multilingual e-Content and e-Library” was established in Sofia after the start of the ATLAS project. A large number of prospective ATLAS end-users will be involved, together with other ATLAS stakeholders, in a process of iterative co-creation, evaluation and refinement of the ATLAS platform and the online services i-Publisher and i-Librarian in a real life setting. Professional designers, editors, content providers will conduct experiments testing the most advanced functionalities and innovative approaches of i-Publisher, i-Librarian, EUDocLib, providing broader impression about the system’s user acceptance and its perspectives of success. The established living lab will be used as a model for establishing, in the future, such labs in the ATLAS partner countries; and will contribute to the **sustainability** of the ATLAS project outcomes, e.g. it will be further employed for **developing other products/services of the kind** (refer to Chapter 6).

The members of the Living Lab, along with the national focus groups members, will be our main assessors; we will record user responses and reactions; we’ll consequently depict the corresponding values to the associated user acceptance indicators; calculate the final measurement per indicator; and consolidate and analyse the findings.

In more detail, the evaluation of the user acceptance will be based on the collection, process and analysis of the individual assessments of a number of users through four evaluation rounds (their detailed description follows in section 2.5).

The evaluation rounds planned are:

- **First round:** a small set of the focus group members (along with ATLAS project members) will evaluate initial set of functionalities of i-Librarian, i -Publisher and EUDocLib in English.
- **Second round:** evaluation of i-Librarian, i-Publisher and EUDocLib first production versions in English.
- **Third round:** evaluation of i-Librarian, EUDocLib and i-Publisher versions with the additional part of planned functionality available in all project languages.
- **Fourth round:** evaluation of the final version of the public services and the ATLAS software with all planned functionalities available in all partner languages.

Four User Test Scenarios and a LivingLab specific Test Scenario will be trialled during these evaluation rounds / phases in order to get targeted, relevant and mostly valued feedback covering the main ATLAS user group types (we target mainly 5 user group types; detailed description is provided in section 2.2):

- **User Test Scenario 1 (Reader):** i-Librarian service will be used by non-profitable organisations personnel and academic staff in order to evaluate the interface usability and the users' reaction to the language features provided by the service; as well as extended features such as storing and processing collection of documents, retrieval and review of extracted textual details such as important phrases, named entities, translation of textual details in the supported languages.

- **User Test Scenario 2 (User):** i-Publisher service will be tested by non-professionals while customising a ready-to-use website. The users will customize a template web site and will fill in multilingual content.
- **User Test Scenario 3 (Creator):** general users with moderate web experience will use the i-Publisher service in order to evaluate the easiness, simplicity and convenience of website creation and publishing, as well as the users' reaction to the provided features and the work-flow of the different actions. The users will create a web site following simple wizards
- **User Test Scenario 4 (Content provider):** where professionals, working with on-line content, editors in news and media agencies, publishers, lawyers, web designers will work on i-Publisher in order to evaluate the features and flexibility of the i-Publisher interface that enable the content editors to work (create, update, search, compare) with digital content.
- **LL Test Scenario (Professional users):** professionals such as information designers, web studio members, and web designers from the Living Lab will test the i-Librarian, but they will mainly focus on the advanced functionalities of the i-Publisher service so as to evaluate the available features and flexibility of the i-Publisher interface for creating and customizing a rich content-driven web site. The experiments will be trialled from M18 to M36.

Each scenario will be complemented by an exercise. The exercise will request the user to accomplish various tasks, each consisting of one or more steps. Some tasks/steps will be mandatory, other will be optional. We will associate various scenario and task fulfilment characteristics with assessment indicators.

The users will have the possibility to access an online questionnaire available through the project's website (www.atlasproject.eu) in all four rounds of the evaluation process. The user feedback will be stored in a database and the contents will be exported into an Excel processing framework at the end of each evaluation round. In addition, we'll store in the database (through automatic system logging) and we'll analyse data (e.g. time to accomplish a task, number of tasks / steps successfully completed per scenario / exercise, failures, etc.) related to the execution of user exercises.

Each question in the questionnaire refers to an indicator. For the measurement of each indicator a 5-point scale will be used. Value “1” represents the estimation “very low” (depending on the content of each question), value “3” represents a qualitative assessment of “moderate-neither high nor low”, while value “5” represents a qualitative assessment of “very high”. The values “2” and “4” represent intermediate qualitative assessments. In all cases, a value of above “3” will denote a “pass” for the indicator.

We will use tools of descriptive statistics to analyse the questionnaires and the appreciation of the indicators values. Moreover, for every single indicator/question, a spectrum chart will be created, based on the values assigned by the users. This chart will show us the overall picture of user's response per question and reveal any polarisation situations (e.g. 66% of users selected a value of “3”, while none selected the value of “0”). Furthermore, for every indicator/question the following values will be calculated:

- Mean value (μ) of all scores of a specific indicator. This value shows the average scores of the assessments of users for each feature/indicator of the system.

- Mode value (τ) of all scores of an indicator. Mode value illustrates the assessment of users that appears most frequently in all the estimates for the respondent indicator.
- Median value (m) which shows the value that is in the middle of the distribution of total scores for each evaluated characteristic of the system.

The calculation of these 3 statistical measures and the spectrum chart will allow the definition of the central tendency and the identification of any polarisation situations with respect to users' estimation for every feature/indicator of the ATLAS system.

2.2 Target user types

Overview of the services to be evaluated

i-Publisher

The online service i-Publisher is a novel software-as-a-service solution for web content management, which allows both small and large organizations to build, deploy and manage multilingual web sites without spending time and effort to install and maintain a content management system. This service assists organizations in retrieving, unifying, and packaging heterogeneous pieces of content, and dynamically rendering them on multiple web sites. i-Publisher fosters collaboration in content creation by enabling authors, editors, and other contributors to work together.

Furthermore, the service allows web sites to be built with a point-and-click user interface by people with different expertise but no programming experience – publishers, information designers and graphic designers. Finally, web site builders may include in a newly created web site any functionality that is supported by the ATLAS platform – user management and registration, complex content work flows, versioning, authoring, publishing, and last but not least – automatic categorization, summarization, annotation, and translation of textual content.

The i-Publisher service is mainly targeted at small enterprises and non-profit organizations. Therefore, it addresses several specific requirements. The most important of these is the ability to build via a point-and-click user interface content-driven web sites, which provide a wide set of predefined functionalities and whose textual content is automatically processed, i.e. categorized, summarized, annotated, etc. With i-Publisher, publishers, information designers and graphic designers can easily collaborate. In a similar fashion, the service saves authors, editors and other contributors valuable time by automatically processing textual data and allows them to work together to produce high-quality content.

i-Librarian

i-Librarian is a thematic web site (online service), which encourages visitors to register and get a personal workspace where they can store, share and publish various types of documents and have them automatically categorized into appropriate subject categories, summarized and annotated with important words, phrases and names.

The i-Librarian web site addresses the needs of authors, students, young researchers and readers. Although most of the requirements set forth by these target groups are general, such as the ability to easily create, organize and publish various types of documents, there are also

specific requirements. These include the ability to find similar documents in different languages, to share personal works with other people, and to locate the most essential texts from large collections of unfamiliar documents.

EUDocLib

EUDocLib is a publicly accessible repository of EU law documents from the EUR-LEX collection. This web site (online service) provides enhanced navigation and easier access to relevant documents in the user's language.

EUDocLib addresses the needs of people who require easier access to EU documents in their own language. Users of this web site can easily find similar documents, read the summaries of desired documents, or read extracted important phrases and words.

Target user groups description

Target User Groups

Target user group UG1

Evaluated service: i-Librarian

The first target user group (**UG1**) consists of students and scholars. We expect them to be one of the major user groups of the i-Librarian service because:

- young people are already accustomed to work with digital content. Moreover, they need access to many textual sources during their studies in order to compare them or to find important parts of text. In addition, they need resources translated in their own language;
- they will be particularly interested to have their personal library, within i-Librarian, accessible from everywhere and with whatever device for web access they have;
- extra features of the service such as textual extracts, suggestions for similar documents, automatic summary and translation of documents, as well as the indexing and full text search will support them to work efficiently.

We expect the first user group to evaluate and estimate the following features of i-Librarian public service:

- process of signing-up and signing-in to the service
- attractiveness and convenience of the i-Librarian user interface
- ability to create or upload, store, update and organize textual contents such as documents, learning materials, publications, e-books, (scientific) publications and articles
- ability to read documents and e-Books directly in-line the web browser
- ability to apply machine translation of words, texts or parts of the documents in their own language
- access content from a variety of web devices

Target user group UG2

Evaluated service: i-Librarian

The second target user group (**UG2**) consists of authors, young scientists and researchers. These users need to review large amounts of textual data coming in many languages. i-Librarian service will support them to:

- add and organize various types of documents, e-books or other sources of textual content such as list of URLs (search results) in an easy and efficient way
- upload and process several documents in various file formats at one go
- read the documents within the browser interface, regardless of their format
- share the translated in all EU languages extracts and summaries of their papers, articles and documents with the other users of the i-Librarian service.

Target user group UG3

Evaluated service: i-Librarian, i-Publisher

The third target user group (**UG3**) consists of general Internet users with moderate web experience. It will represent the biggest target group of the project services. The users will use:

- i-Publisher free public service to create their personal web site.
- i-Librarian web service for building their own digital library on-line

The focus of their evaluation will be the “Simple mode” interface of i-Publisher that will support them in defining their web site with a “point and click” approach. They will use i-Publisher to:

- create a simple web site consisting of a few pages, navigation, texts and images
- add and update textual and media content on the pages
- publish the newly created web site

This group will evaluate the process of building and using a personal library within i-Librarian. The users will test the clustering functionality, together with the automatic summarization and machine translation of the summaries and textual extracts.

Target user group UG4

Evaluated service: i-Publisher

The fourth target user group (**UG4**) consists of professionals such as Information designers, web studio members, web designers and it will evaluate the i-Publisher extended public service for creating and working with complex content-driven web sites. They will use i-Publisher to:

- create custom layout, templates and navigations for website pages
- define a content model for the web site – create different content types with various properties such as title, description, file attachment, image, define relations between content types
- define how to display the content items
- to configure and enable the advanced i-Publisher features such as multilingual full-text search, textual extracts, automatic classification of content items, summarisation, machine translation in the available languages

The added value of their feedback is their previous experience with similar tools and systems.

Target user group UG5

Evaluated service: i-Publisher

The fifth target user group (**UG5**) consists of professionals working with digital content – editors in news and media agencies, publishing houses, lawyers, etc. They will evaluate mainly the management of the multilingual content:

- users with different access rights will work on various content items . They will add, view, update, delete a content item, implement work-flows, approve content, etc.
- users will use the NLP features such as categorization, textual extracts, summarisation and machine translation of texts
- users will use the versioning system for content items

EUDocLib addresses the needs of people who require easier access to EU documents in their own language. The users of this web site can easily find similar documents, read the summaries of the documents or their machine translation if the document is in non native for the user language or read extracted important phrases and words.

2.3 Establishment of a project Focus Group

The efficient and effective involvement of users is a priority in the organisation and implementation of the project evaluation activities. The consortium has set up local Focus Groups (FG) from all countries represented in the project, namely, Bulgaria, Greece, Romania, Poland, Croatia and Germany. The number of FG members will be limited in the first year of the project, but it will rise as the project evolves (i.e. during the 2nd and 3rd project years).

The idea is to keep the FG members active and stimulate their interest in the project throughout the project life-cycle. Main points of their involvement include:

- Provision of feedback on the project idea, scope and objectives.
- Participation in local FG sessions or other local project-related events (e.g. workshop, promotion event).
- Assessment of the project services (i.e. participation in the various rounds of user acceptance evaluation).
- Multipliers / forwarders of promotion material (e.g. newsletters, brochure, etc.).

As of June 2011, we have established 6 local FGs with 70 members in total. Details per country, user type and age range are provided in the following table:

	User type categories					Age ranges			Total
	User type 1	User type 2	User type 3	User type 4	User type 5	<25	26-45	45<	
Greece		4	4		2		7	3	10
Bulgaria	8	11	4	3	2	6	12	10	28
Poland	2	4	3			3	4	2	9
Romania	8					8			8
Germany	2	3		1	1	2	3	2	7
Croatia	2	3	1	2		3	5		8
Total:	22	25	12	6	5	22	31	17	70

NOTATION: “User type” may be one of the following:

1. student

2. staff from a non-profitable organization (librarian, scientist, researcher, academic)
3. digital content expert, staff from media agency / publishing house, lawyer, consultant
4. web publisher / designer
5. other – to be specified

The goal will be to enlarge the local FG per country, up to a minimum number of 20 per local group, i.e. minimum 120 members in total.

2.4 Involvement of Living Labs

In parallel of the User Evaluation activities targeting UG1-UG5 of ATLAS, a pilot sectoral LL in “*Multilingual e-Content and e-Library*” (MLeCeL, <http://livinglab.itd-bg.eu>) will be established in Sofia. As it is important to match the services with targeted user needs and interests in order to ensure the usability of the product and its market validation, we will engage key actors in the design, implementation and evaluation process phases of the development.

The **core partners** in the MLeCeL LL will be:

- Tetracom IS Ltd – **Coordinator of ATLAS**
- Institute of Technology and Development (ITD) – member of ATLAS Project consortium and VirtSOI Living Lab, Coordinator of the MLeCeL LL;
- Institute for Bulgarian Language (IBL), Bulgarian Academy of Sciences, member of ATLAS Project consortium;
- Virtual Services and Open Innovation LL (VirtSOI) – a **Living Labs Competence Centre**, Member of ENOLL;

The two host institutions involved in the Living Lab phases are:

- State University of Library Studies and Information Technologies (SULSIT) Bulgaria (<http://www.unibit.bg/>); SULSIT will **host the ATLAS services pilot based on the Living Labs approach**.
- University Computing Centre (UCC), Sofia University (<http://www.uni-sofia.bg/>); UCC will **host the ATLAS services pilot based on the Living Labs approach**.

In addition, the MLeCeL LL will gradually involve **other prospective local partners**, who are **stakeholders** in the process of development of multilingual user-centric services in the area of Multilingual e-Content and e-Library, such as:

- Research and Development Department, Sofia University (<http://nis-su.uni-sofia.bg/>);
- Digital Spaces Living Lab (DS LL) (www.digitalspaces.info)
- Bulgarian Virtual University (<http://www.bvu-bg.eu/>)
- Institute of Mathematics and Informatics, Bulgarian Academy of Sciences (<http://www.math.bas.bg/>);
- Association of University Libraries (http://aub-bg.org/index_en.html);
- Bulgarian ICT Cluster (<http://www.ictcluster.bg/en/>);
- Ciela Publishing Company (<http://www.ciela.bg/>);

The MLeCeL LL will be open for all stakeholders in the multilingual e-content and e-library products and services area – users, developers, researchers, service providers, policy makers,

etc. It will target also organizations (SMEs, NGOs, universities) which use multilingual e-content and e-library solutions; and will closely cooperate with the European Network of Living Labs – ENoLL (<http://www.openlivinglabs.eu/>) – ITD participates in the VirtSOI Living Lab which is member of the ENoLL.

This open character of the MLeCeL LL will bring a lot of additional opportunities for user evaluation, including peer-reviews, sharing experience and complementary open source solutions, etc. The LL will support the establishment of different communities, such as: communities based on the different ATLAS UGs (UG1-UG5), the ATLAS open source community, content users, researchers, learners, companies, universities.

The MLeCeL LL will contribute to the project evaluation with activities in different phases:

- **Analysis and design phases:** the teams of ITD and Tetracom have contacted potential user groups in order to gather user requirements for i-Publisher and i-Librarian and involve them as “co-designers and co-creators”. As a result, some new user requirements were identified, such as: "Contact form" widget, "Photogallery grid widget", "Login" widget. The process of analysis of user requirements, the user evaluation of ATLAS solutions and the involvement of users as co-designers and co-creators will continue in a spiral way during the whole life cycle of the ATLAS solutions.
- **Multilingual content management:** evaluation of content management advanced functionality of i-Publisher based on a multilingual web site and a real life setting at the University of Library Studies and IT, Sofia.
- **Linguistic framework:** evaluation of the higher-level NLP tools of Atlas such as Categorisation, Summarisation, Machine Translation, as well as linguistic applications as “Similar items”, “Important phrases ” etc. The evaluation will be based on the Open Repository supported by the University Computing Centre at Sofia University and a real life setting at the university.
- **Living Lab Platform:** since the Living Lab will be open for users, designers and developers of other multilingual e-content and e-library products and services, some additional opportunities of peer-reviews, sharing experience, ideas and complementary open source solutions will be exploited.

