



## ECQA Certified Functional Safety Manager

Progress Report

Public Part

## Project information

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## Executive Summary

The functional safety of modern products containing embedded systems has become a first priority in several industrial sectors. The IEC61508 group of standards require companies to have in place "Functional Safety Management".

The objective of SafEUr is to create a European-wide accredited training and certification program for Functional Safety Managers, based on a skill card which is compliant to the European Qualification Framework.

It will deliver modern e-Learning based training that is based on practical case studies and best industry practices. This training will be complemented by a world-wide unique web-based integration platform for industry and academia in the domain of Embedded Systems.

SafEUr trainers and trainees will be trained and certified all over Europe, assuring a major impact and sustainability of the program. High-impact international dissemination channels to industry and academia will be deployed in order to involve and inform external partners.

# Table of Contents

- 1. PROJECT OBJECTIVES..... 5
- 2. PROJECT APPROACH ..... 6
- 3. PROJECT OUTCOMES & RESULTS..... 8
- 4. PARTNERSHIPS ..... 11
- 5. PLANS FOR THE FUTURE ..... 12
- 6. CONTRIBUTION TO EU POLICIES ..... 14
- 7. QUALITY MANAGEMENT..... 17

# 1. Project Objectives

SafEUr will fill a significant gap in modern job-role based lifelong learning on a European and foreign level. It will be integrated in the offer of the European Certification and Qualification Association (ECQA, [www.ecqa.org](http://www.ecqa.org)) and other bodies.

The SafEUr program will use and make available modern systems and best practices in the field of e-Learning for training for functional safety management competences. The learning content will be based on case-studies and best practices to a very large extent. In particular, it will be facilitated by a world-wide unique web-based integration platform, which puts at the convenient disposal of learners the most up-to-date knowledge in the field of embedded systems.

Currently there is no comparable training and certification program available in the area of functional safety management. However, this job role is gaining importance very rapidly, due to the high demand in several industry sectors, and the force of standards. SafEUr will thus be a unique means to train and certify competences and skills in functional safety management, and thereby an optimal lever for experts to full this new job role.

SafEUr will innovate the way in which functional safety management competences are accessible, taught, and certified. By assuring the good quality of training and certification, it will contribute to the quality of Functional Safety Management in enterprises.

SafEUr consortium partners are training institutions, industrialists, and academic bodies with common objective. They will create a training which will transport cutting-edge valuable and varied knowledge from enterprises, universities, and standardization bodies using modern e-Learning and a unique innovative IT integration platform.

SafEUr will innovate in the way that information and knowledge in the area of functional safety management, in particular with respect to embedded systems, are put at the disposal of learners, and in which the underlying IT-platforms are continuously fed by the international expert community in the field.

## 2. Project Approach

The functional safety of modern products containing embedded systems has become a first priority in several industrial sectors. The IEC61508 group of standards require companies to have in place "Functional Safety Management". The objective of SafEUr is to create a European-wide accredited training and certification program for Functional Safety Managers, based on a skill card which is compliant to the European Qualification Framework. It will deliver modern e-Learning based training that is based on practical case studies and best industry practices. This training will be complemented by a world-wide unique web-based integration platform for industry and academia in the domain of Embedded Systems. SafEUr trainers and trainees will be trained and certified all over Europe, assuring a major impact and sustainability of the program. High-impact international dissemination channels to industry and academia will be deployed in order to involve and inform external partners.

SafEUr builds on a close and strong partnership of EMIRAcle (P1), ISCN (P2), and the ECQA that has delivered five very successful projects in the lifelong learning area. One of the common actions that can be considered key to motivation for this proposal is the Integrated Design Engineer (iDesigner) European training and certification program. iDesigner has been developed by a European consortium with the financial support of the EC from October 2008 to December 2010, and currently enters its exploitation phase. More than 100 people from leading companies have been trained, with very positive feedback and a strong demand for further trainings. Some of these companies have many thousands of employees.

