MSP-REFRAM

Coordination and Support Action (CSA)

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Set of internal KM tools

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Summary

Set of internal KM tools

Approval

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CONTENT

EXECUTIVE SUMMARY

Knowledge management (KM) requires the support of tools to achieve a proper knowledge generation and delivery to the society. An accurate plan for KM is crucial in MSP-REFRAM, especially considering the project multi-actor approach, the cross-sectorial features of the information and the different areas where information will be handled (both inside the consortium at an internal level involving Expert Committees and project partners, and also outside the consortium involving target audiences). Therefore, MSP-REFRAM will implement a KM system as a set of infrastructures and tools that support project activities. They are more than information systems, since they must provide a context that facilitates the creation, transfer and application of knowledge.

Internal KM tools will be used by project partners and are be based in Open source software and customised in order to meet project needs and requirements. This set of tools has been defined considering project partner needs and has been developed aiming for a smooth and quick adoption that will allow the maximisation of knowledge creation and sharing efforts. These tools are: Document management platform, workflow tools, scheduling & planning tools, forum, Wiki, telepresence (WebEx) and face-to-face meetings. From the group of IT tools, the document sharing platform and workflow tool have been set up using the Electronic Content Collaboration Platform tool from LGI, while the rest of IT tools (Forum, Wiki and Calendar) have been developed by IDENER and embedded in the same ECCP to trigger its use and make easier its adoption by project partners.

1. INTRODUCTION

Knowledge management (KM) requires the support of tools to achieve a proper knowledge generation and delivery to the society. An accurate plan for KM is crucial in MSP-REFRAM, especially considering the project multi-actor approach, the cross-sectorial features of the information and the different areas where information will be handled (both inside the consortium at an internal level involving Expert Committees and project partners, and also outside the consortium involving target audiences). Therefore, MSP-REFRAM will implement a KM system as a set of infrastructures and tools that support project activities. They are more than information systems, since they must provide a context that facilitates the creation, transfer and application of knowledge.

Internal KM tools will be used by project partners. In order to make things easier for the users and to encourage the adoption of the tools, all the applications to be developed will be integrated in the same platform. The tools will be based in Open source software and customised in order to meet project needs and requirements.

2. GENERAL APPROACH: KNOWLEDGE MANAGEMENT TOOLS

The goal of knowledge management is a practical one: to improve organizational capabilities through better use of the organization's individual and collective knowledge resources [1]. An established discipline since 1991 [2] knowledge management efforts have a long history, including on-the-job discussions, formal apprenticeship, discussion forums, corporate libraries, professional training, and mentoring programs. With increased use of computers in the second half of the 20th century, specific adaptations of technologies such as knowledge bases, expert systems, knowledge repositories, group decision support systems, intranets, and computer-supported cooperative work have been introduced to further enhance such efforts.

KM is supported by the implementation of a KM system, as a set of infrastructures and tools that support organisation or project activities. They are more than information systems, since they must provide a context that facilitates the creation, transfer and application of knowledge. They usually refer to any kind of IT system that stores and retrieves knowledge, improves collaboration, locates knowledge sources, mines repositories for hidden knowledge, captures and uses knowledge, or in some other way enhances the KM process. The IT system is further supported by non-IT activities such as meetings, brainstorming sessions, etc.

There are several IT systems or tools that can be used for KM [3]:

- Groupware systems
- The intranet and extranet
- Data warehousing, data mining, & OLAP
- Decision Support Systems
- Content management systems
- Document management systems
- Artificial intelligence tools
- Simulation tools
- Semantic networks

When implementing KM systems and more specifically, internal KM tools, the most common failure factors are:

- Inadequate support: managerial and technical, during both implementation and use.
- Expecting that the technology is a KM solution in itself.
- Not understanding the specific function and limitation of each individual system.
- Lack of organizational acceptance, lack of appropriate organizational culture.

- Inadequate quality measures (e.g. lack of content management).
- Lack of organizational/departmental/etc. fit
- Lack of understanding of knowledge dynamics and the inherent difficulty in transferring tacit knowledge with IT based systems

In order to address the factors defined before, and according to [4], the process of successful implementation has three stages: adoption, acceptance, and assimilation. Based on recognized models and theories, the authors identified three comprehensive sets of factors affecting these three elements. The resulting model organized the KMS implementation factors into the following categories:

- Adoption:
  - Influenced by design: Innovation characteristics, fit, expected results, communication characteristics.
  - Not influenced by design: Environment, technological infrastructure, resources, and organizational characteristics.
- Acceptance
  - Influenced by design: Effort expectancy, performance expectancy.
  - Not influenced by design: Social influences, attitude towards technology use.
- Assimilation:
  - Influenced by design: social system characteristics, process characteristics.
  - Not influenced by design: Management characteristics, institutional characteristics.

First, to promote KMS adoption is important to evaluate information/knowledge needs & flows, lines of communication, communities of practice, etc. These findings should form the basis of determining the systems needed. In addition, evaluation of existing work practices and determination of how the systems will improve - and not hinder - the status quo is needed.

Second, acceptance can be improved by involving the users in the design and implementation process when possible and in the evaluation of the system when applicable. The KM system or tools should be as user friendly and as intuitive as possible. Adequate technical and managerial support has to be provided as well.

Third, assimilation can be improved by conducting content management: in order for the system to remain useful, its content must be kept relevant through updating, revising, filtering, organization, etc. In parallel, the system must be championed by management at all levels.

3. MSP-REFRAM INTERNAL KM TOOLS - DESCRIPTION

From the list of IT-tools provided in previous section, some of them such as the Decision Support System or the Document Management System have been identified as external KM tool since they will be used by people not participating in MSP-REFRAM consortium. Regarding internal KM tools, they are the set of tools from the KM system that will be used by the organisation (in this case, MSP-REFRAM consortium) on a private level. The approach that has been selected is the use of groupware systems.

