D6.3b – Maturity Model for SME collaboration – M30 issue

Author: ESI
Contributors: Mikel Vergara (ESI), Juncal Alonso (ESI), Leire Orue-Echevarria (ESI), Iker Martinez de Soria (ESI), Xabier Larrucea (ESI), Matthias Heindl (SIEMENS), Josef Withalm (University of Wien), Iris Karvonen (VTT), Mikko Höynälänmaa (PÖRY), Alberto Olmo (ISOIN) and contributions of other COIN End users.

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ANNEX A. ECMM CONTEXT QUESTIONNAIRE
1 EXECUTIVE SUMMARY

COIN service platform will be able to expose, integrate, compose and mash-up in a secure and adaptive way existing and innovative Enterprise Interoperability and Enterprise Collaboration services. Work package WP6.3 is part of Subproject SP6 and deals with “Maturity Models for SMEs Collaborative networks”.

WP6.3 establishes the approach for the uptake of the services developed within COIN. An Enterprise Collaboration Maturity Model (ECMM) will be developed in WP6.3 in order to support COIN objectives by analysing and developing end users readiness for collaboration and interoperability. ECMM is the research target of the WP6.3 and its most prominent result.

The ECMM has as main objective to analyze, measure, and propose improvement practices for increasing the capability of an organization to be able to collaborate and interoperate. That is, both interoperability and collaboration aspects should be included to reach a model that takes into account Enterprise Interoperability and Enterprise Collaboration as the two sides of the same COIN.
2 INTRODUCTION

In the current globalized and networked society, it is widely recognized that collaboration and interoperability are key issues for today’s organizations. As professed in the introduction to the COIN IP project, both concepts are different but they are so interconnected that can be considered two sides of the same COIN [1].

In this new situation where enterprises have shifted towards networked enterprises, companies need to adopt innovative forms of collaboration in order to compete and maintain their position in the global market. These new ways of collaboration are mainly based on Information Technologies and therefore interoperability capabilities at different levels have become crucial to create value and success, combining technology and business approaches to catalyze and sustain added value for enterprises and customers.

New economic activities have arisen alongside with new classes of networks and services, new forms of enterprise collaboration, new business models and new value propositions. Business has changed as well [2]. As stated by the European Commission in its published Enterprise Interoperability Value Proposition, economies of scale can now reach world wide, allowing firms to tap into the narrowest parts of the long tail of demand. In fact, collaboration is one of the global trends in business nowadays and collaborative practices are gaining importance in firms. These collaborative practices are being carried out in different forms, from cohesive and stable networks like Collaborative Networked Organisations (CNO) to more ephemeral and occasional cooperation like (VBE) Virtual Business Ecosystems.

Existing literature points out different definitions and analysis of new types of collaboration forms [3], as well as numerous enterprise interoperability types and practices [4]. There are also existing proposals on readiness for certain types of collaborations forms, like the Aricon approach [5], where a methodology for Virtual Enterprises and Product development is presented. However, for enterprises, it is still a hard task to identify best practices and improvements to start implementing collaboration and interoperability practices inside different types of networked environments.

Presuming that an organization is collaborating in any type of the networks aforementioned, the question they face is: how is my company performing alone and in the network, that is, how mature is my organization in terms of collaboration and interoperability and what can be improved to perform better?

Enterprise Collaboration Maturity Model (ECMM) to be presented in this document tries to answer this question. ECMM has the main objective of assessing organizations that desire to know their collaboration and interoperability maturity level with respect to a set of best practices. The result of these assessments will present, among other issues, an improvement plan and a roadmap to increase the enterprise’s collaboration and interoperability capabilities, instilling in organizations the benefits of excellence models.
This Deliverable “D6.3b-MM-for-SME-Collaboration” is the second report from COIN WP6.3 “Maturity Models for SMEs Collaborative networks”.

The WP consists of the four tasks:

T6.3.1: Analysis of state of the art and needs for the ECMM
T6.3.2: Define requirements for the ECMM
T6.3.3: Specification of the ECMM
T6.3.4: Development and Testing of ECMM services

The first report (deliverable “D6.3a-MM-for-SME-Collaboration”) was the output of the tasks: “T6.3.1: Analysis of state of the art and needs for the ECMM Due M6” and “T6.3.2: Define requirements for the ECMM Due M12”.

D6.3a focuses on:
- State of the art of current Maturity Models and other Process Improvement Frameworks that can be found in the market nowadays.
- Concepts and existing approaches for the analysis of Interoperability capabilities.
- Concepts and existing approaches for the analysis of Collaboration capabilities.
- Requirements and the convergence of Enterprise Interoperability and Enterprise Collaboration.

This Deliverable “D6.3b-MM-for-SME-Collaboration” is the output of the tasks “T6.3.3: Specification of the ECMM” and “T6.3.4: Development and Testing of ECMM services”.

This document is composed by 8 chapters:
Chapter 3 describes briefly the objectives and uses of the ECMM.

Chapter 4 introduces the structure of the ECMM including its hierarchy of components: domains, maturity levels, process areas, goals and practices. It also includes a section called “ECMM innovation and comparison with the State of the Art (SOA)” that aims to describe how sources and previous models have been taken into account.

Chapter 5 is a detailed description of the 23 ECMM Process Areas clustered into 7 domains, with their specific goals and specific practices.

Chapter 6 describes other model components: generic goals and generic practices. They are called “Generic” because the same practice applies to multiple process areas.

Chapter 7 introduces the ECMM Application Method. The assessment method is part of the ECMM application method. Two options, which are described in this chapter, are possible to carry out an assessment: “Formal assessment” and “Self-assessment”.

Chapter 8 includes a description of the two ECMM pilots that have been carried out until M30: Pilot 1 in Pöyry that analyses how to use maturity model in global offices network, project organization, pilot 2 in the “Aeronautic Cluster of Andalucia” and new pilots in IND, VEN and FILAS.
3 OBJECTIVES AND USE OF THE ECMM

The Enterprise Collaboration Maturity Model (ECMM) has as main objective to analyze, measure, and propose improvement practices for increasing the capability of an organization to be able to collaborate and interoperate.

In order to reach this main objective, other secondary and more specific objectives have been identified:

- Diagnose the state of an organization’s current practices regarding collaboration and interoperability issues.
- Set improvement objectives and priorities.
- Guide for improving projects and organizational processes.
- Help ensure stable, capable, and mature processes.
- Proposition of EC and EI technologies and services that could be useful.

Regarding the special features for collaboration practices the ECMM should be useful to:

- Support the collaboration during the whole life cycle of a Collaborative Networked Organisation (CNO): from its creation, operation, evolution, to its dissolution.
- For an enterprise (that could be part of a CNO or not) in order to evaluate its preparedness for collaboration (in a specific collaboration or in general) and provide best practices to correctly position the enterprise inside its collaborative network.

In order to diagnose the current state of organizations, ECMM can be applied by external independent evaluators and also internally as a self assessment tool.

Seven EC and EI process domains to which the ECMM can be applied have been identified:

- **Project and Product Management**: This domain contains the cross-project and product activities related to defining, planning, developing, risks management and quality assurance.
- **Business Process and Strategy**: This domain covers areas that support business process management and financial aspects.
- **Customer Management**: This contains aspects related to relationship with the customer and evaluation.
- **Collaboration, Legal Environment and Trust**: Legal activities, terms of collaboration relationships.
- **Organisation**: This domain covers activities related to management of resources, development of competences, measurement.
- **ICT infrastructure and Interoperability**: Technologies and Services for Interoperability and Collaboration.
- **Innovation**: This domain covers all activities related to innovation processes.
### 4.1 ECMM Domains and Process Areas

ECMM is structured in a hierarchy of components to support different users and their needs.

ECMM contains 23 process areas, clustered into 7 domains. This is summarised as follows:

<table>
<thead>
<tr>
<th>Domains</th>
<th>Description</th>
<th>Process Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project and Product Management</td>
<td>Cross-project and product activities related to defining, planning, developing, risks management and quality assurance.</td>
<td>- Collaborative Project Management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Configuration Management</td>
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<tr>
<td></td>
<td></td>
<td>- Requirements Management</td>
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<tr>
<td></td>
<td></td>
<td>- Process and Product Assurance</td>
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<tr>
<td></td>
<td></td>
<td>- Risk Management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Collaborative Product Solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Quantitative Project Management</td>
</tr>
<tr>
<td>Business Process and Strategy</td>
<td>Business process management and financial aspects.</td>
<td>- Business Management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Business Governance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Collaborative Business Process</td>
</tr>
<tr>
<td>Customer Management</td>
<td>Relationship with the customer and evaluation.</td>
<td>- Collaborative Customer Relationship Management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Customer Evaluation</td>
</tr>
<tr>
<td>Collaboration, Legal Environment and Trust</td>
<td>Legal activities, terms of collaboration relationships.</td>
<td>- Intellectual Property Rights</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Collaboration agreement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Trust management</td>
</tr>
<tr>
<td>Organisation</td>
<td>Management of resources, development of competences, measurement.</td>
<td>- Measurement and Analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Resource Management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Defect and Problem Prevention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Training and Competency Development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Collaborative Business Process Performance</td>
</tr>
<tr>
<td>ICT infrastructure and Interoperability</td>
<td>Technologies and Services for Interoperability and Collaboration.</td>
<td>- Interoperability and Collaboration technologies</td>
</tr>
<tr>
<td>Innovation</td>
<td>All activities related to innovation processes.</td>
<td>- Organisational Innovation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Open Innovation</td>
</tr>
</tbody>
</table>

*Table 1 - ECMM Domains and Process Areas*
4.2 Maturity Levels

The top-level components of ECMM are the maturity levels (four). According to the CMMI [6] definition:

A maturity level is a well-defined evolutionary plateau toward achieving a mature process. Each maturity level indicates a level of process capability. Since process capability describes the range of expected results that can be achieved by following a process, the process capability of an organization provides one means of predicting the most likely outcomes to be expected from the next effort the organization undertakes.

The graphical representation of the ECMM Maturity Levels is the following one:

Following are the details of what each Level means:

1. **Performed**: Collaboration with external entities is done, but in an ad-hoc and chaotic manner. Collaborative tasks and processes usually exceed budget and schedule, their past success cannot be repeated, and the potential of the technology is not used properly.
2. **Managed**: The objective is to create a management foundation for collaboration. Network technologies are used to collaborate.
3. **Standardized**: The objective is to establish a common business strategy and business process infrastructure for collaboration. Business collaboration is facilitated through interoperability technologies and use of standards.
4. **Innovating**: The objective is to manage and exploit the capability of the CNO process infrastructure to achieve predictable results with controlled variation. Additionally, another objective is to continuously improve the CNO processes and the resulting products and services through continuous capability, and planned innovative improvements.
4.3 Process Areas, goals and practices

Process areas are organized by maturity levels. The staged representation prescribes an order for implementing process areas according to maturity levels, which define the improvement roadmap for an organization from the initial level to the innovating level.

The following structure for the ECMM is presented:

![ECMM Structure](image)

**Figure 2 – ECMM Structure:**

Process Area, Goals and Practices

Where, using CMMI [6] definitions:

- A **process area** is a cluster of related practices in an area that, when implemented collectively, satisfy a set of goals considered important for making improvement in that area.

- A **specific goal** describes the unique characteristics that must be present to satisfy the process area. A specific goal is a required model component and is used in appraisals to help determine whether a process area is satisfied.

- A **specific practice** is the description of an activity that is considered important in achieving the associated specific goal. The specific practices describe the activities that are expected to result in achievement of the specific goals of a process area. A specific practice is an expected model component.

- **Generic goals** are called “generic” because the same goal statement applies to multiple process areas. A generic goal describes the characteristics that must be present to institutionalize the processes that implement a process area. A generic goal is a required model component and is used in appraisals to determine whether a process area is satisfied.

- **Generic practices** are called “generic” because the same practice applies to multiple process areas. A generic practice is the description of an activity that is considered important in achieving the associated generic goal. A generic practice is an expected model component.
Following a table with ECMM process areas short description is presented:

<table>
<thead>
<tr>
<th>Maturity Level</th>
<th>Process Area Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Business Management (BM) Business Management (BM) plans and manages the business and financial aspects of a CNO.</td>
</tr>
<tr>
<td>2</td>
<td>Collaboration Agreement (CA) The purpose of the Collaboration Agreement (CA) is to set up the terms in which the collaboration within the CNO takes place as well as the management of this collaboration throughout the whole life of a CNO.</td>
</tr>
<tr>
<td>2</td>
<td>Collaborative Project Management (CPM) The purpose of Collaborative Project Management (CPM) is to establish and manage the project and the involvement of the relevant stakeholders. This process area also covers the establishment of a shared vision for the project and the establishment of collaborative teams that will carry out the objectives of the project.</td>
</tr>
<tr>
<td>2</td>
<td>Configuration Management (CM) The purpose of Configuration Management (CM) is to establish and maintain the integrity of the work products of the collaborative project and make them available to concerned parties.</td>
</tr>
<tr>
<td>2</td>
<td>Intellectual Property Rights (IPR) The purpose of the Intellectual Property Rights (IPR) is to clarify and agree the terms of the Intellectual Property Rights within the CNO.</td>
</tr>
<tr>
<td>2</td>
<td>Measurement and Analysis (MA) The purpose of Measurement and Analysis (MA) is to develop and sustain a measurement capability of the CNO that is used to support management information needs.</td>
</tr>
<tr>
<td>2</td>
<td>Process and Product Assurance (PPA) Process and Product Assurance provides appropriate conformance guidance and objectively reviews the activities and work products of work efforts within the CNO to ensure they comply with applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures.</td>
</tr>
<tr>
<td>2</td>
<td>Requirements Management (REQM) The purpose of Requirements Management (REQM) is to identify, negotiate and validate requirements of the collaborative products, and to identify inconsistencies between requirements and the collaborative project's plans and work products.</td>
</tr>
<tr>
<td>2</td>
<td>Resource Management (RM) Resource Management plans and manages the acquisition, allocation, and reassignment of people and other resources needed to prepare, deploy, operate, and support the CNO's products and services.</td>
</tr>
<tr>
<td>2</td>
<td>Trust Management (TM) The purpose of Trust Management (TM) is to promote the establishment of trust relationships among CNO participants, including the assessment of the trust level among members and between members and the CNO as a whole.</td>
</tr>
<tr>
<td>Maturity Level</td>
<td>Process Area Definition</td>
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</tbody>
</table>
|               | **Business Governance (BG)**  
| 3             | Business Governance (BG) establishes executive accountability for the management and performance of the CNO’s work and results. |
|               | **Collaborative Business Process (CBP)**  
| 3             | The purpose of Collaborative Business Process (CBP) is to establish and maintain a usable set of collaborative business process assets and work environment standards. This process area also covers the establishment of organizational rules and guidelines that enable conducting work using collaborative teams in CNO’s. |
|               | **Collaborative Customer Relationship Management (CCRM)**  
| 3             | The purpose of Collaborative Customer Relationship Management (CCRM) is to establish and maintain an optimal long-term mutually valuable relationship between customers and collaborative enterprises. |
|               | **Defect and Problem Prevention (DPP)**  
| 3             | Defect and Problem Prevention identifies and addresses the causes of defects and other problems that are the primary obstacles to achieving a CNO’s plans and quantitative improvement goals so these defects and problems do not recur. |
|               | **Organisational Innovation (OI)**  
| 3             | The purpose of Organisational Innovation (OI) is to select and deploy innovations that improve the collaborative processes and technologies. |
|               | **Risk Management (RSKM)**  
| 3             | The purpose of Risk Management (RSKM) is to identify potential risks before they occur across the life of the collaborative project and then mitigate these risks to reduce adverse impacts on achieving collaborative objectives. |
|               | **Interoperability and Collaboration Technologies (ICT)**  
| 3             | The purpose of Interoperability and Collaboration Technologies (ICT) is to standardize the usage of a set of baseline tools, techniques and methods for interoperability and collaboration. |
|               | **Collaborative Product Solution (TS)**  
| 3             | The purpose of Collaborative Product Solution (CPS) is to design and implement the collaborative product. Previously the best product solution has been selected from different alternatives. |
|               | **Customer Evaluation (CE)**  
| 4             | The purpose of Customer Evaluation (CE) is to measure the customers’ satisfaction regarding the delivered products and services and to set up a set of indicators internal to the CNO w.r.t. the customers. |
|               | **Open Innovation (OPI)**  
<p>| 4             | Systematically explore a wide range of internal and external sources for innovation opportunities, integrate and exploit those opportunities through multiple channels. |</p>
<table>
<thead>
<tr>
<th>Maturity Level</th>
<th>Process Area Definition</th>
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</thead>
</table>
| 4             | **Collaborative Business Process Performance (BPP)**  
The purpose of Collaborative Business Process Performance (BPP) is to achieve a quantitative understanding of the performance of the collaborative business processes by means of establishing metrics for quantitative process management, quality goals for the collaborative business processes and metrics for the quality of work products. |
| 4             | **Quantitative Project Management (QPM)**  
The purpose of Quantitative Project Management (QPM) is to quantitatively manage the collaborative processes to achieve the established collaborative project’s quality goals. |
| 4             | **Training and Competency Development (TCD)**  
The purpose of Training and Competency Development (TCD) is to develop the skills and knowledge of people in a collaborative way so they can perform their roles in the network effectively and efficiently. |

*Table 2 – ECMM Process Areas*
4.4 ECMM Structure

In the following table, the relationship among ECMM Domains, Maturity Levels and Process Areas is depicted.