Users in the MLeCeL LL will conduct experiments following a complex user scenario (refer to LL related scenario in section 4.2) as well as while working on the specific lab projects. The LL feedback will be channelled through:

- User interviews and user suggestions;
- Idea generation workshops with lead-users and experts;
- Online suggestion box (ongoing moderation and summarization);
- Workshops with users and / or researchers;
- Prototype testing;
- Feedback from real settings service deployment (at SULTSIT and Sofia University);
- Possible collaboration with the Usability Lab of the Fatih University¹ to get feedback on a controlled assessment of user acceptance (feasible only if collaboration conditions are met);
- Education and training sessions at university level and training workshops with developers;

¹ <http://ie.fatih.edu.tr/?labs,37&language=EN>

- Ongoing support of ATLAS communities and summing up of their feedback;

The information and data gathered will be published on the web site of the LL (refer to Chapter 6 and Annex2). The partners will use the gained user experience and will adapt the system accordingly.

Finally, the ATLAS solutions will be used and evaluated by a wide community of end users in real settings provided by the ATLAS pilot host institutions, e.g. while:

- producing a multilingual web site of State University of Library Studies and Information Technologies, Sofia, and
- integrating and using the ATLAS Linguistic platform in the Open Research Repository supported by the University Computing Centre (UCC), Sofia University.

More on Living Labs in ATLAS, in Chapter 6.

2.5 Schedule of the user acceptance evaluation

User feedback will be collected during four evaluation rounds:

First round

Preparation to go online: ATLAS project members and a small set of users from the project focus group will evaluate an initial set of functionalities of i-Librarian, EUDocLib and i-Publisher in English.

Second round

Pilots: Several workflows will be added to i-Publisher after the first launch of the system in PM 12. The second round will test the implementation of the feedback from the first round together with the new functionalities. The user feedback will be collected via questionnaires accessible online and will be used for further improvement of the services.

Third round

Larger Scale Trials, extra functionality: Users from all target user groups will be encouraged to test the adapted and localized interfaces on all project languages and to evaluate the language-aided features of the i-Librarian and i-Publisher services on all project languages.

Fourth round

Testing and evaluation of production versions of the services: Users from all target user groups will be encouraged to test the machine translation functionalities together with the multilingual search as well as the overall testing of the i-Librarian and i-Publisher services in all project languages.

Living Lab

Testing and evaluation of the advanced functionalities of i-Publisher: Users from all target user groups will be encouraged to test the full workflow (LL Test Scenario) for creating a web site that uses the linguistic framework – multilingual web management, automatic categorisation, annotations and summarisation, machine translation functionalities together with the multilingual search. In addition, members will perform overall testing of the i-Librarian and i-Publisher services in Bulgarian and English. At a further stage the members of the ATLAS communities will be invited to join this exercise.

The Table following provides the time-plan for the User Evaluation Rounds of Atlas services:

	User groups	Evaluated Service	User test scenarios	Timing
First round	Consortium members and limited FG participation	i-Librarian EUDocLib i-Publisher	Test 1, Test 4	M11
Second round	UG1, UG2, UG3, UG4, UG5	i-Librarian i-Publisher	Test 1, Test 2, Test 3, Test 4	M18
Third round	UG1, UG2, UG3, UG4, UG5	i-Librarian EUDocLib i-Publisher	Test 1, Test 2, Test 3, Test 4	M24
Fourth round	UG1, UG2, UG3, UG4, UG5	i-Librarian EUDocLib i-Publisher	Test 1, Test 2, Test 3, Test 4	M30
Living Lab Analysis	UG1, UG2, UG3, UG4, UG5	i-Librarian EUDocLib i-Publisher	Test 1, Test 2, Test 3, Test 4	M1-M12
Living Lab Multilingual Content Management	UG1, UG2, UG3, UG4, UG5	i-Librarian EUDocLib i-Publisher	LL Test Scenario, Work on a multilingual web site of SULSIT	M18-M32
Living Lab Linguistic	UG4, UG5, relevant LL communities	i-Librarian EUDocLib i-Publisher	LL Test Scenario, Work on integration of Linguistic platform in UCC	M18-M32

First evaluation round (UER1)

Timing

Project month 11

Evaluation Objective

To evaluate i-Librarian, EUDocLib and i-Publisher pilot versions and the subset of planned functionality in English language

User groups

Consortium members and limited Focus group (FG, chapter 2.3) participation

Relevant user scenarios: 1, 4

Specifics

Small-scaled experimentation in controlled environments

Evaluated Features:

i-Librarian:

- User registration

- Data storing and retrieval
- Display list of items, filter and reorder items, preview a document, e-book
- Full-text search within textual contents of files
- Organizing items – categories, keywords / topics
- Similarity, groups (clusters) of similar documents
- Textual extracts, important (noun) phrases, named entities
- Extractive summary of a document
- My content, shared content filter
- Shared content available as references

EUDocLib:

- Display list of items, filter and reorder items, preview a document
- Full-text search within textual contents of files
- Textual extracts, important (noun) phrases, named entities

i-Publisher

- User registration
- User management
- Create web site, add pages, assign layouts to pages
- Add widgets to pages - navigation, list of items, item details
- Add, update content model, content items
- Search, locate and modify content items
- Classification of content items, filter content items
- Content work-flows
- Automatic summarization of textual contents (in English)
- Automatic language processing of textual content (text mining, in English)

(*) With term **items** above we are referring to documents and e-books or computer files from various file types (doc, pdf, etc), that have mainly textual content.

Second evaluation round (UER2)**Timing**

Project month 18

Evaluation Objective

To evaluate i-Librarian and i-Publisher first production versions with the suggested functionality

User groups

UG1, UG2, UG3, UG4, UG5

Relevant user scenarios: 1, 2, 3, 4

Specifics

Full-scaled experimentation in production environment

Evaluated Features:

i-Librarian:

All features from UER1 plus

- Add documents as list of URLs or search engine result list

i-Publisher

All features from UER1 plus:

- Simple mode of the interface (register, create web site, assign design template, add page, add navigation, add page content, publish web site).
- Core domain (reusable content model(s), vocabularies & taxonomies).
- Super-user support.
- Create a website snapshot and revert a website to a previous snapshot.

Third evaluation round (UER3)

Timing

Project month 24

Evaluation Objective

Evaluation of i-Librarian, EUDocLib and i-Publisher versions with the additional functionality available in all project languages

User groups

UG1, UG2, UG3, UG4, UG5

Relevant user scenarios: 1, 2, 3, 4

Specifics

Full-scaled experimentation in production environment

Evaluated Features:

i-Librarian:

All features from UER2 for all project languages plus

- Automatic language processing of textual content (text mining) in all project languages
- Automatic categorization of documents and e-books in all project languages
- Cross-lingual search

i-Publisher

All features from UER2 plus

- In-line editing of a content item
- Automatic language processing of textual content (text mining) in all project languages
- Automatic categorization of textual content in all project languages
- Cross-lingual search

Fourth evaluation round (UER4)

Timing

Project month 30

Evaluation Objective

Evaluation of the final version of the public services and the ATLAS software with all planned functionalities available in all partner languages

User groups

UG1, UG2, UG3, UG4, UG5

Relevant user scenarios: 1, 2, 3, 4

Specifics

Full-scaled experimentation in production environment

Evaluated Features:

i-Librarian:

All features from UER3 plus

- Machine translation of textual extracts in all project languages
- Automatic summarization (all project languages)

i-Publisher

All features from UER3 plus

- Machine translation of textual extracts in all project languages
- Automatic summarization (all project languages)

Living Lab Phases

Analysis phase

Timing

Project month 1- 20 and 21-32

Evaluation Objective

Gathering user requirements in production environment. The collection will be organised in two periods to allow the addressing of user suggestions.

User groups

UG1, UG2, UG3, UG4, UG5.

Evaluated Features:

i-Librarian:

All features from UER4

i-Publisher

All features from UER4

Multilingual content management

Timing

Project month 18 - 32

Evaluation Objective

Evaluation of content management advanced functionality of i-Publisher.

User groups

UG1, UG2, UG3, UG4, UG5.

Specifics

Creating a multilingual web site, customised web design, NLP in English, Bulgarian

Evaluated Features:

i-Publisher

All features from UER4

Linguistic framework

Timing

Project month 18 - 32

Evaluation Objective

Evaluation of the higher-level NLP tools of Atlas

User groups

UG4, UG5, relevant LL communities

Specifics

Integration of NLP in English, Bulgarian, Categorisation Tool, Summarisation Tool, Machine Translation Service, as well as linguistic applications as “Similar items”, “Important phrases”, etc.

Evaluated Features:

i-Publisher

All features from UER4

3 USER ACCEPTANCE INDICATORS

3.1 Introduction

As presented in the previous chapter (methodology), we will use indicators to measure the various degrees of user acceptance with respect to different facets of user experience. We will group the indicators into three main categories, namely:

- Usability indicators, with a range U1-U9
- Qualitative (general) indicators, with a range Q1-Q4
- Satisfaction indicators, with a range S1-S7
- Task fulfilment indicators, with a range SX1_1 – SX4_4 and SXLL_1 – SXLL_5

Each indicator will be mapped to one (1) question for the user, with the exception of the SX and SXLL indicators (values for the first 2 indicators of each scenario will be calculated automatically by the system (i.e. through logging of user activity).

Questions will be included in the user questionnaire (see Chapter 5). Not all questions are applicable to all users. For example:

- S1: Level of satisfaction from the user friendliness of the system is related to the question:
 - QS1: I am happy with the user interface of the system

The table below defines the relation between the indicators, questions and the users groups.

Indicator	Question	Service	UG1	UG2	UG3	UG4	UG5
Q1	QQ1	iP, iL, EUDocLib	+	+	+	+	+
Q2	QQ2	iP, iL, EUDocLib	+	+	+	+	+
Q3	QQ3	iP, iL, EUDocLib	+	+	+	+	+
Q4	QQ4 UG2, UG3	iP		+	+		
Q4	QQ4 UG1, UG2	iP, iL, EUDocLib	+	+			
Q4	QQ4 UG4	iP, iL				+	
U1	QU1	iP, iL	+	+	+	+	+
U2	QU2	iP, iL	+	+	+	+	+
U3	QU3	iP, iL	+	+	+	+	+
U4	QU4	iP, iL	+	+	+	+	+
U5	QU5 UG3	iP			+		
U5	QU5 UG4	iP				+	
U6	QU6 UG5	iP					+
U7	QU7 UG5	iP					+
U8	QU8 UG5	iP					+
U9	QU9 UG5	iP					+

Indicator	Question	Service	UG1	UG2	UG3	UG4	UG5
S1	QS1	iP, iL	+	+	+	+	+
S2	QS2	iP, iL	+	+	+	+	+
S3	QS3 UG3	iP			+		
S3	QS3 UG4	iP				+	
S4	QS4 UG4, UG5	iP				+	+
S5	QS5 UG5	iP					+
S6	QS6 UG1	iL	+				
S7	QS7 UG2	iL		+			
SX1_1, SX1_2	Auto calculation	iL	+	+			
SX1_3, SX1_4	QSX1, QSX2	iL	+	+			
SX2_1, SX2_2	Auto calculation	iP			+		
SX2_3, SX2_4	QSX3, QSX4	iP			+		
SX3_1, SX3_2	Auto calculation	iP			+		
SX3_3, SX3_4	QSX5, QSX6	iP			+		
SX4_1, SX4_2	Auto calculation	iP					+
SX4_3, SX4_4	QSX7, QSX8	iP					+
SXLL_1-3	Auto calculation	iP				+	
SXLL_4-5	QSX9-10	iP				+	

Legend:

- Q* refers to a qualitative indicator
- U* refers to a usability indicator
- S* refers to a satisfaction indicator
- SX* refers to a task fulfilment indicator
- iP refers to the i-Publisher service
- iL refers to the i-Librarian service
- UG* refers to a user group

In the sections following, we present in detail the indicators we plan to use.

3.2 User Acceptance Indicators

Qualitative (general) indicators

Q1	Level of timely system response (overall impression)
Q2	Degree of user productivity increase (as author, editor, publisher, researcher, student)
Q3	Degree of completeness of the offered facilities (e.g. is there any facility missing,

	are there any facilities with limited functionality)
Q4	Degree of correctness of system produced content (e.g. summary, translation)

Usability indicators

U1	Degree of the system being user friendly (overall impression)
U2	Easy access to on-line (content sensitive) help and tips for the functionalities
U3	Clarity of the system responses to user requests
U4	Level of easiness in navigating across offered facilities
U5	Easiness / usability to build and publish a multilingual web site
U6	Easiness / usability of the multilingual content management facilities
U7	Easiness / usability of the automatic classification/clustering facility
U8	Comprehensiveness / usability of the automatic summarization facility
U9	Usability of the content translation facility

Satisfaction indicators

S1	Level of satisfaction from the user friendliness of the system
S2	Level of satisfaction from the provided on-line (content sensitive) help and tips for the functionalities
S3	Level of satisfaction from the offered WEB Site publishing facility
S4	Level of satisfaction from the multilingual content management facilities
S5	Level of satisfaction from the automatic classification facility
S6	Level of satisfaction from the automatic summarization
S7	Level of satisfaction from the content translation facility

Task fulfillment indicators

SX1_1	The number of steps completed successfully by the user in the scenario and exercise #1
SX1_2	The time needed by the user to add (data and metadata) a new book
SX1_3	The level of appropriateness of the available domain categorizations and topics
SX1_4	Easiness of updating the user categorization tree
SX2_1	The number of steps completed successfully by the user in the scenario and exercise #2
SX2_2	The time needed by the user to setup his own simple web site
SX2_3	The level of appropriateness of the available most popular template websites
SX2_4	The level of appropriateness of the machine translation on the user's web site
SX3_1	The number of steps completed successfully by the user in the scenario and exercise #3
SX3_2	The average time needed by the user to add a page to his WEB Site
SX3_3	The level of appropriateness of the available template pages for a selected theme
SX3_4	Easiness of customisation of the available widgets
SX4_1	The number of steps completed successfully by the user in the scenario and exercise #4
SX4_2	The average time needed by the user to fill in and save a Content Form
SX4_3	Degree of the “automatic translation facility for the Content Form” being helpful
SX4_4	Degree of the “automatic production of summaries for the textual content added to

	the site” being helpful
SXLL_1	The number of steps completed successfully by the user in the LL scenario and exercise
SXLL_2	The average time needed by the LL user to add navigation to all WEB Site pages
SXLL_3	The average time needed by the LL user to create and publish the WEB Site
SXLL_4	Level of help provided by the system in creating a new content type
SXLL_5	Level of the system being helpful in showing only approved content on the web site

4 USE-CASE SCENARIOS

4.1 Introduction

Trials Specification

Five thematic scenarios will be performed by the target groups during the project development. The test content will be chosen with great care in order to serve the purposes of the tests.

Trials Execution and User-centric Evaluation

The trials aim to evaluate the opinion of users on the advanced language tools and solutions for interactive content management and to reveal any new user requirements. The trials are designed so that users focus on the evaluation of the newly added functionality together with the overall evaluation of the system. The trials will begin with a small-scaled experimental group of users in a controlled environment and will evolve to large-scale user groups from diverse communities, in different deployment contexts and in different locations.

The deployment trials and user evaluation are scheduled in a way as to find potential limitations on usability, interactivity, performance or user acceptance at their early stage. The outcome of the trials will be collected, analysed and will result in service improvements.

4.2 User scenarios

User Test Scenario 1

User groups

scholars, students and young scientists

Evaluated Service

i-Librarian

Evaluation Objective

To evaluate the interface usability and the user reaction to the language features provided by the service.

Features

As a free service i-Librarian offers some interesting features for students and scholars such as:

- storing, organizing and language-aided processing of documents, publications, e-books, etc. in various file formats that can later be examined, previewed and read online.
- automatic document clustering, suggestion of tags and categories.
- automatic compilation of document summaries, extraction of special text elements such as name entities, important words and phrases, etc.

Outline of steps:

1. *Registration process and logging in the system.*
 - Open your browser and go to <http://www.i-Librarian.eu>. Click on the “Sign Up” button on the home page to register a new account in the system.

- Enter your name, your email and a chosen password. You can fill your personal information now or later by editing your profile. You will receive a confirmation of your registration via email.
2. *Add your data / book*
 - Login into i-Librarian with your email and password. Click on the “Add new book” button. A form for adding a new book opens. Fill out all bolded fields (they are mandatory). There are three ways to add the actual content of the book in i-Librarian:
 - Local file - choose a file from your local machine.
 - URL – provide the URL of a page containing the book.
 - New text file – fill book content directly from this form.
 - Choose one of these approaches, select the corresponding radio button and upload the content of the book.
 3. *Review book details*
 - Click on the “My items” button and you will see a list of your books. Click on the newly added book.
 - Review the extracted summaries of the shorter documents (summaries for larger documents or books will not be generated)
 - Review the extracted text excerpts such as named entities, noun phrases (NPs), important words and phrases, etc.
 4. *Review suggested keywords and make your own update. The suggested keywords are marked in red, while the manually assigned ones are in blue.*
 - By clicking on the “Edit classification” button in the toolbar next to the selected name of the book (in the book details page), review the suggested:
 - Domains and Topics of your documents or e-books.
 - “Name Entities” and “Noun Phrases”.
 - On the same page, assign some of the automatically suggested keywords to each document/book:
 - Select one of the “Domain categorization”, “Topics”, “Name Entities” or “Noun Phrases” tabs from the accordion to the right.
 - Double-click or drag and drop some of the elements from the trees in these tabs in order to assign the corresponding keywords to the selected book.
 5. *Access available free books added to i-Librarian service from Project Gutenberg*
 - Click on “Public domain”.
 - Browse through the available books from Project Gutenberg – try different orders of the items (by title or by author), search through the books, find similar documents, etc.