Among those are companies from SOQRATES ([www.soqrates.de](http://www.soqrates.de)) German task force, which unites leading German companies in automotive, software, and embedded systems development with the target to create standards, exchange best practices, etc. One task force is dedicated to Functional Safety, whose members, SIBAC (P4), Methodpark (P5) and SPINET (P6) are among them, have a very strong involvement in the elaboration of ISO 15504 Part 10 standard.

These companies, as well as other companies trained in iDesigner, and confronted with functional safety management issues, have expressed a very strong need for a program like iDesigner dedicated competences in Functional Safety Management. In integrated design, functional safety is one issue among many others that have to be taken into account as early as possible in product creation. Therefore the subject has no particular treatment in that program.

However, they also expressed two additional requirements:

1. Such a program would also need to innovate in the way in which the training content is elaborated and delivered. Contrary to the few trainings in Functional Safety competencies that exist today, the training that they wish to have should not be limited to delivering knowledge about standards in the field, but much rather be based on practical case studies, experience, best practices, and sensitization for tendencies and upcoming tools and methods (i.e. research and pre-development).
2. As described in the IEC61508 family of standards, mastering Functional Safety is an organisation-wide topic, and thus a management issue. Thus,

they see a key importance in agreeing on competences required for Functional Safety Managers rather than Engineers.

Inspired and driven by these rich sources of feedback from industry, we have carried out an investigation about existing education and training programs in Functional Safety Management. Briefly stated, the astonishing result of this investigation was a strong confirmation of their request: Although the IEC61508 group of standards require companies to have in place "Functional Safety Management", there are absolutely no training programs available, which

- are accredited European-wide,
- have an associated European-level certification,
- also teach management competences in Functional Safety,
- are not high-level, lacking guidance, practical detail, best practices, and case studies, and
- have strong links to cutting-edge knowledge and tendencies in the field, thus allowing to keep certified managers pace with the unequalled rapid development of the embedded systems domain.

In terms of competencies, experience, and confidence, the consortium of SafEUR partners in collaboration with their clients and partners from industry, felt able to respond to such a challenging demand of creating innovation in training in the Functional Safety Management field, which is becoming ubiquitous in our high-technology-driven society.

Highly motivated by the fact to be able to create a world-wide unique innovation in a field which affects our daily lives in an increasingly ubiquitous and complex manner, the consortium members, and their associated partners, have already worked very closely together in the planning and the development of this application.

### 3. Project Outcomes & Results

The first year of the project has brought the following major tangible results:

1. Full specification of SafEUr competences (SafEUr Skill Card)
2. Fully configured skill portal for self-assessment and examination
3. Fully configured e-Learning environment
4. Training material in English language for almost all the competence elements
5. Paper publications in scientific conferences
6. Article publications in newsletters and websites

The first outcome of the project is the specification of the SafEUr competence set, from which e-Learning based training material in the four consortium languages and test questions in English for the European certification have been developed. This competence set has been developed according to the standard that is proposed by the ECQA. This standard is compliant with the European Qualification Framework (EQF), and is based on the concept that the skills which characterise a specific job role define the so called **Skill Card** (or Skill Set), which contains Skill Units, which consist of Skill Elements. The competences expected from a candidate who wants to get certified for a particular skill element are specified by so-called Performance Criteria. For certification, the candidate is tested on the basis of a pool of test questions that have been specified for each performance criterion. Alternatively, candidates can ask for the assessment of documents that prove that they have successfully applied the principles and associated performance criteria in their professional activities.

The methodological approach in the project is to define the set of competencies in the form a Skill Card including content descriptions in a first step. This has been done by the partners on the basis of their profound experiences in industry co-operations on both project and process level. OEMs and tier one suppliers coming mainly from automotive industry and nuclear power plants have been closely involved in this process, in order to assure the high degree of relevance of the result.

