
Semantic Interoperability Centre Europe

Vision of the Clearing Process



This document has been prepared by

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PREFACE

ABOUT SEMIC.EU

SEMIC.EU (Semantic Interoperability Centre Europe) is an EU-Project to support the data exchange for pan-European e-Government services. Its goal is to create a repository for interoperability assets that can be used by e-Government projects and their stakeholders. SEMIC.EU is offering the following services for the public sector in Europe:

- SEMIC.EU will provide access to interoperability assets, which have been developed in previous governmental projects.
- A clearing process will safeguard certain rules and standards to assure the quality of published assets.
- Community features will be available on the platform, e. g. a forum to discuss best practices for the use of assets.
- SEMIC.EU will invite to seminars and workshops that are related to its activities.
- SEMIC.EU offers coaching services for the creation and/or reuse of interoperability assets.

More information on SEMIC.EU can be found at: <http://www.semic.eu>.

SEMIC.EU is an action of IDABC. Contracted technical service providers for the project are: Jinit[(main contractor), Fraunhofer ISST, GEFEG, and France Telecom R&D.

ABOUT IDABC

IDABC stands for Interoperable Delivery of European eGovernment Services to public Administrations, Business and Citizens. It takes advantage of the opportunities offered by information and communication technologies to encourage and support the delivery of cross-border public sector services to citizens and enterprises in Europe and to improve efficiency and collaboration between European public administrations.

The programme also provides financing to projects addressing European policy requirements, thus improving cooperation between administrations across Europe. National public sector policy-makers are represented in the IDABC programme's management committee and in many expert groups. This makes of the programme a unique forum for the coordination of national eGovernment policies.

<http://ec.europa.eu/idabc>

TYPOGRAPHICAL CONVENTIONS

The type styles shown below are used in this document to emphasize parts of the text.

Times New Roman – 11 pt.: Standard body text

Times New Roman – 11 pt. Italic: Citations

GRAPHICAL NOTATIONS

The notations listed below are used in this document to visualize concepts. The notation is briefly explained in the appendix of the document. Those illustrations are intended to support the readers understanding, however are not supposed to substitute any specification or tutorial. For further information on this topic, referring to the specific documentation is advised. The captions of the figures in this document indicate which particular notation is used:

BPMN – Business Process Modelling Notation from the Object Management Group

FMC – Fundamental Modelling Concept from the Hasso Plattner Institute, Potsdam, Germany

1. INTRODUCTION

Comparable to the creation of a joint economic and currency zone in Europe, in the age of information technology, the creation of a cooperative administration domain must be considered and promoted.

The domain will facilitate electronic interaction among citizens, companies, the EU administrations, and the EU Member States through electronic channels, as well as the use of pan-European eGovernment services (PEGS). Users and processes will be supported by modern information and communication technologies without restriction due to nationality, language, or place of residence.

Just as the fusion of the national economies into one common European domestic market necessitated multilateral harmonisation efforts in the economic sector, action must now be undertaken in order to harmonise the data exchanged via electronic services.

1.1. Purpose of this Document

The “*Vision of the Clearing Process*” primarily forms a visionary strategy for the most fundamental process – the Clearing Process – of the newly created cooperation service: the *SEMANTIC INTEROPERABILITY CENTRE EUROPE* (SEMIC.EU). Its further intention is to provide clear guidance for all interested parties onto what direction the clearing process and the related processes are directed and how those may be implemented in practice. All core features are presented in figure 1-1.

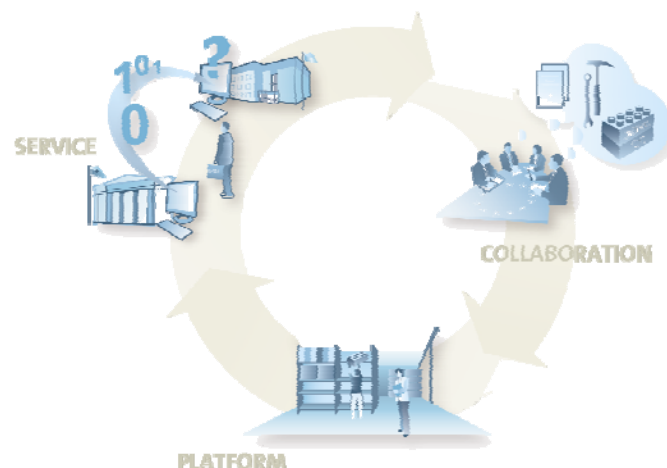


Figure 1-1: The SEMIC.EU Concept

Since the “*Vision of the Clearing Process*” is of a rather visionary nature, not all and every feature, which is described in this document, is to be implemented and supported by the platform to its launch. The vision also states new, innovative approaches and solutions, which might not be implemented at all, however, highlight new possibilities for solving problems.

The visionary content of this document is accompanied by strict and technical specifications. Since many parts of the vision of SEMIC.EU’s clearing process are to be implemented in practice, binding specifications and process definitions need to be stated. The result is a dual-purpose document, which firstly covers visionary design aspects in the first part and secondly the concrete technical specifications in the second part. Based on the technical process specifications of this document, the concrete platform processes are to be designed, created, and implemented.

Additionally, since the implementation and launch of the SEMIC.EU platform created numerous new findings and good practices, the vision is planned to be refined and amended with every new key finding. Therefore, this document also represents a so-called “*living document*” which changes over

time in order to reflect the current state-of-the-art at all times of the SEMIC.EU service's development and operation.

This “*Vision of the Clearing Process*”¹ forms the basis for a series of core design papers describing numerous important aspects of the SEMIC.EU platform and its processes. Those documents support the clearing process and its specific requirements within its intended domain.

The paper “*Quality Framework for Interoperability Assets*”² explains all relevant aspects and details about the quality process as part of the clearing process. This includes the quality goals of SEMIC.EU and the implementation of a quality system for the assets. The quality system will cover quality criteria, the assessment of the quality of assets and a branding system using quality labels to indicate the fulfilment of a specific set of quality criteria.

The “*Licensing Framework for Interoperability Assets*”³ states the fundamental licensing *Framework* for semantic interoperability assets of and on the SEMIC.EU platform. It additionally introduces the Intellectual Property Rights, specifies the rights and duties of the individual roles of the platform, and combines those to a comprehensive guideline on licensing.

Another supportive document is the “SEMIC.EU GLOSSARY”. In the glossary, short definitions of the key terms for SEMIC.EU including further references and usual abbreviations are provided.

This list of key documents at the given time covers not all of the SEMIC.EU core specifications, which will be created. With respect to the “*living-document*” nature of the “*Vision of the Clearing Process*” any newly created document is to be added accordingly.

1.2. Positioning and Goals of SEMIC.EU

The SEMIC.EU platform is primarily intended as a cooperation and collaboration platform, which deals with semantic interoperability assets. The resulting assets may be of pan-European nature and enable a partly or fully interoperable communication between the different administrations of the Member States.

SEMIC.EU is targeted to provide the conceptual base, technical infrastructure and support services in order to establish a pan-European repository for interoperability assets. It is a major goal to freely include all interested and related parties in the development of interoperability assets using an open and community-based process.

However, SEMIC.EU is neither a governmental agency nor a standardisation committee of any kind. The platform holds neither the political power or the political intention to develop and enforce binding communication regulations for semantic interoperability, nor the intention to create new standards for inter-agency communication. Therefore, the SEMIC.EU platform should not be mistaken to represent any standardisation efforts of any kind but as an enabler for harmonisation between the communication partners.

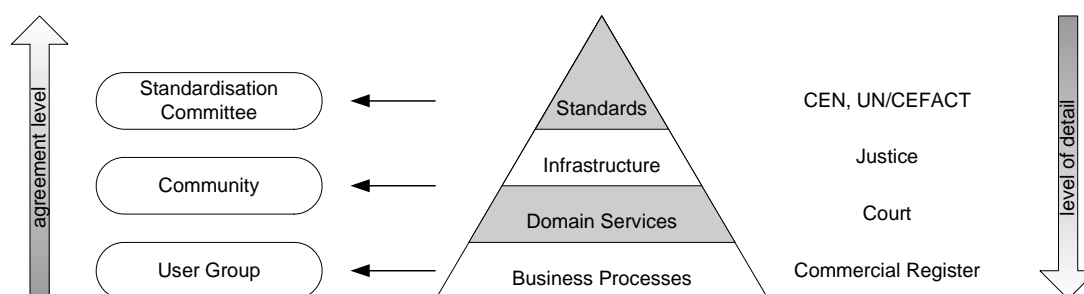


Figure 1-2: Responsibilities of regulation bodies

¹ Vision of the Clearing Process. <http://www.semic.eu/semic/view/documents/vision-of-the-clearing-process.pdf>

² Quality Framework for Interoperability assets, <http://www.semic.eu/semic/view/documents/quality-framework.pdf>

³ Licensing Framework for Interoperability Assets, <http://www.semic.eu/semic/view/documents/licensing-framework.pdf>

Harmonisation activities in Europe are pushed “top-down” by European and national standardisation agencies as well as “bottom-up” by various industrial and research initiatives, as illustrated in figure 1-2. Domain specific activities are located at the bottom of the pyramid and are usually describing detailed business processes, whereas standardisation is located on the top of the pyramid and aims at specifying a “common ground and rule-set” with is of less detail. This leads to international standards on the one hand as well as to domain-specific agreements on the other hand:

- *INTERNATIONAL STANDARDS* as published by governmental agencies or not-for-profit standardisation bodies must be generic in order to be applicable to a significant number of domains and businesses across many regions and cultures. These standards are usually well accepted by industry and users and are characterised by a high degree of visibility.
- *DOMAIN-SPECIFIC AGREEMENTS* on the other hand are the results of individual initiatives and communities within a specific domain or business. Agreements may have the status of national recommendations, but in most cases in practice, they are simply accepted by a group of actors. The visibility is usually rather low and depends greatly on the visibility of the promoting actors.

Given this situation, solution providers for e-Governmental services face the challenge that existing standards may not cover a certain problem with the appropriate level of business awareness, whereas existing business-specific agreements are likely to be hard to find and even harder to evaluate in terms of vitality, quality, and sustainability. This situation is complicated by the fact that, in many cases, different communities and initiatives provide competing solutions that are neither interoperable nor combinable.

The establishment of SEMIC.EU seeks to mitigate the shortcomings of both standards and domain-specific agreements by establishing a clearing process and an asset mediation platform that supports public administration and users in the following activities:

- finding appropriate solutions for pan-European eGovernment activities by providing interoperability assets for reuse, adaptation, and profiling,
- increasing the visibility and sustainability of existing domain-specific agreements, and
- defining an asset lifecycle by means of a quality-increasing maturity and conformance process.