Groupware is a term that refers to technology designed to help people collaborate and includes a wide range of applications. Wikipedia defines three handy categories for groupware:

- Communication tools: Tools for sending messages and files, including email, web publishing, wikis, file sharing, etc.
- Conferencing tools: e.g. video/audio conferencing, chat, forums, etc.

- Collaborative management tools: Tools for managing group activities, e.g. project management systems, workflow systems, information management systems, etc.

These tools can greatly facilitate explicit knowledge sharing through publishing and communication tools. They can support the knowledge creation process with collaborative management tools - although this process is still very much about people interacting and experimenting. Finally, they have some limited benefit to tacit knowledge transfer by supporting socialization through tools like video conferencing and informal communication.

Considerations for Groupware Design and Implementation

When developing groupware it is important to establish the functions that best match the organization's needs, to determine the processes that take place in the organization as well as how knowledge is currently stored and distributed, and to establish how certain functions would improve them. Selection of the groupware systems should be influenced by the users or in the very least be carried out by someone who is knowledgeable in both the functions of the system and the work practices of the users. It is also important to consider also how the chosen tools relate to one another, and if one should invest in an integrated solution. For instance, an integrated groupware system composed of many complementary modules may be easier on the user since it implies getting accustomed to one brand.

In the case of MSP-REFRAM the set of internal tools has been defined according to partner needs. These tools are:

- Document management: this will be done through the use of the ECCP tool
- Workflow tools: this is integrated in the ECCP tool. A presentation providing information to project partners on how to proceed has been distributed
- Scheduling & planning: a calendar feature has been added to the ECCP tool
- Forum: integrated in the ECCP tool this will support quick questions sharing to the group
- Wiki: this will allow collaborative content modification
- Calendar: integrated in the ECCP tool as well and gathering relevant dates and events for project execution
- Telepresence: WebEx can be used as a tool for remote meeting
- Face-to-face meetings

From these tools, the ECCP tool has been previously developed by LGI. This is the same platform used by PROMETIA association members and most of MSP-REFRAM partners are already members of PROMETIA so this approach ensures an easy adoption process as most of users are familiar with this approach. IDENER has developed and embedded in the ECCP tool the forum, the wiki and the calendar.

A description of MSP-REFRAM internal IT-tools is provided in the next subsections.

3.1 ECCP tool description

The ECCP is an Electronic Content Collaboration Platform. This platform allows project partners to share main documents and deliverables from the project. ECCP includes functions like:

- Check in/check out: For checking stored information for consistency
- Version management: Workflow tool to keep track of different versions of the same information with revisions and renditions (same information in a different format) to be done by consortium partners.
- Search and navigation: For finding information and its associated contexts

- Organizing documents: In structures like files, folders, and overviews
- Milestones and deliverables: due dates for milestones and deliverables and related lead beneficiary

Partners are asked to create/use and account, which is linked to their mail address. This allows the system to send notifications regarding version management duties and also about deliverable submission or milestones accomplishment dates. Specifically, main functionalities of the ECCP regarding deliverable submission and validation are:

- Automated emails will be sent to the authors 6 weeks and 3 weeks before the delivery date, to remind the authors the report shall be produced and uploaded on the Workflow system
- There is no longer the need to include the cover pages for the deliverables, since the Quality pages will be automatically added by the Project Management Office (PMO) after the coordinator's validation

Following figure provides an overview of ECCP home tab.

