Communication and Cooperation platform for multidisciplinary Project Management

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Communication, Cooperation and Knowledge Management are the leading factors for successful scientific projects besides the scientific work, especially in multidisciplinary cooperation projects. Furthermore a sustainable organization and presentation of the results after the projects are terminated gets more and more into the focus of researchers and investors. The new developed Communication and Cooperation platform addresses these facts. It helps to manage, organize and accomplish scientific multidisciplinary projects and make them accessible after the project has finished. It uses state of the art web technologies and standards to make the work of the scientist with the tool as easy as possible and open the platform for add-ons and special modules like data reconciliation or simulation and modeling to focus the special needs of the different projects and researchers like chemical engineers.

1. Daily business in research and development

The daily business in research and development projects at universities as well as in industry is affected by short project durations, multidisciplinary teams and a rising amount of new and also state of the art knowledge. In many cases the team member's work at different places or universities, so communication and easy collaboration will be the main goal to solve today's challenges in research and development. For a successful research you need to know what your colleagues are actually working on, what their actual problems are and how they do modeling and simulation. Especially in chemical engineering, biotechnology and similar technologies it is essential to have unified communication and a clear overview about the project status to enhance creativity and new ideas. Concluding the results of the studies done by Siemens Enterprise Communications [Siemens Entpr.] and European Commission [EU Report] the main costs of a fragmented communication are: "getting the information at the right time", "attempting to reach a colleague to get information", "coordinating projects via e-mail", "search effort for the right document" and "not having the right software". To enhance the scientific work and to support the process of generating new ideas, it is

essential to share ideas, make new approaches available for the others to get into productive discussions.

Today's tools in research communication and knowledge management are MS Outlook mainly for e-mails, the local computer or sometimes a central server to save files and data. Articles, conference papers and presentations as well as master and doctor theses and reports are the main methods to save knowledge for the future. In future projects starting on this knowledge base the unproductive literature research, organization of scientific data or extracting them from papers and theses will be a time consuming and avoidable working step. In our opinion this is not sufficient and not an adequate method to handle knowledge in a modern an IT-focused community.

2. The communication and collaboration tool

The new internet-based "Communication and Cooperation platform" orangeProject and orangeScience developed by Conveloper in Cooperation with the Institute of Process and Plant Dynamics, TU-Berlin will solve these problems in communication and collaboration and knowledge management mentioned above. The main parts of both orange tools are the knowledge management-, the document management, the project management, the communication-module, all combined in one easy to use and easy to access software package. The main purpose of orangeProject is the establishing of a framework for research work in teams. In addition orangeScience will focus on special interests of chemical engineers, providing a modeling and simulation environment, tools for data analysis like data reconciliation or similar.
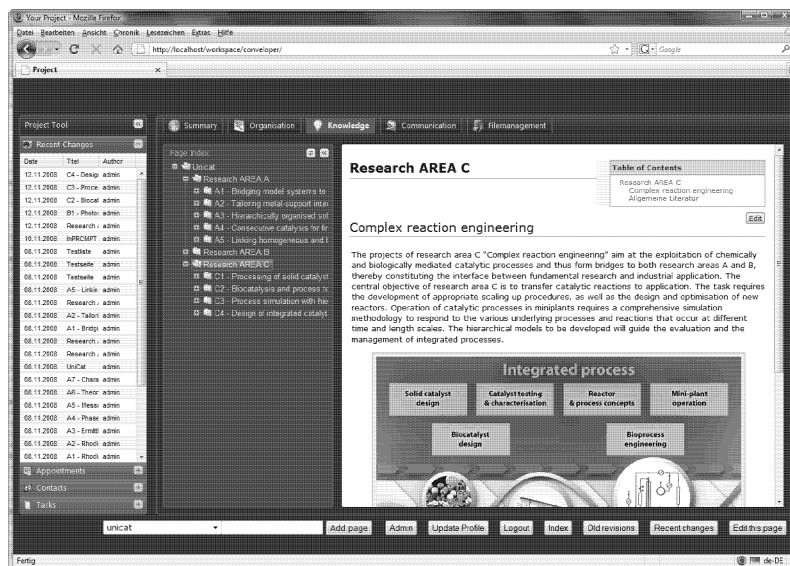