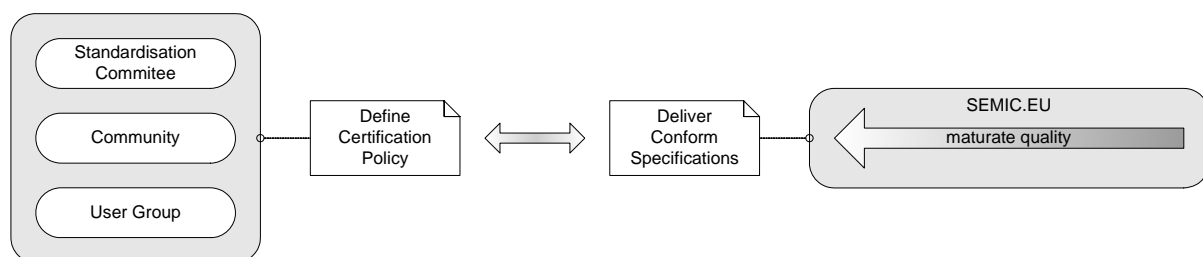


Figure 1-3: Relationship between the policies and assets (specifications)

There is a clear distinction of activities between regulatory bodies and SEMIC.EU (see figure 1-3).

SEMIC.EU’s primary goal is to increase the maturity (in reference to its individual development and quality progress level) of semantic interoperability assets through an open, guided process and to deliver high quality specifications with respect to the specific quality goals of SEMIC.EU⁴.

Regulatory bodies, such as government agencies or standardisation committees, however, are welcome to use resulting assets, which are published on SEMIC.EU, as input for their own standardisation processes.

⁴ The specific quality goals are specified in the paper “*Quality Framework for Interoperability Assets*”.

1.3. Vision of the Clearing Process

The fundamental process of the SEMIC.EU platform is the clearing process. Its general principle is illustrated in figure 1-4.

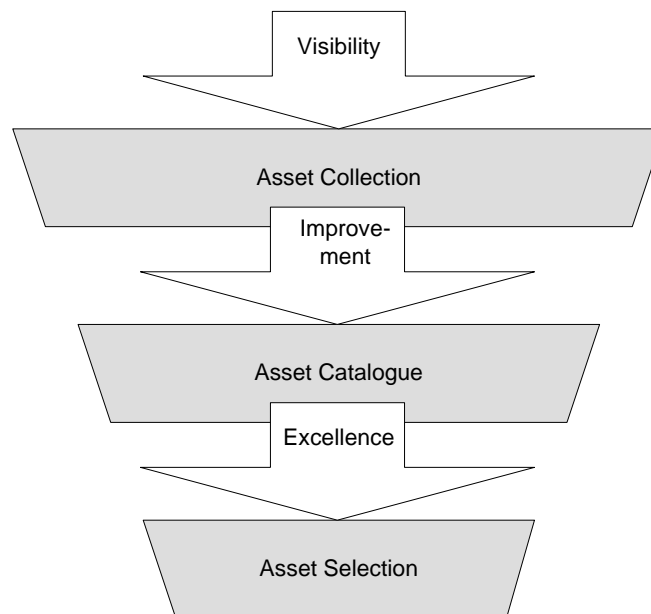


Figure 1-4: Goals of the Clearing Process

The clearing process guides the evolvement of an interoperability asset along its different stages of development. During the clearing process, the interoperability asset's functionality and quality is generally expected to be improved continuously until the interoperability asset is complete. The clearing process leads to assets that comply with SEMIC.EU's guidelines for semantic interoperability. The clearing process manager, who controls the flow of the assets, manages this process.

The clearing process is structured according to three overall stages of the development of an asset. Each step in the process has a different goal:

- **VISIBILITY:**
The goal is to provide the opportunity to participate and cooperate even in an early stage of development. Interoperability assets can be registered on the platform with only a minimal set of mandatory quality requirements that have to be fulfilled. Even an idea for an interoperability asset with minimal documentation may be made known to the interested community, thus providing the opportunity to participate and cooperate even in an early stage of development.
- **IMPROVEMENT:**
The goal is branding of an asset, thereby indicating the fulfilment of dedicated quality criteria defined by the quality goals of SEMIC.EU. As the development proceeds, the maturity of an asset concerning its quality and suitability for reuse in other projects should increase. Certain quality criteria are assessed and documented in a quality report. A branding of the asset using predefined quality labels indicates the fulfilment of dedicated quality criteria.
- **EXCELLENCE:**
The goal is awarding a conformance statement of SEMIC.EU. Mature assets, which have been finalised in development could achieve an outstanding level of quality which is indicated by awarding a conformance statement approving the quality goals of SEMIC.EU and passing a detailed review of the asset by domain experts.

The improvement of an asset's quality with respect to its usability for pan-European services is twofold:

- The clearing process leads to assets that fully comply with SEMIC.EU's guidelines for semantic interoperability.
- All assets that pass the clearing process indicate their suitability and usability for use and operation as part of the future pan-European e-Government services.

The clearing process also helps to raise the degree of acceptance a certain asset achieves within the appropriate domain. By involving interested parties and supporting the building of communities, the clearing process lowers the barriers for reuse and results in wide applicability of an asset.

To reflect the diversity of assets, their origins, and the different motivations for providing and reusing assets, the clearing process is not designed as a sequential path but rather as a framework. It is not the technical platform, but the individuals representing the roles defined by the clearing process that are in control of the process and the performance of the further development of assets. The openness of the SEMIC.EU clearing process with respect to balloting mechanisms, support functionality, and cooperation patterns allows for creating and elaborating assets that can conform to a wide range of quality and certification policies.

1.4. The Vision as a Guideline for Further Development

Implementing the vision of the clearing process requires a clear picture of the assets to be elaborated, a concrete specification of the clearing process, profiling of the acting roles, a roadmap for rollout and further development, a strategy for stakeholder involvement, and a vision of what might be the next steps. All of these are described in this paper.

Given the aspects of the clearing process that are covered by this paper, it clearly has the status of an overview document: It provides an overview of a clearing process as it should be implemented in the near future. Nevertheless, as the current implementation of the clearing process is a subset of the process described in this paper, it is also implicitly covered by this paper. The main difference between the vision and the initial version platform is that the part of the clearing process that is "real" has been agreed upon in detail and can be described in detail. In contrast, the part of the clearing process that is still part of the "vision" must remain visionary, since in most cases the requirements and objectives are clear, but the ways to reach them are either manifold or current ideas rather than concrete paths.

In respect to those characteristics, the vision paper has its own lifecycle:

- *IMPLEMENTATION PHASE:* Before and during the launch of SEMIC.EU, it mainly defines requirements and roll-out strategies. The first running platform will reflect the *MUST*-sentences of this paper, while the *SHOULD*-sentences form the vision part of this document.
- *MATURITY PHASE:* After the first months of operations, many things will be far more concrete, and a strategy for further development can be focussed on primary goals that have been identified by evaluating user feedback, performance measures, and the mixture and vitality of assets and communities on the platform. Given this, the vision paper will still very much focus on requirements, but most of the *SHOULD*s and *SHOULD NOT*s will have turned into *MUST*s and *MUST NOT*s.
- *IMPROVEMENT PHASE:* When SEMIC.EU is established, this vision paper will provide an overview of the running system and act as a guideline for further development. Strategic aspects of the vision will particularly pick up evaluation results and user feedback in order to reach new groups of users or to adjust the branding and positioning of SEMIC.EU.

The transition between these three major phases - and all the possible sub-phases - is intended to be fully seamless. In particular, the update of this document will be seamless but periodic in order to provide a constant reflection of the current boundary between current practice and vision, between agreement and discussion, and between fact and idea.

2. THE CLEARING PROCESS

The focus of the clearing process is on interoperability assets. An asset is a package of related documents that form a specification. Thus, assets are rather formal descriptions of either interoperable services or components that are required to build interoperable services (e. g. taxonomies and message types). The assets are explained in detail in section 3. In this section, the asset is a more abstract item, which is the basic property of the clearing process.

This section provides an overview of all aspects of the clearing process on interoperability assets. Among those are:

- the different stages and sub-processes of the process itself
- the roles involved
- the identification of assets and its states
- the quality measures used to characterise the quality of an asset

With respect to the goals *VISIBILITY*, *IMPROVEMENT* and *EXCELLENCE* (as described in section 1.3), the clearing process consists of three dedicated stages (see figure 2-1). These global development stages directly reflect the goals.

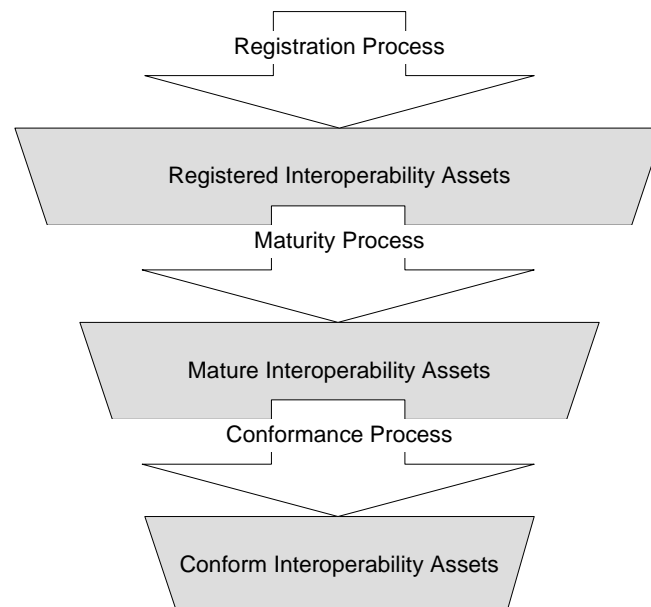


Figure 2-1: Clearing Process

The *VISIBILITY STAGE* is implemented by the registration process. The asset becomes a *REGISTERED INTEROPERABILITY ASSET* and part of the Asset Collection managed by the SEMIC.EU platform, which contains all assets. Assets and even “asset candidates” can be uploaded and registered on SEMIC.EU without any unnecessary barriers. In practice, this means that these assets only need to implement basic requirements regarding development stage, documentation, and quality progress level. The reason for doing this is to maximise the visibility of an asset in the early stages of the development process. This enables the community to collaborate and participate as early as possible in order to produce reusable results.

The *IMPROVEMENT STAGE* is implemented by the maturity process. The asset becomes a *MATURE INTEROPERABILITY ASSET* if it passes this process at least one time. It will be part of the Asset Catalogue managed by the SEMIC.EU platform, which contains all usable assets in practical applications. A mature asset has to be usable for practical applications even if it is still under development. The maturity process is an iterative process. Each time passing the maturity process a milestone in the development roadmap should be reached. Each milestone should improve the

functionality and quality of the asset. So as an asset is adequately developed, certain quality criteria are met and its documentation is appropriate, the asset may be brought into the maturity process. In that process, the clearing process manager evaluates the current development (maturity) of an asset.