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<tbody>
<tr>
<td>Level 2</td>
<td>Collaborative Project Management</td>
<td>Business Management</td>
<td></td>
<td>Intellectual Property Rights</td>
<td></td>
<td>Measurement and Analysis</td>
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<td></td>
<td>Configuration Management</td>
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<td></td>
<td>Collaboration agreement</td>
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<td>Resource Management</td>
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<td>Requirements Management</td>
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<td>Trust management</td>
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<td></td>
<td>Process and Product Assurance</td>
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<tr>
<td>Level 3</td>
<td>Risk Management</td>
<td>Business Governance</td>
<td></td>
<td>Collaborative Customer Relationship Management</td>
<td></td>
<td>Defect and Problem Prevention</td>
<td>Interoperability and Collaboration technologies</td>
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<td></td>
<td>Collaborative Product Solution</td>
<td>Collaborative Business Process</td>
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<tr>
<td>Level 4</td>
<td>Quantitative Project Management</td>
<td>Customer Evaluation</td>
<td></td>
<td>Training and Competency Development</td>
<td></td>
<td>Collaborative Business Process Performance</td>
<td>Open Innovation</td>
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</table>

Table 3 - ECMM Domains, Maturity Levels and Process Areas
4.5 ECMM innovation and comparison with the State of the art (SoA)

4.5.1 Innovation

We can consider innovation in ECMM from three points of view:

- **Innovation in the Maturity Model itself.** COIN ECMM is a new model that has been created specifically for Collaboration and Interoperability whereas other maturity models have been focused only on Collaboration or Interoperability issues independently. In fact, innovation is one of the categories of process areas that has been identified to be included in the Maturity Model.

- **Innovation in the development process.** COIN End Users are deeply involved in the creation of the ECMM within a participative process by means for example of Innovation Games. The problems and users’ needs and the potential of maturity models are linked together in a creative process.

- **Innovation in the application of the Maturity Model.** COIN ECMM will be used for proposition of EC and EI services. EC and EI services will be associated to the goals of the Maturity Model. According to the results of an assessment, the organisation may add the associated services where the respective goal has not been met. Thus, the application of these services may be implemented as a new orchestration or choreography so as to let COIN Platform offer Innovative Web Services based on the gap identified. Finally, the results of the assessment will be serialized to feed the COIN service platform in order to create an iterative process that involves implicitly a great innovation.
4.5.2 Comparison with the State of the Art (SoA)

In order to define the ECMM the following sources have been studied:
- Capability Maturity Model Integration (CMMI) [6]
- Business Process Maturity Model (BPMM) [7]
- Enterprise Interoperability concepts and frameworks
- Enterprise Collaboration concepts and frameworks
- Other maturity models and related frameworks.
- COIN End Users requirements.

According to its source we can distinguish two main groups of Process Areas:
- First group includes Process Areas that are based on CMMI [6] maturity model. These are 11 of the 23 Process Areas of the ECMM, corresponding to “Project and Product Management” and “Organisation” domains. “Organisational Innovation” is also included. Each Process Area in this group is based on other that exists in CMMI model (or is a combination of two existing Process Areas) and has been adapted to a Collaborative Network scenario, including new goals, practices or modifying the existing goals and practices. This group includes:
  o Collaborative Project Management
  o Configuration Management
  o Requirements Management
  o Process and Product Assurance
  o Risk Management
  o Collaborative Product Solution
  o Quantitative Project Management
  o Measurement and Analysis
  o Training and Competency Development
  o Collaborative Business Process Performance
  o Organisational Innovation
- Second group includes 12 Process Areas coming from other sources such as frameworks, models (not necessarily Maturity Models) and COIN End Users. Those are all new Process Areas that have been specifically created for ECMM. This group includes:
  o Business Management
  o Business Governance
  o Collaborative Business Process
  o Collaborative Customer Relationship Management
  o Customer Evaluation
  o Intellectual Property Rights
  o Collaboration agreement
  o Trust management
  o Resource Management
  o Defect and Problem Prevention
  o Interoperability and Collaboration technologies
  o Open Innovation
We can distinguish here four subgroups:

- Process Areas coming from **Enterprise Interoperability** concepts, for example ATHENA IP project [4]. “Collaborative Business Process” is based on the homonymous ATHENA IP project concept. “Interoperability and Collaboration Technologies” includes the PÖRY\(^1\) vision to establish and deploy a basic ICT environment, management & Engineering tools and ICT support.

- Process Areas coming from **Enterprise Collaboration** concepts, for example ECOLEAD project [3]. This group includes “Intellectual Property Rights”, “Collaboration agreement” and “Trust Management”.

- Process areas that are based on **BPMM** [7] maturity model. These process areas correspond to the domain “Business Process and Strategy” (excluding “Collaborative Business Process”) and also includes “Resource Management” and “Defect and Problem Prevention”.

- Process Areas coming from **other models and End Users** concepts. These process areas correspond to the “Customer” domain. It also includes “Open Innovation”. In this subgroup, for example, “Collaborative Customer Relationship Management” has been significantly modified, based on the results of an assessment performed in an ICT cluster of companies at the Basque Country.

---

\(^1\) PÖRY is one of the COIN End Users.
In the following table, the sources of the ECMM Process Areas are represented. The colours are used to show the Process Area source (green for Process Areas based on CMMI, blue for Process Areas related to Enterprise Interoperability concepts, etc.).

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<td></td>
<td>Collaborative Project Management</td>
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<td>Intellectual Property Rights</td>
<td>Measurement and Analysis</td>
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<td></td>
<td>Configuration Management</td>
<td></td>
<td></td>
<td>Collaboration agreement</td>
<td>Resource Management</td>
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<tr>
<td></td>
<td>Requirements Management</td>
<td></td>
<td></td>
<td>Trust management</td>
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<tr>
<td></td>
<td>Process and Product Assurance</td>
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</tr>
<tr>
<td>Level 3</td>
<td>Risk Management</td>
<td>Business Governance</td>
<td>Collaborative Customer Relationship Management</td>
<td>Defect and Problem Prevention</td>
<td>Interoperability and Collaboration Technologies</td>
<td>Organisational Innovation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collaborative Product Solution</td>
<td>Collaborative Business Process</td>
<td></td>
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</tr>
<tr>
<td>Level 4</td>
<td>Quantitative Project Management</td>
<td>Customer Evaluation</td>
<td>Training and Competency Development</td>
<td>Collaborative Business Process Performance</td>
<td>Open Innovation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 3- ECMM Process Areas Sources**
The seven domains and 23 process areas have been identified and structured into the ECMM model following a process that has been described in COIN deliverable D6.3a – Maturity Model for SME collaboration (M12), at section “6.3 Enterprise Collaboration Maturity Model (ECMM) requirements”. This section explains the logic behind the structure of the ECMM.

The figure below shows the different sources from which the ECMM has obtained its requirements:

**Figure 4 – ECMM Requirements**
5 PROCESS AREAS

This section describes, in detail, all the generic and specific goals and practices of ECMM. Specific Process Areas are defined. For each Process Area, specific goals and specific practices by goal are defined.

5.1 Project and Product Management

5.1.1 Collaborative Project Management

A Product and Project Management Process Area of Level 2

Purpose

The purpose of Collaborative Project Management (CPM) is to establish and manage the project and the involvement of the relevant stakeholders. This process area also covers the establishment of a shared vision for the project and the establishment of collaborative teams that will carry out the objectives of the project.

Collaborative Project Management address the activities related to establishing and maintaining the project plan, establishing and maintaining commitments, monitoring progress against the plan, taking corrective action, and managing supplier agreements.

Sources:

{CMMI-Dev-v1.2 Project Planning, Project Monitoring and control} [6]
BPMM [7]

SPECIFIC GOALS

| SG 1 | Establish a shared Vision of a collaborative project |
| SG 2 | Develop Project Estimates |
| SG 3 | Establish a Collaborative Project Plan |
| SG 4 | Obtain Commitment to the Collaborative Project Plan |
| SG 5 | Track Progress against Plan |

SPECIFIC PRACTICES

| SP 1.1 | Establish project alignments with the collaboration network interests |
| SP 1.2 | Establish the project collaborative team from the collaborative network |
| SP 1.3 | Establish shared responsibilities for the project |
SP 2.1 Develop Work Breakdown Structure
SP 2.2 Develop Estimates of Work Product and Task Attributes
SP 2.3 Select Collaborative Project Lifecycle
SP 2.4 Develop Estimates of Competences for the project
SP 2.5 Develop Estimates of Effort and Cost
SP 3.1 Establish project Budget and Schedule
SP 3.2 Establish a Plan for Collaborative Project Data Management
SP 3.3 Establish a Plan for Collaborative Project Resources
SP 3.4 Establish a Plan for Needed Knowledge and Skills
SP 3.5 Alignment of network members competences and project needed Skills
SP 3.6 Establish a Plan for Stakeholder Involvement
SP 3.7 Establish the Collaborative Project Plan
SP 4.1 Review other Plans that affect the Collaborative Project
SP 4.2 Reconcile available and estimated resources
SP 4.3 Obtain Commitment from relevant stakeholders
SP 5.1 Track Project Planning Parameters
SP 5.2 Track Commitments
SP 5.3 Track Data Management
SP 5.4 Track Stakeholder Involvement
SP 5.5 Perform Progress Reviews

Specific Practices by Goal

SG 1 Establish a shared Vision of a collaborative project
Establish and maintain a common vision of the project among all the members of the collaborative networks.

SP 1.1 Establish project alignments with the collaboration network interests
SP 1.2 Establish the project collaborative team from the collaborative network
<table>
<thead>
<tr>
<th>SP 1.3</th>
<th>Establish shared responsibilities for the project</th>
</tr>
</thead>
</table>

**SG 2**

**Develop Project Estimates**

*Develop and document estimates of project planning parameters.*

<table>
<thead>
<tr>
<th>SP 2.1</th>
<th>Develop Work Breakdown Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Develop a top-level work breakdown structure (WBS) to estimate the scope of the collaborative project.</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SP 2.2</th>
<th>Develop Estimates of Work Product and Task Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Develop estimates of the attributes of the work products and tasks.</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SP 2.3</th>
<th>Select Collaborative Project Lifecycle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Select a lifecycle model for the collaborative project which is appropriate to the scope, magnitude, and complexity of the project.</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SP 2.4</th>
<th>Develop Estimates of Competences for the project</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Estimate the competences needed for the project and alignment of those competences and project members.</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SP 2.5</th>
<th>Develop Estimates of Effort and Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Estimate the project effort and cost for the work products and tasks based on estimation rationale.</em></td>
</tr>
</tbody>
</table>

**SG 3**

**Establish a Collaborative Project Plan**

*Establish and maintain a plan as the basis for managing the collaborative project.*

<table>
<thead>
<tr>
<th>SP 3.1</th>
<th>Establish project Budget and Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Establish and maintain the project’s budget and schedule, based on the lifecycle model, work breakdown structure and estimates.</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SP 3.2</th>
<th>Establish a Plan for Collaborative Project Data Management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Establish a plan for the management of project data in a collaborative network.</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SP 3.3</th>
<th>Establish a Plan for Collaborative Project Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Establish a plan for necessary resources to perform the collaborative project.</em></td>
</tr>
</tbody>
</table>
SP 3.4 Establish a Plan for Needed Knowledge and Skills

*Establish a plan for knowledge and skills needed to perform the collaborative project.*

SP 3.5 Alignment of network members competences and project needed Skills

*Alignment of network members competences and the skills needed for the collaborative project development.*

SP 3.6 Establish a Plan for Stakeholder Involvement

*Establish a plan for the involvement of identified stakeholders.*

SP 3.7 Establish the Collaborative Project Plan

*Establish and maintain the overall project collaborative plan content.*

SG 4 Obtain Commitment to the Collaborative Project Plan

*Establish and maintain commitments to the project plan.*

SP 4.1 Review other Plans that affect the Collaborative Project

*Review all plans that affect the project to understand project commitments.*

SP 4.2 Reconcile available and estimated resources

*Reconcile the project plan to reflect available and estimated resources.*

SP 4.3 Obtain Commitment from relevant stakeholders

*Obtain commitment from relevant stakeholders responsible for performing and supporting plan execution.*

SG 5 Track Progress against Plan

*Actual progress of the project is monitored against the project plan.*

SP 5.1 Track Project Planning Parameters

*Track the actual values of the project planning parameters against the project plan.*

SP 5.2 Track Commitments

*Track commitments against those identified in the project plan.*
<table>
<thead>
<tr>
<th>SP 5.3</th>
<th>Track Data Management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Track the management of project data against the project plan.</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SP 5.4</th>
<th>Track Stakeholder Involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Track stakeholder involvement against the project plan.</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SP 5.5</th>
<th>Perform Progress Reviews</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Periodically review the project progress, performance, and incidences.</em></td>
</tr>
</tbody>
</table>
5.1.2 Configuration Management

A Project and Product Management Process Area of Level 2

Purpose

The purpose of Configuration Management (CM) is to establish and maintain the integrity of the work products of the collaborative project and make them available to concerned parties.

Sources: CMMI-DEV-v1.2 [6]  
BPMM [7]

SPECIFIC GOALS

<table>
<thead>
<tr>
<th>SG 1</th>
<th>Establish Configurations</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG 2</td>
<td>Control Contents of Configuration</td>
</tr>
<tr>
<td>SG 3</td>
<td>Report Configuration Management Information</td>
</tr>
</tbody>
</table>

SPECIFIC PRACTICES

| SP 1.1 | Establish Collaborative Configuration Management Strategy |
| SP 1.2 | Establish Collaborative Configuration Management Repositories |
| SP 1.3 | Identify Configuration Items |
| SP 1.4 | Specify Product Baselines |
| SP 2.1 | Manage Change Requests |
| SP 2.2 | Control changes to the Configuration Items |
| SP 3.1 | Maintain Configuration item history |
| SP 3.2 | Audit Product Baselines |
| SP 3.3 | Provide Configuration Management Reports |
Specific Practices by Goal

**SG 1 Establish Configurations**

_Baselines of identified collaborative work products and their configuration items are established._

**SP 1.1 Establish Collaborative Configuration Management Strategy**

_Establish and maintain the strategy for performing and coordinating configuration management for the collaboration._

This specific practice ensures that the people involved in developing, maintaining, controlling, and using the collaboration’s configuration items and configuration management collaborative product baselines understand how configuration management will be performed.

**SP 1.2 Establish Collaborative Configuration Management Repositories**

_Establish and maintain collaborative configuration management repositories for the collaboration._

This specific practice ensures that the collaborative repositories needed to store and manage the collaborative work unit’s configuration items, configuration management collaborative product baselines, and associated data and records are adequate and appropriate.

**SP 1.3 Identify Configuration Items**

_Identify configuration items that need to be independently identified, stored, reviewed, changed, delivered and maintained._

Items under configuration management can include: Collaborative products that are delivered to the customer, tools, specifications and interface documents of the collaborative product, etc. Other documents, such as test results, may also be included, depending on their criticality to defining the collaborative product.
SP 1.4 Specify Product Baselines

Specify product baselines for a collaborative use within the collaboration and for delivery to the customer.

A baseline is a work product or a set of work products that has been established as the basis for further development or delivery to the customer. A baseline has been formally reviewed and agreed on among relevant agents, and therefore can be modified only by means of change control procedures.

SG 2 Control Contents of Configuration

The content of the collaboration’s configuration management product baselines and their configuration items are managed and controlled.

The specific goal serves to maintain baselines after they are established by the specific practices under the Establish Configurations specific goal.

SP 2.1 Manage Change Requests

Manage change requests for the configuration items.

Manage change requests to maintain collaborative work products. Analyse the impact that the change will have on the collaborative work product, budget, and schedule.

SP 2.2 Control changes to the Configuration Items

Control changes to the configuration items.

Control updates to the collaborative work product baseline. Track the configuration of each configuration item.

SG 3 Report Configuration Management Information

Information that describes the content and status of the collaboration’s configuration management product baselines and their configuration items is maintained and reported to relevant stakeholders.

SP 3.1 Maintain Configuration item history

Maintain a history of each configuration item, recording configuration management actions against the item in sufficient detail to allow for recovery of previous versions.

SP 3.2 Audit Product Baselines

The collaborative product baselines, service packs, their component configuration items and associated records are audited to ensure they are ready for use.

Configuration audits confirm that the resulting baselines and documentation conform to a specified standard or requirement.

SP 3.3 Provide Configuration Management Reports

Reports are provided to relevant stakeholders on the collaboration’s configuration management activities.
This specific practice ensures that relevant stakeholders for the collaboration’s configuration management activities are kept informed of the relevant configuration management information so they can fulfill the configuration management roles and responsibilities or appropriately use the collaborative configuration management product baselines.
5.1.3 Requirements Management

A Project and Product Management Process Area of Level 2

Purpose

The purpose of Requirements Management (REQM) is to identify, negotiate and validate requirements of the collaborative products, and to identify inconsistencies between requirements and the collaborative project’s plans and work products.

This process area deals with the initial set of requirements and with changes taking into account both collaborative network perspective and customer vision in order to offer valuable way to manage the requirements.