Related Exercise:*Mandatory Steps*

6. *In the context of STEP4, select one of your books and delete one of the suggested Domains and Topics; then add new ones.*
7. *Update the user categorization tree, i.e. assign new keywords to an item:*

- Click on the “My profile” button. You can see your topics (your keywords) tree on the bottom of the page.
- Follow the instructions to the right of the tree and add a new keyword. For instance, right-click on “Edit my topics tree”, select “Add new” from the dropdown menu and a new node in the tree appears with a textbox where you can enter the new keyword. Enter the keyword and click ‘Save’.
- Click on “My items”, select one of your books and click on the “Edit classification”. Open “My keywords” tab and assign the newly created keyword.

Optional Steps

8. Repeat STEP2 above, by using different ways of uploading a new book and by uploading different file formats (i.e pdf, doc, odt, txt, rtf, html, epub).

From this scenario / exercise we’d like to record / assess:

- SX1_1: The number of steps completed successfully by the user.
- SX1_2: The time needed by the user to add (data and metadata) a new book.
- SX1_3: How appropriate were the available domain categorizations and topics?
- SX1_4: How easy was to update the user categorization tree?

User Test Scenario 2

User group

UG3 – General users with moderate web experience

Evaluated Service

i-Publisher – Simple Mode

Evaluation Objective

To evaluate the process of creating a multilingual web site using the ready-to-use web sites in the system. The evaluation will focus on the user reaction to the features outlined below.

Evaluated features

- Point-and-click interface that enables a user with none or moderate web experience to create a web site.
- Multilingual web site support.
- Managing multilingual content
- Machine translation

Outline of steps:

The users are free to experiment with i-Publisher's interface, using its simple mode to create and publish a basic website.

1. Login i-Publisher with the email and password given to you
2. Choose one of the most popular template websites (do not choose the empty website).
 - Choose one of the template websites shown in the first step of the wizard. The template websites come with predefined pages and content model. They are also populated with dummy content items. Only the most popular template websites are listed. If you don’t find any of them suitable, you can click on the link below and see all template websites. You can also choose an empty website and create your

own site structure. Click on a certain template website and you can see its details and a preview of its pages. When you are ready with this step, click “Next”.

- Chose another web site template, if you are not satisfied with the selected one.

Related Exercise:*Mandatory Steps**3. Choose one of the available color schemes for your site.*

- In the third step of the wizard you can customize the selected theme by choosing a colour scheme. Choose one of the colour schemes from the list to the left. You can see a preview of the template pages in the selected colour scheme. When you are ready with this step, click “Next”.

4. Give your website a name and choose at least two of the available most popular languages

- The last, fourth, step of the wizard allows you to customize website general properties. Give your site a name and select the languages you want to be supported. Only the few most popular languages are listed. If you want your website to feature other languages, click the link below and select from the languages available in the newly opened dialog window. When you are ready with this step, click “Done” and your site is ready.

5. Add content to the web site

- Open your new website. Hover on the star icon in the top left corner of the screen. A menu opens below the icon. Click on the “Add new content” button. A list with all available content types appears. Select one of them.
- The “Content item wizard” opens allowing you to create a new content item of the chosen type. Fill the content item form. When you fill all bolded fields (these are the mandatory fields) the “Done” button becomes active. Click the “Done” button and your new content item is ready.

*6. Click “translate’ in order for the system to translate automatically the web site in the languages defined for the web site.***From this scenario / exercise we’d like to record / assess:**

- SX2_1: The number of steps completed successfully by the user.
- SX2_2: The time needed by the user to setup his own simple web site.
- SX2_3: How appropriate were the available most popular template websites?
- SX2_4: How appropriate was the machine translation of your web site?

User Test Scenario 3**User group**

UG3 – General users with moderate web experience

Evaluated Service

i-Publisher – Simple mode

Evaluation Objective

To evaluate the process of creating and publishing a web site. The evaluation will focus on the user reaction to the features outlined below.

Evaluated features

- Point-and-click interface that enables a user with none or moderate web experience to create a web site. The interface is available in simple and advanced mode.
- Customizable look and feel (templates) of the web site.
- Customizable layout of the web pages.
- Multilingual structured content – predefined content types such as news, documents, events, which are customizable, as well as new, user-defined content types.
- Various widgets such as news blocks, events blocks, related reading blocks, etc., displaying dynamically changing content.

Outline of steps:

1. *Login into i-Publisher*

- Enter your email and the password given to you and login into i-Publisher.
- Create your own user profile, filling in the necessary information.

1. *Create a new website*

- After filling your personal data, the “New website wizard” opens
- Choose “Empty website” in order to create a completely new website. Click the “Next” button.
- Choose a theme for your website. Select one of the themes from the list to the left. You can see the details of the selected theme and a preview of its template pages. When you are ready with this step, click “Next”.
- Choose a colour scheme for your theme from the list to the left. You can see a preview of the theme’s template pages in the selected colour scheme. When you are ready with this step, click “Next”.
- Give your site a name and select the languages you want to be supported. Only the few most popular languages are listed. If you want your website to feature other languages, click the link below and select from the languages available in the newly opened dialog window. When you are ready with this step, click “Done” and your new site is ready.

2. *Add new pages*

- Your new website is opened. Hover on the star icon in the top left corner of the screen. A menu opens below the icon. Click on the “Add new page” button.
- The “Add new page” wizard opens.
- In the first step of the wizard you can see a list of the template pages for the selected theme. Click on one of them and you can see its details. Choose one of the template pages for your new page and click on the “Next” button.
- In the next step of the wizard you should specify the common page properties. Give your page a name and select whether this would be the home page and choose which navigation it would be included into (if the page only has one navigation, this option would be disabled and the page would be included in this navigation by default). When you have filled all the necessary information, click on the “Next” button.
- The third and final step of the wizard allows you to translate the name of the page in all site languages. For each language provide a translation of the page name. If the

website supports only one language, this option would be disabled. When you are ready click on the “Done” button and your page is ready and included in the selected navigation/navigations. It is accessible through the navigation. The page is created with widgets filled with dummy data, which are ready for you to customize.

- Create a home page and a number of extra pages for the website.
3. *Add page content*
- Open one of the newly created pages, which has a text widget. Hover on the text you want to edit. A toolbar with available actions opens. Click on the “Edit” button and the text widget wizard opens. Select a language from the dropdown menu and fill the widget’s content for the selected language. Fill the content of the widget for as many languages as you want and click “Done”.
 - Open one of the newly created pages, which has an image widget. Hover on the image you want to edit. A toolbar with available actions opens. Click on the “Edit” button and the image widget wizard opens. Upload an image from your file system. You can see a preview of the uploaded image. Change the image dimensions if you want and fill the alt text. Choose what should happen when a user clicks on the image. You have four options
 - ◇ nothing happens
 - ◇ image opens in a lightbox
 - ◇ user is redirected to another page within the same website
 - ◇ user is redirected to an external pageClick “Done” when you are ready.

Related Exercise:*Mandatory Steps*

4. *In the context of STEP2, select one of your websites (choose a multilingual website), hover on the star icon. Click on the “Add new page” button.*
5. *Add a new page:*
 - Review the available template pages for the selected theme.
 - Choose a page that has static text field.
 - Give your page a name and an alias, select whether this would be the home page and choose which navigation it would be included into.
 - Translate the page name in all site languages.
6. *Edit static text*
 - Hover on the static text and click the “Edit” button.
 - Select a language from the dropdown menu and fill widget’s content for the selected language. Fill the content of the widget for as many languages as you want.

Optional Steps

7. *Repeat STEP6 above, by using different template pages.*
8. *Repeat STEP6 above customizing different widgets.*

From this scenario / exercise we’d like to record / assess:

- SX3_1: The number of steps completed successfully by the user.
- SX3_2: The average time needed by the user to add a page to his WEB Site.
- SX3_3: How appropriate were the available template pages for the selected theme?
- SX3_4: How easy was to use and customize the available widgets?

User Test Scenario 4

User group

UG5 - professionals, working with on-line contents, editors in news and media agencies, publishers, lawyers, web designers

Evaluated Service

i-Publisher

Evaluation Objective

To evaluate the features and flexibility of the i-Publisher interface that enable the content editors to work (create, update, search, compare) with digital content.

Features to be evaluated:

- Multi-user environment, flexible user access rights system (security policies may be set for groups and users);
- Multilingual content management – view, add, update, delete, approve content in several languages;
- Versioning of structured content, versions management;
- Automatic suggestion of categories, topics and keywords for textual content.
- Automatically generated summaries of the textual content or binary files in various formats – pdf, doc, rtf, odt, etc.
- Automatic extraction of important phrases, naming entities, noun phrases from textual content.
- Machine translation of content item extracts – details (title, description, etc...), summaries, important phrases, etc...

Outline of steps:

The users are free to experiment with i-Publisher's interface, implementing some basic content management actions.

1. *Login into the i-Publisher system* - Enter your email and the password given to you and login into i-Publisher.
2. *Customize your interface*
 - Open the “Core domain perspective” by clicking on the last (rightmost) button in the perspective toolbar, located on the top right corner of the screen.
 - Customize the “Constructor perspective” user interface – choose to display, hide, maximize, minimize or completely remove the available windows/containers (Shortcuts, My web sites, Content model, Data-filters), adjust the placement of the windows on the screen so that it is convenient for you.
3. *User management*
 - Open the “Welcome perspective” and click on the “Users” link from the domain section. A new editor opens and you can see a list of all users in the domain.
 - Click on the “Add new user” link above the users list. The “New user” editor opens. Fill in the required information and select the groups the new user belongs to. Click the “Save” button. Your new user is created and can start working with the system.
 - Different users may have different rights, defining their level of access to the system. To see user rights open the “Manage content” tab of the user editor. By

default your new user does not have any permissions on any content type. To allow them to view items from a certain content type just check the first checkbox in the line corresponding to the selected content type. Click ‘Save’. Now your new user will be able to see only items from the selected content type, but not edit them.

4. *Add content*

- Open the “Welcome perspective”. From the “Create content” section and select the content type you want to create an item from. The “New content item” editor opens. Fill in the corresponding content form. You have to fill all bolded fields (they are mandatory). The fields with a blue star are multilingual, i.e. you have to fill their values in all site languages. You can use the automatic translation service to translate multilingual property values from the site’s default language to all other site languages (notice that some language pairs are not supported).
- Save content item. You can see a preview of your content item, created with the provided system template.

5. *Search for a content item*

- Open the “Content item perspective”. Use the provided search functionality to filter and find content items containing certain text, created or updated within a certain period of time, belonging to a particular user, etc..
- Explore and reorder the search results.
- Refine the search results – search within the search results list. Apply additional filtering to narrow down the results list.

6. *Review content versions*

- Select one content item and open its editor.
- Open “History of changes” tab. In this tab you can see how selected content item was changed and when. For instance, you can see when it was created, when it was edited and which properties were changed, when it was classified and which keywords were assigned or removed, etc.
- You can create a content version by clicking the “Create content version”. The current state of the selected content item will be saved and accessible at any time in the “Content versions” section. From this section you can see all content versions and compare them.

7. *Apply Categorization*

- Select one content item and open its editor.
- Content items are automatically categorized on their creation if the text mining functionality is configured. Make sure that the text mining functionality is properly configured for the item’s content type (see step four).
- If the selected content item is not yet categorized, you can send it for automatic categorization by pressing the “Auto tag” button in the shortcuts menu.
- By pressing the “Analyse text” button, you send this content item for text mining analysis.
- You can manually categorize a content item from the “Categorization” tab of the content item editor. Open this tab and explore the accordion to the right – each tab contains either
 - existing categorization trees, or
 - a tree with automatically suggested keywords, formed by the text mining analysis.
- Choose the category (node in some tree) you want to apply to the selected content item, drag and drop this category to the “Categorisation node” area and save.

- Assign some of the suggested keywords from the “Named entities” or “Noun phrases” trees.
 - a. Assign some of the keywords from the categorization trees.
- 8. *Review textual extracts - important (noun) phrases, named entities*
 - Open the site editor and click the “Preview” button located just above the site preview window. Your home page opens in a new tab of your web browser.
 - Navigate through the site until you reach a page containing a list widget with analyzed content items. Click on one of them and the details page opens. In this page you can see not only the details of the content item, but also the item keywords and text mining extracts - important (noun) phrases, named entities, summary, similar documents.
- 9. *Review the MT for the summaries of the content items* – this can be achieved by selecting another language in the translation widget dropdown menu. Select one language and notice which items are translated.
- 10. *Suggest a better translation (optional)*
 - As mentioned before, you can use the automatic translation service within i-Publisher to translate multilingual properties of a certain content item. If you are not satisfied with the result you can provide your own translation or update the suggested one.

Related Exercise for test scenario 4:*Mandatory Steps*

11. *In the context of STEP4, select one of the available content types and add new content item for this type.*
12. *Fill correspondent content form:*
 - Fill out all bolded (mandatory) fields.
 - Fill out all multilingual fields (marked with blue asterisk) only in the default domain language.
 - Select one of the other languages. The translation button (flags button) becomes active (not all language pairs are supported by the automatic translation service, so this button may not activate for certain languages). Click on the automatic translation button.
 - Review translated properties and correct translation if necessary.

Optional Steps

13. *Repeat STEP4 above, by creating items from different content types and uploading files with different formats (i.e pdf, doc, odt, txt, rtf, html, epub) for file properties.*

From this scenario / exercise we’d like to record / assess:

- SX4_1: The number of steps completed successfully by the user.
- SX4_2: The average time needed by the user to fill in and save a Content Form.
- SX4_3: How helpful was the automatic translation facility for the Content Form?
- SX4_4: How helpful was the automatic production of summaries for the textual content added to the site?

Living Lab Test Scenario**User group**

UG4 – professionals like information designers, web studio members, web designers; relevant LL communities.

Evaluated Service

i-Publisher – Advanced Mode

Evaluation Objective

To evaluate the available features and flexibility of the i-Publisher interface for creating and customizing a complex content-driven web site.

Evaluated features:

The i-Publisher system offers some interesting features for professionals working in the field of online content management services:

- Point-and-click interface that ensures a quick and easy website creation process. The interface is available in simple and advanced mode.
- Multi-user environment, flexible user access rights system (security policies may be set for groups and users).
- Customizable look and feel of the web site.
- Customizable layout of the web pages.
- Multilingual structured content – predefined content types such as news, documents, events, which are customizable, as well as new, user-defined content types.
- Single content repository per domain, rendered on multiple web sites.
- Various widgets such as news blocks, events blocks, related reading blocks, etc., displaying dynamically changing content.
- Versioning of structured content, versions management.
- Automatic suggestion of categories, topics and keywords for textual content.
- Automatically generated summaries of the textual content or binary files in various formats – pdf, doc, rtf, odt, etc...
- Automatic extraction of important phrases, naming entities, noun phrases from textual content.
- Machine translation of content item extracts – details (title, description, etc...), summaries, important phrases, etc...

Outline of steps:

The LL users are encouraged to experiment with i-Publisher's interface using its advanced mode to create and publish a content-driven website. They will build a website structure by creating a few pages, choosing their layouts, adding widgets and components to the pages, applying different templates/styles, etc.

1. Register in i-Publisher

- Go to <http://i-publisher.atlasproject.eu/> and click the “Register link”. Fill the required data and click “Register”. When you register to i-Publisher you receive a new domain with a number of predefined entities. Nevertheless, you can import various entities from our admin domain.
- Create users for the new domain
- Open “Welcome perspective” and click on the “Users” link in the “Domain” section and click on a name from the list of already existing users in your domain. View the user’s details and close the dialog.

