1 Project Objectives

The objective of the project KiWi (Knowledge in a Wiki) is the development of an advanced knowledge management system ("KiWi System") based on a Semantic Wiki that is flexible enough to integrate many different kinds of content and gradually structure knowledge emerging in enterprise settings from informal texts to queryable structured representations. The system will support collaborative knowledge creation and sharing and use semantic descriptions and reasoning as a means to intelligently author, change, and deliver content. A particularly salient aspect of combining wikis with advanced semantic technologies is that the wiki still is a generic and flexible tool, but semantic technologies allow to provide specific support for the user based on domain, context, role, and experience.

In the course of the project, we will (1) work out an enhanced wiki vision (the "KIWI vision") describing how the "convention over configuration" paradigm of wikis combined with semantic technologies can lead to flexible and problem-oriented knowledge management, (2) implement a collaborative, web-based environment (the "KIWI system") that provides support for knowledge sharing, knowledge creation, and coordination in software and project knowledge management, and (3) evaluate it in two concrete, industry relevant use cases at our industry partners in the areas of software and project knowledge management, which are representative of many forms of knowledge management in knowledge-intensive areas. The experiences with the system will then (4) result in the "KIWI handbook", describing the project vision, the KIWI system functionalities, as well as giving recommendations and best practices for using the system in concrete knowledge management scenarios.

2 Achievements in Year 3

Year 2 of the project was dedicated to finalising the integration of technologies into the KiWi core system (WP4), to the evaluation of the two KiWi use cases on top of the KiWi platform (WP7), and to the dissemination and demonstration of the project outcomes to a wider community (WP8 and WP9).

2.1 KiWi Core System (WP4)

KiWi Releases Version 1.0

The major achievement of the third year was the release of version 1.0 of the KiWi system at the KiWi release party on 14th October 2010 in Vienna. The KiWi core system is developed as a layered, service-oriented architecture based on Java EE and JBoss Seam and follows the model-view-controller pattern. All content and metadata is stored in the same way (regardless whether it is a wiki article, a blog post, an image, a location, or a comment), making it easy to reuse content in different settings. This is enabled by the flexibility of combining human-readable textual content with semi-structured Semantic Web data. In addition, the following enabling technologies components have been integrated:

- the rule-based reasoning language KWRL, offering Datalog-style rules over RDF triples in the KiWi system together with reason maintenance for providing efficient updating and explanations to the user; SKWRL is implemented as a component in KiWi that gets asynchronous notifications after a transaction is finished and processes incrementally all added and removed triples in a forward-chaining manner
- the query and search language KWQL, combining structural and free-text querying over the content in the KiWi system; KWQL offers advanced users the possibility of querying over the linking structure as well as the document structure of pages
- an advanced information extraction component tailored towards use in Social Media applications that implements different algorithms and offers various functionalities to the user, including the recommendation of tags, the recommendation of types/categories, the recommendation of links, and the recommendation of RDFa annotations in the text
- an advanced personalisation component offering multifactor personalisation in various parts of the KiWi system, including in recommendation widgets, the dashboard, and the personalised search option; personalisation is based on the tagging information contained in the KiWi system
- a faceted semantic search component allowing to search over all kinds of content and refining the search based on semantic annotations associated with the resource; semantic search covers the textual content
as well as structural information represented in RDF

- advanced visualisations in so-called “perspectives” that give different kinds of viewpoints for editing and viewing content, e.g. as wiki page, as location, as event, as person and so on; a perspective is a light-weight template that can be associated with a resource.

**KiWi Demonstration**

All functionalities of the KiWi system are demonstrated in a demo setup representing an idealised project management scenario. The demo setup has been presented also at the release party and at several subsequent events, and is available as VirtualBox image for public download. In the following, we illustrate based on several screenshots the main functionalities of the KiWi system. In the scenario, the main task is to structure and share information about a meeting that started out as a brainstorming text that is typical for the information stored in an Enterprise Wiki.

**Annotation and Perspectives**

The first step in the exemplary scenario is to take an unstructured description of a meeting and transform some information contained in it into structured and queryable data.

![Figure 1: Annotation, Editing and Information Extraction in KiWi](image1.png)

Figure 1 shows the KiWi Semantic Wiki editor. In the centre area, a rich text editor allows easy-to-use editing of content. The information extraction component automatically detected terms that are candidates for linking or further annotation using RDFa (in the example: location information about the meeting and persons known in the system). The right panel shows several contextual widgets for the page currently displayed. The information extraction component automatically recommends an RDF type (*Meeting*) based on similar pages that have the same type (machine learning with positive and negative examples).