Sources: CMMI-DEV-v1.2 [6]  
BPMM [7]

SPECIFIC GOALS

| SG 1 | Manage Requirements |
| SG 2 | Define Collaborative Product Requirements |
| SG 3 | Validate Requirements |

SPECIFIC PRACTICES

| SP 1.1 | Identify Requirements |
| SP 1.2 | Negotiate Requirements |
| SP 1.3 | Obtain Commitment |
| SP 1.4 | Manage Changes to Requirements |
| SP 1.5 | Manage Traceability of Requirements |
| SP 1.6 | Conduct Regular Requirements Review |
| SP 2.1 | Analyse Collaborative Product Requirements |
| SP 2.2 | Allocate Requirements to the Product Components |
| SP 2.3 | Define Interface Requirements |
| SP 3.1 | Define Scenarios |
SP 3.2 Establish Functional Analysis

SP 3.3 Requirements Validation

Specific Practices by Goal

SG 1 Manage Requirements

Customer needs, expectations and constraints are collected and translated into requirements. Inconsistencies with collaborative project plans and work products are identified.

SP 1.1 Identify Requirements

Customer needs, expectations and constraints are collected and translated into customer requirements.

The customer needs, expectations, constraints, are analysed, harmonized, refined, and elaborated for translation into a set of requirements.

SP 1.2 Negotiate Requirements

Negotiate the proposed requirements with the stakeholders.

Negotiate the proposed requirements with the stakeholders to ensure that they are consistent with the scope of responsibility, capability and capacity of the collaborative enterprises.

SP 1.3 Obtain Commitment

Review the proposed requirements with the stakeholders to obtain commitment.

Ensure that requirements are understood by stakeholders in order to obtain commitment.

SP 1.4 Manage Changes to Requirements

Manage changes to the requirements and analyse the impact of these changes.

During the collaborative project changes may have to be made to the existing requirements. In order to analyse the impact of the changes, the source of each requirement should be identified and the rationale for any change documented.

SP 1.5 Manage Traceability of Requirements

Maintain traceability between the requirements and collaborative work products.

Establish the bidirectional traceability from requirements to each level of the collaborative product decomposition.
**SP 1.6 Conduct Regular Requirements Review**

*Review the requirements periodically in order to identify inconsistencies between the collaborative project plans, work products and the requirements.*

Find the inconsistencies between the requirements and the collaborative project plans and work products and initiates the corrective action to fix them.

**SG 2 Define Collaborative Product Requirements**

*Refine customer requirements in order to define collaborative product requirements.*

**SP 2.1 Analyse Collaborative Product Requirements**

*Analyse collaborative product requirements which are based on the customer requirements.*

The collaborative product requirements are the expression of the customer requirements in technical terms that can be used for design decisions.

**SP 2.2 Allocate Requirements to the Product Components**

*Allocate all the collaborative product requirements to the high-level components of the collaborative product.*

**SP 2.3 Define Interface Requirements**

*Define interface requirements.*

Define interface requirements between products or product components identified in the collaborative product architecture.

**SG 3 Validate Requirements**

*Validate requirements and develop a definition of required functionality.*

**SP 3.1 Define Scenarios**

*Establish and maintain collaborative product scenarios.*

A scenario is a sequence of interactions that occur in the use of the collaborative product, which is used to make explicit some of the needs of the stakeholders.

**SP 3.2 Establish Functional Analysis**

*Establish a definition of required functionality.*

The definition of functionality (also called functional analysis) is the description of actions, sequence, inputs, outputs, or other information that communicates what the collaborative product is intended to do.

**SP 3.3 Requirements Validation**

*Validate requirements with end users to ensure the resulting collaborative product will perform as intended.*
Requirements validation is performed early in the collaborative project lifecycle to ensure that requirements serve as the basis for successfully defining the needed collaborative work products.

5.1.4 Process and Product Assurance

A Project and Product Management Process Area of Level 2

Purpose

The purpose of Process and Product Assurance (PPA) is to provide appropriate conformance guidance and objectively reviews the activities and work products of work efforts within the collaboration to ensure they comply with applicable laws, regulations, standards, organizational policies, business rules, process descriptions and work procedures.

Sources:

CMMI-DEV-v1.2 [6]
BPMM [7]

SPECIFIC GOALS

SG 1 Evaluate Collaborative Processes and Results
SG 2 Resolve Non-Conformance Issues

SPECIFIC PRACTICES

SP 1.1 Provide Conformance Assistance
SP 1.2 Evaluate Collaborative Processes
SP 1.3 Evaluate Collaborative Work Products and Services
SP 2.1 Review Evaluation Results
SP 2.2 Ensure Resolution of Non-Conformance Issues
SP 2.3 Address Non-Conformance Causes
SP 2.4 Establish Records of Process and Product Assurance activities
Specific Practices by Goal

**SG 1** Evaluate Collaborative Processes and Results

**Evaluate collaborative processes and associated work products and services against collaborative process descriptions, standards and procedures.**

**SP 1.1 Provide Conformance Assistance**

*Assistance is provided to the individuals, collaborative work units, and workgroups so they can understand and comply with the laws, regulations, organizational policies, business rules, and standards that are applicable to their work.*

This specific practice consolidates the investigation of the potentially complex and large volume of applicable laws, regulations, organizational policies, business rules, and standards, so that each individual, collaborative work unit, and workgroup does not have to separately determine the applicable clauses and provisions with which they must comply.

**SP 1.2 Evaluate Collaborative Processes**

*Evaluate collaborative processes against the applicable laws, regulations, standards, organizational policies, and business rules.*

This specific practice ensures that the applicable laws, regulations, standards, organizational policies, and business rules are reflected in the collaborative processes, so that in following the collaborative processes the people have confidence they are in conformance.

**SP 1.3 Evaluate Collaborative Work Products and Services**

*Selected work products and services that are outputs of the collaborative processes are objectively evaluated against the applicable laws, regulations, standards, organizational policies and business rules.*

This specific practice identifies work products and services that are not in conformance with the applicable laws, regulations, standards, organizational policies, and business rules, so that corrective actions can be taken.

**SG 2** Resolve Non-Conformance Issues

*Non-conformance issues are tracked, communicated and resolved.*

**SP 2.1 Review Evaluation Results**

*The results of the process and product assurance evaluations are reviewed with the responsible individuals, collaborative work units, workgroups, and managers on a regular basis.*

This specific practice ensures that the individuals, collaborative work units, workgroups, and managers who are responsible for the work are kept informed of the results of the assurance evaluations so they understand all non-conformance issues and, where appropriate, they can take corrective actions and make appropriate adjustments in their future work.
<table>
<thead>
<tr>
<th>SP 2.2</th>
<th><strong>Ensure Resolution of Non-Conformance Issues</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Ensure resolution of non-conformance issues with the staff and managers.</em></td>
</tr>
<tr>
<td></td>
<td>Non-conformance issues are problems identified during evaluations and reflect a lack of compliance to applicable standards, process descriptions or procedures.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SP 2.3</th>
<th><strong>Address Non-Conformance Causes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>The likely causes of significant non-conformance issues are identified and addressed.</em></td>
</tr>
<tr>
<td></td>
<td>This specific practice ensures that, where possible, significant non-conformance issues that occurred in the past do not recur.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SP 2.4</th>
<th><strong>Establish Records of Process and Product Assurance activities</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Establish, maintain and make available records of the collaborative process and product assurance activities.</em></td>
</tr>
</tbody>
</table>
5.1.5 Risk Management

A Project and Product Management Process Area of Level 3

Purpose

The purpose of Risk Management (RSKM) is to identify potential risks before they occur across the life of the collaborative project and then mitigate these risks to reduce adverse impacts on achieving collaborative objectives.

Sources: CMMI-DEV-v1.2 [6]
BPMM [7]

SPECIFIC GOALS

SG 1 Establish Collaborative Risk Management Strategy
SG 2 Establish Collaborative Risk Plan
SG 3 Handle Collaborative Risks

SPECIFIC PRACTICES

SP 1.1 Identify Risk Sources
SP 1.2 Identify Risk Parameters
SP 1.3 Elaborate Collaborative Risk Management Strategy
SP 2.1 Identify Risks
SP 2.2 Assess Risks
SP 2.3 Establish Collaborative Risk Plans
SP 3.1 Establish Collaborative Risk Mitigation Plans
SP 3.2 Monitor Collaborative Risk Mitigation Plans
SP 3.3 Communicate Risk Information
Specific Practices by Goal

SG 1  Establish Collaborative Risk Management Strategy

*Establish and maintain the collaborative strategies for risk management.*

**SP 1.1 Identify Risk Sources**

*Identify Risk Sources.*

The sources are what need to be managed for pro-active collaborative risk management. The clearer the sources, the better are the outcomes of the collaborative risk management strategy and the more meaningful the management of risks. The identification of the sources is straightforward and focuses on how the risk can eventuate or be triggered.

**SP 1.2 Identify Risk Parameters**

*Identify the parameters used to analyze and prioritise risks.*

Examples of risk parameters are: probability of risk occurrence and impact of risk occurrence.

**SP 1.3 Elaborate Collaborative Risk Management Strategy**

*Establish and maintain a Collaborative Risk Management Strategy*

This specific practice is the result of the two previous ones. In a strategy the items that are addressed are, among others, scope of the risk management effort, sources of risk, definition of measures to monitor the status of risks, etc. It can happen that the strategy appears as part of the risk mitigation plan.
SG2 Establish Collaborative Risk Plan

Establish and maintain the collaborative risk plan.

SP 2.1 Identify Risks

Identify and document the risks that could jeopardize the collaborative business objectives.

Risk identification is the process of examining the collaborative project areas and each critical technical process to identify and document the associated risk. The identification of potential issues, hazards, threats and vulnerabilities that could negatively affect work efforts or plans is the basis for the collaborative risk management strategy. The collaborative project utilizes several methods for identifying risks:

- Examination of the work breakdown structure (WBS) to uncover risk areas
- Conductance of a risk assessment
- Interviews with subject-matter experts (SME) (i.e. engineering, manufacturing etc)
- Reviewing risk management efforts from similar products
- Examination of lessons-learned documents or databases
- Examination of design specifications and agreement requirements

Cost, schedule and performance risk identification takes place during the concept phase and continues throughout the collaborative project’s life cycle. Cost risks include those associated with funding and budgets. Schedule risks include for example those associated with requirements, analysis, design, new technologies, manufacturing, operation, verification, validation, maintenance and resources.

Individual team members involved in the detailed day-to-day technical, cost and scheduling aspects of the program are the most aware of the potential problems (i.e., risks) that need to be managed. Program management must instill in the staff the discipline for and the importance of identifying these potential risk sources.
SP 2.2 Assess Risks

Evaluate known risks and prioritise them based on the risk parameters.

Risk assessment is the process of analyzing known risks and prioritizing them based on their threat in the attainment of collaborative project goals. During the assessment phase, the collaborative project analyzes each risk to isolate its cause and to determine its effects. The collaborative project rates the risk in terms of its probability of occurrence and its severity of impact to cost (i.e. €), schedule (i.e. time) and technical performance, as applicable.

The probability of a risk issue is the chance that the risk will materialize as a “real collaborative project problem”. This probability can be expressed in quantitative (e.g. ROM, range of impact, factored impact, etc.) or qualitative terms (i.e. high, medium or low). The risk impact is a measure of how the collaborative project is affected if the risk issue materializes. Qualitative assessments may be used as an initial filter but all high and medium risks must be assessed quantitatively.

SP 2.3 Establish Collaborative Risk Plans

Establish and maintain the collaborative risk plans to manage the selected high-priority risks.

A comprehensive risk management strategy addresses items such as the following:

- The interrelationship among the selected risks
- The scope of the risk management effort
- Assess the cost of the mitigation plans for each selected risk against the expected benefits
- Select and define risk measures to monitor the status of the risks

SG 3 Handle Collaborative Risks

Risks are handled and mitigated to reduce adverse impacts on achieving collaborative objectives.

Risk handling is the process that identifies, evaluates, selects and implements options to set risk at acceptable levels given collaborative project constraints and objectives. This includes the specifics on what should be done, when it should be accomplished, who is responsible and associated rating as indicated below.

SP 3.1 Establish Collaborative Risk Mitigation Plans

Establish a collaborative risk mitigation plan for the most important risks of the collaborative project.

An important component of a risk mitigation plan is to define alternative courses of action, with a recommended course of action for each critical risk.

SP 3.2 Monitor Collaborative Risk Mitigation Plans

Systematically tracks and evaluates the performance of risk-handling actions.

Risk mitigation plan monitoring is the process that against established metrics and develops further risk-handling options, as appropriate. To effectively control and manage risks during the work effort, the collaborative project regularly monitors the risks and the status/results of risk-handling actions.
SP 3.3 Communicate Risk Information

Status and information on the marketing risks are communicated to relevant stakeholders.
5.1.6 Collaborative Product Solution

A Project and Product Management Process Area of Level 3

Purpose

The purpose of Collaborative Product Solution (CPS) is to design and implement the collaborative product. Previously the best product solution has been selected from different alternatives.

Sources: CMMI-DEV-v1.2 [6]

SPECIFIC GOALS

SG 1 Select the best product solution
SG 2 Design the Collaborative Product
SG 3 Implement the Collaborative Product

SPECIFIC PRACTICES

SP 1.1 Analyse alternative product solutions
SP 1.2 Select the best product solution
SP 2.1 Develop a design for the collaborative product
SP 2.2 Design Interfaces
SP 2.3 Perform a “make-or-buy analysis”
SP 3.1 Implement the collaborative product components
SP 3.2 Develop collaborative product support documentation

Specific Practices by Goal

SG 1 Select the best product solution

Select a collaborative product solution from alternative solutions.
### SP 1.1 Analyse alternative product solutions

**Analyse alternative product solutions and develop a selection criteria.**

These alternative product solutions are based on product architectures that address critical product functionalities.

### SP 1.2 Select the best product solution

**Select the collaborative product solution that best satisfy the selection criteria.**

Allocate the requirements to collaborative product components of the solution that best satisfy the selection criteria. Generate the lower level requirements that will be used for collaborative product component design.

### SG 2 Design the Collaborative Product

**Design collaborative product and product components.**

### SP 2.1 Develop a design for the collaborative product

**Design collaborative product and product components.**

Collaborative product design includes two phases: high-level design and detailed design. High-level design describes the product architecture, identification of product components, internal and external interfaces, etc. Detailed design describes the structure and functionalities of each product component.

### SP 2.2 Design Interfaces

**Design collaborative product interfaces.**

Design of interfaces reflects critical parameters that must be defined depending on the product typology: interoperability, security, and communication protocols, standards compliance, etc.

### SP 2.3 Perform a “make-or-buy analysis”

**Determine if the collaborative product components should be developed, acquired or reused based on a predefined criteria.**

This make-or-buy analysis starts at the beginning of the collaborative project during the first design iteration and follows during the whole design phase. The analysis ends with the decision to develop, purchase or reuse the product component.
SG 3  **Implement the Collaborative Product**

*Implement the collaborative product and its components from the design.*

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<th>Implement the collaborative product components</th>
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<td><em>Implement the collaborative product components.</em></td>
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<td>The implementation depends on the specific characteristics of the product component.</td>
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<th>SP 3.2</th>
<th>Develop collaborative product support documentation</th>
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<tr>
<td></td>
<td><em>Develop and maintain the documentation that will be used to install, operate and maintain the collaborative product.</em></td>
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</table>
5.1.7 Quantitative Project Management

A Project and Product Management Process Area of Level 4

Purpose

The purpose of Quantitative Project Management (QPM) is to quantitatively manage the collaborative processes to achieve the established collaborative project’s quality goals.

Sources: CMMI-DEV-v1.2 [6]
BPMM [7]

SPECIFIC GOALS

SG 1 Quantitatively Manage the Collaborative Project
SG 2 Statistically Manage the Collaborative Process Performance

SPECIFIC PRACTICES

SP 1.1 Establish the Collaborative project’s quality goals
SP 1.2 Define and document the processes performed in the organization
SP 1.3 Define overall strategy
SP 1.4 Monitor collaborative project performance
SP 2.1 Select statistical methods
SP 2.2 Apply statistical methods to understand the variation
SP 2.3 Monitor the performance of the collaborative process
SP 2.4 Record statistical management data
Specific Practices by Goal

SG 1 Quantitatively Manage the Collaborative Project

The collaborative project is quantitatively managed following an overall strategy to achieve the established project’s quality goals.

SP 1.1 Establish the Collaborative project’s quality goals

Establish quality goals for the product and process that can be evaluated throughout the project, preferably in a quantitative manner.

SP 1.2 Define and document the processes performed in the organization

Define and document the processes performed in the organization by identifying and describing:
- Inputs and outputs for the process;
- Entry and exit criteria for entering and exiting the process;
- Control points in the process where key reviews and decisions are made;
- External interfaces with related processes, which supply inputs and consume outputs;
- Internal dependencies between the activities in the process;
- Process measures for the process that can be used to demonstrate achievement of the process goals.

SP 1.3 Define overall strategy

Develop an overall strategy at the collaborative project and organization level to achieve the defined goals.

SP 1.4 Monitor collaborative project performance

Perform the identified control activities and monitor the project performance.

Monitor collaborative project performance and identify corrective action as appropriate.
### SG 2  Statistically Manage the Collaborative Process Performance

*The performance of the collaborative project’s defined process is statistically managed.*

#### SP 2.1 Select statistical methods

*Select the statistical methods to manage the collaborative process performance.*

This practice ensures that the methods needed to effectively analyze the collaborative process performance and variations are defined and available to the people involved in the collaborative project.