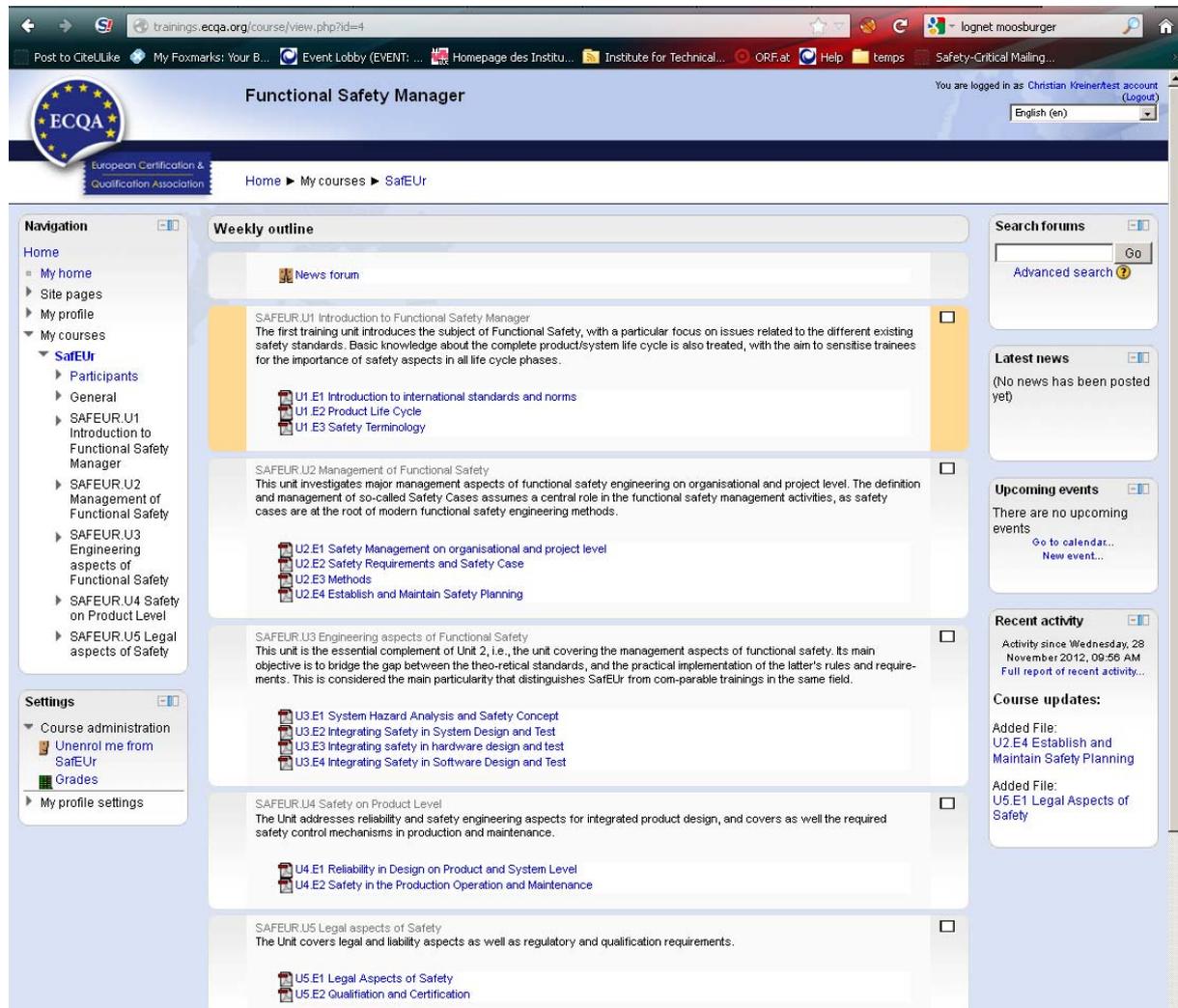
The so defined skill card provides the basis for the elaboration of the **training material**, which are largely based on principles demonstrated by practical case studies in the form of **e-Learning enabled** presentation material. Based on the experiences of the consortium partners, and their contacts to industry, this material will be focussed on the standards IEC 61508, the machine standard, and ISO 26262. This set of training material will be validated in both on-site and on-line pilot trainings in different EU countries, which will be free of charge during the project duration. Feedback will be collected and used to improve and enrich the training material, as well as the skill card if necessary.