Figure 1   *Screenshoot of orangeProject/ orangeScience*

The main modules of both, orangeProject and orangeScience, are the knowledge and document management module (figure 1), where the user can share his ideas, share the knowledge, articles and files. All data will be searchable with help of modern semantic technologies using OWL Standards [Davis, Hitzler, OWL]. All input will be marked with help of Metadata (i.e. Microformats). All documents are full text searchable using the Apache Lucene engine [Apache Lucene]. The modern search technologies will make the daily work easier because the user can find the information more quickly. Furthermore with help of the knowledge and document management the preparation of reports, talks, proposals, etc. becomes much easier. But also for the future use of knowledge and information it is necessary to have a structure which is easy to use, effective and sustainable.

Future versions will include connectivity to information systems like Wikipedia[1] (which will have a semantic search engine in the near future), Planetmath[2], Chemipedia[3] or other interesting knowledge base systems.

The project and information module will give the user easy access to project management and organization tools like tasks, Gantt-charts, calendar functions, contacts, "what's new" and messages.

The communication module will make discussions over the internet available, using modern video and audio conference technologies. Desktop or application sharing including overlay-whiteboard is also available to discuss the problem directly in the software or on the sketch.
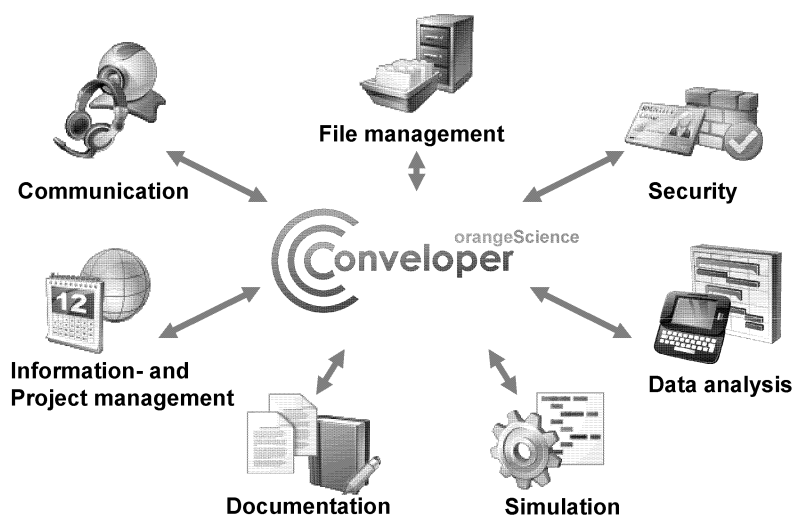

Figure 2   Tools integrated in orangeScience

[1] www.wikipedia.org, http://semantic-mediawiki.org/wiki/Semantic_MediaWiki
[2] www.planetmath.org
[3] www.chemipedia.org

Orange Tools will bring modern technologies like groupware, document management, wiki's and conference tools together and extend and adapt them for the use of scientists and engineers (see figure 2). As Software as a Service (SaaS) - framework Orange Tools will be accessible from all over the world 24 hours 7 Days a week.

OrangeScience will integrate tools for chemical engineers like syntax highlighting for Fortran^{TM}, Java^{TM} and Matlab^{TM}, viewer for CAD and P&ID sketches as well as graphical tools to visualize experimental and simulation data. In the future it is planed to integrate interfaces to Matlab^{TM} or gPROMS^{TM} to provide an option for online simulation. Commercial tools like Matlab^{TM} and gPROMS^{TM} will be available using ASP (application service providing).

Furthermore the integration of the java simulation tool MOSAIC which is a development of the Institute of Process and Plant Dynamics [Zerry] is planed.