- Click on “Add New User” in the Navigation Block and fill in the username and the password and save it. The newly added users can start working now.
2. *Import content types from the “Import area”*
 - Click on the “Domain” button in the domain area of the “Welcome perspective”
 - Open the last tab – the “Import” tab. Here you can see various entities and import packages grouped by their type. Feel free to import any entity you want and as many as you want. These are predefined commonly used content types, site templates, widgets, etc.
 - Import some content types, categorization trees and at least one site.
 3. *Customize your interface*
 - Open “Core domain perspective” by clicking on the last (rightmost) button in the perspectives toolbar located on the top right corner of the screen.
 - Customize the “Constructor perspective” user interface – choose to display, hide, maximize, minimize or completely remove available windows/containers (Shortcuts, My web sites, Content model, Data-filters), adjust the placement of the windows on the screen so that it is convenient for you.
 4. *Create a new content type*
 - Click on the “Add new content type” link from the shortcuts window in the “Core domain area” perspective.
 - Give your new content type a name and description.
 - Open the “Existing properties” tab of the accordion store to the right and drag-and-drop one of the existing property carts on the working area.
 - Open the “Add new property” tab of the accordion store to the right and drag-and-drop one of the available property types on the working area. Give your new property a name, a description or any other information that is needed.
 - Click “Save” and your content type is ready.
 5. *Configure functionalities (Text extracts, Categorization, Summarization) to certain fields of your new content type.*
 - Click on the “Usage” tab in the content type editor shortcuts.
 - The accordion tab that opens in the working area contains all text-based properties. They are the only properties suitable for text analysis. Select all properties that you want to be included in the text analysis operations (Text extracts, Categorization, Summarization). Click the “Save” button located in the bottom of the accordion tab.
 - The second tab of the accordion contains a list of the available categorization trees in the domain. Select all trees you want the automatic categorization to use for this content type.
 6. *Add an approval chain to a content type.*
 - a. Create an approval chain
 - i. Open “Welcome perspective” and click on the “Domain” button.
 - ii. Open the “Approval procedures” tab. You see a list of all existing approval procedures for this domain. Click on the “Add new approval procedure” link. The “New Approval Chain” editor opens.
 - iii. Give your approval procedure a name and description. Define some approval steps by clicking the “+” button and give your new step a name. You can also reorder the approval steps by dragging an approval step and dropping it on another approval step's "Name" column. You can reject an approval step by dragging an approval step and dropping it on another approval step's "Reject" column. An approval step can be rejected only by the approval step before it.
 - b. Assign newly created approval step to the newly created content type

- i. Open the “Content model” editor, select your newly created content type and open its editor.
 - ii. In the “Overview” tab there is an “Approval procedure” dropdown menu. Select the approval procedure created in the previous step. Your choice is automatically saved.
7. *Add pages to the website, arrange them hierarchically as a website map.*
 - a. Add new page
 - i. Click on the “Home” button (the leftmost button in the bottom toolbar) and open the “Welcome” perspective.
 - ii. Click on the “My websites” button and select one of the existing websites. The site editor opens.
 - iii. Open the “Pages” tab from the shortcuts menu.
 - iv. Click the “Add new page” link on the top of the pages list. The page editor opens. Give your new page a name and fill the other optional properties. Choose a template with a list widget placeholder. Drag and drop this template on the page layout area. Click the “+” button in the list widget’s placeholder’s toolbar in order to add new list widget. The list widget editor opens.
 - v. Give your new list widget a name and description. From the “Data” tab select at least one content type. From the “Visualization” tab define visualization for each content type. Click “Save” and your list widget is ready.
 - b. Add a new “details page” for the details widget, pointed to by the list widget created in the previous step.
 - i. Choose a suitable template page (a page that contains placeholders for the details widget and the text mining widgets) and follow the procedure from the previous step or create your own page layout (dropping and nesting layouts on the page layout area) and add the details widget through the widget button in some of the regions.
 - ii. The details widget configuration is similar to the list widget configuration in the previous step. It is important to choose the same content types as those selected for the list widget.
 - iii. Add text mining widgets to the “details page” in order to show extracts from the content item text mining analysis. These are the “Named entities”, “Important phrases”, “Similar documents” and “Summary” widgets.
 - Add a new “Important phrases” widget, give it a name and description. From the “Configure” tab select how many excerpts you want to show and how you want to show them – as a list or as a tag cloud. Save the widget.
 - Add a new “Named entities” widget, give it a name and description. From the “Configure” tab select which types of named entities, how many items of each type would be shown and how they should be selected. Save the widget.
 - Add a new “Similar docs” widget, give it a name and description. From the “Configure” tab select how many similar document you want to show and what the threshold above a document, which is considered to be similar to the given one, is. You have to select a list widget to display these similar documents. Save the widget.
 - Add a new “Summary” widget, give it a name and description. From the “Configure” tab select how to display the summary – show the whole summary in a box with given height (if summary is longer, a

- scroll appears in this box) or to truncate the summary, i.e. show the beginning of the text with a “more” link that shows the remaining part of the text. Click the “Save” button to save the widget.
- You can also add a “Classification” widget to show how your content item is classified, i.e. show the keywords attached to a certain item. Give your widget a name and description. From the “Configure” tab select a categorization tree, from which you want to show certain keywords.
 - Add a “Translation” widget so you would be able to use the automatic translation service to translate some of the text mining extracts. Give your widget a name and description. From the “Language” tab select which languages you want this widget to support. In the “Language pairs” tab all language pairs formed by the languages selected in the previous tab, which are supported by the automatic translation service, are shown. Select all of the ones you want your widget to support. Save the widget. Save the page as well.
- c. Connect the details and the list widget
- i. Open the page with the list widget.
 - ii. Right click on the list widget name. A popup dialog opens. Select the page with the details widget from the “Default target page” dropdown menu in this popup. With this act you have connected the list and the details widget. i.e. now i-Publisher knows that whenever an item from the list is selected (a user clicks on it) the user should be redirected to the specified details page and the details of the selected item should be shown.
- d. Assign a navigation to the pages
- Create a new navigation
 - Open the site editor and select the “Navigations” tab. The navigations editor opens. Here you can see all navigations created for your site.
 - Click the “Add new navigation” link located on the top of the navigations list. The “New navigation” editor opens.
 - Give your navigation a name and description and select whether this is the main navigation in the site
 - Drag and drop all the pages you want to be included in the navigation from the “Pages” tab of the accordion store to the right.
 - Click “Save” and your new navigation is created.
 - Assign this new navigation to some of the pages
 - Go to one of the newly created pages, for instance the home page. All template pages have at least one navigation widget placeholder. Go to this placeholder and click the “+” button. The navigation widget editor opens.
 - Give your new navigation widget a name and description and go to the “Content info” tab. Select the “Navigation” radio button. The dropdown is now active. Browse through the existing navigations and select the one you created in the previous step. You can edit the selected navigation or create a new navigation from here. Select “List visualization”, click “Save” and close the editor. Save the page you have modified. Now your page has a navigation.
 - Follow the same procedure and add the newly created navigation to all pages you want.

8. *Create content*
 - a. Go to the “Welcome” perspective. From the “Create content” section select the content type, from which you want to create an item. The “New content item” editor opens. Fill the necessary information. You have to fill all bolded fields (they are mandatory). The fields with a blue star are multilingual, i.e. you have to fill their values in all site languages. Click on the “Save” button and your new content item is ready.
 - b. Create a number of content items from the content types selected in the list widget and some from your new content type. Thus when you open this page you will see all your items listed.
9. *Approve the newly added content items*
 - a. Open one of the content items from your new content type. You can easily find specific content items from the “Content item perspective”. Just fill the search form. In this case you have to select your new content type and all created content items for this type would be listed. Select one of them and open the content item editor.
 - b. After a content item is created it is automatically set in the first approval step of the approval procedure
 - c. You can promote/approve a content item by clicking the “Promote” button. This means that the selected content item is now in the next step of the approval procedure
 - d. You can demote/unapprove a content item by clicking the “Demote” button. This means that the selected content item is now in the previous step of the approval procedure.
10. *Publish the website on-line and access it via a browser.*
 - a. Your pages are automatically accessible from the browser immediately after their creation (unless explicitly stated otherwise). They are accessible through the default alias (the page name, seen in the URL link) given to each page after creation.
 - b. To open your site in the browser you have to open the site editor and select the first, “Properties” tab. Click on the “Preview” button located just above the preview window. Your site opens in a new tab of the current browser window. Notice its URL address. This is the address of your site (your home page).
11. *Use the provided search functionality to enter term in one of the project languages and to search all available textual content in all languages.*

Related Exercise for the Living Lab test scenario:*Mandatory Steps*

12. *In the context of step 4:*
 - a. Create new content type and give it a name and description.
 - b. Open the “Existing properties” tab of the accordion store to the right and drag-and-drop one of the existing property carts on the working area.
 - c. Open the “Add new property” tab of the accordion store to the right and drag-and-drop one of the available property types on the working area. Give your new property a name, a description or any other information that is needed.
 - d. Click “Save” and your content type is ready.
13. *In the context of step 7, a, d*
 - a. *Add new page, give it a name and description. Select one template page and drop it on the layout area. Add the widgets required by the template page.*

- b. Create a new navigation
 - Create new navigation from “Navigations” area. Give your navigation a name and description and select whether this is the main navigation in the site. Drag and drop all the pages you want to be included in the navigation from the “Pages” tab of the accordion store to the right.
 - Go to the page created in STEP 13a and create navigation widget in the navigation widget placeholder. Select the navigation created in the previous step.

14. In the context of step 9:

- a. Select one existing content item and open its editor.
- b. Promote or demote selected content item.
- c. Reject selected item.

Optional

15. Follow the same procedure and add the newly created navigation to all pages you want.

From this scenario / exercise we’d like to record / assess:

- SXLL_1: The number of steps completed successfully by the user.
- SXLL_2: The average time needed by the LL user to add navigation to all WEB Site pages.
- SXLL_3: The average time needed by the LL user to create and publish the WEB Site.
- SXLL_4: How helpful was to create a new content type?
- SXLL_5: How helpful was to show only approved content on the web site?

5 THE ONLINE USER ACCEPTANCE QUESTIONNAIRE

5.1 Test environment

An online WEB based questionnaire system will collect the results of the user evaluation tasks as:

- it gives flexibility when choosing users from specific group
- it is convenient to schedule user test evaluation within a larger time frame
- it is possible to explain what users are expected to accomplish using text and screenshots.

The i-Librarian users will display, browse and review multiple entries using a large set of books, freely available on the Project Gutenberg web site, stored, processed and organized as references in advance. They will appear as “Shared content” entries in i-Librarian.

The users of i-Publisher service from user group 3 have to be able to create a simple web site from scratch and make it available on-line. To accomplish their tasks, they are expected to use the simple mode of i-Publisher.

Users of i-Publisher service from user groups 4 and 5 should be able to gain an impression on how they can work with an already created and populated content-driven web site. Therefore an example web site will be created, configured and populated with content items from popular content types such as news, events, documents and publications.

Users will be pointed to load a web address in their browser where they have to select a user group to which they belong. Depending on their choice users will be presented with a specific short description of the evaluation process along with a test scenario and exercise appropriate to their group type, and will be provided with guidance on what they are expected to accomplish. Afterwards they will be forwarded to the web address of the evaluated service and will perform the expected tasks.

After the user finishes the evaluation process he/she will be asked to fill in a questionnaire which is specific for the particular test scenario and user profile. Each question in the questionnaire relates to a particular user acceptance indicator (UAI). In the end the evaluating user enters his contact data – name, age, nationality and e-mail.

Answers to the questions and user data are stored in a database for further evaluation by the ATLAS team and are also sent to the user e-mail address. Access logs from the user evaluation are preserved for examination as well. In addition, data from user activity per scenario and exercise is stored automatically in the same database to allow further processing and calculation of values for certain task fulfilment indicators.

Online User Evaluation questionnaires URL: <http://ue.atlasproject.eu>

5.2 Indicators and questions

The following scale which reflects the format of a typical five-level Likert item is suggested to the users to evaluate the questions:

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Qualitative (general) indicators and applicable questions

Q1	Level of timely system response (overall impression)
Q2	Degree of user productivity increase (as author, editor, publisher, researcher, student)
Q3	Degree of completeness of the offered facilities (e.g. is there any facility missing, are there any facilities with limited functionality)
Q4	Degree of comprehensiveness of system produced content (e.g. summary, translation)

Applicable Questions:

QQ1 The system is responsive (overall impression)	1	2	3	4	5
QQ2 The system increases your productivity	1	2	3	4	5
QQ3 The system offers a complete set of facilities	1	2	3	4	5
QQ4 UG2, UG3. The website I created is on par with my expectations	1	2	3	4	5
QQ4 UG1, UG2. The system produces comprehensive, well grouped documents with relevant text excerpts, summaries and their translations	1	2	3	4	5
QQ4 UG4. The system produces comprehensive multilingual content items	1	2	3	4	5

Usability indicators and applicable questions

U1	Degree of the system being user friendly (overall impression)
U2	Easy access to on-line (content sensitive) help and tips for the functionalities
U3	Clarity of the system responses to user requests
U4	Level of easiness in navigating across offered facilities
U5	Easiness / usability to build and publish a multilingual web site
U6	Easiness / usability of the multilingual content management facilities
U7	Easiness / usability of the automatic classification/clustering facility
U8	Comprehensiveness / usability of the automatic summarization facility
U9	Usability of the content translation facility

Applicable questions

QU1 The user interface is friendly and easy to use.	1	2	3	4	5
QU2 On-line help, tips and screen casts are useful.	1	2	3	4	5
QU3 The system response is adequate to my requests	1	2	3	4	5
QU4 System navigation is intuitive and easy to use	1	2	3	4	5
QU5-UG3 It is easy to build and publish a web site with i-Publisher	1	2	3	4	5

QU5-UG4 It is easy and fast to

- build a multilingual web site 1 2 3 4 5
- build a complex content model 1 2 3 4 5
- map a complex work-flow 1 2 3 4 5
- customize the look and feel of the web site 1 2 3 4 5

QU6-UG5 Working with multilingual content items is easy and productive 1 2 3 4 5

QU7-UG5 The automatic classification tool saves me time and effort 1 2 3 4 5

QU8-UG5 The automatically produced summary gives me a better overview of the textual content 1 2 3 4 5

QU9-UG5 The automatically produced translations assisted me in my work with multilingual content 1 2 3 4 5

Satisfaction indicators and applicable questions

S1	Level of satisfaction with the user friendliness of the system
S2	Level of satisfaction with the provided on-line (content sensitive) help and tips for the functionalities
S3	Level of satisfaction with the offered WEB Site publishing facility
S4	Level of satisfaction with the multilingual content management facilities
S5	Level of satisfaction with the automatic classification facility
S6	Level of satisfaction with the automatic summarisation
S7	Level of satisfaction with the content translation facility

Questions

QS1 - UGALL I am happy with the user interface of the system 1 2 3 4 5

QS2 – UGALL I am satisfied with the online help 1 2 3 4 5

QS3 – UG3 I am satisfied with the default functionalities 1 2 3 4 5

QS3 – UG4 I am satisfied with the preview of the web site I created 1 2 3 4 5

QS4 – UG4/5 I am satisfied I produced a web site/provided content in many languages at once 1 2 3 4 5

QS5 – UG5 I am satisfied with the automatic classification of the documents I upload daily. 1 2 3 4 5

QS6 – UG1 I am satisfied I found documents in the library similar to mine 1 2 3 4 5

QS7 – UG 2 I am satisfied I found relevant documents in a language I do not use 1 2 3 4 5

Task fulfillment indicators and applicable questions

SX1_1	The number of steps completed successfully by the user in the scenario and exercise #1
SX1_2	The time needed by the user to add (data and metadata) a new book
SX1_3	The level of appropriateness of the available domain categorizations and topics
SX1_4	Easiness of updating the user categorization tree
SX2_1	The number of steps completed successfully by the user in the scenario and exercise #2
SX2_2	The time needed by the user to setup his own simple web site
SX2_3	The level of appropriateness of the available most popular template websites
SX2_4	The level of appropriateness of the machine translation on the user’s web site
SX3_1	The number of steps completed successfully by the user in the scenario and exercise #3
SX3_2	The average time needed by the user to add a page to his WEB Site

SX3_3	The level of appropriateness of the available template pages for a selected theme
SX3_4	Easiness of customisation of the available widgets
SX4_1	The number of steps completed successfully by the user in the scenario and exercise #4
SX4_2	The average time needed by the user to fill in and save a Content Form
SX4_3	Degree of the “automatic translation facility for the Content Form” being helpful
SX4_4	Degree of the “automatic production of summaries for the textual content added to the site” being helpful
SXLL_1	The number of steps completed successfully by the user in the LL scenario and exercise
SXLL_2	The average time needed by the LL user to add navigation to all WEB Site pages
SXLL_3	The average time needed by the LL user to create and publish the WEB Site
SXLL_4	Level of help provided by the system in creating a new content type
SXLL_5	Level of the system being helpful in showing only approved content on the web site

Questions

Qsx1 How appropriate were the available domain categorizations and topics?

Qsx2 How easy was to update the user categorization tree?

Qsx3 How appropriate were the available most popular template websites?

Qsx4 How appropriate was the machine translation of your web site?

Qsx5 How appropriate were the available template pages for the selected theme?

Qsx6 How easy was to use and customize the available widgets?

Qsx7 How helpful was the automatic translation facility for the Content Form?

Qsx8 How helpful was the automatic production of summaries for the textual content added to the site?

Qsx9 How helpful was to create a new content type?

Qsx10 How helpful was to show only approved content on the web site?

6 THE LIVING LAB IN ATLAS

6.1 Overview of the Multilingual e-Content and e-Library Living lab

The Multilingual e-Content and e-Library (MLeCeL, <http://livinglab.itd-bg.eu>) Living Lab (LL) is a pilot sectoral Living Lab dedicated to contribute and promote digital multilingual on-line content and libraries as an important instrument for development of knowledge-based and multicultural society. We strongly believe that the access to multi-language information and knowledge makes the world better place. The main assumption is that the Living Labs model provides a mechanism for improving quality of innovative products and services by **involving different stakeholders as co-creators** from the early stages of multilingual e-content and e-library products and services development.