Unit Identifier	Unit Name	Element Identifier	Element Name
SAFEUR.U1	Introduction to Functional Safety Management	SAFEUR.U1.E1	International Standards
		SAFEUR.U1.E2	Product Life Cycle
		SAFEUR.U1.E3	Terminology
SAFEUR.U2	Management of Functional Safety	SAFEUR.U2.E1	Safety management on organisational and project level
		SAFEUR.U2.E2	Safety Requirements and Safety Case Definition
		SAFEUR.U2.E3	Overview of Required Engineering and V&V Methods
		SAFEUR.U2.E4	Establish and Maintain Safety Planning
SAFEUR.U3	Engineering aspects of Functional Safety	SAFEUR.U3.E1	System Hazard Analysis and Safety Concept
		SAFEUR.U3.E2	Integrating Safety in System Design & Test
		SAFEUR.U3.E3	Integrating Safety in Hardware Design & Test
		SAFEUR.U3.E4	Integrating Safety in Software Design & Test
SAFEUR.U4	Safety on Product Level	SAFEUR.U4.E1	Integration of Reliability in Design to Enhance Functional Safety
		SAFEUR.U4.E2	Safety in the Production, Operation and Maintenance
SAFEUR.U5	Legal aspects of Safety	SAFEUR.U5.E1	Legal aspects and Liabilities
		SAFEUR.U5.E2	Regulatory & Qualification Requirements

### SafEUr Skill card

online published via [http://www.iscn.com/projects/piconew\\_skill\\_portal/Browse/?id=80](http://www.iscn.com/projects/piconew_skill_portal/Browse/?id=80)

SafEUr training material is used to configure an **e-Learning environment for the ECQA Certified Functional Safety Manager**. This screenshot shows a student's view after registering on the learning platform and enrolment:



In a second step, trainers will be trained in the participating consortium countries, in order to assure the sustainability after the project. At the same time, further pilot trainings will be organized, and the focus will be put on targeted dissemination actions to prepare the training exploitation phase after the project end in November 2013.

## 4. Partnerships

SafEUr – ECQA Certified Functional Safety Manager – has been launched in November 2011 as a Multilateral Project for the Development of Innovation in the Leonardo da Vinci Programme of the European Commission by a consortium of six partners in Europe with vast practical experience in industrial functional safety management projects, and solid partnerships with OEMs and tier one suppliers in automotive, aerospace, and nuclear power plants.

The six consortium partners are the following (in alphabetical order):

- [EMIRAcle](#) – European Manufacturing and Innovation Research Association, a cluster leading excellence, an international non-profit association of 25 leading research laboratories, companies and government institutions in 16 different countries, with its legal office in Belgium and its executive office in France;
- [Institute for Technical Informatics at Graz University of Technology](#) in Austria, among other topics specializing on the design of dependable embedded systems, and serving as SafEUr project coordinator;
- [ISCN LTD](#), International Software Consulting Network, based in Austria and in Ireland, who manages the project operatively;
- [Method Park Software AG](#) in Germany, a company that actively supports the development and management of functional safety related products in the automotive and medical device industry, and delivers training and consulting for different safety standards like ISO 26262;
- [SIBAC GmbH](#) in Germany, a company that has experience in the automotive industry in the development of safety related projects (automatic transmissions, electrically supported steering systems, active suspension systems) with all large suppliers and OEMs;
- [Spinet Oy](#) in Finland, a micro-size company specialized in process assessment and improvement services and a partner in the European ARTEMIS project RECOMP [12], whose aim is to develop new methods and certification schemes for safety-critical systems.

In order to integrate the training and certification program in a Europe-wide accepted and promoted scheme, this consortium has partnered up with the [European Certification and Qualification Association, ECQA](#). The ECQA currently promotes more than 20 modern professions, which are all enabled by an integrated web-based environment for self assessment, e-Learning, and examination for certification.