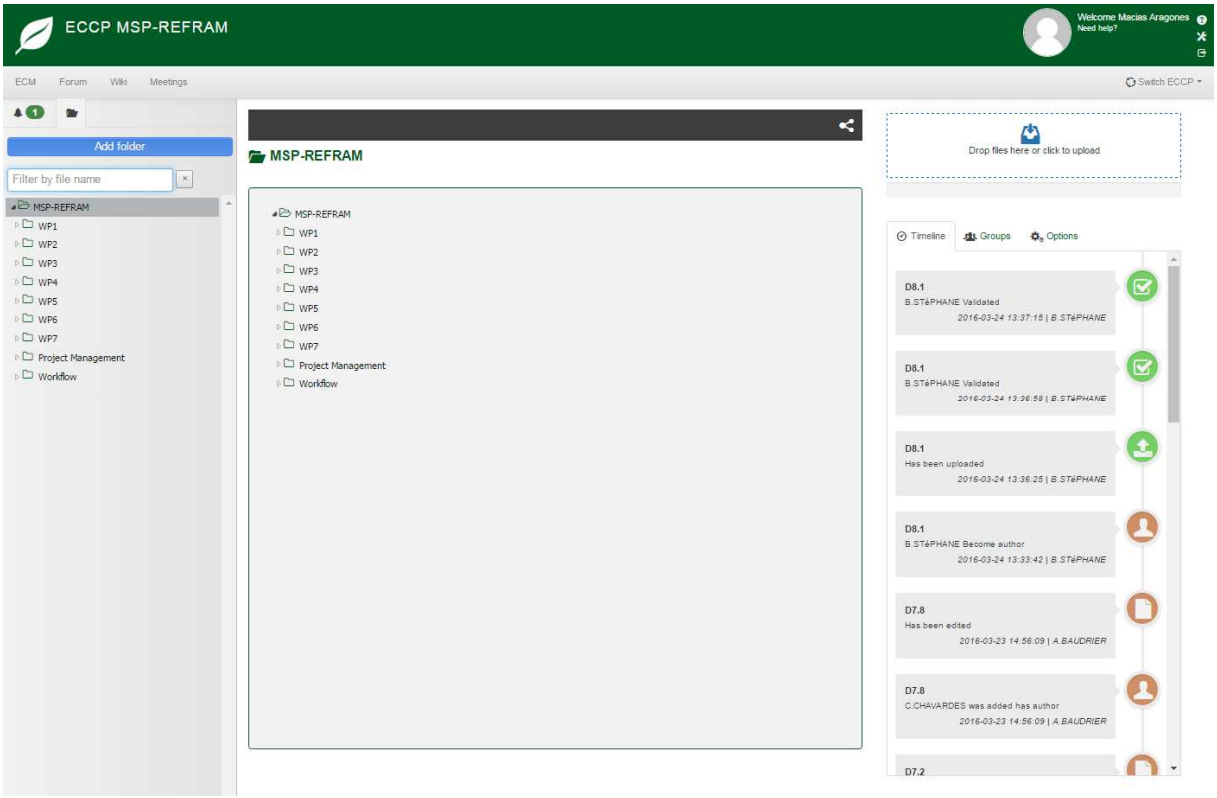

Figure 1. MSP-REFRAM ECCP screen caption

MSP-REFRAM Workflow

A presentation with main information about ECCP workflow for deliverables submission and validation has been produced by LGI. This is aimed to facilitate publication and approval of deliverables while ensuring an appropriate Quality Assurance process. As main guidelines only PDF documents can be uploaded on the Workflow, only the identified person responsible for the delivery of the deliverable (author) can upload the PDF document on the Workflow and WP leaders have to identify the responsible person for each deliverable before upload or each responsible person declares itself as « author » (next figures show how this process is done in the ECCP).