The MLeCeL LL scope of activities goes beyond the ATLAS Project framework although the ATLAS solutions will be used for the pilot launching of the LL activities. The LL will be a powerful instrument for **involvement of external stakeholders** in the ATLAS activities and the whole life cycle of the ATLAS solutions, including in the user evaluation of i-Publisher, i-Librarian and EUDocLib.

Mission

The mission of the MLeCeL Living Lab is to create an **open innovation ecosystem and services** related to development and deployment of innovative multilingual e-content and e-library software products and services by involvement as co-creators the end-users and other stakeholders.

Objectives

The overall objectives of the *Multilingual e-Content and e-Library (MLeCeL) Living Lab*, as a pilot sectoral LL, are:

- To involve **users as co-creators** of innovative multilingual e-content and e-library products and services from the very early stages of development – identification of requirements and initial design;
- To **evaluate and validate new multilingual e-content and e-library solutions** with users in contexts familiar to them in real-world scenarios;
- To **coordinate the efforts of key stakeholders** participating in the life cycle of developing multilingual e-content and e-library applications and services by creating an environment for knowledge creation and exploitation, using formal and informal networks of collaboration;
- To open **access to advanced research outcomes** in the area of multilingual e-content and e-library and to integrate the developed products and services in **educational and training activities**;
- To **acquire and share expertise** with other Living Labs in terms of applying the principles of open innovation for the development of innovative products and services;
- To provide a set of **targeted services** related to the Living Lab methodologies, as well as services dedicated to support all stakeholders in deployment of multilingual e-content and e-library products and services;
- To **coordinate** the Living Lab activities with other European initiatives and programs, such as Horizon 2020, EU2020, Digital Agenda, FP7, CIP ICT PSP, ETPs, JTI, EIT, Lead Markets, etc.

Partnerships and stakeholders

The **core partners** in the MLeCeL LL will be: Tetracom IS Ltd; Institute of Technology and Development (ITD) – Coordinator of the MLeCeL LL; Institute for Bulgarian Language (IBL), Bulgarian Academy of Sciences, member of ATLAS Project consortium; VirtSOI Living Lab. Two Living Lab **host institutions** are invited - State University of Library Studies and Information Technologies (SULSIT) and University Computing Centre (UCC), Sofia University. Refer to Annex 2 for more details on the hosting institutions.

In addition, the MLeCeL LL will include **other prospective local partners**, who are **stakeholders** in the process of development of multilingual user-centric services in the area of Multilingual e-Content and e-Library.

The MLeCeL LL will rely on the support and the expertise of all ATLAS partners and will make efforts to catalyse establishment of other Living Labs in the ATLAS partner countries during and after the project period. The Living Labs approach will be among the **main instruments for achieving sustainability of the ATLAS project outcomes**.

The MLeCeL LL will closely cooperate with the European Network of Living Labs (ENoLL²) and its members (ITD participates in the VirtSOI Living Lab which is member of ENoLL). The MLeCeL LL will adopt the shared reference model - “interoperability cube”, and the sequence of maturity phases for establishment of Living Labs in ENoLL³ (See Annex 1). Additional source of competence and expertise will be the AMI@Work Communities⁴, including the Living Labs Open Innovation Community (LL-Open), Amsterdam LL Knowledge Centre⁵, ECOSPACE Project⁶, APPOLON Project⁷, CO-LLABS Project⁸, LLToolbox⁹, Laboranova¹⁰, CoreLabs Project¹¹, etc.

6.2 Contribution of MLeCeL to the ATLAS user evaluation

Phase 1: Analysis phase, M1-20 and M21-32 (ITD & Tetracom).

A) Identification of prospective users and user groups, user needs analysis.

Established contacts:

- Sudtirol tourist buro as a great potential resource group that needs multilingual web presentation of tourist services – hotels, restaurants, travel agencies;
- Airbnb tarevlogue as a good starting point to offer multiannual web sites with a simple structure;
- Humboldt Foundation – they build a multilingual website containing research papers, publications book of the winners the Humboldt scholarship;
- University of Library Studies And Information Technologies– they need a multilingual website with automatic classification of publications;

² ENoLL, <http://www.openlivinglabs.eu/>

³ Mulder, I., Fahy, C., Hribernik, K., Velthausz, D., Feurstein, K., Garcia, M., Schaffers, H., Mirijamdotter, A., & Stahlbrost, A. (in press).

⁴ “Towards harmonized methods and tools for Living Labs”. Forthcoming in Proceedings of eChallenges 2007. Paper to be presented at eChallenges 2007, 24 - 26 October 2007, The Hague, The Netherlands.

⁵ <http://www.ami-communities.eu>

⁶ <http://www.amsterdamlivinglab.nl/>

⁷ www.ip-ecospace.org

⁸ <http://www.apollon-pilot.eu/>

⁹ <http://www.ami-communities.eu/wiki/CO-LLABS>

¹⁰ <http://www.lltoolbox.eu>

¹¹ <http://www.laboranova.com/>

¹² <http://www.ami-communities.eu/wiki/CORELABS>

- University Computing Centre, Sofia University – they need tools for categorisation, summarisation and machine translation for the Sofia University Electronic Library;

Identified functionality: i-Librarian - multilingual web site, text extraction, automatic categorisation, machine translation, summarisation, similar items; EUDocLib - automatic categorisation, search.

Feedback: new requirements already identified - "Contact form" widget, "Photogallery grid widget", "Login" widget.

B) All UGs, relevant LL communities: gathering user requirements related to i-Librarian and i-Publisher in a production setting and in a real-life environment. Evaluation and validation of ATLAS solutions.

Phase 2. M18-M32 - UG4, relevant LL communities:

Conduct experiments with i-Publisher in the MLeCeL LL for building a multilingual web site for SULSIT. Expected feedback on the tested features:

- Point-and-click interface that ensures a quick and easy website creation process. The interface is available in simple and advanced mode.
- Multilingual web site support with the same or different structure in each language.
- Customizable look and feel of the web site.
- Customizable layout of the web pages.
- Multilingual structured content – predefined content types such as news, documents, events, which are customizable, as well as new, user-defined content types.
- Single content repository per domain, rendered on multiple web sites.
- Various widgets such as news blocks, events blocks, related reading blocks, etc., displaying dynamically changing content.
- Versioning of structured content, versions management.

Test of the i-Librarian service and the advanced functionalities of the i-Publisher service in order to evaluate the flexibility of the i-Publisher for creating and customizing a rich content-driven web site.

Phase 3. M18-M32 - UG4, UG5, relevant LL communities:

Conduct experiments in the MLeCeL LL for integration of the linguistic platform and the classification tool in the Electronic Library of Sofia University.

Expected feedback on the tested features:

- Automatic suggestion of categories, topics and keywords for textual content.
- Automatically generated summaries of the textual content or binary files in various formats – pdf, doc, rtf, odt, etc.
- Automatic extraction of important phrases, naming entities, noun phrases from textual content.
- Additional features, such as content item versions, import of structured data (content items), static website export (in an HTML format), content item export.

Phase 4. M18-M32 , M33 - after the end of the project

Conduct experiments, workshops, expert meetings, educational and training activities with local partners (developers, universities, SMEs, NGOs); Co-operate with other Living Labs.

*Conduct experiments with libraries, publishing houses, media agencies, online bookstores.
Issues to assess:*

- reduce classification editors manual work by using the automatic classification of editions, news, documents
- better publication overview due to the extended information published: names, dates, dates, important phrases
- better navigation – relevant information presented in dynamic context blocks like “Similar items” and “Hot topics”.

Conduct workshops and expert meetings with other local researchers and developers of multilingual e-content and e-library services:

- expert evaluations, peer reviews;
- sharing open source solutions;
- building joint services;
- sharing research outcomes.

Conduct educational and training seminars with other local users and developers of multilingual e-content and e-library services:

- educational activities with BSc, MSc and PhD students;
- training activities with developers and other interested parties;
- gathering and analysing students and trainees feedback.

Cooperate with other Living Labs in order to assess, mainly:

- granular user access rights ensure the fluent and secure workflows
- efficient prototyping and implementing of new web site
- single content repository per domain, rendered on multiple web sites.

Education and training of communities of end-users and developers of the new products/services will be one of the main roles of the MLeCeL LL. This will be done by offering blended learning opportunities based on short face-to-face seminars and/or online learning tutorials. The communities will be stimulated to bring some substantial added value through cooperation, communication, share of information, resources, innovations, knowledge and experience by using the MLeCeL LL platform (wiki, blogs, forums). The **development of users’ guides, developers’ guides and other training materials** is typical example where the MLeCeL LL base communities involvement could bring substantial added value.

6.3 Contribution of MLeCeL to the ATLAS Overall Evaluation

SULSIT will provide an open innovation ecosystem for the evaluation of content management advanced functionality of i-Publisher based on a multilingual web site, as well as categorisation of the digital content: books, papers, articles etc. The electronic library of Sofia University (supported by UCC) will be used as a **real life setting** mainly for the evaluation of the ATLAS higher level NLP tools (initially in Bulgarian and English), such as categorisation, summarisation, machine translation, as well as linguistic applications as “similar items”, “important phrases ” etc. Both host institutions will make efforts to embed the ATLAS solutions in their **educational and research activities** and will be involved in the process of analysis of user requirements, user evaluation of ATLAS solutions and involvement of users as co-designers and co-creators during the whole life cycle of the ATLAS solutions.

The Living Lab will be open for users, designers and developers of other multilingual e-content and e-library products and services and will support building different ATLAS **communities**, that share practice and knowledge, such as: the ATLAS open source developers community, content users, researchers, trainers, learners, companies, universities. The MLeCeL LL will provide a **set of services that facilitate visibility of the user evaluation** feedback and empirical data and **support integration of new versions of the ATLAS solutions**.

Users in the MLeCeL LL will conduct **experiments following a complex user scenario** as well as while **working on the specific lab projects**. The ATLAS solutions will be used in **educational and training activities at university level**, initially at SULTSIT and Sofia University, and later – in other universities that are members of the Bulgarian Virtual University. Close cooperation with the **teams of university researchers** from SULTSIT and Sofia University, working in the area of e-content and e-library will be established. A typical example of such cooperation could be considered the Usability Seminar, organized in 18-19 May 2011 in Sofia by Sofia University and ITD with 20 participants – developers, users, researchers. i-Publisher and i-Librarian were used as case studies. The training programme included the following topics: Usability and User Experience, Benefits of Usability, Usability Heuristics and User Interface Principles, Methods of Usability Engineering, Analysis, Innovation, Design, Prototyping, Evaluation, Trends and Special Topics in HCI, Exercises in Usability Reviews & Testing.

The LL will provide a **cooperation platform** (including wikis, blogs, forums) and **services** for the ATLAS communities facilitating visibility of user/expert evaluation, learning, co-working, software integration, sharing of information, knowledge, innovations and expertise, etc. The LL will organise a number of idea generation workshops and seminars with experts and lead-users, e.g. in cooperation with the VirtSOI LL and Digital Spaces LL.

The LL contributions and feedback will be channelled through:

- User interviews (more than 20) and user suggestions (more than 30);
- Feedback from idea generation workshops with lead-users (at least 3);
- Feedback from idea generation workshops with experts (at least 2);
- Online suggestion box (ongoing moderation and summarization);
- Feedback from workshops with users and prospective users (at least 4);
- Feedback from prototype testing (at least 2);
- Feedback from real settings service deployment (at SULTSIT and Sofia University);
- Usability Lab controlled assessment of user acceptance (at least 1);
- Feedback from education and training sessions at university level (at least 2);
- Feedback from training workshops with developers (at least 2);
- Feedback from workshops with researchers (at least 2);
- Catalysing research activities based on ATLAS (at least 1 PhD study and 10 MSc studies);
- Ongoing support of ATLAS communities and summing up of their feedback;
- Final report of the LL activities.

7 GENERAL REFERENCES

Likert scale: http://en.wikipedia.org/wiki/Likert_scale

EurLex: <http://eur-lex.europa.eu/>

Project Gutenberg: <http://www.gutenberg.org/>

ATLAS Online User Evaluation questionnaires: http://ue.atlasproject.eu
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ANNEX 1: THE LIVING LAB MODEL

Living Labs have been recently adopted as a new innovation instrument to foster European competitiveness¹². Living Labs is an innovation model that **aims to bring together and involve all stakeholders** (such as end-users, researchers, industrialists, policy makers, and so on) at the earlier stage of the innovation process in order to experiment breakthrough concepts and potential value for both the society and users that will lead to breakthrough innovations, such as products, services and applications. It refers to an R&D methodology where innovation (like service, product or application enhancements) is created or validated in collaborative, multi-context, empirical **real-world environments**. By this approach, the individual is focused in his or her role as a citizen, user, consumer, or worker. The Living Labs research methodology integrates a user-centric research approach and a user community driven innovation based on real life experiments.

Open Innovation

A key concept for Living Labs is **Open Innovation**. In the **Closed Innovation paradigm** the development of new businesses and the marketing of new products are restricted to the boundaries of the companies (see Fig. 1). The companies “*must generate their own ideas and then develop, build, market, distribute, service, finance, and support them on their own*”¹³.

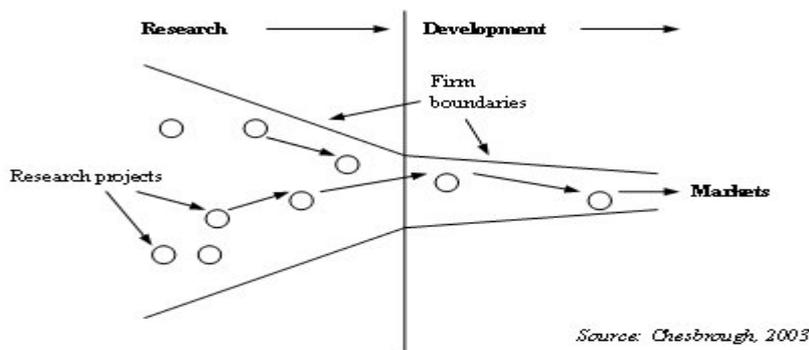


Fig.1. Closed Innovation

If the companies apply the **Open Innovation paradigm**, they are able to use both external as and internal sources of innovation (see Fig. 2 and Fig. 2). The shift from the closed innovation to the open innovation model is typical process for many companies in the current economic, information and technology environment. The difference between the closed and open innovation models could be illustrated in Table 1¹⁴.

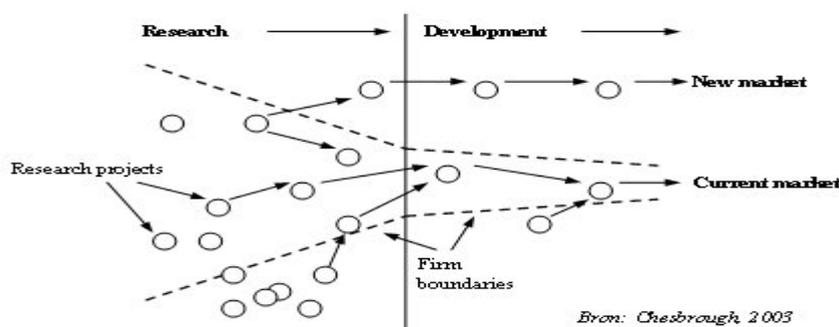


Fig. 2. Open Innovation (Chesbrough, 2003)

¹² Living Lab Handbook, <http://www.ve-forum.org/apps/pubs.asp?Q=1&T=Living%20Lab%20Handbook>

¹³ Chesbrough, H. (2003), Open Innovation - The New Imperative for Creating and Profiting from Technology, Harvard Business Press

¹⁴ Open Innovation, <http://www.openinnovation.eu/>

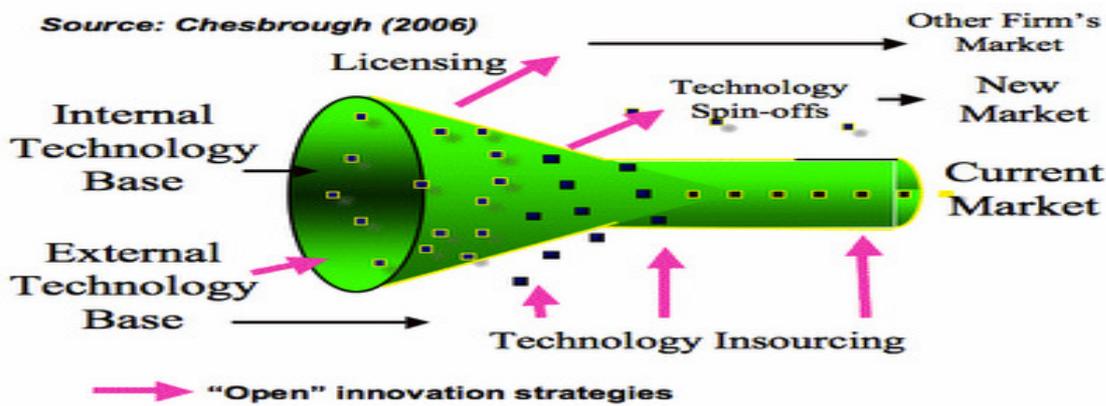


Fig. 3. Open Innovation (Chesbrough, 2006)

Closed innovation principles	Open innovation principles
The smart people in the field work for us.	Not all the smart people in the field work for us. We need to work with smart people inside and outside the company.
To profit from R&D, we must discover it, develop it, and ship it ourselves.	External R&D can create significant value: internal R&D is needed to claim some portion of that value.
If we discover it ourselves, we will get it to the market first.	We don't have to originate the research to profit from it.
The company that gets an innovation to the market first will win.	Building a better business model is better than getting to the market first.
If we create the most and the best ideas in the industry, we will win.	If we make the best use of internal and external ideas, we will win.
We should control our IP, so that our competitors don't profit from our ideas.	We should profit from others' use of our IP, and we should buy others' IP whenever it advances our business model.