#### SP 2.2 Apply statistical methods to understand the variation

*Apply statistical methods to understand the variation of the collaborative process performance.*

Identify causes of variation by means of collecting and analysing collaborative process and product measures in order to achieve a predictable performance.

#### SP 2.3 Monitor the performance of the collaborative process

*Monitor the performance of the collaborative process and identify corrective actions as necessary.*

The intention of this practice is to do the following:

- Determine statistically the expected collaborative process behaviour.
- Appraise the probability that the collaborative process will meet its quality and collaborative process-performance objectives.
- Identify the corrective action to be taken, based on a statistical analysis of the collaborative process-performance data.

Corrective actions may include renegotiating the affected collaborative project objectives, identifying and implementing alternative practices.

#### SP 2.4 Record statistical management data

*Record statistical and quality management data in the collaboration’s measurement repository.*

This practice ensures that the people involved in the collaborative project have access to the information.
5.2 Business Process and Strategy

5.2.1 Business Management

A Business Process and Strategy Process Area of Level 2

Purpose

The purpose of Business Management (BM) is to plan and manage the business and financial aspects of the collaborative project.

Sources: BPMM [7]

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<td>Establish Business Justification</td>
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<td>SP 3.4</td>
<td>Communicate Business Results</td>
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Specific Practices by Goal

**SG 1 Define Capabilities and Features**

*Define capabilities and features of the collaborative project based on the needs of the collaboration and it’s positioning in the market.*

**SP 1.1 Evaluate the Market Situation and Trends**

*Evaluate the current market situation and trends related to the collaborative project to identify their effects on collaboration needs and on their likely buying decisions.*

This practice develops an understanding of the various factors, such as economic, political, technological, demographic, social, and cultural factors, that impact the market situation for the collaborative project.

**SP 1.2 Establish Business Goals**

*Establish and maintain collaborative business goals covering quality, market share, financial returns, and other business and technical factors for the collaborative project.*

Establish and maintain the collaborative business goals as the basis for making collaborative business decisions and defining the collaborative business strategies and plans for the collaborative project.

**SP 1.3 Establish Descriptions of Business Requirements**

*Establish and maintain descriptions of the collaborative business requirements, including the capabilities and features, for the collaborative project to address the collaborative business goals.*

This practice determines the collaborative business requirements for the collaborative project for current and future periods and determines additional capabilities and features for the collaborative project that will be passed on for planning and development.

**SG 2 Define Collaborative Business Case**

*Define the collaborative business case for making business and management decisions.*

**SP 2.1 Establish Cost Structure**

*Establish and maintain the cost structure and cost strategy for the collaborative project.*

The collaborative project and the selectable capability and feature options are priced to achieve the collaborative business goals.
**SP 2.2 Establish Estimates of Financial Return**

*Establish and maintain the estimates of the financial return, revenue/profit timeline, and other impacts and benefits of the collaborative project.*

Management understands the financial collaborative business case for the collaborative project.

**SP 2.3 Establish Business Justification**

*Establish and maintain the business justification for the collaborative project.*

The collaborative business case for the collaborative project is readily available so that accurate and timely business and management decisions can be made.

**SG 3 Manage Collaborative Business Aspects**

*The business and financial aspects of the collaborative project are managed.*

**SP 3.1 Establish Business Plans**

*Establish and maintain business strategies and plans for the collaborative project.*

All aspects of the collaborative project are planned, including plans for development, manufacturing, sourcing, production, marketing, sales, distribution, deployment, operations, support, maintenance, and disposal.

**SP 3.2 Establish Business Risk Management Plans**

*Establish and maintain business risks inherent in a collaborative project.*

There is an awareness of the business risks that could jeopardize the collaborative project or the organization so that these risks are appropriately considered in the planning and management of the collaborative business activities.

**SP 3.3 Address Significant Deviations**

*Identify and address significant deviations from the collaborative business plans and financial estimates and plans for the collaborative project.*

Significant deviations are recognized and addressed so that the collaborative business plans and financial estimates and plans for the collaborative project are achieved or adjusted to reflect a reasonable plan forward.

**SP 3.4 Communicate Business Results**

*Progress, accomplishments, issues, and risks related to the collaborative business plans and financial estimates for the collaborative project are reviewed with relevant stakeholders as needed.*

This practice ensures that those concerned with and affected by the collaborative business and financial results for the collaborative project have a common, correct, and current understanding of the progress, accomplishments, issues, and risks so there are no surprises.
5.2.2 Business Governance

A Business Process and Strategy Process Area of Level 3

**Purpose**

The purpose of Business Governance (BG) is to establish effective mechanisms and structure in order to make decisions within the collaborative enterprise.

**Sources:**

- BPMM [7]
- [http://hbswk.hbs.edu/archive/4241.html][9]
- IT Governance (oakton) [10]
- Business Intelligence (BI) Governance (Infosys) [11]

**SPECIFIC GOALS**

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<th>Establish Governance Plan</th>
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<tr>
<td>SG 2</td>
<td>Establish Governance Structure</td>
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**SPECIFIC PRACTICES**

| SP 1.1 | Establish Business Objectives |
| SP 1.2 | Actively Design Governance |
| SP 1.3 | Implement Common Mechanisms |
| SP 2.1 | Establish Organizational Structure |
| SP 2.2 | Involve Senior Managers |
| SP 2.3 | Assign Ownership and Accountability for Governance |
Specific Practices by Goal

SG 1 Establish Governance Plan

Establish and maintain a common view of governance to make decisions.

SP 1.1 Establish Business Objectives

Establish and maintain the collaboration’s business goals.

Establish the collaborative business context for performing the collaboration’s business processes.
The creation of a full collaborative business strategy is a complex undertaking that is outside the scope of this model. This process area assumes that some form of collaborative business strategy has been created and that near-term and long-term collaborative business goals can be derived from it. Collaborative business goals provide a more defined foundation for guiding the implementation and evaluation of collaborative business processes. Collaborative business goals, and especially near-term goals, are the focus of interactions between collaborative business strategy and collaborative business processes.

SP 1.2 Actively Design Governance

Design governance to achieve effective mechanisms around the collaboration’s objectives and business goals.

“Many enterprises have created disparate governance mechanisms. These uncoordinated mechanism “silos” result from governance by default, introducing mechanisms one at a time to address a particular need (for example, architecture problems or overspending or duplication). Patching up problems as they arise is a defensive tactic that limits opportunities for strategic impact from IT. Instead, management should actively design governance around the enterprise’s objectives and performance goals.” [32]


SP 1.3 Implement Common Mechanisms

Implement the same mechanisms to govern different key assets.

Enterprises using the same mechanisms to govern different key assets have better governance. Each asset (for example: relationship, IP, human, information and IT, physical and financial) may be expertly governed but many enterprises successfully coordinate these assets within a project but not across the collaborative enterprise via governance.
SG 2  Establish Governance Structure

*Establish and maintain governance structure within the collaborative enterprises.*

SP 2.1  Establish Organizational Structure

*Establish and maintain an organizational structure for the governance members.*

The purpose of this practice is to identify the business stakeholders within the collaborative enterprises for the governance. Business stakeholders for the governance usually come from three areas:

- **Business.** Every business area/department should nominate who their representative is going to be.
- **IT.** IT provides the back office support for the committee.
- **CFO Office.** As collaborative projects are considered strategic in nature, and as the implementation cost can easily escalate, it is recommended to have a direct line to the CFO (Chief Information Officer).

SP 2.2  Involve Senior Managers

*Involve senior managers.*


SP 2.3  Assign Ownership and Accountability for Governance

*Define responsibilities for governance.*

“Governance must have an owner and accountabilities. Ultimately, the board is responsible for all governance, but the board will expect or delegate an individual (probably the CEO or CIO) or group to be accountable for governance design, implementation, and performance, similar to the finance committee or CFO being accountable for financial asset governance. In choosing the right person or group, the board, or the CEO as their designate, should consider three issues.

- Governance cannot be designed in isolation from the other key assets of the collaboration (financial, human, and so on). Thus the person or group owning governance must have an enterprise-wide view that goes beyond IT, as well as credibility with all business leaders.
- The person or group cannot implement governance alone. The board or CEO must make it clear that all managers are expected to contribute to governance as they would contribute to governance of financial or any other key asset.

*IT assets are more and more important to the performance of most collaborative enterprises. A reliable, cost-effective, regulation-compliant, secure, and strategic IT portfolio is more critical today than ever before. The person or group owning governance must understand what the technology is and is not*
It is not the technical details that are critical but a feel for the two-way symbiotic connection between strategy and IT." [32] Harvard Business School Press. Excerpted from IT Governance by Peter Weill and Jeanne W. Ross. Copyright © 2004


5.2.3 Collaborative Business Process

A Business Process and Strategy Process Area of Level 2

Purpose

The purpose of Collaborative Business Process (CBP) is to establish and maintain a usable set of collaborative business process assets and work environment standards.

Sources: [ATHENA: Cross-Organisational Business Processes] [12]
BPMM [7]

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<td>SP 3.2</td>
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</table>
Specific Practices by Goal

SG 1  Link internal Business Processes

**Link existing internal processes to achieve an agreed cross-organizational business process.**

---

**SP 1.1  Link internal Business Processes**

Conceal details of the business processes.

A Collaborative Business Process (CBP) represents a process that is executed by multiple business process management systems in different organizations. Collaborative business process management needs sophisticated and fine-grained communications and messaging technologies for deployment and enactment. The successful designing of Collaborative Business Processes requires that partners link their existing internal processes and resources to achieve an agreed cross-organizational business process. That means that internal private processes of different organisations have to be linked in order to create long running end-to-end processes.

---

**SP 1.2  Internal Processes Visibility**

Selectively expose or hide information about their internal processes.

Each company has to be able to selectively expose or hide information about their internal processes, whilst still being able to act in a cross-organizational business process. The level of exposure can vary, and contracts with partners as well as trust building may lead to revealing more internal information as the business relationship develops.

---

SG 2  Establish Collaborative Business Processes

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**SP 2.1  Establish Collaborative Business Processes**

Establish and implement appropriately consistent defined processes across the collaborative enterprise.

Source: [BPMM, Organizational Process Management (OPM), SP6 Maintain Descriptions of Standard Processes]

Interoperable enterprises base their collaboration on public collaborative business processes which are well documented, practical and reflect industry standards. The collaborative business processes cover all the activities involved in performing a collaborative work effort or set of related work efforts (for example, preparing a product, delivering a service, or performing a support function). The collaborative business processes cover:

- work processes
- management processes
- support processes
SP 2.2  Collaborative Business Process Modelling

**Collaborative Business Process Modelling.**

“Business process modelling (BPM) is the activity of representing processes of an enterprise, so that the current ("as is") process may be analyzed and improved in future ("to be"). BPM is typically performed by business analysts and managers who are seeking to improve process efficiency and quality. The process improvements identified by BPM may or may not require Information Technology involvement, although that is a common driver for the need to model a business process, by creating a process master.” [33]

“Collaborative Business Process Modelling” concept encompasses private processes out of which view process views can be modelled. Process views represent an abstraction of private processes and do not contain any private confidential information anymore but are still sufficient to set up a CBP model. The entire concept is explained in more detail below.

**Private Process**

Private business processes are internal processes and to a specific enterprise. Private processes do contain either confidential information or the tasks within those processes are business critical. Therefore, private processes are not designated for collaboration or any publication purpose.

**View Process**

A view process represents an abstraction of a private process model and shows the outside world what an enterprise has to offer. The main difference to a private process is that several graphical notations can be merged into a single one. For example several business critical tasks of a private process can be merged into one view task of a view process. This allows enterprises to hide private and confidential information to the outside world. The abstraction provides also another benefit. From each private process 1…n process views can be abstracted.

Different view processes can be created as an abstraction from the same private process. This allows partner to keep their internal processes static while still being able to interact with different partners in a different context.

Since view processes represent an abstraction of a private process they cannot be executed within an ICT system. Instead view processes outsource their implementation to private processes.

Therefore process views have to be tightly bound into their corresponding private process.

SG 3  Monitor and Optimise Collaborative Business Processes

**Monitor and Optimise Collaborative Business Processes.**

SP 3.1  Monitor Collaborative Business Processes

**Monitor Collaborative Business Processes.**

“Monitoring encompasses the tracking of business processes, so that information on their state can be easily seen, and statistics on the performance of one or more processes can be provided. An example of the tracking is being able to determine the state of a customer order (e.g. ordered arrived, awaiting delivery, invoice paid) so that problems in its operation can be identified and corrected.

In addition, this information can be used to work with customers and suppliers to improve their connected processes. Examples of the statistics are the generation of measures on how quickly a customer order is processed or how many orders were processed in the last month. These measures tend to fit into three categories: cycle time, defect rate and productivity.
The degree of monitoring depends on what information the business wants to evaluate and analyze and how business wants it to be monitored, in real-time or ad-hoc. [13]

**SP 3.2 Optimise Collaborative Business Processes**

Optimise Collaborative Business Processes.

Process optimization includes: retrieving process performance information from monitoring phase; identifying the potential or actual bottlenecks and the potential opportunities for cost savings or other improvements; and then, applying those enhancements in the design of the process. Overall, this creates greater business value.
5.3 Customer Management

5.3.1 Collaborative Customer Relationship Management

A Customer Process Area of Level 3

Purpose

The purpose of Collaborative Customer Relationship Management (CCRM) is to establish and maintain an optimal long-term mutually valuable relationship between customers and collaborative enterprises.

Sources:
- Implementing a Customer Relationship Management Programme in an Emerging Market (Adele Berndt, Frikkie Herbst, and Lindie Roux) [14]
- Customer Relationship Management (http://www.berytech.org) [15]
- CRM, Customer Relationship Management (Enrique Dans) [16]

SPECIFIC GOALS

| SG 1 | Implement a Collaborative Strategy for Customer Management |
| SG 2 | Implement a Collaborative Strategy for Customer Relationship |
| SG 3 | Monitor Customer Management and Customer Relationship Strategies |

SPECIFIC PRACTICES

| SP 1.1 | Determine Responsibilities with the Customer |
| SP 1.2 | Customer Management after Collaboration |
| SP 1.3 | Analyse the Establishment of a New Legal Entity on the Basis of the Collaborative Network |
| SP 2.1 | Identify Potential Customers |
| SP 2.2 | Identify Technologies for Collaboration with the Customer |
| SP 2.3 | Define a Difference Service |
| SP 2.4 | Stimulate Interaction with Customers |
### Specific Practices by Goal

#### SG 1 Implement a Collaborative Strategy for Customer Management

**Implement a collaborative strategy for customer management in order to determine responsibilities of the collaborative network with the customer**

#### SP 1.1 Determine Responsibilities with the Customer

**Determine the responsibility of each organisation in the collaboration with the customers**

This practice tries to satisfy the following points:

- Define the management of the new customers that have been originated from the collaboration
- Define the relationship of the customer with the collaborative network
- Define the relationship of the customer with each organisation
- Establish the relationship with potential customers that belonged to some of the organisations

#### SP 1.2 Customer Management after Collaboration

**Determine the customer management strategy of the collaborative network when the collaboration has finished**

Due to the finite relationship with the customer, this practice is looking for that the collaborative network determines clearly the customer management strategy once the collaboration lifecycle has finished.

#### SP 1.3 Analyse the Establishment of a New Legal Entity on the Basis of the Collaborative Network

**Analyze the possible creation of a new juridical independent entity on the basis of the collaborative network**

This practice aims to analyse the possible creation of a new juridical entity independent of the companies of the collaborative network. A schema of main legal forms of companies should be elaborated, for example:

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**SP 2.5 Customize Products, Services and Communication**

**SP 3.1 Establish Mutually Satisfying Goals**

**SP 3.2 Understand Customer Lifecycle**

**SP 3.3 Monitor Customer Rapport**

**SP 3.4 Monitor Responsibilities with the Customer**
• LLP or Limited liability partnership,
• LP or Limited partnership,
• Ltd. : a private company limited by shares, the shares not being traded publicly,
• p.l.c. or public limited company, explaining the advantages and disadvantages of adopting each legal form.

SG 2  Implement a Collaborative Strategy for Customer Relationship

Implement a collaborative strategy to manage the relationships with the customer in a organised way.

SP 2.1 Identify Potential Customers

Identify new and existing clients to increase the level of customer services.

The identification of customers enables the collaborative enterprises to select those customers that they regard as being strategically significant and who they believe can contribute to the success of the collaboration. These customers have unique needs and due to their value to the collaborative enterprises, will have products developed to meet these needs. It must be possible to identify these customers and so obtain as much detail as possible. This involves collecting as much data as possible in order to obtain as clear a picture as possible of the customer and their profile. This may require the development of a database or the continued maintenance of a database in order to ensure that the data stays as recent as possible. Having this information enables the collaborative enterprises to determine those customers that have been with the collaborative enterprises for a long period and those that have recently started using the products and services of the collaborative enterprises.

SP 2.2 Identify Technologies for Collaboration with the Customer

Identify technologies, tools and methodologies that support and enforce the communications with the customer

The goal of this practice is that the collaborative network identifies those technologies that their customers have, in order to adapt or take into account to select its own technologies (see SP1.1 of Process Area Interoperability and Collaboration technologies).

SP 2.3 Define a Difference Service

Differentiating between the services offered to new and existing clients increases the level of customer service.