Meanwhile, the asset audience assesses the suitability of that particular asset for its potential to be re-used in other projects. Both, the clearing process manager and the asset audience may request adjustments in order to ensure an asset's usability. An asset passing the maturity process one time is a *MATURE INTEROPERABILITY ASSET*.

The *EXCELLENCE STAGE* could be reached when the development of the asset is completed. The asset becomes a *CONFORM INTEROPERABILITY ASSET* and part of the Asset Selection by the SEMIC.EU platform, which contains only assets for broad usage in practical applications. They should be utilisable for regulatory bodies as well. Therefore, the initiation of the conformance process for the asset is the final development step for a semantic interoperability asset. Prerequisite for requesting conformance is that the asset:

- has already passed the maturity process
- has reached high quality progress levels
- has a significant potential of re-usability

CONFORM INTEROPERABILITY ASSETS are branded with an outstanding level of quality, which is evaluated in detail and formally assessed by domain experts.

It should be noted that not all features and all aspects of all processes are to be implemented in the first version of SEMIC.EU. This paper includes functionalities that may be realised in future development of the project or may be replaced by other concepts later. The subset of the processes and features to be implemented in the SEMIC.EU platform will be described in detail in the related system specifications for each implementation phase.

2.1. Roles

The clearing process involves numerous people in a variety of roles. Most of the people are supported by the SEMIC.EU platform in executing their tasks. They have to be registered as users at the SEMIC.EU platform. With respect to their duties and rights, roles are assigned to these users. These roles are attached to permissions, which enable the users to execute tasks on the SEMIC.EU platform. The chart in figure 2-2 shows an overview on these relationships.

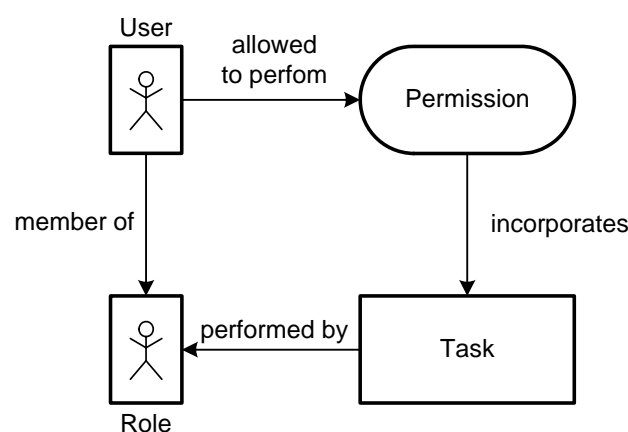


Figure 2-2: Role concept

The roles related to the SEMIC.EU platform can be split up into:

- SEMIC.EU Audience
- the Asset Provider
- SEMIC.EU Organisation

In this section only an overview of the roles with their intentions is given. A more detailed description of each role and the related tasks are explained together with each sub process in the later sections.

2.1.1. SEMIC.EU Audience

The SEMIC.EU audience is the target group of the SEMIC.EU platform. It consists of all users and beneficiaries of SEMIC.EU, who should be able to use the assets in their implementations.

The users can be registered to get more rights and be part of the SEMIC.EU community, which consists of the more interested and active users. The asset audience and the asset community are sub-groups directly interested in one asset.

The SEMIC.EU clearing process is an open and public process, the maturity process in particular. Every registered user can participate in the development of an asset. These active users form the community of an asset. A member of the asset community can discuss in the public forum, provide content, reviews the asset, uses the asset, gives comments and feedbacks as well as take part in ballots to give recommendations to the SEMIC.EU organisation. The membership of the community is not assigned by the platform, but the user's activity is making them a member of the community.

2.1.2. Asset Provider

The Asset Provider includes the roles Asset Owner, Contributor and Developer.

The central role is the asset owner, who is responsible for the asset over its entire lifetime. The asset owner holds the intellectual property rights (IPR) of the asset.

As the asset owner may well be an organisation, the organisation might be represented by the Asset Agent, which is the legal representative and assigned point-of-contact of that organisation. This special relationship is explained in greater detail within the document "*Licensing Framework for Interoperability Assets*".

The asset owner can be supported by additional asset developers but he is the coordinator for all critical decisions related to the asset. The asset owner may support the development process itself, however, this is no necessity. An asset contributor provides artefacts to the asset but he is not actively involved in the development of the asset itself. This will be typically the case when an artefact is included which will be developed in another internal or external process.

2.1.3. SEMIC.EU Organisation

The SEMIC.EU Organisation monitors, supervises and supports the seamless and smooth operation of the clearing process. One of the SEMIC.EU's organisational roles of fundamental importance is the Clearing Process Manager. The clearing process manager is responsible for the correct application and operation of the clearing process. This role supervises and improves the clearing process itself. The clearing process manager supports all stakeholders regarding issues directly related to the process.

Apart from the clearing process manager, two additional distinctive organisational roles exist:

- SEMIC.EU Owner
- SEMIC.EU Advisory Board

IDABC, as a representative of the European Commission, is the owner of SEMIC.EU. The SEMIC.EU Advisory Group consists of representatives from the Member States. In general, the SEMIC.EU owner supervises the activities of the clearing process manager and SEMIC.EU.

In case, that the clearing process manager is unable to find an appropriate solution to a dispute or in case that valid complaints against the decisions of the clearing process manager have been filed, the SEMIC.EU owner should mediate between the involved parties.

Furthermore, the SEMIC.EU Advisory Group is responsible for the execution of the conformance process. As part of the conformance process, a conformance committee could be set up for an asset. This is a group of domain experts for reviewing an asset.

The clearing process, realised by the SEMIC.EU platform, consists of predefined tasks and control points, but it may be tailored in order to address specific, extraordinary situations. So it should be possible to pass through the maturity process in a short time with minimum efforts if the goal is to publish an existing and advanced specification that is already published as an official standard.

A detailed assignment of tasks to these roles will be described in the following sections.

2.2. Lifecycle of an Asset

Any potential asset traversing the clearing process is subject to a common life cycle. Although every asset has its own, individual life cycle, the paths and development stages are defined by the clearing process of the SEMIC.EU platform. An example for a typical life cycle – from registering an asset towards achieving the conformance state - of an asset is illustrated in figure 2-1. This illustration provides a rather short overview of the basic concept of the clearing process (the so called “*happy-case*”, where no significant problems and issues occur). A more detailed business process is provided by figure 2-3. In order to align the platform processes to real-world business cases, all process definitions are provided using the “*Business Process Modelling Notation*”.

The sequence of the tasks emphasizes the stepwise improvement of the asset by looping through the tasks related to the maturity process. Furthermore, the various results of the tasks are highlighted. The update process is an exception and can be applied anytime under predefined conditions. The following sub-sections give an overview of the main processes. All sub-processes will be specified later in this document.

The specifications to be published are represented in the clearing process by interoperability assets (IA) or short assets. An asset is a logical set of several artefacts inside a package. Details of the technical and design aspects of assets will be presented later in this document.

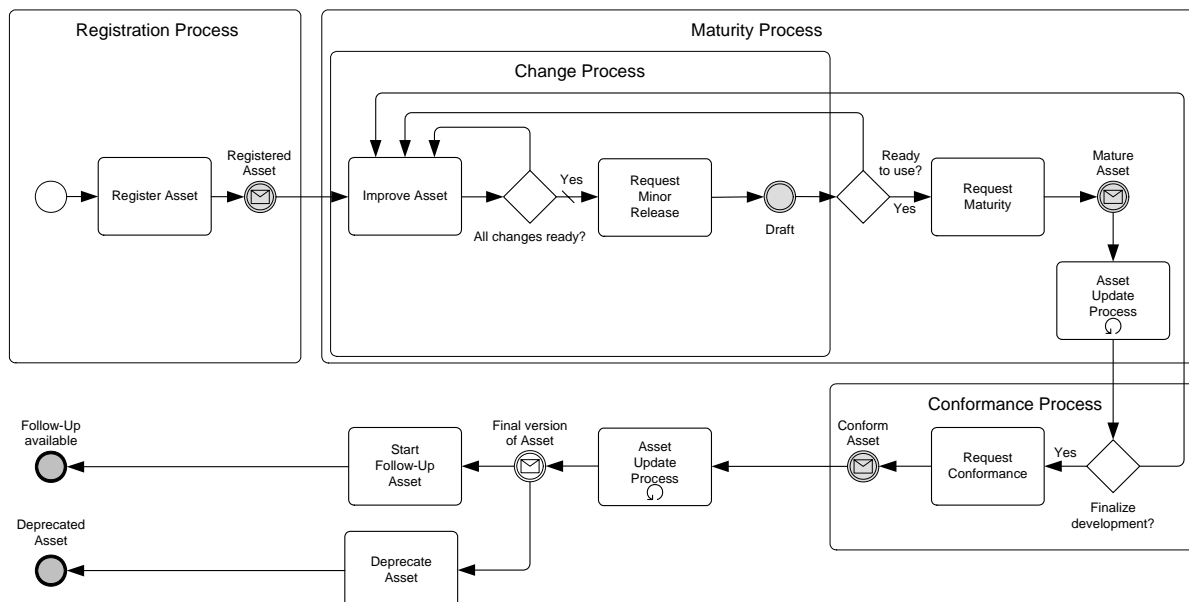


Figure 2-3 – BPMN: Lifecycle of an Interoperability Asset

2.2.1. Asset Registration

In order to publish an asset on the SEMIC.EU platform, the asset owner needs to invoke a certain platform process. This process is referred to as the “asset registration process” and deals with uploading and registering new assets on the platform.

The registration of an asset includes general information about the asset and a short description of what the purpose of the asset is. The given information - including its attached content - is reviewed by the clearing process manager before it may be published on the SEMIC.EU platform.

This step is aimed at validating whether the interoperability asset follows the terms-of-use as well as other predefined regulations and recommendations.

The SEMIC.EU platform will now perform various platform tasks, such as including the asset in the asset collection, creating a workspace for the asset-related files, and setting up collaboration tools for the asset.

Collaboration tools like forums are a very important aspect of open processes as these enable each registered user to participate in the development. The collaboration tools support the building of an active community and social network.

Furthermore, registered users are adequately informed about the existence of a new asset within SEMIC.EU.

In order to keep asset providers motivated and willing to offer new assets and share their results, the asset registration process needs to be quick, simple, and straightforward. It should be possible to register a new asset within a short period of time and publish the initial content in much less than a week.

It is absolutely crucial to the overall success of the project that publishing a new asset is very fast and easy. Publishing incomplete assets or even the idea for an asset on the SEMIC.EU platform should be possible enabling the interested community to participate in its further development. The visibility of the asset helps to find additional developers, contributors or partners.

Furthermore, the feedback from the asset community will help the asset developers to improve the asset.