Table 1. Closed and Open Innovation Paradigms

User Involvement

Since the demand for designing and developing products or services that meets the individual needs of the end-users, the innovation created by the users should strongly complement the innovation activities of the companies¹⁵. However, it is important to engage in the process some **appropriate users** as representative of the whole user community. These users should be actively involved in the process (even – as part of the development team) instead of only assessing their needs.

Users and companies tend to develop different kind of innovation. A manufacturer approaches the development of a new product/service from a more technological perspective, while the users' knowledge is based on concrete experience with other related products/services. However, although the users could identify some of their needs and requirements related to a concrete product/service, typically they are not aware of all their needs. Many problems can be identified only in the process of active use of the new product/service. In addition, during the process of active use some new needs and ideas could pop-up. A clear tendency is emerging – establishment of a **co-creation process** between product/service development and the user active usage and evaluation of the innovations. During the co-

¹⁵ Living Lab Handbook, <http://www.ve-forum.org/apps/pub.asp?Q=3415&T=Living%20Lab%20Handbook>

creation process the product/service could be considerably improved and the incremental development provides the users with the potential of the usefulness of the innovation.

For users the main motivation is the challenge to take part in development of the products and the services they will use. A core user group from a future **virtual community of users** could be involved in the further improvement of the product/service. Thus some new business models, typical to the Enterprise 2.0 concept¹⁶, could be applied. For instance, the **Long Tail** business model¹⁷ - a company can engage a large group of users to collaborate and their aggregated work is used for improvement of the innovation. Such communities of users can perform rapidly the trial and error process of innovation, share information, test and diffuse the results¹⁸.

Living Labs

Living Labs are “*open innovation ecosystems in real-life settings in which user-driven innovation is fully integrated in the co-creative process of new services, products and societal infrastructures*”¹⁹. The main feature of the Living Labs model is that the end-users participate from a very early stage of the process of innovative product/service development and their needs are better analyzed, evaluated and fulfilled. Users are not considered simply as an object of innovation, but rather **contributors, co-creators and innovators**.

Another definition is: “*A Living Lab is a system enabling people, users/buyers of services and products, to take active roles as contributors and co-creators in the research, development and innovation process*”²⁰. Living labs are used for open user driven innovation validation and development environments, which are managed by external and in many cases by public-private consortiums to create market like conditions to test also emergent markets for new services and products. The Living Labs Roadmap document provides several examples. For instance – Nokia has been actively working on Living Labs since 2001 when it started developing its own open innovation work space at Karaportti Finland (first Corporate Living Lab). The company creates strategic alliances with many Living Labs and acts as a client for their services. Such Living Labs close to Nokia are at the MIT, Boston/Cambridge Campus, selected Living Labs from the European Network of Living Labs²¹, such as Helsinki Living Lab²², Nokia's Living "Open Innovation" Laboratory²³, Village Living Labs in developing countries (e.g. South Africa²⁴), in big cities of China, etc.

A Living Lab should have capability to:

- Form an appropriate organisation and partnership;
- Motivate and empower large scale user engagement;
- Establish adequate tools and infrastructure;
- Form and execute case-dependent processes and manage IPR;
- Disseminate a wide variety of results.

Another benefit from the Living Labs approach is the **training and education of communities of end users** of the new products/services. The **development of user guides and other training materials** is another example where the end users involvement brings substantial added value.

¹⁶ Enterprise 2.0, http://andrewmcafee.org/2006/05/enterprise_20_version_20/

¹⁷ Anderson, Chris (2006). [The Long Tail: Why the Future of Business Is Selling Less of More](http://www.amazon.com/Long-Tail-Why-Future-Business-Is-Selling-Less-More/dp/1401302378). New York: Hyperion. ISBN 1-4013-0237-8.

¹⁸ Long Tail User Driven Innovation, http://en.wikipedia.org/wiki/Long_Tail#User-driven_innovation

¹⁹ Living Labs for user-driven open innovation, http://ec.europa.eu/information_society/activities/livinglabs/index_en.htm

²⁰ CoreLabs Project and Living Labs Portfolio Leadership Group. Building Sustainable Competitiveness, Living Labs Roadmap, 2007-2010, http://ec.europa.eu/information_society/events/cf/ict2008/document.cfm?doc_id=6474

²¹ European Network of Living Labs – EnoLL, <http://www.openlivinglabs.eu>

²² Helsinki Living Lab, <http://www.helsinkilivinglab.fi/>

²³ Nokia's Living "Open Innovation" Laboratory, http://venture2.typepad.com/innovationnet/2004/07/nokias_living_o.html

²⁴ Living_Labs_in_Southern_Africa , http://lisa.meraka.org.za/index.php/Living_Labs_in_Southern_Africa

Figure 4 provides a picture of the scope of the Living Labs model in the frames of the whole process of innovative product or service development.

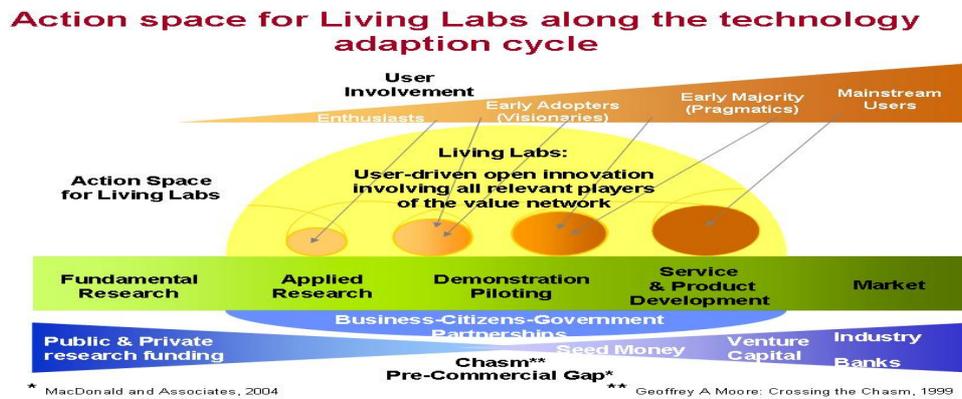


Fig. 4. Action space for Living Labs along the technology adaption cycle

Boston University extends the concept of the Living Lab and emphasise on the **role of the universities the innovation ecosystem**²⁵. They consider students and the experiential learning opportunities as central to the concept of Living Labs. Through their learning activities, research works and practice, the students become an integral part of the research, adaptations and venture development process. The university brings together researchers, students, solution and service providers, users/consumers/citizens into the system of research and innovation. This deepens the understanding of the complex systems and substantially increasing the potential for both ground breaking innovation and successful adoption.

The Living Labs could serve several purposes:

- a platform for multidisciplinary research, innovation and commercialization;
- a unique environment of experiential learning for students;
- a unique value proposition for working with industry and institutional partners;
- a means for re-engaging with the community.

The European Commission considers the Living Labs as a model which benefits citizens, industry and research²⁶:

- Living Labs **empower citizens**, as end-users, to influence the development of innovative services & products that eventually could benefit the whole society.
- Living Labs allow **industry to develop**, validate and integrate new ideas, to partner with other companies and to increase their chances of success during product and/or service launches.
- Living Labs facilitate the integration of technological innovation in society and increase return on investments in ICT **research**.

Living Labs are expected to boost and support the innovation process through the whole innovation lifecycle²⁷ (see Fig.5).

²⁵ The New Living Lab Model: A Cross-Disciplinary, Multi-Stakeholder Research, Education, & Innovation Platform, <http://www.bu.edu/itec/action/living-lab/>

²⁶ Living Labs for user-driven open innovation, http://ec.europa.eu/information_society/activities/livinglabs/index_en.htm

²⁷ European Network of Living Labs – EnoLL, <http://www.openlivinglabs.eu>

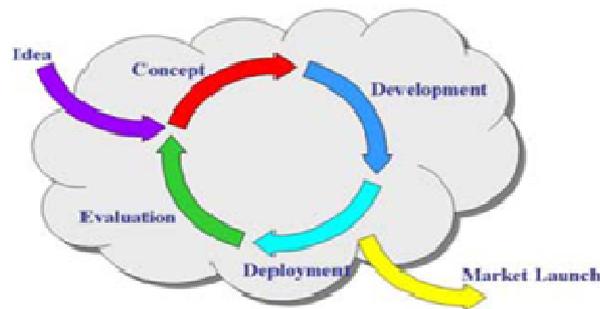


Fig. 5: Innovation lifecycle

Compared to other experimental platforms, such as: prototyping platform, testbed, field trial, market pilot and societal pilot, Living Labs are more suitable for products and services that are “semi-mature” in terms of distance to market, and put the focus on innovation²⁸ (see Fig. 6).

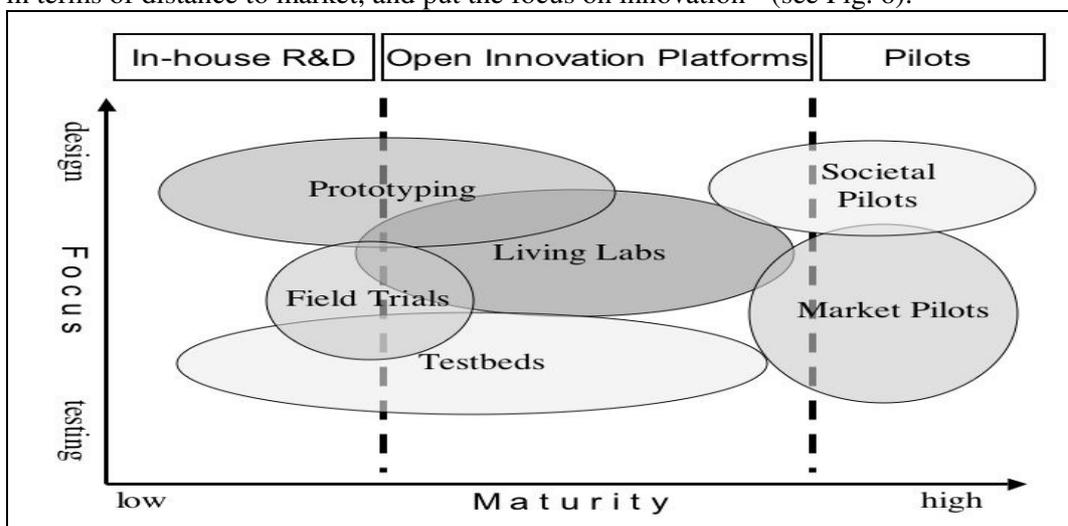


Fig. 6. Conceptual Framework of Test and Experimentation Platforms

Living Labs provide a **set of services** to their customers²⁹ - SMEs, industry, research or public and civic organisations. The main important services are the **co-creation services** supported by services for both integration and data preparation.

A unified and shared reference model (“interoperability cube”) and sequence of maturity phases for establishment of Living Labs in ENoLL were developed³⁰(see Fig. 7, Fig. 8 and Fig. 9). The cube model enables also recognizing the degree of harmonization of used methods and tools in Living Labs. The six sides of the cube correspond with the **six most important topics: user involvement, service creation, infrastructure, governance, innovation outcomes and methods & tools**. Each topic facilitates interoperability between the phases of a Living Lab (**setup – sustainability – scalability**). The three columns of each cube side reflect the **organizational, technical, and contextual issues** of the Living Lab. The harmonization cube not only represents the most important elements of a Living Lab, but also enables specifying bridges between existing Living Labs, i.e., to learn from each other,

²⁸ Ballon, Pieter, Pierson, Delaere, & Simon. (2005). *Test and Experimentation Platforms For Broadband Innovation: Examining European Practice*. Brussels, Belgium: Interdisciplinary institute for broadband technology (IBBT), http://userpage.fu-berlin.de/~jmueller/its/conf/porto05/papers/Ballon_Pierson_Delaere.doc

²⁹ Laboranova consortium, D 7.1.1. Living Labs methodology, scenarios and tools for data collection, www.laboranova.com/modules/download_gallery/dlc.php?file=28

³⁰ Mulder, I., Fahy, C., Hribernik, K., Velthausz, D., Feurstein, K., Garcia, M., Schaffers, H., Mirijamdotter, A., & Stahlbrost, A. (in press). “Towards harmonized methods and tools for Living Labs”. Forthcoming in Proceedings of eChallenges 2007. Paper to be presented at e-Challenges 2007, 24 - 26 October 2007, The Hague, The Netherlands.

benchmark the validation of user behaviour studies, exchange best practices, and interconnect the Living Labs³¹.

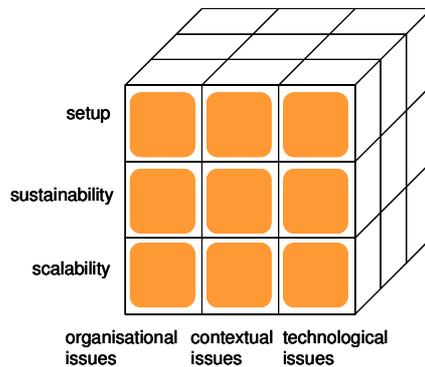


Fig. 7. Living Labs Harmonization Cube

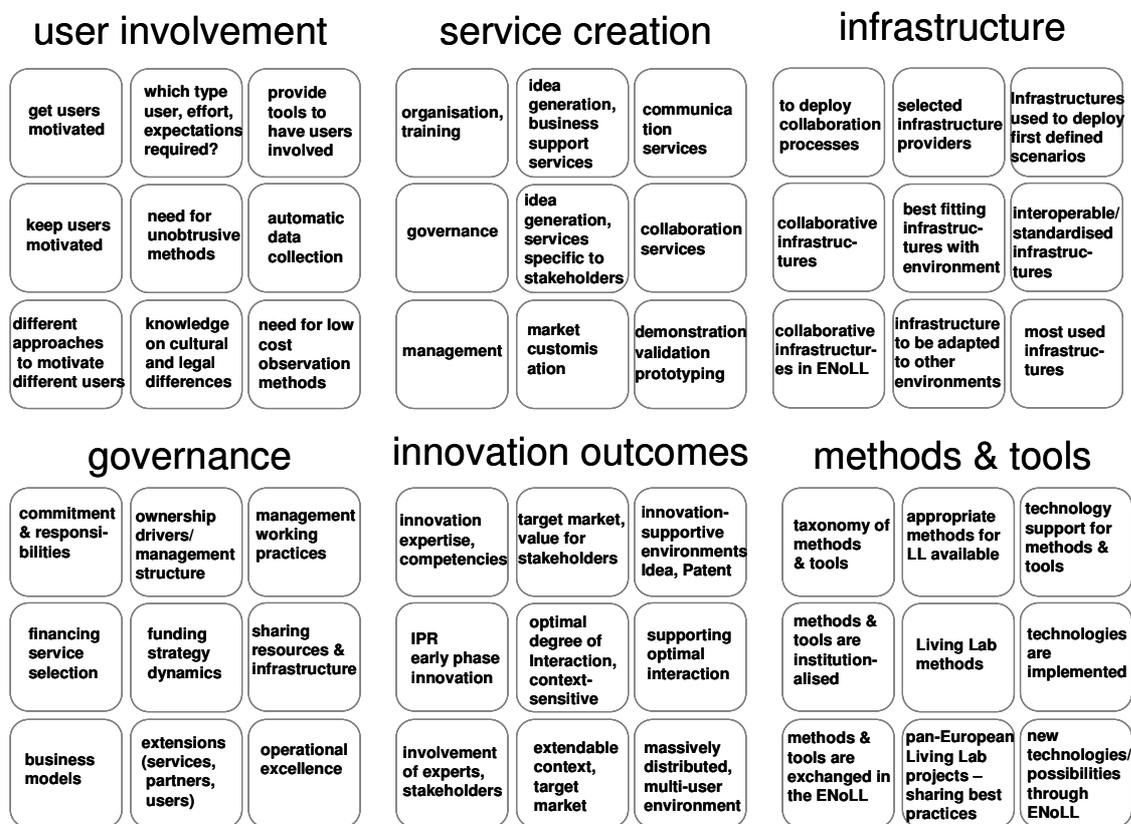


Fig. 8. Six sides of the harmonization cube

The cube model helps to understand the **main characteristics of a Living Lab** in the different development phases and areas for further development. This model provides an instrument for **evaluation** of a Living Lab, including about the added value it brings as an open innovation. The harmonization cube model provides a framework for sharing methods, tools, experiences, and best practices among the Living Labs in the ENoLL and building repositories of methods and tools.

