Advances

While many times, developers focused on the details of the technologies they use, Romulus focuses on domain engineering, delegating to a metaframework and making use of code generation techniques for generating most of the web applications from this domain model.

**Roma MetaFramework** – as the core part of the Romulus suite – provides the main functionalities of common Web. It is based on an extensible plug-in architecture that allows developers to include new modules using a metaframework syntax in an aspect oriented way. These modules implement the different aspects of Java Web application like persistence, view, services, users, workflow, reporting, etc. Besides, Romulus speeds up the web application development through the reuse of existing services and components. Applications are exposed as services, allowing developers to extend their applications through mashups with external services, enterprise systems, data sources or portal components such as:

- **Data-level mashups.** Applications created by Roma can be easily integrated within DERI pipes and Sig.ma semantic tools thanks to the module for RDF generation.
- **Portal mashups.** Integration with Liferay portal allows to access some portal functionalities from other platforms (Facebook and Netvibes) and provide the ability to build new applications combining specific parts of already existent applications.
- **Web services mashups.** Applications are integrated in MyCocktail-the Romulus Mashup Builder- through services. The developer can extend his application with mashups in a graphical way.
- **Enterprise mashups.** The developed components allow users to extend the generated applications within external Enterprise applications thanks to its OpenESB integration.

The Romulus suite is completed with **IDE4Romulus** -plug-in for create Roma applications within integrated development environments-,
ATP4Romulus - tool for automatic tests of the applications generated using the Roma framework - and Wapiti - black-box testing tool for assessing the security in the generated web applications.

**Positioning in global context**
The impact of Romulus in European software and services development is based on the fact that most software and services are developed in Java Enterprise Edition in Europe. Romulus improves productivity in Java Web Development. Due to the impact of software in the economy, reducing the cost of software development and improving software quality are important economic objectives in Europe. In addition, Romulus is delivered as an Open Source project, which promotes cost reduction and improvement of innovation. Romulus is carrying out an active dissemination in open source communities (Roma Metaframework, Liferay and OWASP).

**Contribution to standardization and interoperability issues**
- W3C Semantic Web Deployment WG: assists users in publishing data and vocabularies describing data.
- W3C RDB2RDF WG: a language for mapping relational data and schemas into RDF and OWL.

**Examples of use cases**
*To show the applicability of Romulus’ technologies in real contexts and demonstrators are provided:*
- The European Projects Manager demo is a complete application that is able to manage the costs and the information of European FP7 research projects. Once all information of each project is completed, the project coordinator will be able to make a costs report to send it to the NEF application of the European Commission.
- Cornelius is an application that allows managing projects, company’s employees and their hours worked over projects activities. Its user policy is based on different profiles thanks to the security annotations included in Roma Framework.
- Scrooge is an application for personal financial management. This Rich-Client application has been created by using the Janus wizard. Scrooge allows users to categorize their own expenses and compare them with similar users.

**Achievements**
Main software products developed within Romulus:
- Roma Meta Framework, core part of the Romulus suite, provides the main functionalities of common Web applications. [http://www.romaframework.org/download.htm]
- IDE4Romulus, NetBeans and Eclipse plugins which provides IDE integration facilities to Roma. [http://www.ict-romulus.eu/web/ide4romulus]
- MyCocktail, web application with a graphical user interface for building mashup, it allows to extend Roma applications with mashups. [http://www.ict-romulus.eu/web/mycocktail/download]
- ESB4Romulus, Roma Enterprise module allows the exposition of web services defined in Roma over ESB. [http://www.ict-romulus.eu/web/esb4romulus]
- Wapiti, an application for auditing the security of web applications. [http://www.ict-romulus.eu/web/wapiti/download]
- ATP4Romulus is a tool for the test case generation for the Romulus Framework. [https://ict-romulus.svn.sourceforge.net/svnroot/ict-romulus/trunk/testing/ATP4Romulus-v03]
- The complete list can be found at [http://www.ict-romulus.eu/web/romulus/community/downloads]