2.2.2. Maturity Process

The major step for the asset is to improve its functionality and quality. Most of the assets are not published for the first time when the development has been completed and finished. The clearing process complements the basic development process of the asset. It should be used to publish even intermediate results.

The asset providers can publish different kinds of releases of their asset to show to and discuss with the asset community changes and new issues (minor release) as well as offering results for practical applications (major release). The release system is explained in detail in section 2.3. This means that an asset is published multiple times in the maturity process as the development moves forward. The intended publications should be carefully planned and documented in detail in the roadmap of the asset.

The maturity process is the central process for quality improvement and assurance. The asset developers upload improved artefacts like the specification and its documentation. Modifications on the asset are brought into the change process in order to guarantee a well-defined and organised way of processing adjustments. The asset community reviews the results and makes recommendations to the asset providers. This dialogue is one basic mechanism for the quality process.

The final target of the maturity process is to complete the functionality of the asset including all required or optional features and to fulfil all required quality criteria, especially the quality goals of SEMIC.EU. The development of the asset should be continued until these goals are reached. The time

required to pass all iterations of the maturity process depends on the number of iterations and the time needed for review and ballot. It depends mainly on the structure of the community and their requirements how long the review phase and balloting should take. The details of these tasks should be flexibly established for each asset as a specific agreement between the asset owner, asset community and the clearing process manager.

If the asset community is small and has a strong relationship, the time could be as short as one week. If the asset community is very large this time could be up to several weeks. It should be possible that most members of the community have the possibility to review the results, test them, give feedback and take part in the ballot.

2.2.3. Conformance Process

The final step, the conformance process, can be - but does not need to be - a request for the conformance branding of SEMIC.EU. This branding confirms the outstanding quality of the asset, its applicability, and its practical relevance.

The approval will be granted by a special “*conformance committee*”, which will include domain experts and members of the SEMIC.EU Advisory Group. This process may take several months, as there must be enough time for the committee members to review the asset and discuss critical issues.

Furthermore, there should be more than one practical application implementing the specification. This means the asset community should get enough time to make experiences with the asset, demonstrate its practicability and validate that the specification is unambiguous.

It is up to the users and regulation bodies to recommend or reject the usage of a conform interoperability asset from SEMIC.EU.

After an asset’s conformance status has been approved, its development is completed. Only adjustments required to eliminate errors will be published as an addendum.

If the core functionality or specific features of an asset have to be extended, a new follow-up asset has to be created and registered using the latest version of the asset. As soon as this new asset reaches the same branding as its predecessor, the predecessor should be marked as obsolete and point to the designated follow-up asset.

It may be required for an asset owner to withdraw an asset for several reasons, e.g. the specification is no longer of practical use from a technical or competition point of view and there is no replacement for the asset. In order to reflect this requirement, the asset owner may mark the asset as deprecated.

2.3. Asset ID, releases and states

There are two major aspects for the users to identify assets: The global naming scheme and the interpretation of release numbers including states of an asset.

2.3.1. Asset ID

The ID of an asset should be unique but also easy to remember. Furthermore, the ID could include information about the development stage of an asset. As the title of an asset can change over time and could be different in various languages a number scheme is used.

Two methods, which are applicable to the SEMIC.EU platform, exist. The first option is a numbering using unique, incremental identifiers for the assets. This unique and incremental identifier is preceded by a specific prefix, indicating its affiliation to the SEMIC.EU platform: *SIA* (*Semantic Interoperability Asset*). This option is easy and straightforward and does not require changing the identifier of an asset while it is traversing the platforms processes. Therefore, the asset ID as the unique identifier remains unchanged for the entire lifetime of an asset and can easily be remembered over the whole lifecycle and different development stages of an asset⁵.

As a second option, the development stage of an asset could be shown in the asset identifier's prefix. This information could be used to provide an immediate hint about the development stage of an asset. According to the stages of the clearing process, the asset ID could be classified as *RIA* (Registered Interoperability Asset), *MIA* (Mature Interoperability Asset) and *CIA* (Conform Interoperability Asset). The number for RIA and MIA should be continuous and identical, e. g. "*RIA 1234*" and "*MIA 1234*" refers to the same asset in different development stages.

2.3.2. Asset Releases

Since the development of an asset may be an iterative process, a release numbering system is required to track the release history of assets. A release means publishing a set of artefacts at one point in time⁶. The SEMIC.EU release numbering system is automatically managed by the SEMIC.EU platform. It does not take into consideration any existing version or release numbers. This is done to guarantee a common semantic to release numbers of all assets managed by the SEMIC.EU platform.

The SEMIC.EU release number consists of three parts:

- **MAJOR NUMBER:** this number is incremented each time an asset passes the maturity or conformance process. Each major release⁷ is recommended for use in practical applications.
- **MINOR NUMBER:** this number is incremented each time an asset passes the change process and if the maturity or conformance process is requested. Each minor release⁸ is not yet recommended for practical application. It only shows the current state of development.
- **PATCH NUMBER:** this number is incremented each time an asset passes the update process. The update process can only be applied to a major release and it is not influencing the stage or state of an asset.

⁵ To keep the Asset ID numbering scheme as easy and comprehensive as possible, the first option is chosen by the system implementer.

⁶ As artefacts could be permanently changed a release contains a specific version of an artefact. If this is the latest version or a former one has to be decided by the asset owner. In general the version management of the asset developer is out of scope from SEMIC.EU. Hence it is intended that the developers have an additional version or release numbering system for internal usage.

⁷ With major release a release having a minor number "0" is meant, e. g. "Release 1.0.0" or "Release 6.0.3". Only these releases which pass the maturity or conformance process are "major releases". An update to this release will still be a major release, too.

⁸ With minor release a release having a minor number greater than 0 is meant, e. g., "Release 1.2.0" or "Release 3.2.1". So each release which was not approved by the maturity process or conformance process is a minor release.

Each release should be tagged by the release number in the form:

“Release <major number>.<minor number>.<patch number>”, e.g. “*Release 1.0.3*”.

Changes in the release number are marked by a task in the related, detailed process diagrams and illustrated in figure 5-1.

The development process as supported by the SEMIC.EU platform is linear. This means that a new release created via the change process is always based on the most recent release. For example, if the current release of an asset is 1.0.0 the next initiation will always create a release 1.1.0. It is not possible to create a 0.5.0 release, even if 0.4.0 was the last release prior to 1.0.0.

Patch releases created via the update process are an exception. It is always possible to add patches to major releases. Patches are never applied to minor releases, because it is assumed that the developer chooses to add a new minor version instead.

Applying this numbering scheme provides a clear indication of its current development stage an asset release has reached:

A *MINOR NUMBER* which is *GREATER THAN ZERO* indicates that this asset is a developer version that has not yet reached a sufficient level of stability.

A *MINOR NUMBER* which is *EQUAL TO ZERO* indicates a so-called *MAJOR RELEASE*. A major release has reached either the maturity or the conformance stage and is fully recommended for public use.

A *PATCH NUMBER* which is *GREATER THAN ZERO* indicates that the corresponding major release of the asset has successfully traversed the update process in order to correct smaller errors.

2.3.3. Asset state

This last indicator regards the current working state of a release managed by the SEMIC.EU platform. As all releases are archived, the final state of a release will be visible as well as archived. The following states for each release are used:

- *UNDER DEVELOPMENT*: will be assigned by the change process and indicates that the changes for new minor release have to be uploaded.
- *REQUESTED FOR PUBLICATION*: will be assigned as soon as the asset owner requested the publication of an asset release as part of the registration or change process. It indicates that the asset is awaiting approval by the clearing process manager.
- *DRAFT*: will be assigned by the change process and indicates that the changes of the minor release have been published.
- *REQUEST FOR MATURITY*: will be assigned by the maturity process and indicates that the asset owner initiated the maturity process and does not want to provide a new minor release.
- *COMMUNITY REVIEW*: will be assigned by the maturity process and indicates that the asset passed the assessment by clearing process manager who at the same time announced the community review.
- *MATURITY APPROVED*: will be assigned by the maturity process and indicates that the clearing process manager approved the maturity of the release.
- *MATURITY REJECTED*: will be assigned by the maturity process and indicates that the clearing process manager rejected the maturity of the release.
- *MATURE*: will be assigned by the maturity process to a new major release and indicates that the clearing process manager approved the maturity of the minor release the maturity was requested for.
- *REQUEST FOR CONFORMANCE*: will be assigned by the conformance process and indicates that the asset owner requested the conformance process and completed the development of the asset.

- *CONFORMANCE REVIEW*: will be assigned by the conformance process and indicates that the asset passed the assessment by clearing process manager that the SEMIC.EU Advisory Board initiated the conformance process and the clearing process manager started the expert review.
- *CONFORMANCE REJECTED*: will be assigned by the conformance process and indicates that the SEMIC.EU Advisory Board rejected the conformance.
- *CONFORM*: will be assigned by the conformance process and indicates that the SEMIC.EU Advisory Board has approved the asset's conformance.

The state information about a release should be tracked in the change history and shown to the user, so they have an overview of what is currently done with the asset.

2.4. Quality Measures

The aim of SEMIC.EU is to enable users to search for and exchange high-quality assets. The clearing process itself is focused on improving the assets gradually to reach a higher maturity level. For the asset developer, interested parties, and users it is of vital importance to get information about the quality progress level to which an asset conforms, meaning the quality of an asset has to be measured.

Two distinctive level of quality criteria exist, namely the hard quality criteria and the soft quality criteria.. Hard quality criteria are criteria that can be objectively measured, e.g. the number of logical units of a specification that are documented or the degree to which a specification conforms to certain coding conventions. This kind of quality criteria can be measured by external and internal tools on the SEMIC.EU platform and should be provided in the long term to support the efficient execution of the clearing process.

The soft quality criteria have to be estimated by the developer, reviewer, or community of the asset, e.g. the level of completeness regarding the asset's implemented functionality and features or the readability and comprehensibility of the documentation. These quality criteria can be assigned by the asset owner, clearing process manager, SEMIC.EU Advisory Group, or a community.

Another type of quality measures are represented by the vitality factors that indicate the degree of user awareness and interaction during the maturity process. Vitality factors are usually understood as indicators for the end-users acceptance. For example, the more people who comment on an asset and the more who finally agree on the final specification, the broader the acceptance of this specification is. The SEMIC.EU platform should provide vitality figures for assets, but it must leave the interpretation of these figures to the end-users.

All of an asset's quality measures are collected in a quality report, which has to be updated whenever the asset is changed. While hard quality criteria can be updated by automatic tools, the soft quality criteria should be updated only on demand, e.g. for major releases. It should be noticed that support by means of automatic tools is a sophisticated issue, as these tools depend on the artefact types and have to be adapted to SEMIC.EU specific conventions and policies.