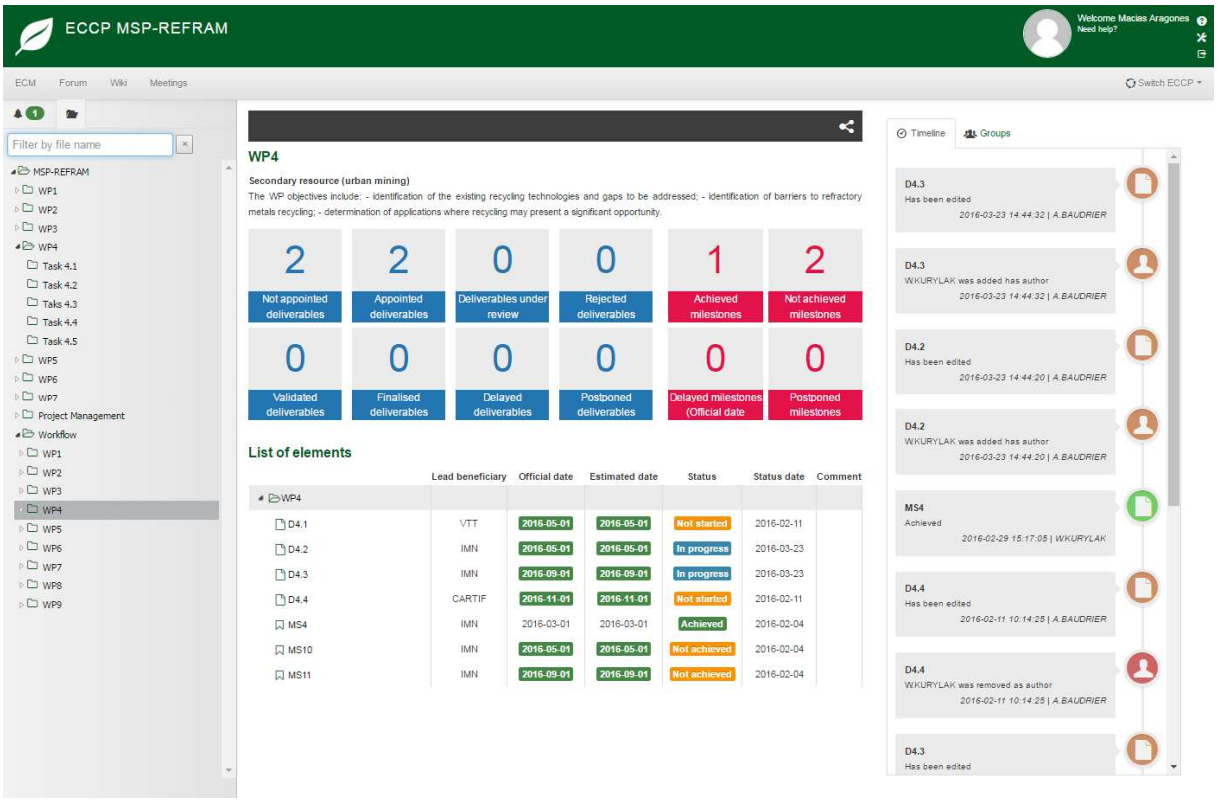

Figure 2. ECCP at WP level

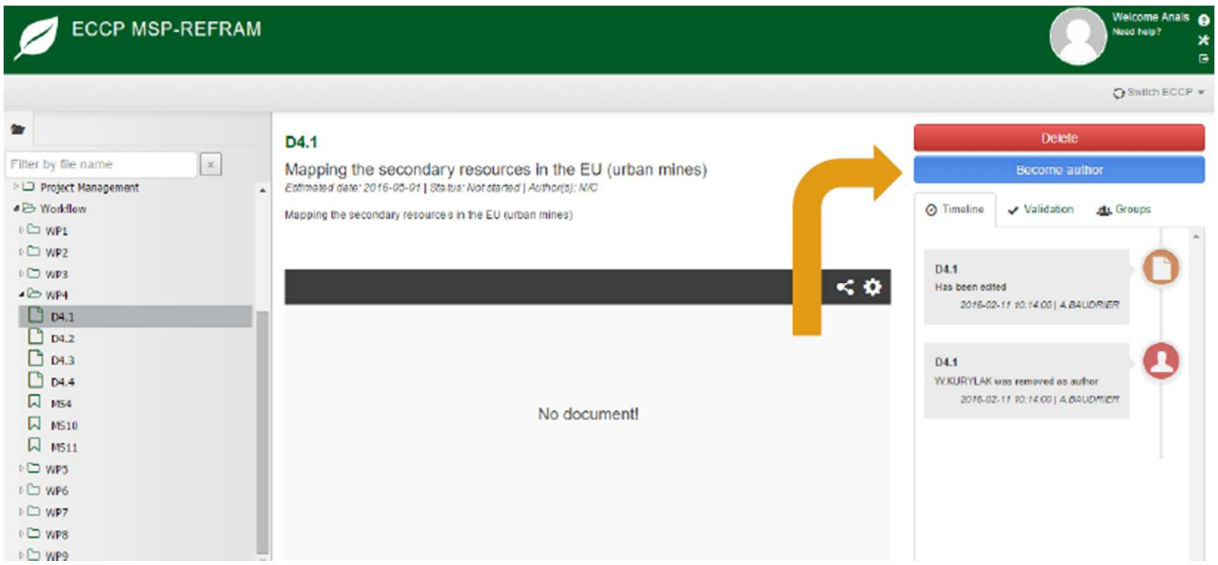

Figure 3. Becoming author in ECCP

Deliverable submission workflow is as follows (depicted in Figure 7):

1. The main author chooses the deliverable number in the list, uploads the deliverable on the tool, and writes the summary, co-author, and keywords

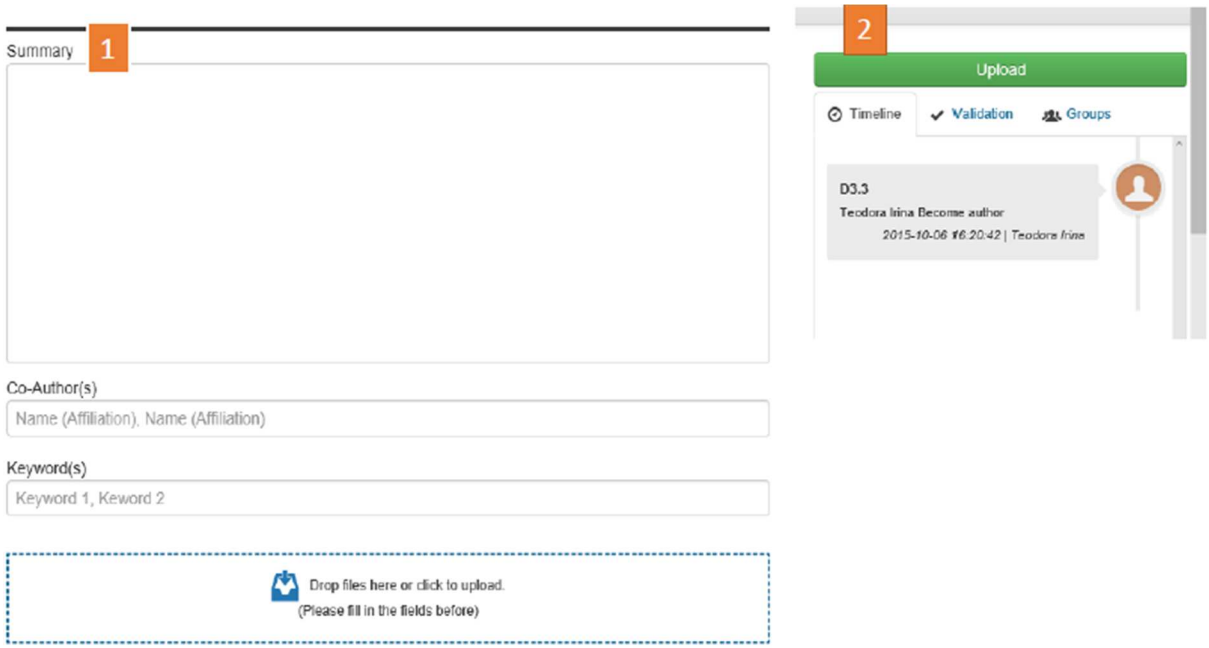

Figure 4. Deliverable upload to the ECCP process

2. An email is sent to the WP leader in order to request the validation of the deliverable.
    a. If there are modifications needed, the WP leader rejects the document and provides comments
    b. If the document is validated, the next step is triggered