The differentiation of service implies that different customers receive a different level of service and a different product from the collaborative enterprises, depending on the value to the collaborative enterprises and their specific needs. This requires the collaborative enterprises to identify the top (or most significant) customers and adapt service accordingly. Identification of these top customers takes place using sales figures or by calculating the CLV (Customer Lifetime Value) associated with each customer. As the collaborative enterprises are aware of the value of their customers, service levels can be adjusted accordingly.

SP 2.4 Stimulate Interaction with Customers

The level of customer service is increased if there is an active interaction with potential and existing clients.
This specific practice refers to the importance of interacting with the customer in relationship building efforts through a variety of communication tools and technologies. This is necessary as the relationship can only develop and be sustained if there is communication with the customers regarding their needs, perceptions and desires. This involves developing methods of communication proactively with customers regarding the collaboration’s products and attempting to initiate dialogue with customers. Use can be made of technology, but this is not essential (Brunjes & Roderick, 2002). The customers with whom communication takes place are not necessarily all the customers, but only those that the collaborative enterprises regard as being strategically significant. This interaction with the collaborative enterprises increases the expectations of the customers regarding the service received as well as the quality of the relationship.

SP 2.5 Customize Products, Services and Communication

*The level of customer service is increased if customized service is offered according to each individual client’s needs.*

Customization is carried out by the collaborative enterprises in order to ensure that customer needs are met. It requires that the collaborative enterprises adapt its product, service or communication in such as way have something unique for each customer. Communication can be customized to address the specific needs and profile the customer, and collaborative enterprises also makes use of personalisation as part of this process. Products can be customized as to the specific desires that the customer has of the collaborative enterprises. In the case of the financial services, it refers to the product package that is offered to the customer. The purpose of customisation is to increase customer satisfaction, and the loyalty that is exhibited by customers.

SG 3 Monitor Customer Management and Customer Relationship Strategies

*The customer management and customer relationship strategies are monitored to ensure that the objectives and needs of both parties are satisfied.*

SP 3.1 Establish Mutually Satisfying Goals

*Establish and maintain mutually satisfying objectives between collaborative enterprises and customers.*

Establish and maintain mutually satisfying goals as the basis for making a good relationship between collaborative enterprises and customers.

SP 3.2 Understand Customer Lifecycle

*The customer life cycle is understood by the collaborative enterprises.*

If you can understand the Customer Life Cycle idea, you can model it to your needs and available resources and leave the marketplace noise and costs behind.

SP 3.3 Monitor Customer Rapport

*The customer relationship is monitored to guarantee the correct communication.*

By monitoring customer rapport, the collaborative enterprises ensure that the common objectives defined and the services offered are appropriately deployed to all customers.

SP 3.4 Monitor Responsibilities with the Customer

*Responsibilities in the collaborative network for managing the shared customers are monitored to verify their fulfilment.*

This practice allows ensuring that organisations in the collaborative network fulfil the type of relationship previously defined.
5.3.2 Customer Evaluation

A Customer Process Area of Level 4

Purpose

The purpose of Customer Evaluation (CE) is to establish and maintain an objective and independent process that considers progress towards achieving collaborative business objectives through customer opinion, achievements to date and lessons learned.

Sources:
- Evaluation Strategy (Natural Environment Research Council) [17]
- Evaluation Agreement (Sonicwall) [18]
- Principles of Design (Zahed Siddique) [19]

SPECIFIC GOALS

| SG 1 | Establish Customer Evaluation Strategy |
| SG 2 | Implement Customer Innovations |

SPECIFIC PRACTICES

| SP 1.1 | Select Customers for the Evaluation |
| SP 1.2 | Identify Evaluation Parameters |
| SP 1.3 | Create the Evaluation Team |
| SP 1.4 | Design the Evaluation |
| SP 2.1 | Review Products or Services for Innovation |
| SP 2.2 | Review Evaluation Process |
Specific Practices by Goal

**SG 1  Establish Customer Evaluation Strategy**

*Establish and maintain customer evaluation strategy.*

**SP 1.1 Select Customers for the Evaluation**

*Select the most suitable customers for the evaluation.*

The collaborative enterprises may work with different customers and many of them may be strategic customers due to the turnover. Therefore, it is very important to select the most suitable customers for the evaluation in order to collect feedback from them.

**SP 1.2 Identify Evaluation Parameters**

*Identify the key parameters to make an evaluation.*

This specific practice identifies the objectives of the evaluation and the parameters of the collaborative enterprises that are considered useful to know the customers point of view in relation to the products or services.

**SP 1.3 Create the Evaluation Team**

*Create a team within the collaborative enterprises to carry out a good evaluation.*

The evaluation team is a small team that conducts and provides guidance on all the evaluation process.

**SP 1.4 Design the Evaluation**

*Design a customer evaluation.*

The scope, methodology and timing of the customer evaluation shall be designed to meet the objectives.

**SG 2  Implement Customer Innovations**

*Implement customer innovations as a result of customer evaluation.*

**SP 2.1 Review Products or Services for Innovation**

*Review products or services to introduce innovations.*

Once the customer evaluations has finished, the feedback obtained may be useful to introduce innovation in the products or services of the collaborative enterprises.

**SP 2.2 Review Evaluation Process**

*Review evaluation process and identify lessons learned.*

It is very important to improve the customer evaluation process through previous experiences in order to accurate as much as possible the customer point of view.
5.4 Collaboration, Legal Environment and Trust

5.4.1 Intellectual Property Rights

A Collaboration, Legal environment and Trust Process Area of Level 2

Purpose

The purpose of Intellectual Property (IPR) is to protect the works the members of the collaborative enterprise create and exploit.

Sources:
- SME Collaborate [20]
- Intellectual Property Strategic Program 2006 [21]
- WIPO Introductory Seminar on Intellectual Property [22]
- ICT to Support Management of IPR in New Industrial Collaborations [23]

SPECIFIC GOALS

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<tbody>
<tr>
<td>SG 2</td>
<td>Protect the Intellectual Property</td>
</tr>
<tr>
<td>SG 3</td>
<td>Exploit the Intellectual Property</td>
</tr>
</tbody>
</table>

Figure 5 – Intellectual Property rights Cycle
SPECIFIC PRACTICES

**SP 1.1** Identify products and collaboration activities related to the creation of the Intellectual Property

**SP 1.2** Define the rights and responsibilities of all involved

**SP 2.1** Establish protection criteria

**SP 2.2** Protect pre-existing knowledge

**SP 2.3** Define the type of IPR protection

**SP 2.4** Review IPR protections during the collaborative project

**SP 3.1** Strategically exploiting Intellectual Property

**SP 3.2** Supporting International Standardization Activities

Specific Practices by Goal

---

**SG 1** Create the Intellectual Property

*Create the Intellectual Property.*

**SP 1.1** Identify products and collaboration activities related to the creation of the Intellectual Property

Identify products and collaboration activities related to the creation of the Intellectual Property.

**SP 1.2** Define the rights and responsibilities of all involved

Define the rights and responsibilities of all involved.

---

**SG 2** Protect the Intellectual Property

*Establish and maintain the ways in which the law provides protection for your Intellectual Property.*

**SP 2.1** Establish protection criteria

Establish and maintain the criteria for evaluating protection alternatives.

The protection criteria provide the basis for evaluating protection solutions.
SP 2.2 Protect pre-existing knowledge

**Protect pre-existing knowledge.**

When starting a collaborative project each member has to bring in some specific own pre-existing knowledge. In many cases this knowledge is strictly confidential – especially when it is about a core competence - and sometimes difficult to be broadly protected by through IPR protection schemes (e.g. patents, copyrights, etc.).

Therefore it should be possible to assure that such pre-existing knowledge will only be used by the involved members for the specific purpose within the collaborative project. Systems to allow collaboration within consortia and assuring proper usage of pre-existing knowledge, e.g. by

- Providing real-time access to all needed knowledge, but restricted to involved partners;

- Allowing concurrent activities and usage of knowledge in a controlled and traceable manner;

- Allowing partners to track access and usage of their pre-existing knowledge by other partners;

SP 2.3 Define the type of IPR protection

**Define the type of IPR right which the collaborative network will use to protect its inventions or creations.**

There are four main types of IPR:

- Patents. Patents protect your inventions for a set of period. You must apply to the Patent Office for a patent. You can only patent an invention if no one has done so before you. To see if there is an existing patent you need to carry out a patent search.

- Trade marks. A trade mark is the distinctive way in which your business’ goods or services are represented in the form of slogans, symbols, words, logos, brand names or forms of packaging, for example. You can take legal action to prevent someone else using your trade mark if you have built up sufficient trading reputation and goodwill in it but this can difficult to prove. For added protection it is a good idea to register your mark.

- Designs. Design right gives automatic but limited protection for the appearance of three dimensional objects. A registered design gives added protection and applies to both two dimensional and three dimensional objects.

- Copyright. This is the automatic protection the law affords original literary (including software), artistic dramatic work and sound recordings that is the result of intellectual effort or creative skills. This could cover your website’s content, technical drawings or instruction manuals, for example.

SP 2.4 Review IPR protections during the collaborative project

**Review all IPR protections that affect the collaborative project to agree who will own these as it progresses.**

The collaborative members may also generate new IPR during the collaborative project and it may be necessary to agree who will own this as the project progresses.
SG 3  Exploit the Intellectual Property

<table>
<thead>
<tr>
<th>Exploit the Intellectual Property efficiently.</th>
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</table>

**SP 3.1**  Strategically exploit Intellectual Property

*Establish and maintain a strategy to exploit Intellectual Property.*

Under some circumstances, collaborative members are expected to exploit their intellectual property more strategically, e.g. establishing their intellectual property portfolio in order to promote efficient R&D, protect their businesses, and differentiate their products from competitors’ products as well as carry out branding strategy, and also raising funds using intellectual property.

**SP 3.2**  Support International Standardization Activities

*Strengthen international standardization activities through collaboration.*

International standardization activities are helpful and important for enabling collaborative products or services to be widely used overseas and maximizing the value of intellectual property owned by members of the collaboration.
5.4.2 Collaboration agreement

A Collaboration, Legal environment and Trust Process Area of Level 2

Purpose

The purpose of the Collaboration Agreement (CA) is to set up the terms in which the collaboration takes place as well as the management of the collaboration activities throughout the whole life of the collaborative enterprise.

Source: SME Collaborate [20]  
CMMI-Dev-v1.2 [6]

SPECIFIC GOALS

| SG 1 | Establish Collaboration Agreement |
| SG 2 | Satisfy Collaboration Agreements |

SPECIFIC PRACTICES

| SP 1.1 | Determine the Type of Collaborative enterprise |
| SP 1.2 | Select Collaborators |
| SP 1.3 | Establish Collaboration Agreements |
| SP 2.1 | Monitor Collaborative Activities |
| SP 2.2 | Accept the Product |
| SP 2.3 | Transition Products |
Specific Practices by Goal

**SG 1** Establish Collaboration Agreement

| Establish and maintain agreements with collaborative agents. |

<table>
<thead>
<tr>
<th>SP 1.1 Determine the Type of Collaborative enterprise</th>
</tr>
</thead>
</table>

**Determine the type of collaborative enterprise**

There are several types of collaboration in which the companies can participate. Enterprises should carefully evaluate which type of collaboration is the best for them.

Typically, types of collaborative enterprises can be typified as follows:

**SCM, Supply Chain Management:** A management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers [Harland, 1996].

**CNO, Collaborative Networked Organization:** A Collaborative Networked Organization is a special type of collaborative network comprising only organized collaborations while, in general, collaborative networks include both organized and non-organized collaborations. A collaborative network [Camarinha-Matos and Afsarmanesh 2005] is constituted of a variety of entities (e.g. organizations and people) that are largely autonomous, geographically distributed, and heterogeneous in terms of their operating environment, culture, social capital and goals. These entities collaborate to better achieve common or compatible goals, and their interactions are supported by a computer network.

**Business Ecosystem:** An economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world. This economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organizations also include suppliers, lead producers, competitors, and other stakeholders. Over time, they co-evolve their capabilities and roles, and tend to align themselves with the directions set by one or more central companies. Those companies holding leadership roles may change over time, but the function of ecosystem leader is valued by the community because it enables members to move toward shared visions to align their investments and to find mutually supportive roles [Harvard Business Review, 1993].

| SP 1.2 Select Collaborators |

**Select the most suitable collaborators that meet the specified business objectives and established criteria.**

Prior to entering a collaborative process, each organization should carry out an internal analysis of its own competencies, goals and potential opportunities in order to be able to establish criteria that help the organization to select the most suitable collaborators.
SP 1.3 Establish Collaboration Agreements

*Establish and maintain the terms, context, scope and timing of the formal collaboration agreements with the collaborative enterprise(s).*

Once the organization has sufficient information, a legal representative may need to be engaged to draw up a Collaboration Agreement appropriate for the project so as to assist, identify, clarify and agree on all major issues.

SG 2 Satisfy Collaboration Agreements

*Satisfaction of the agreements set up with the other collaborative enterprise by both the project as a whole and the enterprises that are collaborating.*

SP 2.1 Monitor Collaborative Activities

*Monitor the collaborative activities against the Collaboration Agreement*

The activities which were specified in the Collaboration Agreement must be monitored to ensure that the members of the collaboration accomplish them.

SP 2.2 Accept the Product

*Assure that the terms of the collaboration agreement in relation to the product are satisfied before accepting the developed product.*

The acceptance of a product is a very important goal within a collaboration and the organization must be assured that all the terms which were in the Collaboration Agreement are correct.

*Note:* “Accept the product” is considered a relevant practice of the “Collaboration Agreement” and therefore a specific practice has been defined.

SP 2.3 Transition Products

*Transition the developed products from the collaborators within the collaborative enterprise to the project.*

Once the products of the collaborators are finally developed, it is necessary to join them in relation to the conditions of the Collaboration Agreement.

*Note:* It is possible that enterprises that have signed a collaboration agreement don’t have to carry out this transition.
5.4.3 Trust management

A Collaboration, Legal environment and Trust Process Area of Level 2

Purpose

The purpose of Trust Management (TM) is to promote the establishment of trust relationships among Collaborative Enterprise participants, including the assessment of the trust level among members and between members and the Collaborative Enterprise as a whole. It also includes the definition of the trust assessment criteria.

Sources: IETF Trust Agreement [24]
ECOLEAD [3]

SPECIFIC GOALS

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<thead>
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<th>SG 1</th>
<th>Establish trust relationship</th>
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<tr>
<td>SG 2</td>
<td>Evaluate trust relationship</td>
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</table>

SPECIFIC PRACTICES

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<tr>
<th>SP 1.1</th>
<th>Determine the type of trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP 1.2</td>
<td>Select trust actors</td>
</tr>
<tr>
<td>SP 1.3</td>
<td>Establish Trust Agreement</td>
</tr>
<tr>
<td>SP 1.4</td>
<td>Define trust requirements</td>
</tr>
<tr>
<td>SP 1.5</td>
<td>Define trust criteria</td>
</tr>
<tr>
<td>SP 2.1</td>
<td>Monitor trust relationship</td>
</tr>
<tr>
<td>SP 2.2</td>
<td>Monitor trust requirements</td>
</tr>
</tbody>
</table>

Specific Practices by Goal

SG 1 Establish trust relationship

Initiation of trust relationship is established.
SP 1.1  Determine the type of trust

*Determine the type of trust.*

Three main kinds of trust are identified as needed to be established among different organizations within the collaborative enterprise:

- Trust of one collaborative enterprise member to another collaborative enterprise member. The main aim of establishing and maintaining trust relationships among collaborative enterprise members is to enhance the efficiency and success of both their cooperation within the collaborative enterprise as well as their potential collaboration in VOs that will be configured within the collaborative enterprise.

- Trust of the collaborative enterprise member to the collaborative enterprise member itself and to the collaborative enterprise’s collaboration. This enhances the chance of members remaining loyal to the collaborative enterprise, increases their willingness for active involvement in collaborative enterprise and encourages collaborative enterprise members to invite and bring other valuable organizations into collaborative enterprise.

- Trust of a customer to the collaborative enterprise. Collaborative enterprise must be trusted by two kinds of customers. Primarily the collaborative enterprise must be trusted by those customers who define the opportunities in the market/society and who make decisions on the submitted proposals. On the other hand, consumers of products from VOs that are configured in a respective collaborative enterprise also need to trust a collaborative enterprise in order to decide positively on purchasing or accepting these products and services.

SP 1.2  Select trust actors

*Actors refer to the organization parties involved in a specific trust relationship.*

One party is the organization that needs to asses the trustworthiness of another party and is referred to as the trustor. Another party is the one that needs to be trusted (trustee), and thus it will need its trustworthiness to be assessed.

SP 1.3  Establish Trust Agreement

*Establish and maintain the terms, objectives, assets and administration of the formal trust agreement within the collaborative enterprise.*

Once the organization has sufficient information, a legal representative may need to be engaged to draw up a Trust Agreement appropriate for the project so as to assist, identify, clarify and agree on all major issues.

SP 1.4  Define trust requirements

*Refer to elements characterizing the trust perspectives, namely the characteristics that are essential to reach the trust perspective.*

Requirements are used to define the conditions and pre-conditions that a trustee must meet in order to be trusted by the trustee from the specified trust perspective. For example, from the technological perspective, trust requirement can be that a trustee must possess ICT infrastructure; from the financial perspective, it can be that a trustee must have accreditation from an authorized body and/or must have enough assets to survive during the project, etc.
SP 1.5 Define trust criteria

Refer to the measurable elements in relation to the trust requirements that can establish a judgment (or suggestion) about a given trust requirement.