2.4.1. Quality Branding

Another important approach to appraise the appropriateness and usability of an asset for its practical operation is called *QUALITY BRANDING*. The quality branding consists of a series of straight-forward process steps.

Firstly, it is determined what quality criteria are to be utilised for that particular asset. Then the current level of fulfilment for the specific set of quality criteria is measured. The result is a so-called quality label, which clearly illustrates what quality extent for which quality criteria is reached (see figure 2-4). It is not necessary that all relevant quality criteria reach the maximum extent. This means that even if not all planned features of an asset are implemented, it can still be used in practical implementations.

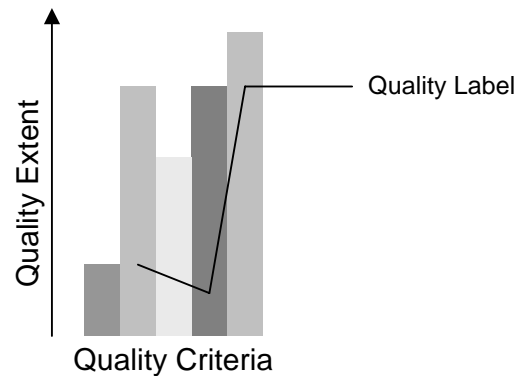


Figure 2-4: Quality criteria and branding

The quality labels indicate special aspects of an asset, e.g. an international asset must use English identifier and has English documentation; a pan-European asset has to support every official language of the Member States.

The quality labels define quality objectives. The quality label of interest to a particular asset user is an individual matter. The quality labels are only a summary of quality criteria to make the quality assurance manageable. The quality labels are not an indication of a general quality progress level, as the requirements are project specific. Some core quality labels that are mandatory to approve a major release and to start the conformance process are defined.

A special quality branding is the conformance statement reached by the asset's having gone through the conformance process. This branding indicates to the potential users of the asset that it is mature, has been reviewed by domain experts, is implemented by more than one party, and that there are no relevant obstacles to using the asset.

The individual criteria and the derived quality labels will be evaluated. A quality report is generated based on the results. This quality report gives indications and advice to the asset developer, such as where the asset could and / or should be improved. Additionally, the quality report enables anyone interested in a specific asset to identify its strengths and weaknesses when it is used in a practical implementation.

The document “*Quality Framework for Interoperability Assets*” provides further details of SEMIC.EUs’ quality system and methodology.

3. ASSETS

This section describes an asset in detail, which is the subject of the clearing process. The section gives an overview on assets including the general issues about an asset and examples. The rest of the section explains the artefacts contained in an asset in detail.

3.1. Asset Description and Examples

The primary task of SEMIC.EU is to support the exchange of interoperability assets by means of the repository. An asset is a package containing a set of artefacts and forms a logical unit.

An artefact is always a single document, which should be available in different representation formats if required, e.g. the source and a printable form. An artefact is an atomic unit of an asset. Figure 3-1 presents two examples of assets. The left one is the minimum representation of an asset.

Every asset must contain the meta-information of the asset and all its artefacts, e.g. in this case the XML Schema only. These are summarised in the manifest file. It defines the semantic relationship between the artefacts of the asset and also contains semantic links to other related assets. Furthermore, every asset needs a copy of its used licenses, which have been announced by the asset owner.

The example on the right in figure 3-1 shows a typical asset. The asset provider bundles a set of specifications with the required documentation. The XML Schema could describe the data format of the code list and the mappings. The global code list contains the common constants to be used. The various mappings are used to correlate the values from the Member State specific application values to the global code and vice versa. The document “*Concepts and Design*” describes the overall ideas and features of the mapping. The XMLdoc is the detailed reference for the code list and its mapping. The manual describes how to use the code list and its mapping in practical implementations.

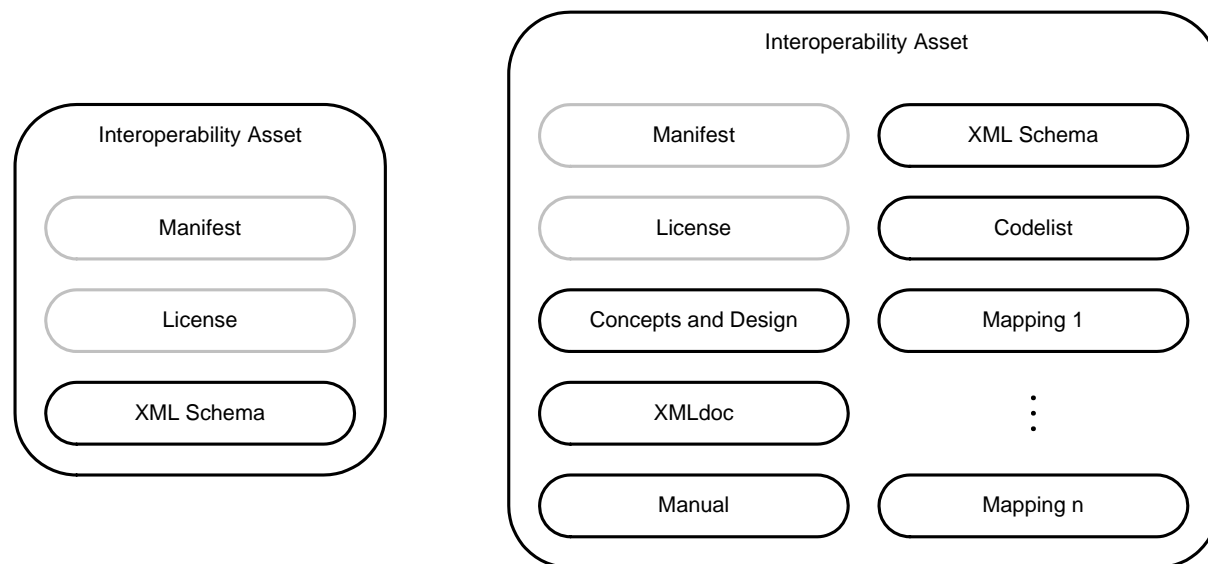


Figure 3-1 – FMC block diagram: Examples of Assets

The two examples shown above demonstrate that the structure and complexity of an asset primarily depend on the domain, the intended application and the provider. Figure 3-2 gives an overview of the kinds and types of artefacts that may be contained in an asset. An asset always features artefacts and always includes the administrative data files.

Artefacts are documents of any kind that have a clear purpose regarding the category of an asset. All artefacts of an asset are related with respect to the intention of the asset’s developer. For the initial phase of SEMIC.EU, there are no strict rules about the kinds of artefacts that should - or must -

belong to an asset. However, recommended asset profiles should be made available for certain kinds of Interoperability assets in order to guide asset providers in assembling an asset's content.

An artefact is characterised by:

- its representation type, which should be its mime type codes
- its content type, which should be a hierarchical classification describing the formal method used, e.g. "CCTS/ABIE"
- its intended purpose, which should be a hierarchical classification, e.g. "syntax/data definition/abstract specification"

In figure 3.2 the artefacts are grouped into functional areas that denote the semantics of an artefact within the scope of an asset. The functional areas will be explained later on in this study.

Not all types of artefacts will be fully supported by the initial platform. However, a comprehensive list of prospective artefact types that have been identified as "should-be" concerning their support within SEMIC.EU is provided as Appendix B of this document.

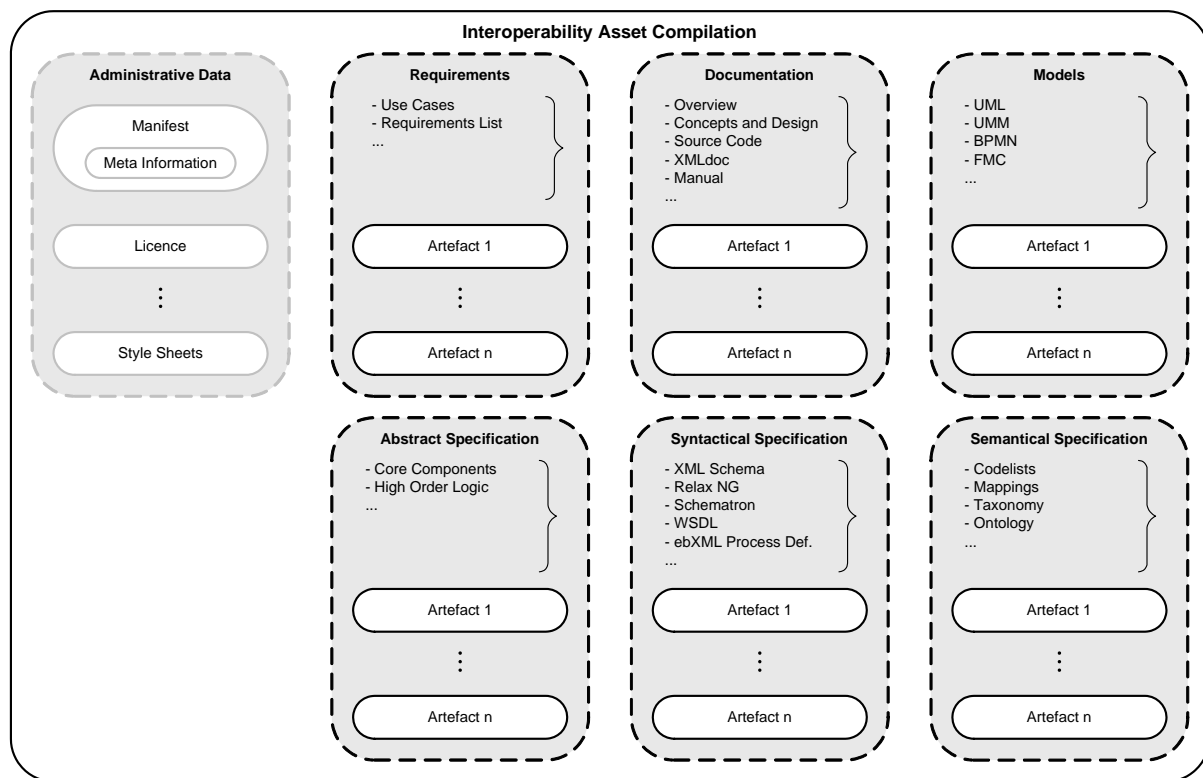


Figure 3-2 - FMC block diagram: Compilation of assets using various artefact kinds and types

Beside its internal structure as described above one should understand the relationships of assets, too. As previously mentioned an asset will usually be published over multiple minor releases before it reaches a mature state. Figure 3-3 shows that the SEMIC.EU platform will store and provide all versions of an asset to the users. As previously mentioned, the development of an asset can be officially finished. This is signalled by the conformance branding. A follow-up has to be created to continue the development. A follow-up can be based on multiple assets, too, if multiple asset developments should be merged. The follow-up will be linked to its predecessors, so the history of an asset will be transparent. The predecessor should contain an obsolete-by link, if a follow-up will replace an asset. As the follow-up is a new asset with a new identifier, there can be no confusion about assets and their implemented functionality and features.