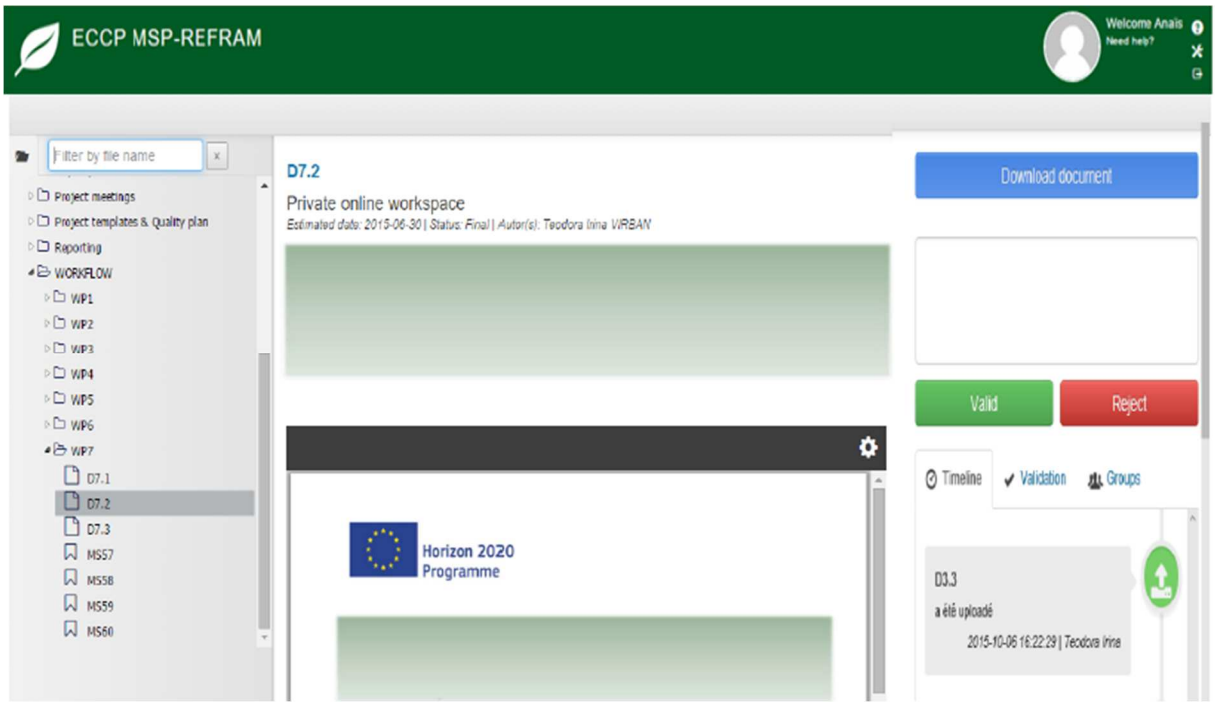

Figure 5. Deliverable validation in ECCP process

3. An email is then sent to the Project leader requesting a final validation
4. After the final validation by the coordinator, the cover sheet with the deliverable identification is automatically generated, following LGI quality check

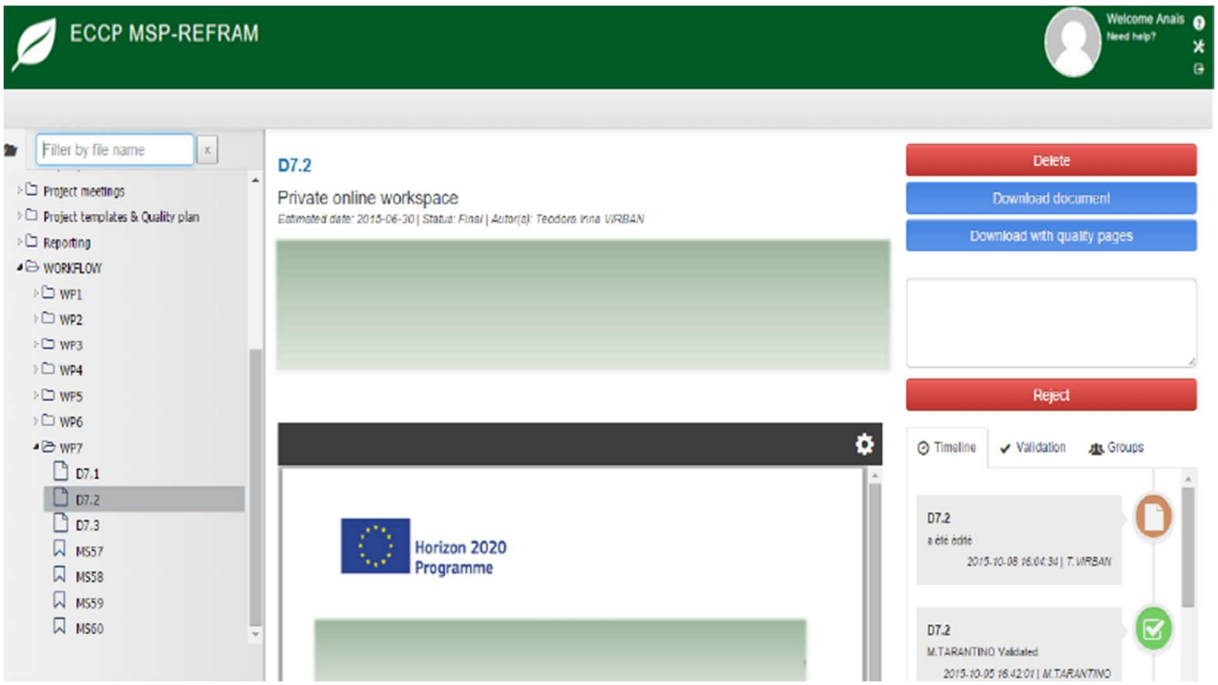

Figure 6. Deliverable submission in ECCP finalisation process

If during validation phase, the document is not validated, the explanation is sent by email to the author; all previous validations are cancelled, leaders are notified and the validation process starts again from the beginning.