Every trust criteria shall further be characterized by two attributes for its values, namely: the trust value constraint and the trust value metric. For example for the requirement of ICT infrastructure, the measurable trust criteria can include the storage capacity, the computing capacity, frequency of the system’s security violation, network speed, etc.

SG 2 Evaluate trust relationship

Evaluate trust relationship.

SP 2.1 Monitor trust relationship

Monitor trust relationship against the trust agreement.

The relation which was specified in the Trust Agreement must be monitored to ensure that the actors accomplish them.

SP 2.2 Monitor trust requirements changes

Monitor changes to the trust requirements as they evolve during the trust relationship.

During the trust relationship, requirements change for a variety of reasons. As needs change and as works proceeds, additional requirements are derived and changes may have to be made to the existing requirements.
5.5 Organisation

5.5.1 Measurement and Analysis

An Organisation Process Area of Level 2

Purpose

The purpose of Measurement and Analysis (MA) is to develop and sustain a measurement infrastructure that is used to support business management information needs in order to help making decisions that affect collaborative business outcomes.

Sources: CMMI-DEV-v1.2 [6]
BPMM [7]

SPECIFIC GOALS

SG 1 Establish Measurement and Analysis Collaborative Activities

SG 2 Communicate Measurement and Analysis Results

SPECIFIC PRACTICES

SP 1.1 Establish Measurement Purpose

SP 1.2 Establish Specifications of Measures

SP 1.3 Establish Measurement Collaborative Plans and Procedures

SP 2.1 Collect and Verify Measurement Data

SP 2.2 Analyze Measurement Data

SP 2.3 Store Data and Results

SP 2.4 Report Results
Specific Practices by Goal

SG 1 Establish Measurement and Analysis Collaborative Activities

Measurement objectives and activities are aligned with identified information needs and objectives of the collaborative enterprises.

The specific practices covered under this specific goal may be addressed concurrently or in any order.

SP 1.1 Establish Measurement Purpose

Establish and maintain measurement Purpose that are derived from identified information needs and objectives of the collaborative enterprises.

Measurement objectives are documented to establish the measurement and analysis purpose and specify the actions that should be taken as result of this analysis.

The sources for these measurement objectives may be collaborative management, technical, project, product, process implementation needs or any requirement to be fulfilled by the collaborative network.

SP 1.2 Establish Specifications of Measures

Establish and maintain specifications of measures to address the measurement objectives.

Measurement objectives are refined and being converted into precise, quantifiable measures. Data for measures can be obtained directly or by combination of other data.

SP 1.3 Establish Measurement Collaborative Plans and Procedures

Establish and maintain the measurement collaborative plans and procedures.

Explicit specification of collection methods helps to ensure that the right data are collected properly. It can also be helpful in further clarifying information needs and measurement objectives. Procedures to be included in these methods are data storage and retrieval ensuring that data are available for future use.

Analysis of specified procedures is also included to achieve the measurement objectives and check that the necessary data has been collected.
<table>
<thead>
<tr>
<th>SG 2</th>
<th>Communicate Measurement and Analysis Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Measurement results, which address identified information needs and objectives, are communicated over the collaborative network.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SP 2.1</th>
<th>Collect and Verify Measurement Data</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>The measurement data are collected and verified as defined in the measurement specifications, plans and procedures.</td>
</tr>
<tr>
<td></td>
<td>The data necessary for analysis are obtained and checked for completeness and integrity.</td>
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</table>

<table>
<thead>
<tr>
<th>SP 2.2</th>
<th>Analyze Measurement Data</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Analyze and interpret measurement data.</td>
</tr>
<tr>
<td></td>
<td>The measurement data are collaboratively analyzed as planned, and results are reviewed with all the entities of the collaborative network and relevant stakeholders, and necessary revisions for future analyses are agreed.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>SP 2.3</th>
<th>Store Data and Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manage and store measurement data, measurement specifications, and analysis results.</td>
</tr>
<tr>
<td></td>
<td>Storing measurement data and related analysis results for enabling its future use as well as the monitoring and evolution of those data over time. These data must be accessible to all the members of the network. The information also is needed to provide sufficient context for interpretation of the data, measurement criteria, and analysis results.</td>
</tr>
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<thead>
<tr>
<th>SP 2.4</th>
<th>Report Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Report results of measurement and analysis collaborative activities to all relevant members and stakeholders of the collaborative network.</td>
</tr>
<tr>
<td></td>
<td>Report results of the measurement and analysis process to relevant stakeholders of the collaborative network in a timely and usable way to support decision making and corrective actions.</td>
</tr>
</tbody>
</table>
5.5.2 Resource Management

An Organisation Process Area of Level 2

Purpose

The purpose of Resource Management (RM) is to plan and manage the acquisition, allocation, and reassignment of people and other resources needed to prepare, deploy, operate and support the collaborative enterprises business.

Sources: BPMM [7]

SPECIFIC GOALS

<table>
<thead>
<tr>
<th>SG 1</th>
<th>Align Collaborative Resources</th>
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</thead>
<tbody>
<tr>
<td>SG 2</td>
<td>Balance Resources with Capacity Plans</td>
</tr>
</tbody>
</table>

SPECIFIC PRACTICES

| SP 1.1 | Identify Collaborative Resources |
| SP 1.2 | Establish Budgets for Collaborative Resources |
| SP 1.3 | Establish Collaborative Resource Plans |
| SP 2.1 | Allocate Resources to Collaborative Enterprises |
| SP 2.2 | Integrate Suppliers of Collaborative Resources |
| SP 2.3 | Monitor Collaborative Resources |

Specific Practices by Goal

SG 1 Align Collaborative Resources

The collaborative available resources are aligned with the resources needed for the collaborative business.

SP 1.1 Identify Collaborative Resources

Identify the collaborative resources for each of the collaborative enterprises.
This specific practice ensures that the collaborative enterprises have an accurate estimate of the total resources of each type required to support all the collaborative business.

**SP 1.2 Establish Budgets for Collaborative Resources**

*Budgets for collaborative resources are established and maintained.*

This specific practice ensures that the collaborative enterprises establish the financial constraints as a basis to balance the collaborative business plan with the resources that can be applied to perform their work.

**SP 1.3 Establish Collaborative Resource Plans**

*Plans are established and maintained to provide the collaborative enterprises with the resources they need to perform their business.*

Plans, within the constraints of budget and other planning parameters, exist to provide sufficient collaborative resources when needed to support their business.

**SG 2 Balance Resources with Capacity Plans**

*The resources provided for the collaborative business are sustained and balanced with the capacity plans of the collaborative enterprises.*

**SP 2.1 Allocate Resources to Collaborative Enterprises**

*The available and planned resources are allocated to the collaborative enterprises based on what they need to perform their assigned work.*

This specific practice ensures that the collaborative resources are equitably allocated to the collaborative enterprises based on the work they do.

**SP 2.2 Integrate Suppliers of Collaborative Resources**

*The sources and suppliers of collaborative resources are integrated into the collaborative resource management process.*

Suppliers are effectively integrated into the collaborative defined processes for performing product and services work in order to improve the efficiency with which collaborative resources are deployed for use.

**SP 2.3 Monitor Collaborative Resources**

*The quantity of each collaborative resource consumed in supporting collaborative enterprises is monitored and problems are identified.*

This specific practice ensures that the collaborative enterprises have accurate data from which to more accurately estimate, plan, and manage the quantity of each collaborative resource required to support their business.
5.5.3 Defect and Problem Prevention

An Organisation Process Area of Level 3

Purpose

The purpose of Defect and Problem Prevention (DPP) is to identify and address the causes of defects and other problems that are the primary obstacles to achieving the collaborative plan and quantitative improvement goals so these defects and problems do not recur.

Sources: BPMM [7]

SPECIFIC GOALS

| SG 1 | Determine Root Causes |
| SG 2 | Address Root Causes |
| SG 3 | Disseminate Prevention Information |

SPECIFIC PRACTICES

| SP 1.1 | Select Defects and Problems for Analysis |
| SP 1.2 | Identify Root Causes |
| SP 1.3 | Identify Collaborative Process Weaknesses |
| SP 2.1 | Perform Corrective Actions |
| SP 2.2 | Coordinate Prevention Activities |
| SP 2.3 | Measure Effects of Preventive Actions |
| SP 3.1 | Document Prevention Data and Results |
| SP 3.2 | Communicate Prevention Information |
Specific Practices by Goal

**SG 1  Determine Root Causes**

*Root causes of defects to achieving the collaborative goals are systematically determined.*

Root causes of defects and other problems that are the primary obstacles to achieving the collaborative plan and quantitative improvement goals of a collaborative enterprise are systematically determined.

**SP 1.1  Select Defects and Problems for Analysis**

*Defects and other problems that are the primary obstacles to achieving the collaborative goals are selected for analysis and preventive action.*

This specific practice selects the defects and other problems for further analysis to determine if preventive actions can be performed. It is recommended to determine if there are defects and problems that are similar enough that they can be grouped and addressed as groups.

**SP 1.2  Identify Root Causes**

*Root causes of the selected defects and problems are identified.*

This specific practice determines the root causes that need to be addressed if the defects and problems are to be prevented from recurring.

**SP 1.3  Identify Collaborative Process Weaknesses**

*Collaborative process weaknesses that allowed the selected defects and problems to remain undetected are identified.*

This specific practice identifies fixes to the collaborative process so that undetected defects and problems of the types previously encountered are caught and addressed closer to the point they are introduced.

**SG 2  Address Root Causes**

*Root causes of defects to achieving the collaborative goals are systematically addressed to prevent them from recurring.*

Root causes of defects and other problems that are the primary obstacles to achieving the collaborative plans and quantitative improvement goals of a collaborative enterprise are systematically addressed to prevent them from recurring.

**SP 2.1  Perform Corrective Actions**

*Corrective actions are identified and performed.*

This specific practice ensures that appropriate actions are performed so that the selected defects and problems are unlikely to recur, and are more likely to be identified and eliminated closer to the point they are introduced if they do occur.
SP 2.2 Coordinate Prevention Activities

Defect and problem prevention activities are coordinated within a collaborative effort.

This specific practice ensures that the priorities and the planned and implemented actions appropriately address a collaborative enterprise issues and obstacles to achieving its plans and goals. The implementations of the preventive actions are addressed as well.

SP 2.3 Measure Effects of Preventive Actions

The effects of the collaboration’s defect and problem prevention actions on its collaborative goals are measured and analyzed.

This specific practice ensures that quantitative information is used to understand the benefits of the defect and problem prevention activities and their contribution to the collaborative enterprises goals.

SG 3 Disseminate Prevention Information

Information from the collaborative prevention activities is disseminated to relevant stakeholders.

Information from the collaboration’s defect and problem prevention activities of a collaborative enterprise that is useful in other improvement activities is disseminated to relevant stakeholders.

SP 3.1 Document Prevention Data and Results

The collaboration’s defect and problem prevention information, measures, analyses and results are documented.

This specific practice ensures that the defect and problem prevention information is available for reference in future activities.

SP 3.2 Communicate Prevention Information

The defect and problem prevention information, results and records of a collaborative enterprise are shared with the other members of the collaboration.

This practice ensures that the defect and problem prevention analysis, actions, and results from the collaborative enterprise are considered and appropriately incorporated into the other processes in the collaboration.
5.5.4 Training and Competency Development

An Organisation Process Area of Level 4

Purpose

The purpose of Training and Competency Development (TCD) is to develop the skills and knowledge of people in a collaborative way so they can perform their roles in the network effectively and efficiently.

Sources:

- CMMI-Dev-v1.2 [6]
- Competence Analysis, People CMM Level 3 Process Area [25]
- SPICE [26]
- BPMM [7]

SPECIFIC GOALS

- **SG 1** Develop a Collaborative Training and Competency strategy
- **SG 2** Provide Necessary Training and Competency Development

SPECIFIC PRACTICES

- **SP 1.1** Identify Training and Competency Needs
- **SP 1.2** Develop a Collaborative Training and Competency Plan
- **SP 1.3** Develop or acquire required training
- **SP 2.1** Deliver Training and Competency
- **SP 2.2** Maintain Training and Competency Records
- **SP 2.3** Assess Training and Competency Effectiveness

Specific Practices by Goal

**SG 1** Develop a Collaborative Training and Competency strategy

A training and competency capability, which supports the collaborative management and technical roles, is established and maintained.
The collaborative enterprises identify the training and competencies required to develop the skills and the knowledge necessary to perform enterprise activities. Once the needs are identified, a training program addressing those needs is developed.

**SP 1.1 Identify Training and Competency Needs**

*Analyze and identify training and competency needs of the collaborative enterprises.*

Training and competency analysis is performed through the identification of the human resources knowledge, skills, and competencies required to perform the collaborative business activities.

Once the competencies are identified, it is required to make a mapping between current competencies and target competencies in order to know the future capability of competencies and take necessary corrective actions.

**SP 1.2 Develop a Collaborative Training and Competency Plan**

*Develop establish and maintain a collaborative training and competency plan.*

The activities to be performed to meet training and competency needs are designed and included in the Collaborative Training and Competency Plan. This plan addresses the scheduling and execution of training activities and is subject to changes and arrangements due to periodical adjusts (e.g., in needs or resources) and to evaluations of effectiveness.

**SP 1.3 Develop or acquire required training**

*Develop or acquire training activities established in the training and competency development plan.*

Select training and competency approaches and developing training materials to be developed or acquired.

**SG 2 Provide Necessary Training and Competency Development**

*Training and competency necessary for individuals to perform their roles effectively is provided.*

**SP 2.1 Deliver Training and Competency**

*Deliver the training and competency following the collaborative training and competency tactical plan.*

**SP 2.2 Establish Training and Competency Records**

*Establish and maintain records of the collaborative training and competency.*

The scope of this practice is for the training and competency performed at the organizational level. Establishment and maintenance of training and competency records for collaborative project is the responsibility of each collaborative enterprise.
SP 2.3 Assess Training and Competency Effectiveness

Assess the effectiveness of the collaborative training and competency program.

A process should exist to determine the effectiveness of training and competency (i.e., how well the training is meeting the collaborative enterprises needs).
5.5.5 Collaborative Business Process Performance

An Organisation Process Area of Level 4

Purpose

The purpose of Collaborative Business Process Performance (BPP) is to achieve a quantitative understanding of the performance of the collaborative business processes by means of establishing metrics for quantitative process management, quality goals for the collaborative business processes and metrics for the quality of work products.

Sources: CMMI-Dev-v1.2 [6]

SPECIFIC GOALS

**SG 1 Analyse the collaborative business process performance**

SPECIFIC PRACTICES

**SP 1.1 Select Collaborative Business Processes to be analysed**

**SP 1.2 Establish metrics for quantitative process management**

**SP 1.3 Establish quality goals for the collaborative business processes**

**SP 1.4 Establish metrics for the quality of collaborative work products**

**SP 1.5 Analyse and predict the collaborative business process performance**

Specific Practices by Goal

**SG 1 Analyse the collaborative business process performance**

*Achieve a quantitative understanding of the performance of the collaborative business processes.*

**SP 1.1 Select Collaborative Business Processes to be analysed**

*Select the collaborative business processes whose performance will be analysed.*
Collaborative business processes to be analysed have been established in the Collaborative Business Process (CBP) Process Area.

SP 1.2 Establish metrics for quantitative process management

Establish measurable metrics for processes measurement and collect and analyse data against the metrics.

Conduct quantitative process management based on the established quantitative metrics, benchmarks or statistical data.

SP 1.3 Establish quality goals for the collaborative business processes

Establish quality goals for the business processes that can be evaluated throughout the collaborative project, preferably in a quantitative manner.

Develop an overall strategy at the collaborative project and CNO level to achieve the defined goals by defining the metrics that will measure the results of collaborative project activities and by defining acceptance criteria that will help to assess whether the relevant quality goals have been achieved.

SP 1.4 Establish metrics for the quality of collaborative work products

Establish measurable metrics for collaborative work products quality and enable data to be collected and analyzed against the metrics.

Measure collaborative work products quality based on established metrics, benchmarks, or statistical data.

SP 1.5 Analyse and predict the collaborative business process performance

Estimate, analyse, and predict the collaborative business process performance associated with the processes in the collaborative set of standard processes.

Process-performance models are used to estimate, analyse, and predict the collaborative business process performance. The collaborative enterprises use process-performance models also to assess the potential return on investment for collaborative process improvement activities.
5.6 ICT infrastructure and Interoperability

5.6.1 Interoperability and Collaboration technologies

A Systems and technology Process Area of Level 3

Purpose

The purpose of the Interoperability and Collaboration Technologies (ICT) is to establish tools, techniques and methods for interoperability and collaboration.