![Figure 2: Different Perspectives on Content Items](image2.png)
An example of using KiWi perspectives is shown in Figure 2. Since the page edited represents a meeting, it makes sense to view it as a "location" that has additional location-based information. Since the text already received some initial structuring in the previous step (Figure 1), some information in the form can be pre-filled and used for automatic geolocation. Since all metadata is based on RDF and RDFa, information between forms in different perspectives and the unstructured text is always synchronised, i.e. if the form is updated, so is the text and vice versa.

**Reasoning and Reason Maintenance**

KiWi's reasoning component allows to define Datalog-style rules that operate on the RDF metadata contained in the system. Figure 3 shows a user-defined ruleset for the demo scenario. For example, the "located-message-rule" in the last line infers that a resource is a located meeting if it is a meeting and has a geo-location.

![Figure 3: Datalog-style Reasoning Rules in sKWRL](image)

Reasoning can be used for many different purposes, e.g. for representing rule-based knowledge, which is often the most intuitive form of knowledge. Since inferred information can also lead to consequences not immediately foreseen by the user, KiWi's reasoner also offers an explanation component where users can see why a certain information is present in the system. Figure 4 shows how the system shows a tooltip with explanations when hovering the mouse over an inferred type associated with the resource.

![Figure 4: Reason Maintenance and Explanation of Inferred Information](image)

**Semantic Search and Structural Search (KWQL)**

A central aspect in knowledge management is searching and especially finding the relevant information. KiWi offers two components for searching: a reliable and efficient semantic search component, and an experimental and very innovative interface called KWQL that allows querying over the content and structure of the system at the same time.

Figure 5 shows the two search interfaces. The classical semantic search interface allows searching by keyword and over all available metadata properties and guides the user in refinement of the search query by offering faceted browsing over the metadata properties. The KWQL-based search allows querying over the content as the semantic search, but in addition offers also querying over the linking structure of the resources. To simplify editing of KWQL queries, KiWi offers a visual interface to compose queries.
Personalisation

Personalisation offers users just the information they need. In KiWi, personalisation comes in at many different places. The user's central entry point to the system is the KiWi Dashboard shown in Figure 6. The dashboard offers the information that is relevant for the user: activities around content that the user is interested in, latest personal activities representing the work context, the user’s tag cloud representing the interests, and so on.

Beyond the dashboard, personalisation is also used in the ranking of search results (resources more relevant to the user are ranked higher) and in personal recommendations given for each resource. KiWi implements a so-called multifactor recommendation that takes into account different kinds of information for recommendations, e.g. tag similarity, content similarity, user similarity.

2.2 Use Cases (WP7)

The second focus of the project in year 3 was the advancement and evaluation of the two KiWi use cases. Following the test plans defined in the end of the second year / beginning of the third year, the evaluation showed that many of the aspects demonstrated in KiWi are of high relevance to the two companies. Some of the developed functionalities will also be taken out of research and incorporated into the key value chains of the companies. For example, Oracle will continue to use the semantic tagging as well as the thesaurus management developed in KiWi, and Logica has now taken up Semantic Web technologies into their consultancy portfolio and aims to apply the basic principles demonstrated in KiWi in their internal knowledge management.

The Logica Use Case aims at project knowledge management in companies with a structured process for establishing and working on projects. The Logica Use Case application in KiWi supports such processes from the initial project idea to a structured representation in Logicas ERP system and further iterative refinement steps, going back and forth between the unstructured representation suitable for discussion among team members and...
the structured representation needed by the ERP system. Four storylines will be evaluated: project planning, project monitoring, development or project work and process design.

![Figure 7: Sun Semantic Tag Suggestion based on Information Extraction and SKOS Thesaurus information](image)

The Sun Use Case concentrates on knowledge engineering in a typical Enterprise 2.0 setting with a huge amount of content of different types and many social interactions between coworkers. Central part of the use case have been three storylines that have been evaluated: concept model management, tag and concept recommendation (Figure 7), and search and browse. All three storylines will take into account particularly the social interactions logged by the system. Further issues have been the integration of the thesaurus management system PoolParty developed by the second industrial use case partner Semantic Web Company, as well as the integration of the enterprise wiki solution Atlassian Confluence. PoolParty can now be used as a tool to maintain the SKOS thesauruses that are used inside the KiWi system. The integration with Atlassian Confluence has just started, but it will augment an enterprise scale wiki solution with all the semantic technologies offered by KiWi.

### 2.3 Dissemination and Demonstration (WP8 and WP9)

Besides the release of the system and the use case evaluation, the major focus of the third project year, especially in the last 6 months, was the dissemination and demonstration of the outcomes. To this aim, we have carried out a number of complementary activities to ensure the sustainability of project results, which we will briefly describe in the following sections.