## 5. Plans for the Future

### International and Europe Wide Awareness

Through EuroSPI (European Systems and Software Process Improvement and Innovation) we organise conference since 1994, with 1994 in Dublin, 1995 in Vienna, 1996 in Brighton, 1997 in Budapest, 1998 in Gothenburg, 1999 in Pori, 2000 in Copenhagen, 2001 in Limerick, 2002 in Nuremberg, 2003 in Graz, 2004 in Trondheim, 2005 in Budapest, 2006 in Joensuu, 2007 in Berlin, 2008 in Dublin, 2009 in Alcalá/Madrid, 2010 in Grenoble, 2011 in Roskilde/Copenhagen, 2012 in Vienna, 2013 in Dundalk/Ireland, 2014 in Luxembourg, 2015 in Istanbul, etc. This conference is supporting workshop communities with safety being one of them. The publications are supported by **Wiley**, **Springer**, IGI Global, the ASQ American Software Quality Association. This assures visibility and usage Europe wide to some 20000 managers and conferences of about 150 decision makers annually.

It has a committee of known experts from lead research and lead industry from 28 countries.

This initiative is committed to further push the SafEUr Schema.

### Industry Sector Specific Awareness

SafEUr collaborates with main employers in the Automotive, Aerospace, and nuclear power fields, including Continental Automotive, ZF Friedrichshafen AG, KTM Motorsport, Elektrobit, HELLA, Magna, etc.

SafEUr is supported by the Austrian and surrounding Automotive Clusters and Automotive Academies.

### Main Area of Impact

- Managers responsible for functional safety on system and component level
- System architects and designers on system
- Engineers involved in functional safety – relevant engineering projects
- Students involved in (industry or university) programs - related to Integrated/Systems Engineering
- Quality Managers

### Europe Wide Certification Schema Established

The project partners agree to provide the copy rights of the skills set and test questions to the ECQA at the end of the project. ECQA promotes the skills set

Europe wide, and enters all test questions in the European exam portals, thus enabling Europe wide exam generation and standard processes for certification.

Certificates will be issued by ECQA, prices will be agreed for the certificate.

### Europe Wide Job Role Consortium

The partners (applying the ECQA exploitation guidelines) form a European job role committee and will allow lead industry and other ECQA members to join. The committee annually reworks the skills set and test questions.

### Using Up-To-Date Training Methods

An integrated system with skills browsing, skills self assessment, online learning and automated exams is being set up and used across all member states.

## 6. Contribution to EU policies

### Educational Policy

The SafEUr program will be designed in a way that it will also be relevant to engineering students in their last year of studies, as well as for doctorate and post-doctorate students. This will contribute to the early sensitization of engineers for functional safety and its management in organisations. Above all, in combination with the European-wide recognized certificate of the ECQA it will give them a competitive advantage in the labour market. In this way SafEUr contributes to the ERASMUS policy.

### Qualification Policy

SafEUr is using ECQA as a basis to implement Europe wide quality criteria and EQF based processes to establish this education on the market. The contents are described using skills set description standards, skills profiles and accreditation of prior learning are supported by advanced systems integrating skills assessment and selective online teaching.

### Innovation

SafEUr includes best practices highly needed by industry to maintain the European leadership in Automotive industry and related industry areas. Cars, planes, plants, etc. have an increasing complexity with impacts on safety and this training delivers answers to current problems in industry.

The following LLP program specific objectives and priorities are supported:

*LLP-Obj-b To support the realisation of a European area for lifelong learning*

SafEUr will fill a significant gap in modern job-role based lifelong learning on a European and foreign level.

Within ECQA [www.ecqa.org](http://www.ecqa.org) we have established (for a pool of above 20 LLP professions) a system which offers a lifelong learning account, online skills assessment, online training, standard procedures for exams and certifications. Safety manager will apply these concepts, thus adding a further key profession for LLP.

*LLP-Obj-k To encourage the best use of results, innovative products and processes ... , in order to improve the quality of education*

The SafEUr program will use and make available modern systems and best practices in the field of e-Learning for training for functional safety management competences. The learning content will be based on case-studies and best practices to a very large extent. In particular, it will be facilitated by a world-wide unique web-based integration platform, which puts at the convenient disposal of learners the most up-to-date knowledge in the field of embedded systems.

LEO-SpObj-a To support participants in ... in the acquisition and the use of knowledge, skills and qualifications ....