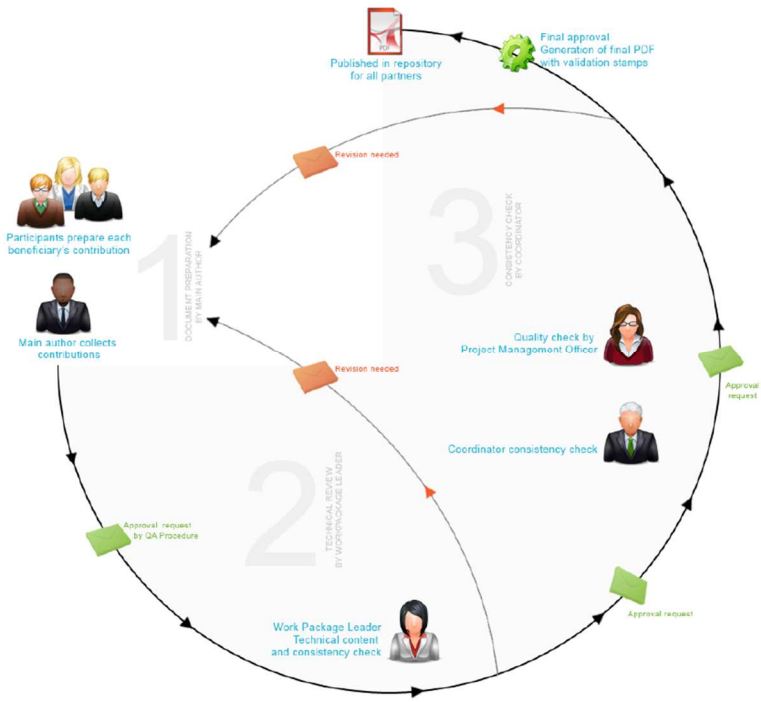

Figure 7. Submission process workflow in ECCP

3.2 Forum

A forum, or message board, is an online discussion site where partners can hold conversations in the form of posted messages. They differ from chat rooms in that messages are often longer than one line of text, and are at least temporarily archived. In the case of MSP-REFRAM all users (partners) will have access to the forum and will be able to publish their messages without the approval of a moderator before it becomes visible. This will help ensuring a smooth and quick communication between partners.

MSP-REFRAM forum is developed and integrated in the ECCP by IDENER and consists of a tree like directory structure. The top end is "Categories". A forum can be divided into categories for the relevant discussions. To avoid duplication of work between WPs and to allow more transparency, categories from MSP-REFRAM forum will be:

- Administrative and financial issues, for discussions related to project management aspects

- Technical issues, for discussions related to the information to be generated/retrieved within the project

- Multistakeholder Platform issues, for discussions about the workshops involving the experts

- Other, for discussions that cannot be categorised under the previous categories

The topics (commonly called threads) come under the different categories and these are the places under which members can start their discussions or posts. All message boards will use one of three possible display formats. Each of the three basic message board display formats: Non-Threaded/Semi-Threaded/Fully Threaded, has its own advantages and disadvantages. If messages are not related to one another at all a Non-Threaded format is best. If a user has a message topic and multiple replies to that message topic a semi-threaded format is best. If a user has a message topic and replies to that message topic, and replies to replies, then a fully threaded format is best. A screen caption of ECCP integrated forum is provided in the next figure.

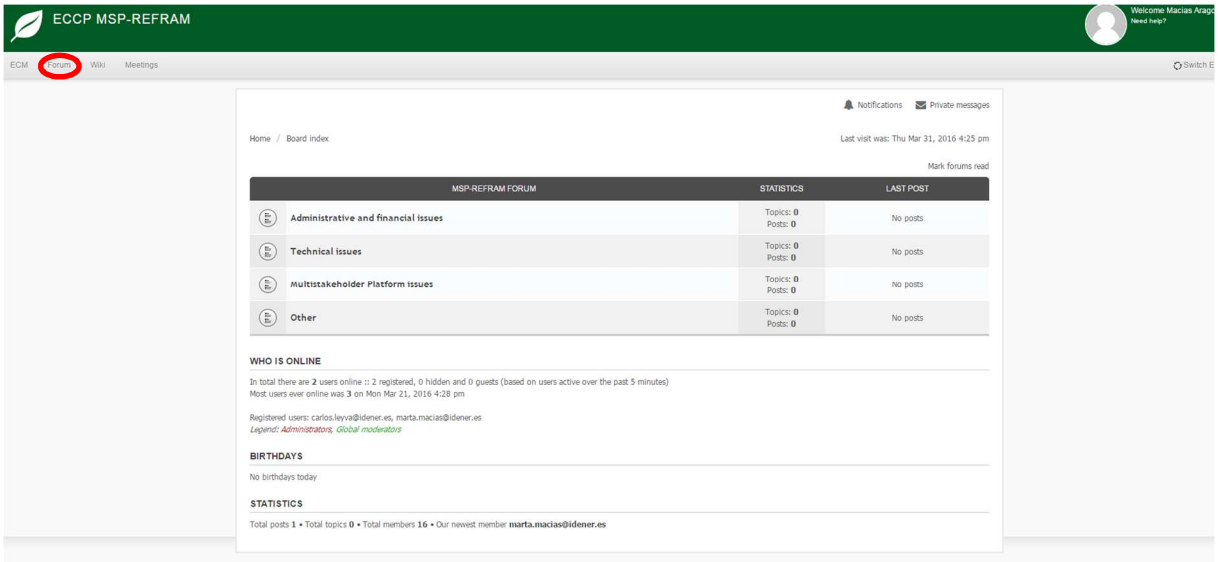

Figure 8. MSP-REFRAM Forum

3.3 Calendar

A calendar is developed by IDENER and integrated in the ECCP. This calendar will gather events related to project execution like bi-annual meetings, workshops with main experts, etc. Each user (partner) will be able to add further events such as technical meetings, scheduled phone-calls, etc. Figure 9 depicts a screen capture of the calendar application provided in the ECCP.