3. A Use-Case

The tool is up to now used in different industry/university and university research projects, like "The Unicat – Cluster of Excellence" [Unicat] and the Desalination Project with the Korean University.

In the context of the Unicat-Project a miniplant has to be build. In this project 34 people have to work together effectively and have to organize their data. To make this project more efficient conveloper orange is used. Figure 3 gives an overview about the organization structure and document flows and data types which are necessary to build up a miniplant in the lab at the TU Berlin.
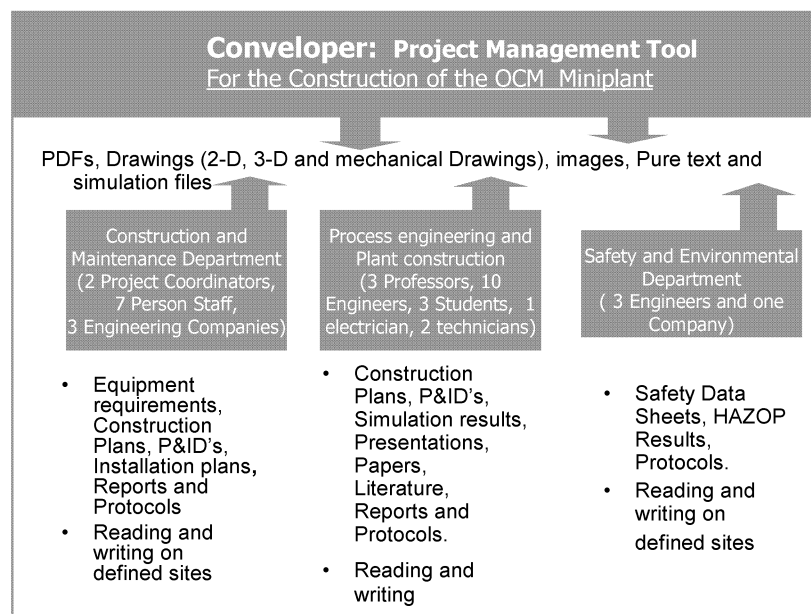

Figure 3:   Organization and document flow for the construction of a miniplant

Conveloper orange is used to organize the document flow between the different assembly sections, companies and university stuff and is used for the project management and collaboration between the team members. Every team member has always the complete information about the project because all relevant documents are stored in conveloper orange and therefore are always accessible. This reduces errors because of old or missing information, increases the information exchange and overall accelerates the project. Furthermore new team members like master students or people from companies gets a much faster and better orientation about the project. This will save time and also reduces errors.

4. Technology

The platform is build with help of standard web technologies like MySQL, php, JavaScript, Java, Apache and will be hosted as a SaaS. So the user doesn't need to install and maintain any software or server infrastructure and will be always up to date. For conveloper orange established open-source components are used and expanded. Therefore new interfaces and an easy to use AJAX-based GUI were developed. Existing documentation and knowledge management components are enriched with a semantic full text search algorithm. Single-sign-on, a security concept as well as a role and rights management for all components is added to build up an easy to handle system.
The integration of the different modules is done with help of the Model-View-Controller Concept to get an open and easy expandable system structure.
The abdication of proprietary data formats and instead the use of machine readable ASCII-files based on popular open-it-standards guaranties sustainable content which will be accessible and readable also in the future. The content can also be easily deployed with other tools or converted into other formats. This makes the system open for new technologies and addresses the need of sustainable content delivery of the scientific community.

5. Conclusion

Conveloper Orange brings scientists and researcher as well as the industry together, increases the scientific outcome and lets people from different places work together as they were working side by side. This is demonstrated in the Unicat uses case. Orange Science will focus the special needs of chemical engineers like analyzing technical data, organizing their models, displaying their data graphically and as well in the near future orangeScience will also make simple process simulations available. By using this tool research and collaboration in multidisciplinary teams will be more productive, easier, satisfying and creative, because every team member can always access the full information of all other partners.

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