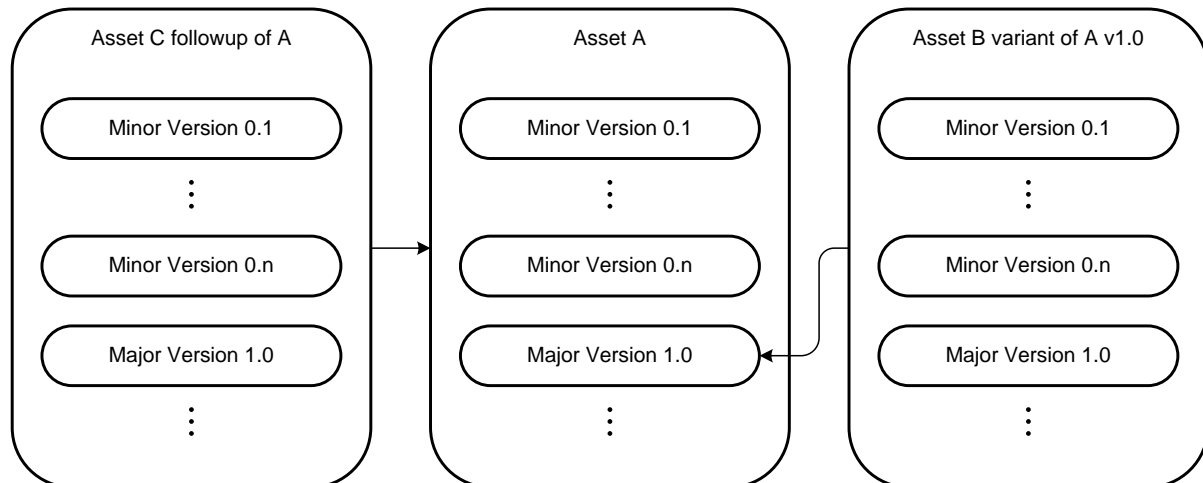


Figure 3-3 – FMC block diagram: Asset Versions and Variants

Various factors could initiate an interest in implementing a variant of an asset, e.g. in the case of different application domains with conflicting requirements. In such a case, a new asset should also be registered and created. It should be linked to the base asset as in the follow-up scenario. The variant, though, can be linked to any version of the base asset.

3.2. Representation Types

The representation types define the primary range of storage formats to be used by the platform and for exchanging files. The number of formats should be limited to widely supported standards.

An artefact might be available in more than one representation format. An artefact has to exist in a common primary format. Additionally, for easier editing, the original source format might also be available. For easy viewing and printing, a PDF file might be made available, too. The platform only requires that the primary format be uploaded. The source files can be added, but the author has to confirm that the content is identical. Additional supported formats could be generated by the platform from the primary file.

The following list lists an exemplary overview of the representation formats that may be supported:

- Extensible Markup Language (XML)
- Plain Text
- Structured Text
- ISO 26300 Open Document Format for Office Applications (ODF)⁹
- ISO 19005-1:2005 Portable Document Format PDF/A (PDF)¹⁰
- Source Code
- Character Separated Values
- Tagged Image File Format (TIFF) Revision 6.0¹¹
- ISO 10918-1:1994/Cor 1:2005 JPEG
- References

Those potential representation formats are described in greater detail in Appendix A.

⁹ ISO/ 26300:2006: http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=43485

¹⁰ ISO 19005-1:2005: http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=38920

¹¹ Adobe TIFF, Revision 6.0, June 1992, Adobe Developers Association

3.3. Administrative Data

The administrative data is not primarily content of an asset; however, it provides important secondary information. The SEMIC.EU platform requires this information for searching and browsing as well as for aspects concerning the community profiling.

3.3.1. Manifest

The Manifest includes the core administrative data and its presence is mandatory. It collects and summarises all meta-information from the asset and its artefacts. Furthermore, the manifest links to all related artefacts and derived files. The representation and storage form of the manifest complies with the XML standard. Its syntax is to be defined in the “Manifest Meta-Schema Specification”. This manifest is a part of the specification artefacts and therefore is described later in this document.

The manifest and all tools that upload assets will be managed by the SEMIC.EU platform. The platform or external tools are responsible for the assembly of the manifest. The specific information used in the manifest is provided by the asset provider when artefacts or asset packages are uploaded to SEMIC.EU.

Each section of the manifest is an XML fragment. A section describes an artefact or additional information about the asset or artefact. There may exist more than one section that describes the asset or an artefact. Each section will be managed by a tool responsible for the section.

The core meta-information of the asset or an artefact is managed by the core functions of the SEMIC.EU platform.

Proposed attributes for the core meta-information of assets are:

- Unique Identifier, which should be a standardised object identifier (OID)
- Status Indicator, reflecting the current lifecycle phase (Registered, Mature or Conform Interoperability Asset)
- Title
- Abstract, describing purpose and content of the asset
- Content Classification, which is a set of categories describing the content of the asset, e.g. for search. The categories are derived from the predefined taxonomy, which describes the usage of assets and its business domain. This taxonomy will be defined by the specifications and updated regularly.
- Owner
- Follow-Up (identifier of a Conform Interoperability Asset)
- Based on (multiple identifier of a Mature Interoperability Asset or Conform Interoperability asset)
- Obsolete By (identifier)
- Variant Of (identifier and version)
- Profile Of (identifier and version)
- Version Number
- Creation Date/Time (given by the creator, initial start of the development)
- Registration Date/Time
- Modification Date/Time
- Approval By (usually the clearing process manager)
- Approval Date/Time
- Issue Date/Time (publishing the new version to the broad audience)
- Signed Checksum, including all artefacts

The (mandatory) change log of an asset is not part of the manifest but administrative data in its own right.

Proposed attributes for the core meta-information of artefacts are:

- Representation Type (mime types)
- Content Type
- Purpose
- Unique Name inside an asset
- Title
- Content Classification, a set of categories describing the content of the artefact, e.g. for search. The categories are derived from the predefined taxonomy, which describes the usage of artefacts and its business domain. This taxonomy will be defined by the specifications and updated regularly.
- Owner
- Version Number (major version number - identical with the asset's version number)
- Creation Date/Time (given by the creator)
- First Upload Date/Time
- Modification Date/Time
- Abstract, describing the content of the artefact
- Change History (version, changed by, date/time, subject, comments)
- Signed Checksum for the artefact's primary source file and optionally for additional representations

The core meta-information comprises attributes managed by the platform. The core meta-information cannot be changed by externally changing the Manifest. The core meta-information can, however, be changed through the methods of the related Web service by internal functions or internal state changes. The platform will override the core meta-information of the Manifest.

In general, the policy should enforce the ability of attributes of a section to be overwritten by the tools that are responsible for these attributes.

3.3.2. License

A license is a mandatory administrative data and must be provided for each asset. The license has to be placed as a source document and not as a link. There may be more than one license provided for an asset, especially when alternative license models exist for an asset. If a license is provided in various languages, an indicator is required to determine whether it is merely a translation of the original license text or an authoritative, binding original.

3.3.3. Roadmap

The roadmap is a mandatory artefact for each asset provided by the asset owner. It should outline the various development milestones of the asset and its artefacts. Each milestone should specifically address the planned functionality, features and quality criteria to be reached.

This special feature of SEMIC.EU assets is vital, because the ongoing progress by raising and achieving the pre-defined quality progress levels is an integral part of the development. The roadmap could include a project plan with the expected timeframes. This information can help interested users planning their own projects where the asset will be used.

3.3.4. Change History

The change history is a mandatory artefact for each asset that is maintained by the platform. All changes to the asset, of its assigned artefacts, or its meta-data are logged in the change history. Although the change history is an artefact of the asset, it is not part of the asset packaging downloaded by users.

3.3.5. Access History

The access history is an optional artefact that should be maintained by the platform. Each access to an asset is recorded within the asset history. In order to record navigational tracks and to mine for semantically related assets, session identifiers may be recorded. The recording of personal data that can be used to identify individuals who access the asset will only be done in accordance with applicable privacy laws.

With the first release of the platform, access histories will not be recorded because further research is required on the interpretation and selection of the attributes and navigational paths to be tracked.

3.3.6. XML Style Sheets

The platform and additional tools may support XML style sheets to format documents, as XML style sheets may be used for representing and transforming the administrative meta-information.

3.4. Requirements

To understand design decisions and the final specification, it is of utmost importance to know about the original requirements. Therefore, these should be documented for an asset. By strictly referencing requirements and design concepts in the documentation, the implementation can become a more transparent process. The fact that negative requirements also have to be documented needs to be taken into consideration.

The following sub-sections contain exemplary approaches for identifying, illustrating, and specifying requirements in real-world environments.

3.4.1. Use Cases

The use cases consist of a figure showing the relationships of the roles and related tasks. The textual description covers the functional and non-functional requirements including pre/post conditions, rules, and additional explanations.

The creation of requirements documents should be supported by providing document templates and transformation/export tools to import requirements from development tools.

3.4.2. Requirements List

An advisable approach on developing and managing requirement lists is to provide list-templates, especially for collecting requirements in a standardised and straight-forward way.

The resulting document should be able to be edited by a spreadsheet editor of the user's choice. Furthermore, requirement lists should be written in a rather simple format, such as CSV-lists, in order to be automatically processed, if desired.

3.5. Documentation

An asset is primarily a specification. The major artefacts of an asset are formal descriptions, such as an XML schema. Despite the fact that these formal descriptions are essential, they are not sufficient to

understand a specification. Therefore, explanations need to be provided for the artefacts and the asset. All documentation should be included in a full text index in order to be fully searchable.

3.5.1. Overview

This document should contain an executive summary, preferably in the first chapter. The intention and purpose of an asset is stated there as well as a summary of its content is given. This short chapter should be used as the abstract for the asset by the platform. It serves as a short introduction for potential users.

The document provides an overview of the asset for any potential user and it should therefore include background information about it.

3.5.2. Concept and Design

This document should describe all ideas and concepts and should explain the current design. It has to refer to the requirements that will be implemented by an idea or concept.

Paragraphs should be individually numbered to enable direct and exact numeric references to or from other documentation.

3.5.3. Source Code Comments

The most direct method is to comment in the source itself. Most text-based source code allows the insertion of comments. This does not require a separate artefact and it should be the method of choice for source code documentation.

Furthermore, structured source code also offers the possibility to refer to specific sections of the source in other documents for additional comments.

Graphical notations typically include highlighted elements to comment on the graph. These should be used. For external comments, the graph should be labelled so these places can be referenced in the external documentation.

If supported by the formal notation of a source code, meta-information may be included directly in the source code.

3.5.4. Reference Doc

Reference manuals are usually assembled from the documentation strings included in the source files. These documents will be generated from the source automatically. They include the navigation tree and all comments related to the viewed context.