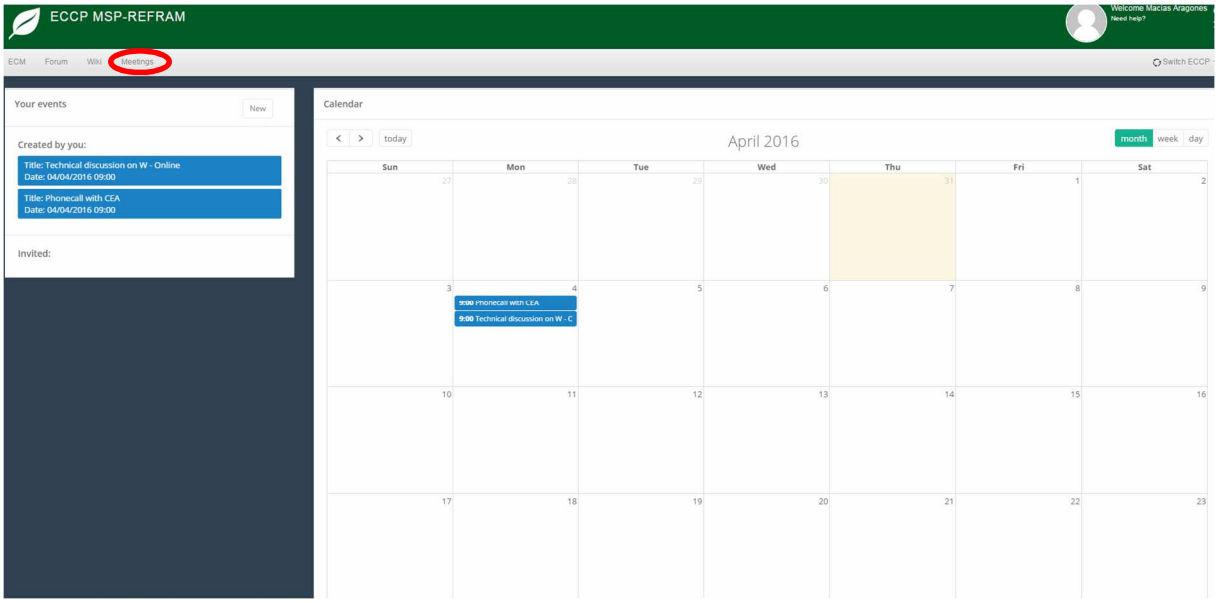

Figure 9. MSP-REFRAM Calendar

3.4 Wiki

Wiki is one special type of knowledge base with very powerful uses in an organization. Unlike a database, a knowledge base will typically develop knowledge as follows:

1. Create new knowledge for a topic
2. Expand the knowledge by discussions and feedback, new learning and ideas
3. Edit the expanded knowledge into better new knowledge
4. Maintain history of revisions

In the context of KM, these tools enable the consortium to create knowledge bases, which are collaborative and participative databases that are structured to answer, for a given knowledge topic, the 'what, why, where, when, who, and how' (the six components of knowledge).

A wiki is developed and integrated in the ECCP by IDENER. It contains a page for each knowledge topic (a discussion page and an editing page for each knowledge topic, and a page to capture history of changes and revisions), which in this case will be each of the selected refractory metals. The wiki will be open to all to collaborate, develop, and access new knowledge. Four sections are implemented: sections article, discussion, edit this page, and history below. Next figure provides a screen caption of MSP-REFRAM wiki.

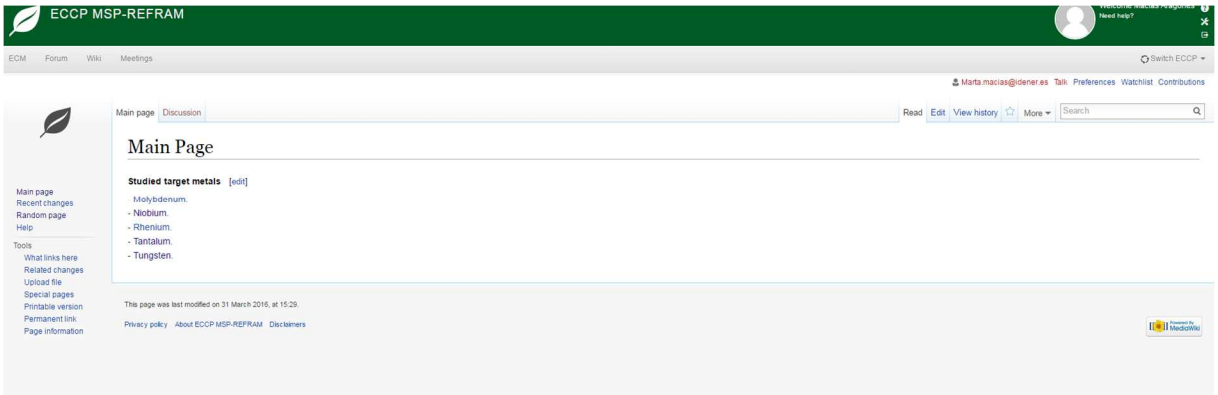

Figure 10. MSP-REFRAM Wiki

4. MSP-REFRAM INTERNAL KM TOOLS - IMPLEMENTATION

The KM Tools of the MSP-REFRAM project have been developed and deployed in two different servers. Specifically, the ECCP tool is installed at LGI's server and make use of the same architecture used for the PROMETIA platform. The forum, the Wiki and the calendar modules have been deployed in a different server in IDENER's IT platform. In order to allow sharing the credentials between all the platforms, the following structure has been follow:

- The user credentials are handle by the ECCP tool from LGI.

- LGI has developed an API for allowing external applications to validate the credentials of a user (further details omitted for security reasons).

- Forum, Wiki and calendar tools are embedded into the main ECCP platform through the use of an iframe.

- When any of these applications are accessed, the server where they are located send a request to LGI's API with the credentials of the user trying to access in order to check user status (further details omitted for security reasons). The communication between the two servers is secure.