Currently there is no comparable training and certification program available in the area of functional safety management. However, this job role is gaining importance very rapidly, due to the high demand in several industry sectors, and the force of ISO. SafEUr will thus be a unique means to train and certify competences and skills in functional safety management.

LEO-SpObj-b To support improvements in quality and innovation ...

SafEUr will innovate the way in which functional safety management competences are accessible, taught, and certified.

The project agrees to implement the ECQA quality guidelines (see [www.ecqa.org](http://www.ecqa.org), about ECQA, Guidelines) which have been standardised for 18 countries and more than 20 LLP professions already. This assures high quality training and certification.

LEO-OpObj-2 To improve the quality and to increase the volume of cooperation ...

SafEUr consortium partners are training institutions, industrialists, and academic bodies with common objective. They will create a training which will transport cutting-edge valuable and varied knowledge from enterprises, universities, and standardization bodies using modern e-Learning and a unique innovative IT integration platform.

By joining the ECQA for exploitation we will agree and link cooperation among above 50 training institutions in 18 EU countries.

LEO-OpObj-6 To support the development of innovative ICT-based content, services, pedagogies and practice ...

SafEUr will innovate in the way that information and knowledge in the area of functional safety management, in particular with respect to embedded systems, are put at the disposal of learners, and in which the underlying IT-platforms are continuously fed by the international expert community in the field.

Priority 3 Developing Vocational Skills ... – New Skills for New Jobs

Currently there is no comparable training and certification program available in the area of functional safety management. However, this job role is gaining importance very rapidly, due to the high demand in several industry sectors, and the force of

standards. SafEUr will thus be a unique means to train and certify competences and skills in functional safety management, and thereby an optimal lever for experts to full this new job role.

## 7. Quality management

The project (to support effective team management) using an advanced system for EU project management.

In the TEAMWORK (IST-2000-28162, 2001 - 2003) project ISCN developed a best practice scenario and e-working platform for quality management in distributed projects including best practices for EU projects. The system allows

- To agree collaboration scenarios and support them over the Internet
- To share materials in a joint knowledge base
- To control versions of materials and submissions among team members online
- To discuss different issues online and record all discussions
- Etc.

Currently e.g. the system is used by a large network of 70 research organisations from US, Europe, and Eastern institutions.

The system also imposes planning and work control features and thus will be used also in this project to manage the entire team and share work.

The offices of ISCN are connected via a central mail and a central team-working portal. Partners in the different offices will be connected via this platform. See also <http://www.nqa.cc>.

If partners agree different scenarios of work a wizard helps to configure any required working infrastructure. The below picture shows a sample deliverable from one of the recent distributed research projects.

The screenshot displays the 'View document' page in the NQA System. At the top, there are navigation links: HOME, WP4 SAFEUR SKILLS SET DEFINITION, DELIVERABLE DESIGN, and DELIVERABLE. Below this, there are buttons for 'Send Notification' and 'Edit Document Title'. The main content area includes:

- Revision Control:** checked in. Includes links for 'Link to Document', 'Version List', and 'Publish New Version'. A note states: 'Last document change: Christian Kreiner - Mon, 26 Nov 2012 14:49:07, GMT+1'.
- Document Status:** Accepted. Includes a 'Public Document' checkbox and a 'Change Status' dropdown menu.
- Status changed by:** Christian Kreiner - Mon, 26 Nov 2012 14:49:07, GMT+1.
- Download current version of LEO\_PILOT\_DEL.1 "SafEUr Integrated Skill Card"** (highlighted in red).
- Linked documents:** EuroSPI2012 Paper - Documented Skill Card (remove).
- Linked files:** (none).

Two callout boxes are present:

- A box labeled 'See the different versions' points to the 'Version List' link.
- A box labeled 'Upload a new version of existing files' points to the 'Publish New Version' link.

Figure 1: Document View in the NQA System

As outlined in Figure 1 Documents are out under version control and can be linked to other documents. Documents are grouped into work packages. There is a standard set of work packages foreseen to control EU projects in network quality assurance.

In case of Leonardo projects the following types of working scenarios are already configured in the Teamwork platform.