Source: PÖYRY (COIN End user) [27]
CMMI-Dev-v1.2 [6]

SPECIFIC GOALS

<table>
<thead>
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<th>Analyse and describe requirements for interoperability and collaboration technologies</th>
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<tbody>
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<td>SG 2</td>
<td>Evaluate interoperability and collaboration technologies</td>
</tr>
<tr>
<td>SG 3</td>
<td>Deploy interoperability and collaboration technologies</td>
</tr>
</tbody>
</table>

SPECIFIC PRACTICES

| SP 1.1 | Identify interoperability and collaboration requirements                          |
| SP 1.2 | Analyse requirements for interoperability and collaboration technologies         |
| SP 1.3 | Describe requirements for interoperability and collaboration technologies        |
| SP 2.1 | Establish Evaluation Criteria                                                    |
| SP 2.2 | Analyse selected interoperability and collaboration technologies                 |
| SP 2.3 | Conduct technical reviews                                                       |
| SP 3.1 | Plan the deployment of interoperability and collaboration technologies            |
| SP 3.2 | Manage the deployment of interoperability and collaboration technologies          |
| SP 3.3 | Establish and deploy a basic ICT environment                                     |
| SP 3.4 | Establish and deploy Document management & Engineering tools                     |
| SP 3.5 | Establish and deploy ICT support                                                 |
### Specific Practices by Goal

**SG 1** Analyse and describe requirements for interoperability and collaboration technologies

*Requirements are analysed and described to ensure that they are necessary and sufficient.*

<table>
<thead>
<tr>
<th>SP 1.1 Identify interoperability and collaboration requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identify the interoperability and collaboration requirements that will be needed to achieve a successful collaboration.</strong></td>
</tr>
</tbody>
</table>

This specific practice finds the requirements that are needed in order to establish a successful collaboration between the network partners and to be able to trace the requirements during the collaborative enterprise life cycle.

<table>
<thead>
<tr>
<th>SP 1.2 Analyse requirements for interoperability and collaboration technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perform analysis of selected requirements to find problems or incoherencies and propose solutions to address these problems.</strong></td>
</tr>
</tbody>
</table>

The purpose of this analysis is to identify collaboration and interoperability problems and propose solutions to correct these problems.

<table>
<thead>
<tr>
<th>SP 1.3 Describe requirements for interoperability and collaboration technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Describe requirements for interoperability and collaboration technologies.</strong></td>
</tr>
</tbody>
</table>

**SG 2** Evaluate interoperability and collaboration technologies

*Technology changes are based on an evaluation of interoperability and collaboration technologies using established criteria.*

<table>
<thead>
<tr>
<th>SP 2.1 Establish Evaluation Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Establish and maintain the criteria for evaluating alternatives.</strong></td>
</tr>
</tbody>
</table>

The evaluation criteria provide the basis for evaluating alternative solutions. Document the evaluation criteria to minimize the possibility that decisions will be second-guessed or that the reason for making the decision will be forgotten.

**Note:** This specific practice is introduced because it is advisable to use previously established evaluation criteria. It would be useful to establish objective evaluation criteria to justify possible changes.

<table>
<thead>
<tr>
<th>SP 2.2 Analyse selected interoperability and collaboration technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perform analysis of selected interoperability and collaboration technologies.</strong></td>
</tr>
</tbody>
</table>
The selected interoperability and collaboration technologies are analysed to determine whether they are necessary and sufficient to meet the objectives of the collaboration. It may be possible to use proven models or simulations to ensure the correct functionality.

**SP 2.3 Conduct technical reviews**

*Periodically review the collaboration’s technical performance and issues.*

Conduct reviews on the collaboration’s technical performance and issues to keep all the members informed about the technical problems or possible improvements. These reviews can be informal and not be explicitly specified.

**SG 3 Deploy interoperability and collaboration technologies**

*Interoperability and collaboration technologies are deployed and supervised.*

**SP 3.1 Plan the deployment of interoperability and collaboration technologies**

*Establish and maintain the plan for deploying the interoperability and collaboration technologies.*

The purpose of this specific practice is to determine what is needed to perform the deployment and to achieve the established objectives, to prepare a plan for performing the deployment, to prepare a description and to get an agreement on the plan by the members of the collaboration.

**SP 3.2 Manage the deployment of interoperability and collaboration technologies**

Management of the deployment includes maintenance of the consistency of the different technologies throughout the life of the collaboration, and resolution of conflicts and change.

**SP 3.3 Establish and deploy a basic ICT environment**

*Establish and deploy a basic ICT environment.*

Basic ICT environment is deployed (according to the PÖYRY vision) in three phases:

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>• PC and required applications in use.</td>
<td>• User id and authentication is specified at network level.</td>
<td>• User id and authentication is specified at CNO level.</td>
</tr>
<tr>
<td>• ICT support is organized.</td>
<td>• To attach new members into network is controlled and easy.</td>
<td>• It is possible to attach external user to the network.</td>
</tr>
<tr>
<td>• User id and authentication is locally specified.</td>
<td>• SSO (single sign on) is used for authentication and access rights.</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 - Establish and deploy a Basic ICT environment in 3 Phases
**SP 3.4 Establish and deploy Document management & Engineering tools**

Establish and deploy Document management and engineering tools.

Document management & Engineering tools are deployed (according to the PÖYRY vision) in three phases:

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Basic knowledge of engineering tools.</td>
<td>• Effective usage of engineering tools.</td>
<td>• Use of tools is effective and also participating innovative development.</td>
</tr>
<tr>
<td>• Document management system in use.</td>
<td>• Common document management system in use.</td>
<td>• Common document management system in effective use.</td>
</tr>
<tr>
<td>• Training courses are available.</td>
<td>• Training courses are available as needed.</td>
<td>• Training courses of different level are available as needed.</td>
</tr>
<tr>
<td>• Installation of engineering tools required outside support.</td>
<td>• Installation of engineering tools with remote support.</td>
<td>• Installation of engineering tools using own staff.</td>
</tr>
</tbody>
</table>

*Table 5 - Establish and deploy Document management and engineering tools in 3 Phases*

**SP 3.5 Establish and deploy ICT support**

Establish and deploy ICT Support.

ICT support is deployed (according to the PÖYRY vision) in three phases:

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ICT support team exists.</td>
<td>• Local ICT support is part of CNO support team.</td>
<td>• Local ICT support is part of CNO support team.</td>
</tr>
<tr>
<td></td>
<td>• Knowledge databases are in use.</td>
<td>• Knowledge databases are in use and participating in development activities.</td>
</tr>
</tbody>
</table>

*Table 6 – Establish and deploy ICT Support in 3 Phases*
SP 3.6 Establish and deploy Communication

Establish and deploy Communication.

Communication is deployed (according to the PÖYRY vision) in three phases:

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Communication tools are specified.</td>
<td>• Communication tools usage is effective.</td>
<td>• Communication as “digital native”.</td>
</tr>
<tr>
<td>• Training and support are available.</td>
<td>• Training and support are available as needed.</td>
<td>• Collaboration tools are part of every day work.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Innovative development of work processes and collaboration.</td>
</tr>
</tbody>
</table>

*Table 7- Establish and deploy communication*
5.7 Innovation

5.7.1 Organisational Innovation

An Innovation Process Area of Level 3

Purpose

The purpose of Organizational Innovation (OI) is to select and deploy innovations that improve the collaborative processes and technologies.

Sources: CMMI-Dev-v1.2 [6]
BPMM [7]

SPECIFIC GOALS

SG 1 Select Innovations
SG 2 Deploy Innovations

SPECIFIC PRACTICES

SP 1.1 Establish Innovation Collaborative Workgroup
SP 1.2 Establish quantitative innovation goals
SP 1.3 Plan Innovation Work
SP 1.4 Identify and Analyze Innovations
SP 1.5 Select Innovations for Deployment
SP 2.1 Plan the Deployment
SP 2.2 Manage the Deployment
SP 2.3 Measure the Deployment
SP 2.4 Communicate Innovation Information
Specific Practices by Goal

SG 1 Select Innovations

Process and technology innovations, which contribute to meeting quality and process-performance objectives, are selected.

SP 1.1 Establish Innovation Collaborative Workgroup

An innovation collaborative workgroup is established and assigned responsibility and authority for achieving specific quantitative innovation goals.

This practice ensures that achieving the goal is planned and managed as a project with well defined requirements.

SP 1.2 Establish quantitative innovation goals

Establish and maintain quantitative innovations goals.

SP 1.3 Plan Innovation Work

Establish and maintain the work plan to achieve the assigned quantitative innovations goals.

The effort and resources required to perform the innovation work are understood and obtained, appropriate commitments are established, and the plans for performing and managing the innovation work are in place.

SP 1.3 Identify and Analyze Innovations

Identify and analyze innovations that could increase the collaboration’s quality and process performance.

The purpose of this specific practice is to actively search for, locate, and analyze innovations.

SP 1.4 Select Innovations for Deployment

Select process and technology innovations for deployment across the collaborative enterprises.

Selection of process and technology innovations for deployment across the collaborative enterprises is based on quantifiable criteria derived from the organization’s quality and process-performance objectives.
### SG 2  Deploy Innovations

**Innovations to the collaboration’s processes and technologies are continually and systematically deployed.**

<table>
<thead>
<tr>
<th>SP 2.1 Plan the Deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Establish and maintain the plans for deploying the selected process and technology innovations.</em></td>
</tr>
</tbody>
</table>

The plans for deploying each process and technology innovation may be included in the collaborative plan for organizational innovation and deployment or they may be documented separately.

<table>
<thead>
<tr>
<th>SP 2.2 Manage the Deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Manage the deployment of the selected process and technology innovations.</em></td>
</tr>
</tbody>
</table>

Manage the deployment of innovations to the collaboration’s processes and technologies that can be quantified against the collaborative business objectives.

<table>
<thead>
<tr>
<th>SP 2.3 Measure the Deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Measure the deployment of the selected processes and technology innovations.</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SP 2.4 Communicate Innovation Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Information, status, measures, and other results of a planned innovation effort are provided to relevant stakeholders and communicated across the collaboration.</em></td>
</tr>
</tbody>
</table>

The people in the collaboration have an appropriate understanding of the planned innovation effort’s activities and results to help them prepare for the deployment and use of the innovations.
5.7.2 Open Innovation

An Innovation Process Area of Level 4

Purpose

The purpose of Open Innovation (OPI) is to combine internal collaborative ideas and external ideas from other collaborations or companies as well as internal and external paths to situate a new product, service or technology with advantage in the current market or in a new one.

![Open Innovation Diagram](image)

*Figure 6 – Open Innovation [31]*

Sources:

- Open Innovation (Henry W. Chesbrough) [28]
- Managing Open Innovation (Tobias Fredberg, Maria Elmquist and Susanne Ollila) [29]
- Innovación Abierta. Más allá de la innovación tradicional (Universidad de Mondragón) [30]

SPECIFIC GOALS

- **SG 1** Establish Open Business Model
- **SG 2** Establish Open Innovation

SPECIFIC PRACTICES

- **SP 1.1** Define Business Objectives for Partnering
SP 1.2  Select the Open Innovation Scenarios

SP 1.3  Align the Business Model of the Entities

SP 2.1  Create an Open Innovation Teamwork

SP 2.2  Define the Complexity of Open Innovation

SP 2.3  Plan for Open Innovation

SP 2.4  Manage Intellectual Capital

Specific Practices by Goal

SG 1  Establish Open Business Model

Establish and maintain an open business model to enable the collaborative enterprises to be more efficient in creating and capture value.

Collaborative enterprises need to adapt their business models to open innovation, as it is a way of generating value from their Intellectual Property.

SP 1.1  Define Business Objectives for Partnering

Define business objectives for partnering to create business models that reduce R&D expenses.

The outside partners are not seen as suppliers but as peers. Therefore, collaborative enterprises can reduce R&D expenses, expand innovation output and open up new markets.

SP 1.2  Select the Open Innovation Scenarios

Select the open innovation scenarios to identify the degree of openness.

Innovation processes hardly can be completely opened or closed. The scenarios for the open innovation are:

• **Advanced Innovation.** In this scenario, the innovation process is opened within the collaboration to let all the workers have the opportunity to participate.

• **Collaborative Innovation.** It is related to the opening for the collaboration with external agents from the collaboration such as suppliers, allied, universities, technology departments and even competitors. In this scenario the most important practice is the collaboration and co-creation.

• **User Innovation.** User innovation is a type of collaborative innovation where the main actor is the user.

• **Crowdsourcing.** This scenario of open innovation has grown up due to democratization of technology and the diffusion of Internet. This scenario is defined like an application of the collective intelligent within the business world. In case of only incorporate lead users to the innovation process, the crowdsourcing involves any person within the collaboration in order to generate value.
SP 1.3 Align the Business Model of the Entities

Business model of the different entities is aligned with defined business needs and objectives.

All the entities involved share the same business objectives for the innovation and are clearly defined.

SG 2 Establish Open Innovation Strategy

Establish and maintain open innovation strategy to include external knowledge and skills in the collaborative innovation strategies.

SP 2.1 Create an Open Innovation Teamwork

Create a teamwork oriented to the open innovation.

The teamwork should be externally oriented, adaptive and see positive results across a wide variety of functions and industries. These teams have extensive ties with outsiders, both weak and strong ties. They operate through three distinct tiers that create differentiated types of team membership: the core tier, operational tier and outer tier. Team members may perform duties within more than one tier.

SP 2.2 Define the Complexity of Open Innovation

Define the complexity of open innovation.

The complexity becomes higher both because of the increased number of actors involved, and the fact that the collaboration is no longer itself in control. Furthermore, an open innovation process demands that managers can handle both the inside and the outside of the collaboration. The traditional solution to handling complexity in innovation processes is to separate the parts that have to do with the outside, with new products or with changed processes from the standardized routine activities in the collaborative enterprises.

Figure 7 - Open innovation increases both potential creativity and complexity of the innovation process[29]
SP 2.3 Plan for Open Innovation

*Plan the open innovation activities to achieve the business objectives.*

All the phases of the open innovation are identified and planned as well as activities, resources (human and material) etc. On the other hand, it is very important the timing (when do you have to be open?) of open innovation and the relation to the innovation process and the product lifecycle.

SP 2.4 Manage Intellectual Capital

*Define different strategies to connect Intellectual Property to business models.*

Not all ideas are protectable as IP, and many ideas that might be protectable are not protected. Intellectual property refers to the subset of ideas that are novel, are useful, have been reduced to practice in a tangible form, and have been managed according to the law.
6 GENERIC GOALS AND GENERIC PRACTICES

6.1 Generic Goals and Generic Practices

According to the CMMI [6]:

“Generic practices are called ‘generic’ because the same practice applies to multiple process areas. A generic practice is the description of an activity that is considered important in achieving the associated generic goal. A generic practice is an expected model component. For example, a generic practice for the generic goal ‘The process is institutionalized as a managed process’ is ‘Provide adequate resources for performing the process, developing the work products, and providing the services of the process.’”

Purpose

As stated by the CMMI [6]:

“The purpose of the Generic Goals and Generic Practices is to institutionalize the collaborative process improvement. The institutionalization implies that the collaborative process is ingrained in the way the work is performed in the enterprise network and there is commitment and consistency to performing the collaborative process. An institutionalized collaborative process is more likely to be retained during times of stress. When the requirements and objectives for the collaborative process change due to the network life cycle, however, the implementation of the collaborative process may also need to change to ensure that it remains effective. The generic practices describe activities that address these aspects of institutionalization.”

The degree of institutionalization is embodied in the generic goals and expressed in the names of the processes associated with each goal as indicated in the following table.

<table>
<thead>
<tr>
<th>Generic Goal</th>
<th>Progression of Collaborative Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>GG 1</td>
<td>Performed Collaborative Process</td>
</tr>
<tr>
<td>GG 2</td>
<td>Managed Collaborative Process</td>
</tr>
<tr>
<td>GG 3</td>
<td>Standardised Collaborative Process</td>
</tr>
<tr>
<td>GG 4</td>
<td>Innovating Collaborative Process</td>
</tr>
</tbody>
</table>

Table 8 - Generic Goals and collaborative process table
The progression of collaborative process institutionalization is characterized in the following descriptions of each collaborative process.

**Performed Collaborative Process**

A performed collaborative process is a collaborative process that accomplishes the work necessary to produce work products in the enterprise network. The specific goals of the process area are satisfied.

**Managed Collaborative Process**

The requirements and objectives for the collaborative process are established by the enterprise network.

As stated by the CMMI [6]:

“The status of the work products and delivery of the services are visible to management at defined points (e.g., at major milestones and completion of major tasks). Commitments are established among those performing the work and the relevant stakeholders and are revised as necessary. Work products are reviewed with relevant stakeholders and are controlled. The work products and services satisfy their specified requirements.”

**Standardised Collaborative Process**

A standardized collaborative process is a process that is highly extended across the enterprise network.

**Innovating Collaborative Process**

An innovating collaborative process is quantitatively managed in order to be optimised to meet the business objectives of the enterprise network.

**GENERIC GOALS**

<table>
<thead>
<tr>
<th>GG 1</th>
<th>Achieve Specific Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>GG 2</td>
<td>Institutionalize a Managed Collaborative Process</td>
</tr>
<tr>
<td>GG 3</td>
<td>Institutionalize a Standardised Collaborative Process</td>
</tr>
<tr>
<td>GG 4</td>
<td>Institutionalize a Innovating Collaborative Process</td>
</tr>
</tbody>
</table>
GENERIC PRACTICES

GP 1.1 Perform Specific Practices
GP 2.1 Establish a Collaborative Policy
GP 2.2 Plan the Collaborative Process
GP 2.3 Assign Collaborative Responsibility
GP 2.4 Review Status with Collaboration Managers
GP 3.1 Adapt the Collaborative Process to the Enterprise Network Life Cycle
GP 3.2 Establish a Standard Interoperability
GP 3.3 Establish the Visibility of the Collaborative Process
GP 4.1 Establish Quantitative Objectives for the Collaborative Process
GP 4.2 Stabilize Collaborative Sub-process Performance
GP 4.3 Ensure Continuous Collaborative Process Innovation

Generic Practices by Goal

GG 1 Achieve Specific Goals

“The collaborative process supports and enables achievement of the specific goals of the process area by transforming identifiable input work products to produce identifiable output work products.” [6]

GP 1.1 Perform Specific Practice

Perform the specific practices of the process area to develop work products and provide services to achieve the specific goals of the process area.