³¹ http://www.ami-communities.eu/pub/bscw.cgi/d310159/ENoLL_leaflet_harmonization_cube.pdf

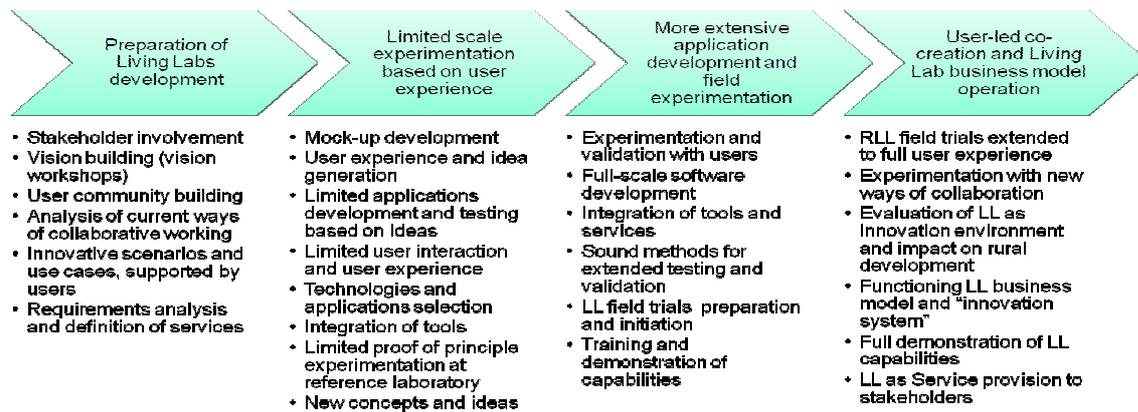


Fig. 9. Living Labs Maturity Steps

The Living Lab Methodology

The Living Labs research methodology integrates a user-centric research approach and a user community driven innovation based on real life experiments. The employed user-centric research methodology includes: sensing, prototyping, validating and refining complex solutions in multiple and evolving real life contexts. The philosophy is to **turn users, from being traditionally considered as a problem, into value creation** by involving the user into the development process ensuring highly reliable market evaluation. Using this approach a reduction of technology and business risks is gained.

The Living Lab approach tries to break the trial and error process of product development previously described, and change that into a **co-design** process where **users and developers actively work together creating the new solutions**.

The principles of Living Lab operations are Continuity, Openness, Realism, Empowerment of users and Spontaneity, **CORES**³²:

- **Continuity** –users and other stakeholders can build trust and context based unique knowledge by participating in series projects, innovation cases and business experiments;
- **Openness** – the innovation processes must be as open as possible;
- **Realism** - realistic behaviour of users and stakeholders is necessary - a Living Lab must be experienced by its users and stakeholders as a real environment;
- **Empowerment of users** - Living Labs efficiency is based on the creative power of significant user communities.
- **Spontaneity** – Living Labs should provide the *“ability to detect, aggregate and analyze spontaneous user’s reactions and ideas over time, along a product/service full lifecycle”*.

The Living Labs framework is a particular innovation approach in which **all stakeholders participate in the development process of a product, service or application**³³. This is a research and development methodology where innovation is created or validated in collaborative, multi-context, empirical real-world environments. By this approach, the individual is focused in his or her role as a citizen, user, consumer, or worker. The main difference between traditional consumer research programs and the Living Labs is this people’s involvement in their every day lives, encompassing all of their societal roles.

³² CoreLabs Project and Living Labs Portfolio Leadership Group, Building Sustainable Competitiveness, Living Labs Roadmap, 2007-2010, http://ec.europa.eu/information_society/events/cf/ict2008/document.cfm?doc_id=6474

³³ CoreLabs Project, D5.1 - Methods & Tools Inventory & Taxonomy, <http://www.ami-communities.eu/pub/bscw.cgi/d308077/D5.1%20Methods%20%26%20Tools%20Inventory%20and%20Taxonomy.pdf>

The main theoretical point is the concept of “users as innovators” - “the basic idea is not about using the users as ‘guinea pigs’ for experiments, it’s about getting access to their ideas and knowledge”³⁴. Thus the Living Lab is based on user centric design, validation and evaluation methodologies, conceiving of the integration with users as the most powerful source of innovation. However, despite the proven advantages of such integration, **the majority of companies are not taking the user into account during the product development process, especially in its early phases**³⁵. In the effort to achieve a quicker return on investment, the developments are often based on the technological possibilities, not on the actual needs of customers. The Living Labs could be turned into widely applied standardised, user centric and market oriented validation environments.

Another key elements of the Living Lab methodology is the **high participation and multiple contexts**, i.e. the participants in a Living Lab are observed across many aspects of their lives, such as their roles as citizens, workers, at home, travelling, and so on.

The Living Labs offer a core set of **services** that can be decomposed as follows:

- **co-creation services**, following the product development process (adapted from Reichart 2002, 24) illustrated in Fig. 10 below, with its four stages, from Idea to Concept and from Product/Service Development to Market Launch:



Fig. 10: Product/Service Development Process

- **integration services**, meaning the efficient, transparent and smooth integration of the Product/Service into the user’s personal experience, which is key for trust and convenience of the customer. Three types of customer integration could be defined³⁶:
 - A weak, passive form that is called “*Listening to Consumer*”,
 - A moderate and active form called “*Interaction with Advanced Users*” and
 - A strongly active form which is called “*User Toolkits for Innovation*”.

The “User Toolkit for Innovation” is characterized by **outsourcing several development tasks to the consumer**³⁷.

- **standardised data preparation services**, allowing comparability of the results within other Living Labs in the same network and/or the confirmation of expected output in the run-up to the usage.

The **methods** used in Living Labs can be divided into more **traditional** (qualitative, ethnographic) research methods on the one hand, and **ICT-enabled methods** (such as online interviews, web-based conjoint analysis, virtual product testing and user toolkits) on the other hand (see Fig. 11 below):

³⁴ Eriksson, M., Niitamo, V.-P., Kulkki, S., Hribernik, K. A. (2006): “State-of-the-Art and Good Practice in the Field of Living Labs”, in: Proceedings of the 12th International Conference on Concurrent Enterprising: Innovative Products and Services through Collaborative Networks, Italy: Milan. 26 – 28 June, pp. 341-348.

³⁵ Reichart, S. (2002): Kundenorientierung im Innovationsprozess. Die erfolgreiche Integration von Kunden in den frühen Phasen der Produktentwicklung, 1. Auflage. Germany: Wiesbaden. Deutscher Universitäts-Verlag.

³⁶ Jeppesen, L. B. (2005): “User Toolkits for Innovation: Consumers Support Each Other”, in: *The Journal of Product Innovation Management*, Vol. 22 (2005), Issue 4, pp. 347-362.

³⁷ Von Hippel, E. (2001): “Perspective: User toolkits for innovation”, in: *The Journal of Product Innovation Management*, Vol. 18 (2001), Issue 4, pp. 247-257.

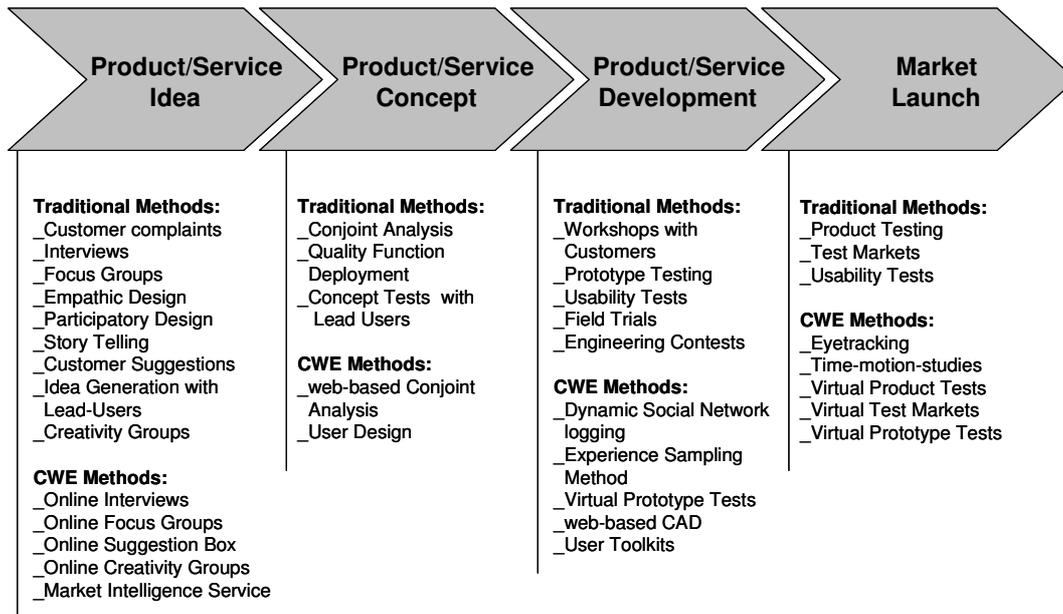


Fig 11: Customer Integration Methods

The Living Labs **ICT Infrastructure** is of crucial importance – it is used as a **cooperative working environment (CWE) for all stakeholders** and as an **environment for evaluation and validation of new products or services**. The ICT infrastructure provides **access of the users to the new and emerging products**, and also – **access of the developers to the user’s feedback**. This integrates the user into the development process provides very **reliable market evaluation** which significantly reduce the technology and business risks.

The information collected and the best practices harmonisation activities led to the following **key features**³⁸:

- The Living Labs are very heterogeneous in their composition.
- The main focus of the Living Labs is to create innovative services out of ICTs.
- All of the Living Labs are a People-Public-Private Partnerships (PPPPs).
- All of the examined Living Labs address more or less the same stakeholders.
- All of the examined Living Labs integrate their stakeholders into the development process of new products or services.
- The ICT infrastructure they provide is very heterogeneous.

Similarly, the methods & tools taxonomy overview led to the following **key observations**, such as:

- The Living Labs currently employ specific methods and tools to integrate and interact with their stakeholders across the entire new product and service innovation process.
- The traditional methods are widespread within the existing Living Labs.
- The Living Labs are currently developing new methods and tools to interact with their stakeholders.
- The methods used within the Living Labs are supported by new ICTs, which helps reduce innovation time and cost.

European Policy on Living Labs

The EC (through the INFSO DG) is promoting user-driven open innovation methodologies in its research, development and innovation programmes along three dimensions³⁹ (see Fig. 12).

³⁸ CoreLabs Project, D5.1 - Methods & Tools Inventory & Taxonomy, <http://www.ami-communities.eu/pub/bscw.cgi/d308077/D5.1%20Methods%20%26%20Tools%20Inventory%20and%20Taxonomy.pdf>

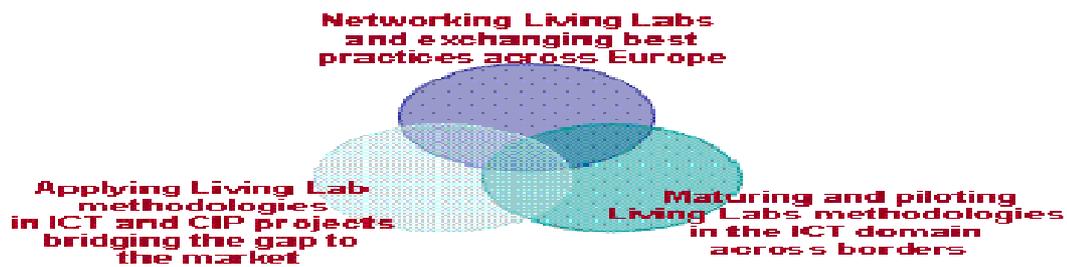


Fig. 12. EC support of user-driven open innovation methodologies

The Living Lab model is very much linked with the [EUROPE 2020](#) strategy, e.g. with Innovation Union Flagship Initiative and [Digital Agenda for Europe](#)⁴⁰, aiming "to deliver sustainable economic and social benefits from a Digital Single Market based on fast and ultra fast internet and interoperable applications". The EC develops Living Labs as a strategic policy and a new infrastructure paradigm and experimental facility related to innovation and ICT⁴¹.

Under the ICT PSP of the [Competitiveness and Innovation Programme \(CIP\)](#) and the [ICT Programme of the FP7](#), the EC supports several projects related to user-centric open innovation and Living Lab methodologies, such as the Smart Cities priority in the CIP⁴², Future Internet PPP⁴³ (see Fig. 13), etc.



Fig. 13. The role of the FI-PPP platform⁴⁴

The [European Network of Living Labs](#)⁴⁵ (ENoLL) was founded in 2006 and includes more than 200 members now. ENoLL has been strongly supported through variety of EC programmes and projects so

³⁹ Living Labs for user-driven open innovation, http://ec.europa.eu/information_society/activities/livinglabs/index_en.htm

⁴⁰ [Digital Agenda for Europe](#), http://ec.europa.eu/information_society/digital-agenda/index_en.htm

⁴¹ Blix, P, Developing Living Labs Policy in ICT, <http://www.ami-communities.eu/pub/bscw.cgi/d506982/Blixt%20Developing%20Living%20Labs%20Policy%20in%20ICT.pdf>

⁴² Lemke, M, Open Innovation for Future Internet enabled Services in “Smart” Cities, http://ec.europa.eu/information_society/activities/livinglabs/docs/pdf/smart_cities_jan2010/morning/02%20Lemke_PUBLIC.pdf

⁴³ Future Internet PPP, <http://www.fi-ppp.eu/>

⁴⁴ EC, Advancing and applying Living Lab methodologies. An update on Living Labs for user-driven open innovation in the ICT domain, July 2010, http://ec.europa.eu/information_society/activities/livinglabs/docs/pdf/newwebpdf/living-lab-brochure2010_en.pdf

⁴⁵ European Network of Living Labs – EnoLL, <http://www.openlivinglabs.eu>

far⁴⁶. The experience shows that the development of Living Labs is possible through different EU Programmes (e.g. FP7, CIP, Interreg, Structural Funds, etc.)⁴⁷.

Some Best Practices in eContent Related Living Labs

IBBT-iLab.o, Belgium

IBBT-iLab.o⁴⁸ sets up test and experimentation platforms and performs Living Lab research for achieving policy and business goals using stakeholder co-design. It works closely with the User Policy Department, based at the Vrije Universiteit Brussel, Belgium. IBBT iLab.o used the UrbiZone network, a WiFi mesh pilot network in the heart of Brussels, covering all college and university campuses. The centre was established as a nucleus for open innovation activities and as a repository of relevant knowledge and expertise.

IBBT-iLab.o embeds the qualifications to set up and to accompany Living Labs in the field of electronic publishing. They participated in several projects related to eContent development like Living Lab testing an eReader device with e-ink technology with 200 dedicated newspaper readers⁴⁹ and in the I-City environment. The IBBT | i-City partnership is dedicated to development and testing a mobile city guide, local news applications, and media sharing services, in co-operation with industry partners like Concentra and Microsoft.

Knowledge Workers Living Lab, Germany

The Knowledge Workers Living Lab⁵⁰ (KW LL) was launched with the support of University Bw Munich and local partners in Munich in 2005. The target users are “*knowledge workers*” and their new working environments, involving individuals, eProfessionals, community members as well as large companies and start-ups. Innovation and related R&D focus on “*knowledge working practices*”, supporting information and communication technologies, and new management systems.

Amsterdam LL, the Netherlands

The Amsterdam Living Lab⁵¹ aims at establishing a European Center for design and development of products and services in the area of ICT and new media. This is done by a strong focus on tools, methodologies and knowledge on measuring and understanding behavior and experience. And by creating processes with a strong link between design and understanding real life behaviour of users. By creating this knowledge and test infrastructure Amsterdam can increase its position as the place to be for design and development of the experience. The Amsterdam Living Lab is supported by the city of Amsterdam through the Amsterdam Innovatie Motor (AIMsterdam.nl), Amsterdam Topstad, the citizens of Amsterdam and works together with world class knowledge institutes (as the University of Amsterdam, Telematica Instituut and The Waag Society), companies (IBM, Nuon, PWC, KPN, Logica, Philips, Accenture, CONTINUON, NUON, Cisco). The Amsterdam Living Lab is financially supported the National Government (Ministry of Economic Affairs) and has the interest of the Dutch Innovation Platform, a national initiative chaired by the prime minister.