It is highly advisable to utilise a highly standardised and widely available target representation format, such as XHTML.

3.5.5. Manual

In order for a specification to be used in the manner intended, there should be an explanation and tips for the user. Furthermore, the manual should include examples to enable the user to start using the asset without difficulty.

The representation may be a structured text or – for better portability - an ODF document.

3.6. Models

Graphical models may be a user-friendly way to visualise complex relationships. In general, they should be used in the development process and be part of the final documentation.

There are two options for the production of models. They can be created using specialized development tools, and the specifications can be derived from the models. This method, though, is somewhat problematic since not all potential users are familiar with these tools or own them. Another option is the generation of model diagrams from the source specification. If these are easy-to-understand text formats, any user is able to create them. The diagrams may be generated automatically from the primary sources and therefore are cheaply available add-ons.

Models have to be primarily available as images and in a standardised exchange format if defined.

The following list gives an overview of potential model artefacts, which may be supported:

- Unified Modelling Language
- UN/CEFACT's Modelling Methodology
- Business Process Modelling Notation
- Functional Modelling Concept

3.7. Abstract Specification

To maximise the reusability of a specification, it has to be very abstract. In particular, the specification should be independent of the representation format. Furthermore, the specification should be independent of the business context.

The following list gives an overview of potential abstract specification artefacts:

- Core Components Technical Specification
- High Order Logic

3.8. Syntax Specification

One major group of specifications are artefacts that define data structures and Web services using a concrete representation.

The following list gives an overview of candidates for syntax specification artefacts:

- XML Schema
- Relax NG
- Schematron
- Web Service Description Language
- ebXML Process Descriptions

3.9. Semantic Specification

Another important group of specifications are artefacts that define a concrete representation for semantic objects.

The following list gives an overview of possible semantic specification artefacts:

- Codelists
- Mappings
- Taxonomies
- Ontologies

4. META-ASSETS

Semantic Interoperability is not only facilitated by providing semantic interoperability assets such as data models, taxonomies or ontologies, but also by methodologies to develop and maintain these assets. For example, a significant facilitation may be achieved by an adequate choice of methods, technical representations and tools to support the development of assets.

Those methodologies, standards and tools are called meta-assets. The meta-assets are also published on the SEMIC.EU platform in order to provide guidelines, best practices and practical advice to any potential users. For instance, if a specific implementation of an UML data model of one individual platform user has proven itself to address the other users' requirements; a profile of this specific model may be published on the platform as a meta-asset. The primary advantage of this profile is that other, probably less experienced users may greatly benefit from the best practice UML representation.

Obviously, those special assets do not represent traditional semantic interoperability assets and therefore are called meta-assets for clear distinction (see table 4-1 for further reference). Concisely, the primary purpose of meta-assets is, to:

- collect
- categorise
- share
- and re-use

technical specifications, good practices, methodologies, and process descriptions. Those are a precondition in order to produce adequate semantic interoperability assets.

Meta assets may be provided and used by any role within the SEMIC.EU platform, such as an individual project, Member States initiatives, standardisation bodies, users, etc. This means in fact, that users may well define and use their own meta-assets if required for instance, when a required asset type is not specified yet or an individual project requires formerly unknown quality criteria. The specific definition and utilisation of meta-assets is, however, of voluntary nature.

	Semantic Interoperability Asset	Meta Asset
Characteristics	Direct exchange or transformation of data	Underlying or preconditionary principles, rules, methodologies, and standards
Type of asset	Interface mappings between bilateral or multilateral systems	methodology, technical standards for the representation of semantic interoperability assets
Graphical notation	UML data model	UML profile (see 4.4)
Abstract data description	Core Component Technical Specification	Profile of Core Components Technical Specification
Business process model	BPMN model	Modelling conventions for BPMN models

Table 4-1: Distinction between interoperability assets and meta-assets

Those specifications may be used to provide orientation and input for the future development of SEMIC.EU platform and its processes, such as output and exchange formats, methodologies, and regulations. The meta-assets also provide vital information to support an integrated and smooth platform operation, such as artefact types, representation types, and profiling of standards. A comprehensive set of methodologies on how to address certain aspects – for example how to write an

adequate XML schema or how to properly document source code – should be provided additionally in form of use-case specific guidelines. This may strongly guide and support the platform users and greatly facilitates in publishing or migrating their assets onto the SEMIC.EU platform.

The meta-assets involve some of the features of traditional assets. Therefore, those meta-assets will share the technical infrastructure of the platform provided. The definition of the individual and user-specified meta-assets is required to be described precisely, structured, and formal in an adequate platform-independent textual form. The resulting descriptions represent meta-assets, which may traverse the platforms processes following the common rule set of the usual interoperability assets. This methodology provides a transparent, well-defined and standardised approach in order to manage the life cycle of meta-assets while exclusively using the established platform functionalities.

The following sections provide examples of typical meta-assets, which are considered candidates for definition.

4.1. Meta-Information

The SEMIC.EU platform and the clearing process itself require meta-information, for example the definition of categories for the content classification or the purpose of an artefact.

It is advisable to align the meta-data used to widely spread and standardised meta-data schemas. In SEMIC.EU, the core elements of the ISO 15836:2003 “*Dublin Core Metadata Element Set*”¹² form the basis of the meta-information set. The core elements are extended by element refinements in order to fulfil the specific requirements of the platform.

This meta-information may be defined using SEMIC.EU self-defined artefact types like taxonomies.

4.2. Artefact Types

The specification of artefact types may be defined using their self-defined artefact types like core components, XML schema definitions, or Topic Maps.

The meta-assets describe the schema and validation rules for the various artefact types. They may include important advice and helpful tips.

The specification should be supplemented by further documentation such as requirements, models, concepts, and manuals.

4.3. Representation Types

The specification of the representation types lists the preferred representation formats. Only formats that are not standardised and not documented sufficiently should be introduced and documented by SEMIC.EU completely itself.

4.4. Profiles of Standards

Most standards are complex in its structure and generic in nature. They are not easily applicable in every context. Therefore, profiles of standards may be defined, which restrict the original standard to a consistent subset.

The specification should be supplemented by the requirements related to the restrictions and a user manual that explains the use cases enforced by the profile.

The profiles of standards should help to motivate users to adopt even complex standards by tailoring those to be applicable for the required context.

¹² ISO 15836:2003 “Dublin Core Metadata Element Set”,
<http://www.iso.org/iso/search.htm?qt=15836&searchSubmit=Search&sort=rel&type=simple&published=on>

4.5. Methodologies

There are no specific assets types. This means that there are no fixed rules regarding which artefacts have to be included for a given use case.

However, to support the development of assets, there should be recommendations for procedures in a specific context or use case. These recommendations should define which artefacts are mandatory and which are optional and how the artefact types should be adopted.

5. INTEROPERABILITY ASSET REGISTRATION PROCESS

The Interoperability Asset Registration Process is the first step in SEMIC.EU's quality assurance process. The asset has to be registered first at the SEMIC.EU platform so that the specification and its intentions become known to the entire SEMIC.EU audience. When the registration on the SEMIC.EU platform is confirmed the artefacts of an asset should be initially uploaded and verified. After successful completion of the registration process, the asset will be marked as a Registered Interoperability Asset (RIA).

5.1. Roles

There are three roles chiefly concerned with the interoperability asset registration process.

The asset owner is responsible for the asset and can initially set it up and - when ready - upload it. He should be able to assign additional asset developers to the asset on demand.

The clearing process manager is responsible for the valid execution of the registration process and supports the asset owner if required. The clearing process manager has to verify the asset.

The SEMIC.EU platform supports the registration process and provides a workspace for the asset and collaboration tools.

5.2. Process Definition

Figure 5-1 gives an overview of the interoperability asset registration process. It shows the three main roles involved in the process and its standard flow.

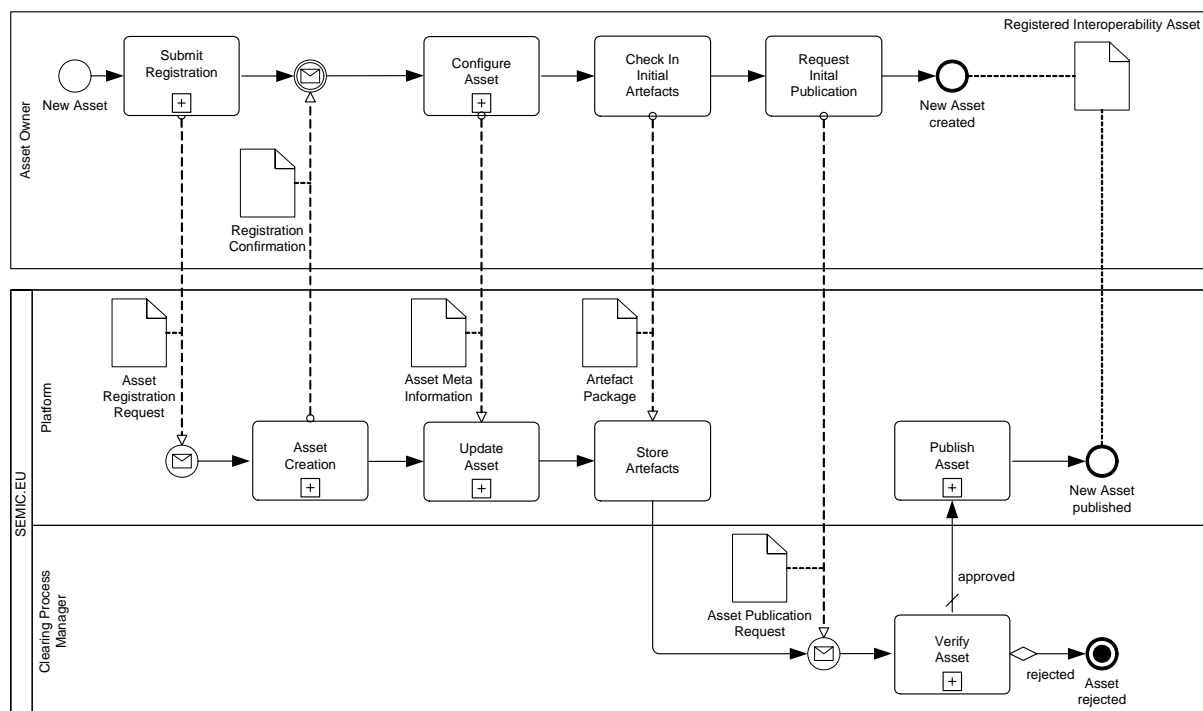


Figure 5-1 – BPMN: Asset Registration Process

A more detailed process diagram is given in D.1. Parts from this detailed chart will be used in the following subsections to illustrate the various parts of certain steps in the process.