“The purpose of this generic practice is to produce the work products and deliver the services that are expected by performing the collaborative process. These practices may be done informally, without following a documented process description or plan. The rigor with which these practices are performed depends on the individuals managing and performing the work and may vary considerably.” [6]
GG 2 Institutionalize a Managed Collaborative Process

The collaborative process is institutionalized as a managed process in the enterprise network.

GP 2.1 Establish a Collaborative Policy

Establish and maintain a collaborative policy for planning and performing the collaborative process in the enterprise network.

“The purpose of this generic practice is to define the network expectations for the collaborative process and make these expectations visible to those in the organization who are affected. In general, senior management is responsible for establishing and communicating guiding principles, direction, and expectations for the enterprise network. The existence of appropriate network direction is the expectation of this generic practice, regardless of what it is called or how it is imparted.” [6]

GP 2.2 Plan the Collaborative Process

Establish and maintain the plan for performing the collaborative process in the enterprise network.

“The purpose of this generic practice is to determine what is needed to perform the collaborative process and to achieve the established objectives, to prepare a plan for performing the collaborative process, to prepare a process description, and to get agreement on the plan from relevant stakeholders. The practical implications of applying a generic practice vary for each process area. For example, this generic practice, when applied to the Collaborative Project Management process area, sets an expectation that the project planning process for the enterprise network itself be planned. Therefore, this generic practice may either reinforce expectations set elsewhere in ECMM or set new expectations that should be addressed.” [6]

GP 2.3 Assign Collaborative Responsibility

Assign responsibility and authority for performing the collaborative process, developing the work products, and providing the services of the collaborative process.

“The purpose of this generic practice is to ensure that there is accountability for performing the collaborative process and achieving the specified results throughout the life of the collaborative process. The people assigned must have the appropriate authority to perform the assigned responsibilities in the enterprise network. Responsibility can be assigned using detailed job descriptions or in living documents, such as the plan for performing the collaborative process. Dynamic assignment of responsibility is another legitimate way to perform this generic practice, as long as the assignment and acceptance of responsibility are ensured throughout the life of the collaborative process.” [6]
GP 2.4  Review Status with Collaboration Managers

Review the activities, status, and results of the collaborative process with enterprise network managers and resolve issues.

“The purpose of this generic practice is to provide enterprise network managers with the appropriate visibility into the collaborative process. These reviews are for managers who provide the policy and overall guidance for the collaborative process, and not for those who perform the direct day-to-day monitoring and controlling of the collaborative process. Different managers have different needs for information about the collaborative process depending on the role in the enterprise network. These reviews help ensure that informed decisions on the planning and performing of the collaborative process can be made. Therefore, these reviews are expected to be both periodic and event driven.” [6]

GG 3 Institutionalize a Standardised Collaborative Process

The process is institutionalized as a standardised collaborative process.

GP 3.1  Adapt the Collaborative Process to the Enterprise Network Life Cycle

Adapt the collaborative process to different phases of the enterprise network.

The purpose of this generic practice is to prepare the collaborative process for the different phases in which an enterprise network could be involved i.e. creation, evolution, maintenance and dissolution. This does not mean that multiple changes are necessary in the collaborative process but it must be taken into account the network life cycle in the definition as well as in the implementation.

GP 3.2  Establish a Standard Interoperability

Establish and maintain a standard interoperability in the enterprise network.

The purpose of this generic practice is to establish and maintain a certain grade of interoperability across the enterprise network in the following levels: technical, semantic and organizational.

GP 3.3  Establish the Visibility of the Collaborative Process

Establish and maintain the visibility of the collaborative process.

The purpose of this generic practice is to establish and maintain the visibility of the collaborative process in the enterprise network to ensure that each organization could define what is private, public or collaborative.

GP 3.4  Establish a Cross Relationship

Establish and maintain the crossed map among the collaborative process of the enterprise network.

The purpose of this generic practice is to establish and maintain the crossed map of the collaborative process in order to define a common workflow and a clear commitment.
GG 4 Institutionalize an Innovating Collaborative Process

The process is institutionalized as an innovating collaborative process.

GP 4.1 Establish Quantitative Objectives for the Collaborative Process

Establish and maintain quantitative objectives for the collaborative process, which address quality and process performance, based on customer needs and business objectives in the enterprise network. [6]

“The purpose of this generic practice is to determine and obtain agreement from relevant stakeholders about specific quantitative objectives for the collaborative process. These quantitative objectives can be expressed in terms of product quality, service quality, and process performance.” [6]

GP 4.2 Stabilize Collaborative Sub-process Performance

Stabilize the performance of one or more collaborative sub-processes to determine the ability of the collaborative process to achieve the established quantitative quality and process-performance objectives in the enterprise network. [6]

“The purpose of this generic practice is to stabilize the performance of one or more collaborative sub-processes of the defined collaborative process, which are critical contributors to overall performance, using appropriate statistical and other quantitative techniques. Stabilizing selected collaborative sub-processes supports predicting the ability of the collaborative process to achieve the established quantitative quality and process-performance objectives in the enterprise network.” [6]

GP 4.3 Ensure Continuous Collaborative Process Innovation

Ensure continuous innovation of the collaborative process in fulfilling the relevant business objectives of the enterprise network.

The purpose of this generic practice is to select and systematically deploy collaborative process and technology innovations that contribute to meeting established quality and process-performance objectives of the enterprise network.
7 Global Plan for ECMM Test Case

7.1 Objectives

A global plan for ECMM Test Cases has been developed and is progressing. It is based on three main phases:
- ECMM First Assessment.
- Implementation of Improvements.
- ECMM Re-assessment

The objectives of the ECMM Test Case are:
- Diagnose the state of COIN End User Collaborative network’s current practices regarding collaboration and interoperability issues.
- Propose improvement practices for increasing the capability of COIN End user Collaborative network and its members to be able to collaborate and interoperate.
- Support and monitor the implementation of the improvement practices.
- Re-diagnosis in order to check if the implementation of the improvement practices has achieved the expected results.
- Update and improve the ECMM based on the input received in the Test Case.

Benefits obtained

For the evaluated companies
- Companies are introduced in enterprise collaboration and interoperability subjects.
- As a result from the assessments, companies will obtain a snapshot on their situation and capacities for collaboration (in the process areas selected and based on the evaluated people’s vision).
- Companies will get an improvement roadmap for collaboration (in the process areas selected).
- Companies are offered to participate in future reviews of the ECMM.
- Companies will obtain a website containing their processes based on the improvement roadmap (instantiation of the ECMM Process areas).

For COIN project
- First versions of both ECMM and Assessment Methodology are piloted in real scenarios.
- Pilots allow us to update and improve the ECMM based on the feedback received.

Two options are possible in order to carry out an assessment:
- On-site: “Formal assessment” carried out by a “evaluator team” in a traditional consultancy service.
7.2 Participants

The table below describes the roles that participate in the formal assessment:

<table>
<thead>
<tr>
<th>Companies</th>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COIN End-User</td>
<td>Sponsor of the assessment</td>
<td>Organization that promotes the evaluation process.</td>
</tr>
<tr>
<td>ESI-Tecnalia</td>
<td>Evaluator team</td>
<td>The evaluator team is made up by people who belong to the companies that organize the evaluation.</td>
</tr>
<tr>
<td>COIN End-User’s Collaborative Networks</td>
<td>Target people</td>
<td>Members of the collaborative network who know in detail the processes of the evaluated organizations or collaborative network, at different levels. (e.g. Quality responsible, Process Engineer, Project Leaders and/or technicians related to the Process Areas to be evaluated).</td>
</tr>
</tbody>
</table>

*Table 9 – Formal Assessment Roles*

7.3 Work Plan

The ECMM Test Case consists of 4 work packages.

**WP1: Project Management**

**Objective**

The project follows the usual tasks of project management as planning and monitoring.

**WP2: ECMM First Assessment**

**Objective**

The main goal of this phase is to measure the practices of the collaborative network and its member organizations in order to identify improvement recommendations that help the network to increase its capability for collaboration and interoperability according to the ECMM.

---

2 COIN End-Users should participate in this phase (from September to December 2010) excluding ISOIN and IND, who have already taken part in a first assessment, and POYRY who is adapting the ECMM for its own purpose.
Description of work
The WP consists of five separate Tasks:

Tasks 2.1 – Define the scope of the assessment
- Select the companies that will be evaluated (recommended number of Companies: 3).
- Identify the relationship between the COIN use cases and the ECMM Process Areas.
- Select the process areas of the ECMM model that will be evaluated (recommended number of Process Areas: 2).

Responsible: Sponsor
Support: Evaluator team

Task 2.2 – Collect information about network and member organizations context
- The sponsor obtains all the necessary information in order to plan the assessment. This information will be collected through a context questionnaire, a document that will be sent by email to the sponsor, who will be the responsible for this task.
- The sponsor will send to the evaluator the collected information about the organization context.
- The sponsor identifies the interviewed people (members of the collaborative network being assessed).

Responsible: Sponsor
Support: Evaluator team

Task 2.3 - Carry out assessments
Assessments can be carried out in different ways, mainly on-site and remote.

If assessments are on-site,

Task 2.3.1. Perform assessments’ questions
The evaluator team will go to the customer’s premises and carry out the assessments there.

Responsible: Evaluator team

Task 2.3.2. Collect evidence
They will look for evidence and findings and will collect them.

Responsible: Target people
Support: Sponsor, Evaluator team

If assessments are on-line,

Task 2.3.1 Prepare Online Questionnaires
The evaluator team will develop the web-based questionnaires of the ECMM Process areas to be evaluated. The questionnaires will contain open and close questions.
Responsible: Evaluator team

Tasks 2.3.2 – Collect information through web-based online questionnaires
The self-assessment will make use of the online web-based questionnaires previously developed.
Responsible: Target people
Support: Sponsor, Evaluator team

Tasks 2.4 – Elaborate improvement recommendations
The collected data will be “manually” analysed and consolidated.
Responsible: Evaluator team

Tasks 2.5– Assessment Results Presentation
The improvement recommendations and the final marks will be presented.
Responsible: Evaluator team

Some screenshots of online web-based questionnaires are depicted next:

![ECMM Self Assessment Questionnaire](image)

*Figure 10- ECMM Self Assessment Questionnaire*
**WP3: Implementation of Improvements**

**Objective**

The main goal of this phase is to carry out the actions that have been identified in the previous phase for improvement of the collaborative network according to the ECMM. This phase includes activities of monitoring and support in order to check if the improvement actions are being carried out according to plans and obtain the expected results.

**Description of work**

The WP consists of three separate Tasks:

**Tasks 3.1 – Implementation of new practices**

Design and implementation of new practices for collaboration and interoperability in the collaborative network according to the ECMM.

*Responsible: Target people*

**Task 3.2 – Pilot new practices in collaborative projects**

Test, communication, training and dissemination of the new practices in the collaborative projects.

---

*Figure 11- ECMM Self Assessment : Question Example*
Responsible: Target people

Task 3.3 - Support and monitor the implementation of improvements
Remote support (via email, phone teleconference, etc.) of the implementation of the new practices for collaboration and interoperability.
Responsible: Evaluator team

WP4: ECMM Re-assessment

Objective
The goal of the ECMM Re-assessment phase is to measure the practices of the network and member organizations for a second time in order to check if the implementation of the improvement practices has achieved the expected results.

Description of work
The WP consists of two separate Tasks:

Tasks 4.1 – Collect information through web-based online questionnaires or through on-site assessments
The (self)-assessment will make use of the online web-based questionnaires previously developed or should the option selected be on-site assessments, the evaluator team will carry out the reassessments by attending the customer’s premises.
Responsible: Target people
Support: Sponsor, Evaluator team

Tasks 4.2 – Report Final Results
Report the final assessment results and lessons learned. Update and improve the ECMM based on the input received in the pilot.
Responsible: Evaluator team
8 REFERENCES


[19] Zahed Siddique, Assistant Professor School of Aerospace and Mechanical Engineering, University Of Oklahoma, zsiddique@ou.edu. Principles of Design, Understanding Customer Requirements.


We want to know important information about your organization. Please, fill in the following questions as sincerely as possible. The requested information will be managed confidentially. Thank you for your collaboration.

**CONTEXT QUESTIONNAIRE**

**GENERAL INFORMATION**

<table>
<thead>
<tr>
<th>Company Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adress</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>Fax</td>
</tr>
<tr>
<td>Number of Employees</td>
<td></td>
</tr>
<tr>
<td>Role/s of the company team involved in the assessment</td>
<td></td>
</tr>
</tbody>
</table>

**BUSINESS DOMAINS:** public administration, services, commerce, industry (specify sector)

**PRODUCTS, SERVICES OR SOLUTIONS**

<table>
<thead>
<tr>
<th>List of Products, Services or Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
</tr>
<tr>
<td>2)</td>
</tr>
<tr>
<td>3)</td>
</tr>
<tr>
<td>4)</td>
</tr>
</tbody>
</table>
### Technological Environment, Tools and Methodology (Examples: Navision, SAP, WIFI, Local Networks...)

<table>
<thead>
<tr>
<th>Maturation of the Current Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicate if there are processes defined or at least operatives. In this case, since when?</td>
</tr>
</tbody>
</table>
0) Indicate the importance of the following process categories in your organisation.

<table>
<thead>
<tr>
<th>Process Category</th>
<th>Not Important</th>
<th>→</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project and Product Management</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project and product activities related to defining, planning, developing, risks management and quality assurance.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Process and Strategy</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business process management and financial aspects.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer Management</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship with the customer and evaluation by the customer.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaboration, Legal Environment and Trust</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legal activities and terms of collaboration relationships.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisation</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management of resources, development of competences and measurement.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systems and Technology</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technologies and Services for Interoperability and Collaboration.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities related to innovation processes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1) Which are the objectives that the organization wants to reach because of the participation in the ECMM evaluation?


2) Which are the organization’s business objectives? Do you see a relation between what you want to reach with this evaluation and the organization’s business objectives?


3) Who is and what role plays the sponsor of the initiative? Which are his responsibilities within the organization (if applies)?


4) Has the organization participated in others process improvement initiatives or quality improvement? (For example: ISO, CMMI etc.)
5) Is the organization in a growth phase? How do you see the future of the organization in 5 years?


6) What is the structure of the organization? Can you draw a diagram picture?


7) Which are the most common complaints of the customers?


8) Which are the most common complaints of the directors?


9) Which are the most common complaints of the employees in relation to daily work methodology?
10) Which are the “fires” that have been put out in the last year through heroic efforts by determined people?

11) Which is the future investment of resources in order to introduce the improvement opportunities?

12) Do service levels agreement with customers exist?
13) Which is the communication channel between the organization and customers?


14) If you could change something within the organization, what would it be?

1) 
2) 
3) 
4) 

15) Which are the positive things of your organization?

1) 
2) 
3) 
4)
Other Notes/Questions

NOTE: Answer this questions only if the assessment will be done to a network (at least two enterprises)

QUESTIONS ABOUT THE CONTEXT OF THE NETWORK AND THE EXPECTATIVES
1) How many organizations does your network contain?

2) How many C.B.P. (Cross Organizational Business Processes) are institutionalized? Are they documented? Does each member know them/adhere to them? Do you monitor it?

3) Are these C.B.P.s modelled? (For example: ARIS, BPMN etc.)

4) Are these C.B.P.s executed? (For example: BPEL, XPDL etc.)
5) Do you know if some member of the network has P.B.P. (Private Business Processes) modelled, executed etc.?

6) Which representation, continuous or staged, do you think is better for the network and why?

7) Independently of the representation, which are the most important process areas in your opinion for the network?

8) Who are the sponsor and the responsible persons for each collaborative enterprise?

9) Which are the collaborative projects to be evaluated?

10) Where is going to be held the assessment?
11) Do you think that the collaborative network is cohesioned? Why?

12) How long do you think that the collaborative network will work? Why?

13) If you could change something within the collaboration, what would it be?

1)

2)

3)

4)
14) Which are the positive things of the collaboration?

1) 

2) 

3) 

4) 

Other Notes/Questions
DISPOSITION FOR PROCESS IMPROVEMENT

We want to know the disposition of your organization for process improvement. Please, request the following questions as sincerely as possible in accordance with the punctuation. The requested information will be managed confidentially. Thank you for your collaboration.

1. Up until what point would you assume the extra costs arised from process improvement?

Little                     Much
1 2 3 4 5 6 7 8 9

2. Have the involved employees in collaboration ask for an improvement of the way they work?

Little                     Much
1 2 3 4 5 6 7 8 9

3. Would the daily work allow introducing the process improvement?

Little                     Much
1 2 3 4 5 6 7 8 9

4. Does the organization define clearly the roles and responsabilities?

Little                     Much
1 2 3 4 5 6 7 8 9

5. Does the organization encourage people to take risks?

Little                     Much
1 2 3 4 5 6 7 8 9

6. When a problem appears, do you look for a “guilty”?

Little                     Much
1 2 3 4 5 6 7 8 9

7. How much importance does the organization give to be faithful to methodologys and procedures?

Little                     Much
1 2 3 4 5 6 7 8 9