Each scenario contains defined roles, result templates, work flows, and version control online.

The following structure is configured for the network quality assurance of EU Leonardo projects, maintaining a version controlled baseline.

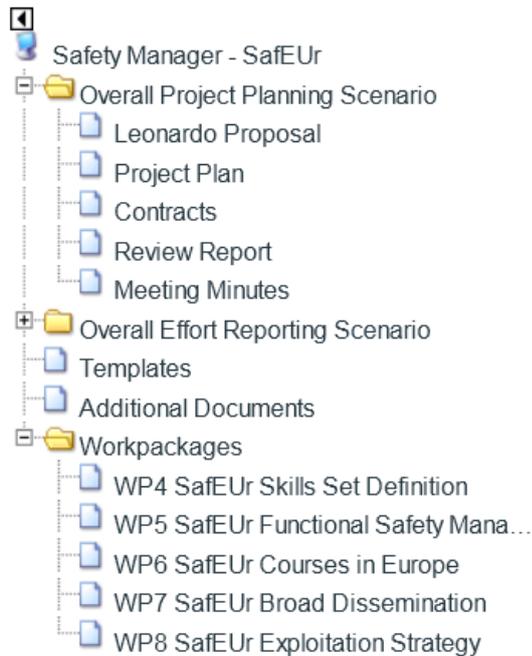


Figure 2: Defined Structure for Baselineing, Version control, and network quality assurance

The project control will be done via the e-working infrastructure inside so called Overall Project Planning scenarios. See below picture of a current research initiatives planning section. This allows the co-ordinator and the EU reviewer to access and review actual baselines online.

**Project Number:** LPP-SafEur-2012  
**Project Type:** Leonardo Pilot Planning  
**Abbreviation:** SafEur  
**Description:** Safety Manager

[Project Log](#)   [Project Calendar](#)   [Add Document Type](#)   [Enter Discussion Forum](#)

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**Overall Effort Reporting Scenario**

Effort Report (12 document(s)) [Download All](#) [Publish](#)

- Excel Report - Partner P7 - EMIRAcle [leo\_pilot\_effrep.13] (Draft)
- Excel Report - Partner P1 - TUGraz [leo\_pilot\_effrep.12] (Draft)
- MID TERM REPORT - Full Documents - Partner P1 TUGraz [leo\_pilot\_effrep.11] (Draft)
- Effort distribution Spinet Year1 [leo\_pilot\_effrep.10] (Draft)
- Spinet explanation of staff costs Year 1 of SafEur [leo\_pilot\_effrep.8] (Draft)
- Excel Report - Partner P6 - SPINET [leo\_pilot\_effrep.5] (Draft)
- EMIRAcle P7-SafEur Mid-Term Package [leo\_pilot\_effrep.9] (Draft)
- Spinet travel records during year 1 of SafEur [leo\_pilot\_effrep.7] (Draft)
- MID TERM REPORT - Full Documents - Partner P2 ISCN [leo\_pilot\_effrep.6] (Draft)
- Excel Report - Partner P2 - ISCN [leo\_pilot\_effrep.3] (Draft)
- Empty Excel Cost Reporting Template [leo\_pilot\_effrep.2] (Draft)
- Financial Handbook [leo\_pilot\_effrep.1] (Draft)

[Download whole phase documentation](#)   [Download phase documentation](#)

Safety Manager - SafEur

- Overall Project Planning Scenario
  - Leonardo Proposal
  - Project Plan
  - Contracts
  - Review Report
  - Meeting Minutes
- Overall Effort Reporting Scenario
  - Effort Report
  - Templates
  - Additional Documents
- Workpackages
  - WP4 SafEur Skills Set Definition
  - WP5 SafEur Functional Safety Mana...
  - WP6 SafEur Courses in Europe
  - WP7 SafEur Broad Dissemination
  - WP8 SafEur Exploitation Strategy

Figure 3: The Overall Planning and Effort Reporting Scenarios for Management Overview

On a quarter annual basis the configuration manager will review the project status and initiate corrective actions.

If required, the system allows online access of and online submission of results to EU officers.