Regarding the server used to allocate the Wiki, Forum and calendar tools, it has been deployed in a virtualised server with the following software and hardware specifications:

Hardware		Software	
Server Model	2013 SP 32G	**Operating System**	Ubuntu Server 14.04.4 LTS
Processor	Intel Xeon E3-1245 V2 8x3.4 Ghz	**Linux Kernel**	2.06.32
R.A.M. Memory	32GB DDR3 ECC RAM	**Web Server**	Apache 2.4.17
Hard Disk	2x2TB SATA3 SOFT RAID	**PHP**	5.5.3
Network Connection	Giga Ethernet with 100Mbps Internet connection	**DB**	MariaDB 10.1.8

4.1 ECCP tool description

The ECCP tool was developed by LGI in 2014 and 2015. It is a php-ajax-mysql web tool hosted on an LGI LAMP server. The deployment and adaptation for the project has been done in January.

In order to integrate 3rd party applications on the platform and allow access to these applications without additional login, an API has been developed: the 3rd party applications can use this API to validate the credentials (through user name and token) of a user.

The API developed by LGI is a basic REST API with a GET function: the external application can then call a URL such as http://api.lgi-consulting.org/users/id-nameofuser and the page will return a JSON string with the credential information (name, surname, email, authentication status, etc ..)

The applications can be hosted on a different remote server than the ECCP. The firewall allows only the servers that host the applications to communicate with the ECCP server.

A menu has been added to the ECCP to access the applications:

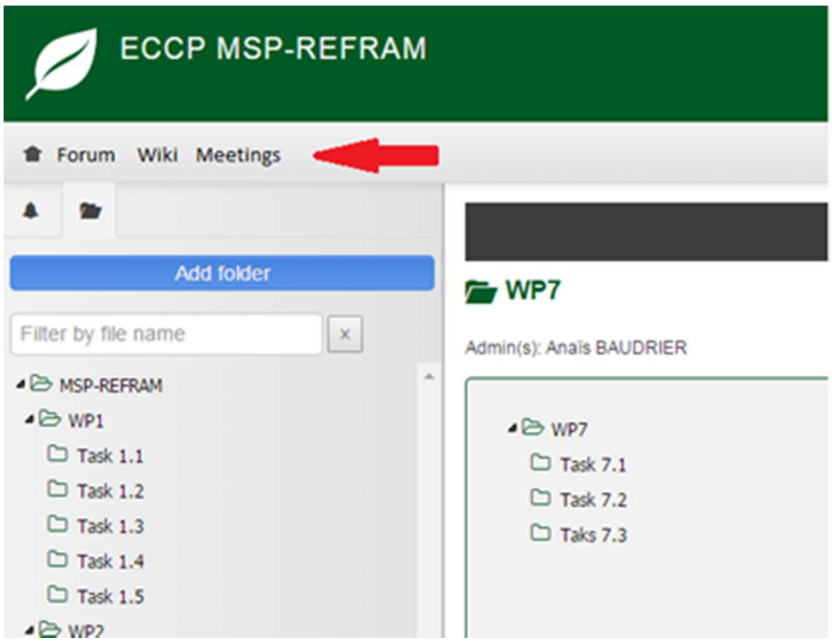

Figure 11. New applications in the ECCP.

4.2 Forum

The forum is an adaptation of phpBB3 forum for ECCP MSP_REFRAM. It has been modified as to share the user credentials with the ECCP tool as described in the introduction of this section. Moreover, the forum login, logout and registration functions have been deactivated, the users are added automatically and both databases are synchronized by user names (the user names cannot be changed).

4.3 Calendar

The Calendar have been developed in PHP, using bootstrap. Five logic layers view, action, bean, controller and model have been developed:

1. The View layer contains the user interfaces: The main view has various widget to manage meetings. On this view the user can execute actions of adding, modifying, deleting and searching meetings. The main widget is a bootstrap component called Fullcalendar.io and it provides the necessary interface functionality.
2. The Action layer gets the user parameters and execute an action using functions from controller layer, for each functionality adding, modifying, deleting… exists an action. The action generates a transfer object from bean layer using the user parameters and after calls controller methods that give a response to user about execution.
3. The Bean layer contains all transfer objects (objects that carries data between processes).
4. The controller layer contains all functions for business logic and generates consistent data to model layer.
5. The model layer is responsible of persistence and it manages the database (insert, select, update, delete…)

The approach followed for meeting elimination is to use soft-delete. When a user try to delete a meeting only the state field is changed to ”deleted”. The Calendar only shows meetings with state different to “deleted”.

The meetings can be customised with the following data:

- Title.
- Description.
- Remarks.
- Start date.
- End date.
- People. (List of invitees)

The Calendar manages the user access with the phpBB3 authentication using the phpBB3 user table, the session is controlled by the gateway.

4.4 Wiki

The wiki is an adaptation of Wikimedia for ECCP MSP_REFRAM. To integrate the security with phpBB3 it make use of extension MediaWiki_PHPBB_Auth.

The wiki login, logout and registration are deactivated, the users are automatically added using the user tables from phpBB3 database. Empty articles have been created one for each of the refractory metals considered in the project: Tantalum, Molybdenum, Tungsten, Rhenium and Niobium.

5. CONCLUSIONS

A set of internal knowledge management tools has been developed in order to support Knowledge Management process at consortium internal level. This set of tools has been defined considering project partner needs and has been developed aiming for a smooth and quick adoption that will allow the maximisation of knowledge creation and sharing efforts. These tools are: Document management platform, workflow tools, scheduling & planning tools, forum, Wiki, telepresence (WebEx) and face-to-face meetings. From the group of IT tools, the document sharing platform and workflow tool have been set up using the Electronic Content Collaboration Platform tool from LGI, while the rest of IT tools (Forum, Wiki and Calendar) have been developed by IDENER and embedded in the same ECCP to trigger its use and make easier its adoption by project partners.

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