RECORD Living Lab, Norway

The RECORD Living Lab⁵² was set up to meet user involvement challenges targeting: evolving user requirements and patterns of media use, design, and user-feedback in the early development phases of ideation and design. The RECORD Living Lab will tap into the creative powers of users by utilizing online community functionality as means to gather knowledge to improve online community design. It

⁴⁶ EC, Advancing and applying Living Lab methodologies. An update on Living Labs for user-driven open innovation in the ICT domain, July 2010, http://ec.europa.eu/information_society/activities/livinglabs/docs/pdf/newwebpdf/living-lab-brochure2010_en.pdf

⁴⁷ Analysis of the ICT related Living Labs structures, work processes and methods in Latvia, http://ballad-livinglabs.eu/LL_Analysis_Report_Latvia.pdf

⁴⁸ <http://www.ibbt.be/en/develop-test/ilab-o>

⁴⁹ <https://epaper.ibbt.be>

⁵⁰ www.cetim.org

⁵¹ <http://www.aimsterdam.nl/>

⁵² <http://www.opinion.no>

consists of a Internet panel and an online environment. The Internet panel includes more than 3000 Internet users meant to be as representative as possible for the Norwegian Internet users aged 15-40 years. The aim of the Living Lab is to provide information about the online community media and services use, to engage users in design discussions and provide design feedback on prototypes or running services, and to involve users in user-centred evaluation. The online environment for user co-creation and feedback is used to allow: user comments and ratings of suggested services and designs, users posting design revisions or alternate design suggestions, user-user and user-developer discussions, etc. The RECORD online Living Lab is hosted by Opinion AS and SINTEF, and is being developed as part of the research project RECORD – supported by the Norwegian research council

Creative Media Lab, Portugal

The Creative Media Lab⁵³ is an open, innovative and creative community with the objective of the conception, development, validation and testing of novel services/products and applications/solutions in the area of digital media, namely digital journalism and participatory media, considering the citizens (readers) as lead users in a real-life context of a university, a neighbourhood, a city or a region. A human centric, user driven and open innovation approach is privileged. Citizens are taking an increasingly active role in the processes of collection, analysis, production and distribution of information, in a perspective of human (user)-centric systemic innovation. The development of the information and communication technologies has enhanced this phenomenon, leading to the emergence of collective communities such as blogs, wikis, podcasts, social networking, etc. These new forms of journalism and the emergence of groups of “reporter citizens” have been inducing a radical change in the traditional media and the emergence of new solutions in the area of digital media. The focus area of the “Creative Media Lab” is using digital media as an enabling technology, aimed at developing and producing innovative and creative applications/solutions in the area of journalism (contents and interactive tools/platforms), within a co-creation perspective. The stakeholders that are involved are public organisations, research institutions, R&D based companies, and the users/citizens as a group of the actual and potential readers of the newspaper (circa 300.000 readers and 960.000 online visitors).

Manchester Living Lab, UK

The Manchester Living Lab⁵⁴ elaborates services provided through EastServe.com, such as email, online chat groups, and news and information tailored to East Manchester. The portal web site is designed specifically for the local community and provides access to local services and news about the area. A residents’ panel of “e-journalists” provides much of this content. The EastServe site delivers information and interactive services from the City Council, national government departments, the Police and local community networks. Plans are underway to expand the Eastserve network to cover 4500 homes in the area and eventual expansion to 50,000 over the next three years is also being considered in a new city wide digital inclusion initiative.

Bulgarian Living Labs

Virtual Services and Open Innovation Living Lab (VirtSOI)

The VirtSOI Living Lab⁵⁵ is member of ENoLL. It is a live ecosystem where research, training and innovation interfere and enhance each other in order to develop and deploy innovative products and virtual services at national and European level with an active end-user participation and international collaboration⁵⁶. VirtSOI aims to integrate a broad vision for virtual services development and implementation within the society related to different sectors, such as: eLearning, eGovernment, eHealth, **eContent**, eInclusion, etc. In this respect the VirtSOI LL plays the role of a **regional lab** and active marketplace platform for regional expertise/innovation/service seekers and providers. After

⁵³ <http://www.inteli.pt>

⁵⁴ <http://www.manchesterdda.com>

⁵⁵ www.virtech-bg.com

⁵⁶ VirtSOI Living Lab, <http://www.openlivinglabs.eu/livinglab/virtual-services-and-open-innovation>

achieving a level of maturity, the VirtSOI LL will make efforts to **incubate a set of service-oriented LLs** targeting different industrial and public sectors. The **network of partnering organizations** includes: companies - Virtech Ltd - the VirtSOI host organization, Astea Solutions AD; research organizations and university centers - Centre of IST, Sofia University (CIST); Technology Transfer Office, Sofia University (TTO); **Institute of Technology and Development (ITD)**; NGOs and professional associations - Agency for Sustainable Development and Euro-integration (ASDE); National Research Network (NRN); Bulgarian Telematics Association (BgTA); iCenters Association; Law and Internet Foundation with the Center for the Law of Information and Communication Technologies (CLICT); E- Health Bulgaria Foundation, Bulgarian Industrial Association (BIA), etc.

Digital Spaces Living Lab (DSLL)

Digital Spaces Living Lab - DSLL⁵⁷ provides a creative environment for research and innovation, as well as new forms of direct user involvement in the innovation process. It aims to establish links between business enterprises, media partners, academia and citizens to ensure the successful collaboration between all these parties in the area of Digital Spaces: “*digital, virtual or computer-generated worlds, but also the spaces we live in, where we use digital media, digital communication devices, digital gadgets, etc*”.

The main objectives of the Digital Spaces Living Lab are:

- to help IT, media and communications companies to test new technologies and products in very early stages of their development and with real users;
- to support new ideas and start-up companies in the digital media sector via the DSLL Technology Incubator;
- to give start-up companies in the digital media sector access to unique, specialised and cutting-edge infrastructure and facilities which will help them develop quicker and better their products and services;
- to foster co-creation and co-development of new technologies and products that combine and fuse core technologies developed by industrial and academic partners; to create a real-life and online community of specialists and non-specialists who are interested in digital media technologies and a venue and forum where they can meet and discuss ideas.

The Digital Spaces LL (www.digitalspaces.info) is a joint initiative of a number of partners, such as:

- Attentive Displays (www.attentivedisplays.com)
- FAVIT (www.favit.com)
- HiLab, New Bulgarian University (NBU) (hilab.nbu.bg)
- NEVEQ (www.neveq.com)
- Ontotext AD (www.ontotext.com)
- Astea Solutions (www.asteasolutions.com)
- Imagga (www.imagga.com)
- Lucrat (www.lucrat.net)
- Informatics and Telematics Institute (ITI), CERTH (www.iti.gr)
- Rapan (www.rapan.com)

⁵⁷ DSLL, <http://www.openlivinglabs.eu/livinglab/digital-spaces-living-lab>

ANNEX 2: MLECEL LL PHASES, HOSTING, INFRASTRUCTURE AND SERVICES

Hosting Institutions

The host institution of the first ATLAS services pilot based on the MLeCeL LL will be the State University of Library Studies and Information Technologies (SULSIT) and University Computing Centre of Sofia University (UCC).

State University of Library Studies and Information Technologies

SULSIT is a unique research and educational interdisciplinary center in Bulgarian context integrating studies in the fields of Library Studies, Information Technologies, Cultural and Historical Heritage. Basic structural units of SULSIT are Faculty of Library Science and Cultural Heritage and Faculty of Information Science. They provide students’ instruction in eight BSc and 14 MSc programs. A structural unit is also the Department of Comprehensive Studies with the Foreign Languages Centre. The Interfaculty Chair “*ICT in Library Studies, Education and Cultural Heritage*” is a new department, established as a structural body of SULSIT, which aims to join the large global network of UNESCO Chairs⁵⁸ and the Open Educational Resources Initiative⁵⁹.

The university has about 3000 students and nearly 200 academic staff. There is a decision of the university management to implement the ATLAS Services. The current portal is only in Bulgarian language (<http://unibit.bg>).

University Computing Centre, Sofia University

The University Computer Centre (UCC) was established in 1972 as one of the independent units of Sofia University St. Kliment Ohridski. Its main objective is to provide computer and communication resources to all faculties and departments of the University, as well as consultations, documentation and specialised literature needed for their daily work. The information and computer services are open to all students (about 25 000) and to the academic staff (about 3000). UCC supports the Electronic Library of research outcomes of Sofia University⁶⁰ which is member of the Open Access Infrastructure for Research in Europe⁶¹.

Phases in the MLeCeL LL Establishment

The MLeCeL LL will follow the sequence of maturity phases for establishment of Living Labs⁶² (see also Annex 1):

- Preparation of the LL development;
- Limited scale experiments based on user experience;
- More extensive application development and field experimentation;
- User-led co-creation and LL business model operation.

During the LL life cycle the six most important topics related to the LL unified and shared reference model will be covered: **user involvement, service creation, infrastructure, governance, innovation outcomes and methods & tools**. This will ensure participation of the MLeCeL LL in the process of sharing methods, tools, experiences, and best practices among the Living Labs in the ENoLL and using

⁵⁸ <http://www.unesco.org/en/unitwin/university-twinning-and-networking/>

⁵⁹ <http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/>

⁶⁰ <http://research.uni-sofia.bg/>

⁶¹ <http://www.openaire.eu/>

⁶² Mulder, I., Fahy, C., Hribernik, K., Velthausz, D., Feurstein, K., Garcia, M., Schaffers, H., Mirijamdotter, A., & Stahlbrost, A. (in press).

“Towards harmonized methods and tools for Living Labs”. Forthcoming in Proceedings of eChallenges 2007. Paper to be presented at e-Challenges 2007, 24 - 26 October 2007, The Hague, The Netherlands.

the repositories of methods and tools.

The MLeCeL LL will pilot its services in the frames of the ATLAS project. The schedule for LL development in the frames of the ATLAS project is given bellow:

- a) Preparation of MLeCeL LL development, identifying the LL stakeholders, initial user community building, analysis of possible ways of collaboration, innovative scenarios and use-cases development, requirement analysis and definition of the core LL services, founding the LL as a network of partnering organizations (ITD, Tetracom) – May 2010;
- b) Conceptual Design of the MLeCeL LL (ITD, Tetracom) – May, 2010;
- c) Launching the LL activities based on the ATLAS solutions (cooperation between ITD, Tetracom and VirtSOI)– June, 2010
- d) Development of a MLeCeL LL web collaboration platform, incl. wiki and a repository (ITD, Tetracom) – June, 2011;
- e) Launching a pilot web collaboration platform for the MLeCeL LL (ITD, Tetracom) – September, 2011;
- f) Incremental development of the Living Lab (ITD, Tetracom, VirtSOI LL) – infrastructure, tools, services, methodology, partners, new innovation products and services to be evaluated and launched on the market, September 2011 – end of the project;
- g) Establishment of partnership and cooperation activities with other sectoral Living Labs, September 2011 – end of the project;
- h) Evaluation of the MLeCeL LL activities – end of the project;
- i) Further development of MLeCeL LL – after the end of the project.

Electronic Infrastructure and Services

The MLeCeL Living Lab will rely on an electronic infrastructure in order to support the pilot development. The infrastructure will include a **web platform** (<http://livinglab.itd-bg.eu>) with a **web-based shared workspace** (see for instance the one of ECOSPACE⁶³). Some screenshots from the pilot web platform are given at Fig. 14

⁶³ <http://www.ami-communities.eu/wiki/ECOSPACE>



Fig. 14. The MLeCeL Living Lab platform

In addition, several tools and instruments, developed under other Living Labs Projects will be adapted, such as: Toolbox for User-Driven Innovation and Living Labs⁶⁴ and Laboranova - Supporting Early-Stage Innovation⁶⁵.

A set of services that support user evaluation will be implemented, following the classification given below⁶⁶ (see Annex 1)

- A weak, passive form that is called “*Listening to Consumer*”,
- A moderate and active form called “*Interaction with Advanced Users*” and
- A strongly active form which is called “*User Toolkits for Innovation*”.

The Living Lab services should improve the users experience while working with the ATLAS services (see Fig. 15).

⁶⁴ Toolbox for User-Driven Innovation and Living Labs, <http://www.lltoolbox.eu/>

⁶⁵ Laboranova - Supporting Early-Stage Innovation⁶⁵, <http://www.laboranova.com/>

⁶⁶ Jeppesen, L. B. (2005): “User Toolkits for Innovation: Consumers Support Each Other”, in: *The Journal of Product Innovation Management*, Vol. 22 (2005), Issue 4, pp. 347-362.

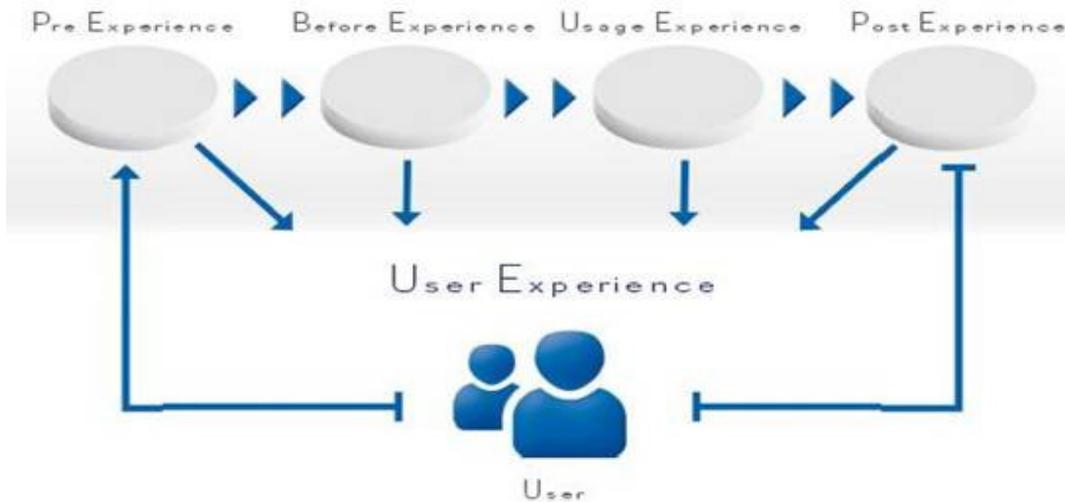


Fig. 15. Improving user experience (© 2011 USECON GmbH)

A **set of services** will be made available to support the development of pilots. The team will integrate/develop dedicated services and tools to support the process, and will monitor and evaluate the utilization of the workspace.

Usability Evaluation

The MLeCel Living lab will provide a unique combination of open innovation services. They allow different users and communities to take part in the ideation, development and implementation and evaluation phase of multilingual e-content and e-library services (see Fig. 16).



Fig. 16. Phases in development of innovative services (© 2011 USECON GmbH)

In the Analysis phase:

- User Analysis: Information on users and user groups
- Task analysis: Which tasks have to be performed with a system, ranking of tasks
- Context analysis: Information on the context of use
- Comparative analysis: Information on similar products and services

In Innovation phase:

- Identification and development of product ideas from a user perspective

- Identification of market potentials from a user perspective

In Prototyping:

- Representation of the future system
- Creative simulation Meeting the requirement: to make it good enough

In Evaluation phase:

- Empirical or expert based evaluation of the user experience
- Quality assurance in all phases of the life-cycle
- Comparison with requirements and/or similar systems
- Identification of potential improvements to the system
- Consideration of different user experience factors

Usability Training

MLeCel Living lab will provide workshops tailored to the specific needs and requirements of each client, fostering the discussion of concrete problems (see Fig. 17).

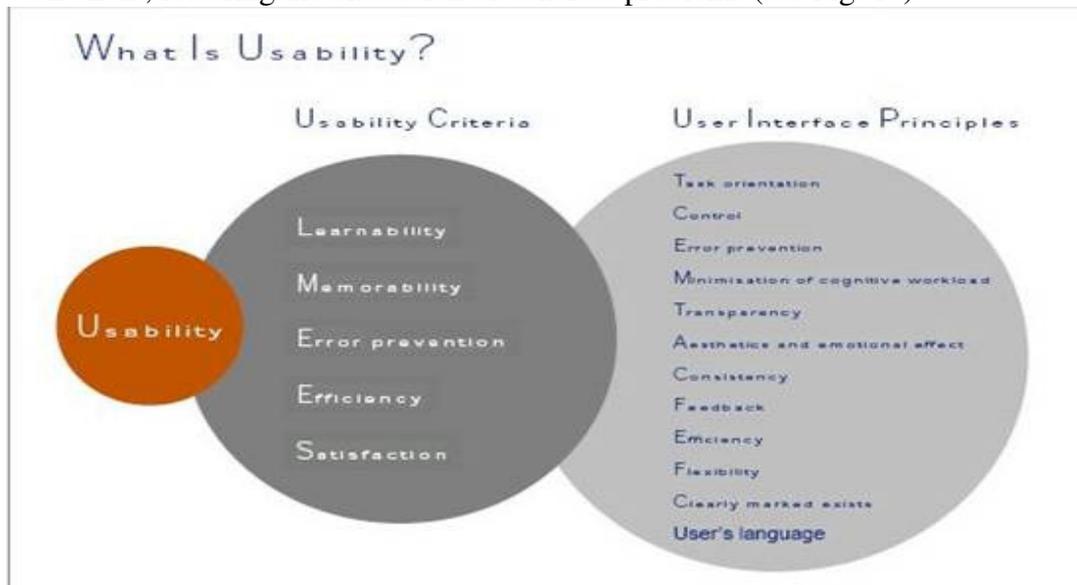


Fig. 17.Usability training framework (© 2011 USECON GmbH)

Potential topics include:

- Introduction to Usability
- Introduction to User Interface Design
- Web Usability
- Accessibility: Serving Special Needs
- Usability of Mobile Devices and Systems
- Usability of MultiChannel and MultiModal Systems
- Usability in eLearning
- Identifying potentials for new services