#### Open Source Community Building

The main goal of the last 6 project months was to try to establish an Open Source Community around the KiWi project outcomes. To achieve this, the project team worked out an extensive documentation around the system, now available at the community website at [http://www.kiwi-community.eu](http://www.kiwi-community.eu), and organised a number of events aimed at developers (described below).

But even though KiWi 1.0 is a great technology prototype, we realised that take up by Open Source developers will be difficult to achieve due to the complexity of the software system and the used technologies. Besides the events listed below, one of the main steps towards building an Open Source Community was therefore to take the KiWi 1.0 code and modularize and simplify it, keeping only the essential technology parts, and transform them into what we now call “Linked Media Framework” or KiWi 2. The Linked Media Framework was first introduced at the “KiWi Snow Camp” in February 2011 and will be further supported by Salzburg NewMediaLab in the coming years.

#### Events and Activities

KiWi has been presented at numerous occasions. The target groups of these activities were peers in the research community, professionals in the knowledge management sector, and interested developers from SMEs and the Open Source Community. In this summary, we highlight the most important events.

**KiWi Release Party** (14th October 2010). The KiWi Release party was the major event of the KiWi project where we presented for the first time the KiWi system to a broader public. The release party took place in the Planetarium in Vienna – a very appropriate place for presenting innovative outcomes of a research project. The reason for the release party was, of course, the publication of the KiWi 1.0 release for public download.
International Semantic Web Conference (Shanghai, November 2010). KiWi also took the opportunity to present the final KiWi system at the International Semantic Web Conference in Shanghai – a good opportunity to spread the KiWi ideas beyond the European communities that are already quite aware of the project. KiWi was presented in the demonstration track of the conference and the demonstration was well attended.

European Semantic Technologies Conference (Vienna, November 2010). The second major activity after the release party was the European Semantic Technologies Conference, a conference aimed more at professionals and industry representatives with an interest in Semantic Technologies. KiWi gave one of the keynote presentations of the conference and quite a number of interesting contacts were established.

Vienna and Berlin Semantic Web Meetups (December 2010 / January 2011). Semantic Web Meetups are places for enthusiasts with an interest in Semantic Technologies. The audience typically found on meetups are representatives from small companies that are often very innovative and technology affine. The Semantic Web Meetups are also a good place to get in touch with developers and start building up an Open Source Community. In both of the KiWi-sponsored meetups, around 60 persons where present and very actively discussing the KiWi presentations.

KiWi Snow Camp (February 2011). The last of the KiWi-organised events aimed at the takeup of KiWi results by an Open Source community. It took place in the remote location of Hintersee in the Alps of Salzburg and interested developers from around Europe were invited to join. At the snow camp, we already worked on the next generation of KiWi technologies called Linked Media Framework (aka KiWi 2).

In addition to these major events, KiWi was also presented at numerous smaller occasions, e.g. at a workshop at the German Ministry of Education and at many meetings with companies.

Additional Applications
Besides the applications officially developed in the KiWi system development and the two use cases, a number of additional applications have been built on top of the KiWi technologies so far by third parties. Figure 8 shows the applications Ideator (for Idea Management), ArtAround (a public art portal) and TagIT (a map-based news atlas). All applications use the KiWi technologies for managing content and metadata.

Figure 8 - Applications built on KiWi: Ideator (Idea Management), ArtAround (Art Portal), TagIT (News Atlas)

3 Potential Impact and Use
The system developed in KiWi has the potential to be used as the foundation of many social semantic web applications in many different settings:

- the area directly targeted by KiWi is enterprise knowledge management, as it is the topic of the two KiWi use cases
- an important secondary area are integrated community platforms, both for public communities and internal communities; the major strength of KiWi in this area is the provision of frequently used functionalities (storing, tagging, versioning, transactions, search), the integration of many different kinds of services in one system (Wiki, Blog, Social Networking, Mindmap, Map, ...), and the possibility to be used as a semantic index that allows to integrate with legacy content
4 Contact

Coordinator: Dr. Sebastian Schaffert  
+43.662.2288-423 
sebastian.schaffert@salzburgresearch.at

Dissemination: John Pereira  
+43.662.2288-247 
john.pereira@salzburgresearch.at

Information:
- info@kiwi-project.eu (Project Office)
- http://www.kiwi-project.eu (Website)
- http://planet.kiwi-project.eu (Blog)
- http://www.kiwi-community.eu (Community Website)
- http://showcase.kiwi-project.eu (Public Showcase)