5.2.1. Submit Registration

Every registered user can register an asset, even when no artefacts are actually ready. The motivation for this is that even the idea for an asset should be known to the community.

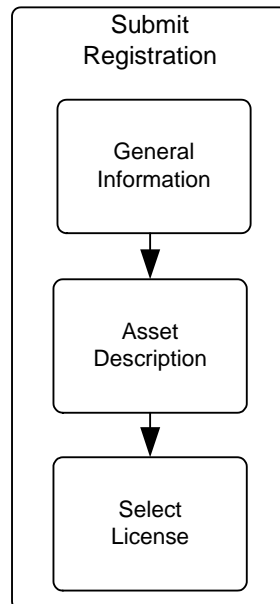


Figure 5-2 – BPMN: Submit Registration

The registered user who registers an asset, acts as the asset owner, and is responsible for all administrative and legal questions, normally over the asset's entire lifetime. Before an asset will be registered, the asset owner has to fill in a registration form (see figure 5-2).

The asset owner has to provide general information such as the title of the asset and its topics from a domain taxonomy. For every asset, the purpose and a short description have to be entered, so the intention, functionality, and basic features of the asset become clear.

An important aspect is the selection of permitted licenses for the artefacts. The license documents have to be uploaded together with the artefacts. The artefact developer can assign more than one license to an artefact. The licenses should later only be changed immediately following the release of a new major version. All providers of content to an asset should trust that their input is licensed under clear and transparent conditions. More details can be found in the paper "*Licensing Framework for Interoperability Assets*".

5.2.2. Asset Creation

As soon as the registration information has been received by the SEMIC.EU platform, the platform will provide technical support to the asset developer (see figure 5-3). The asset will be pre-registered with all its meta-information and a workspace is created that will later collect all the artefacts and version them.

An asset is not only provided to the asset owner alone. Therefore, the possibility should exist to add additional asset developers to the asset by its owner. The SEMIC.EU platform could create a developer group for each asset.

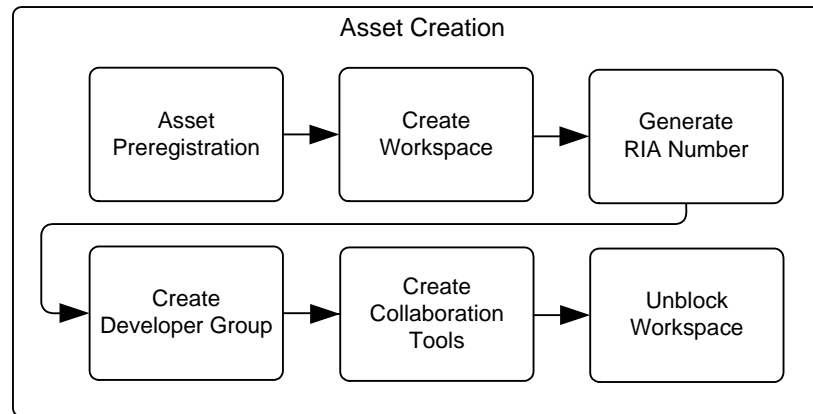


Figure 5-3 – BPMN: Asset Creation

To support the community process, SEMIC.EU will provide several collaboration tools for each asset, e.g. a forum, a blog or a wiki.

5.2.3. Configure Asset and Check-in Artefacts

After the asset has been created, the asset owner can immediately start to upload artefacts, change the meta-information, and add further developers to the asset (see figure 5-4). However, these steps are not compulsory. It is possible to announce an asset at the start of the development just to promote the idea for a new specification and to search for other interested users, partners, and developers on this topic for help.

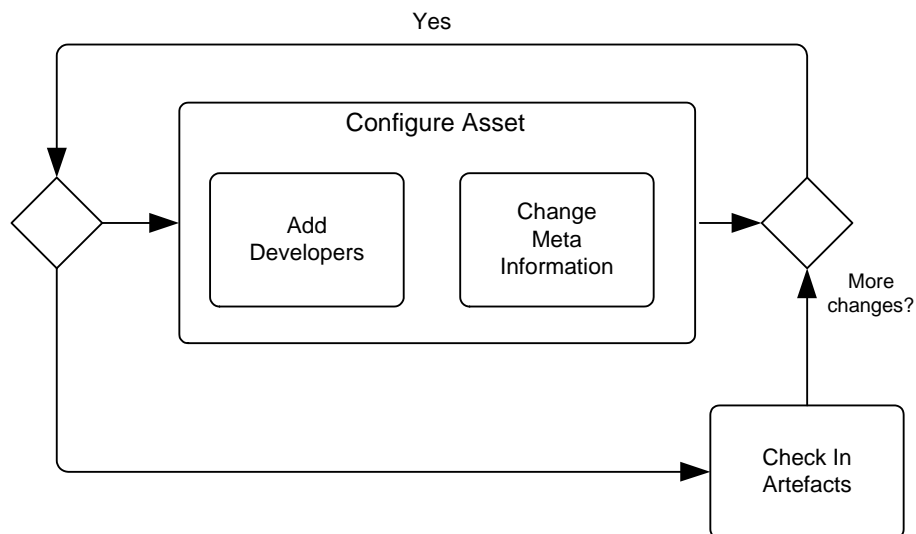


Figure 5-4 – BPMN: Configure and Check In

5.2.4. Update Asset and Store Artefacts

All changes to an asset are stored in the repository of the SEMIC.EU platform (see figure 5-5). Artefacts could be overwritten as long as the version is not published. An asset can be provided as an artefact package, which has to include all files related to the artefact. Upcoming versions of the SEMIC.EU platform could support uploading of single artefacts as well. Whenever a new version is published, the old asset is archived for later availability.

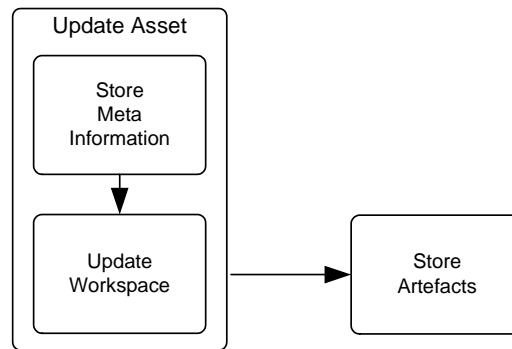


Figure 5-5 – BPMN: Update and Store

5.2.5. Request Initial Publication

As soon as an asset owner fills in the initial content - which can also remain empty - the asset owner may request the Initial Publication. Beside a meaningful purpose and short description about the asset, the initial content should contain documents written in English including an overview, a roadmap, a draft of the targeted syntactic or semantic specification and the asset manifest.

5.2.6. Verify Asset

The clearing process manager has to verify the content of the asset (see figure 5-6). This is a formal process to guarantee the correct execution of the clearing process. Further asset development is blocked to prohibit changes by the asset owner during verification.

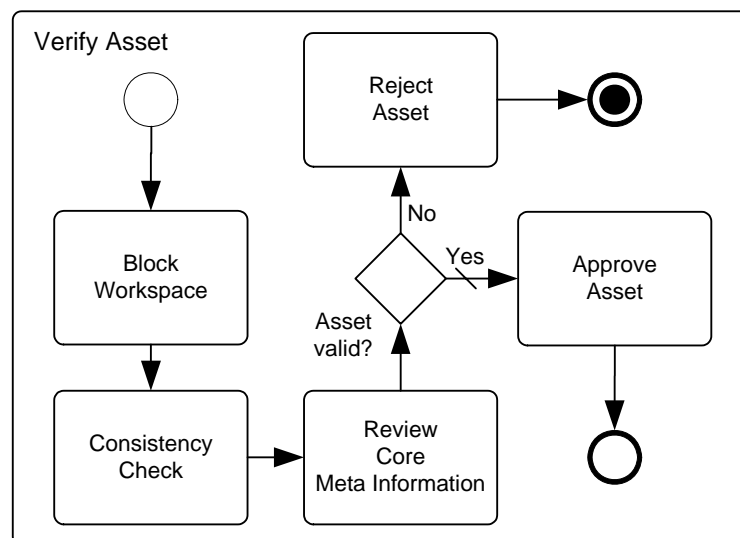


Figure 5-6: Verify Asset

The clearing process manager reviews the content of the asset and verifies that the content is consistent. One of his tasks is to check that the meta-information and content follow the policy of SEMIC.EU and that there is no legal violation.

If any issues are detected in that process, the clearing process manager rejects the asset's publication and creates a so-called change request for the asset owner. The asset owner should adapt the asset in order to resolve the identified problems (in respect to the requested changes). In some cases, a possibly coaching by the clearing process manager may be provided.

5.2.7. Publish Asset

Once the asset has been approved by the clearing process manager, it will be published on the SEMIC.EU platform. This means that the asset can be found by all SEMIC.EU users. To view and download the content of an asset the user must be registered at the SEMIC.EU platform. A recently registered asset will not be recommended to the community for use in practical implementations as of yet.

6. CHANGE PROCESS

The *CHANGE PROCESS* describes how changes to an asset are uploaded and published to the SEMIC.EU platform. The goal is to publish intermediate results to the public so new ideas or recent changes that can be tested and discussed with the asset community. The changes itself are developed outside of the clearing process using common software configuration tools or integrated development environments. The change process is designed to be a cyclic process and is a part of every iteration of the maturity process. The asset owner and its related asset developers always improve the artefacts before publishing a new version.

The SEMIC.EU platform should be primarily used to publish practicable or intermediate results of common interest. Intermediate results are published in an open process to boost the development by discussing and reviewing the actual state of work.

The resulting artefacts of a change cycle should be uploaded to the SEMIC.EU platform, where they have to be verified.

After successful completion of the change process, the asset developers can continue the development of the next minor release according to their roadmap or request the maturity process to recommend the current state of the work for usage in practical implementations.

The result of the change process is usually a changed asset published to the SEMIC.EU community with a new minor release number.

6.1. Roles

There are mainly four roles within the change process.

The asset owner is responsible for the asset and can request the release of a new minor version. The asset owner may also act as an asset developer and contribute new or changed artefacts.

The asset developers support the asset owner in improving the asset by providing new or changed artefacts.

Since both, the asset owner and the asset developers, may provide new or changed artefacts during the change process, they are called asset providers¹³.

The clearing process manager is responsible for the correct execution of the change process and supports the asset owner if required. The clearing process manager has to verify the asset before publication.

The SEMIC.EU platform supports the change process and archives the different versions of a changed asset.

6.2. Process Definition

Figure 6-1 gives an overview of the change process. The figure shows the four main roles involved in the process and its standard flow.

¹³ There is a third group of Asset Providers called Asset Contributor. An Asset Contributor is not directly involved in the development of the actual asset. The Asset Contributor typically created an artefact outside the actual clearing process which will be reused as part of the asset, e.g. a specification which was created in an external standardisation process.

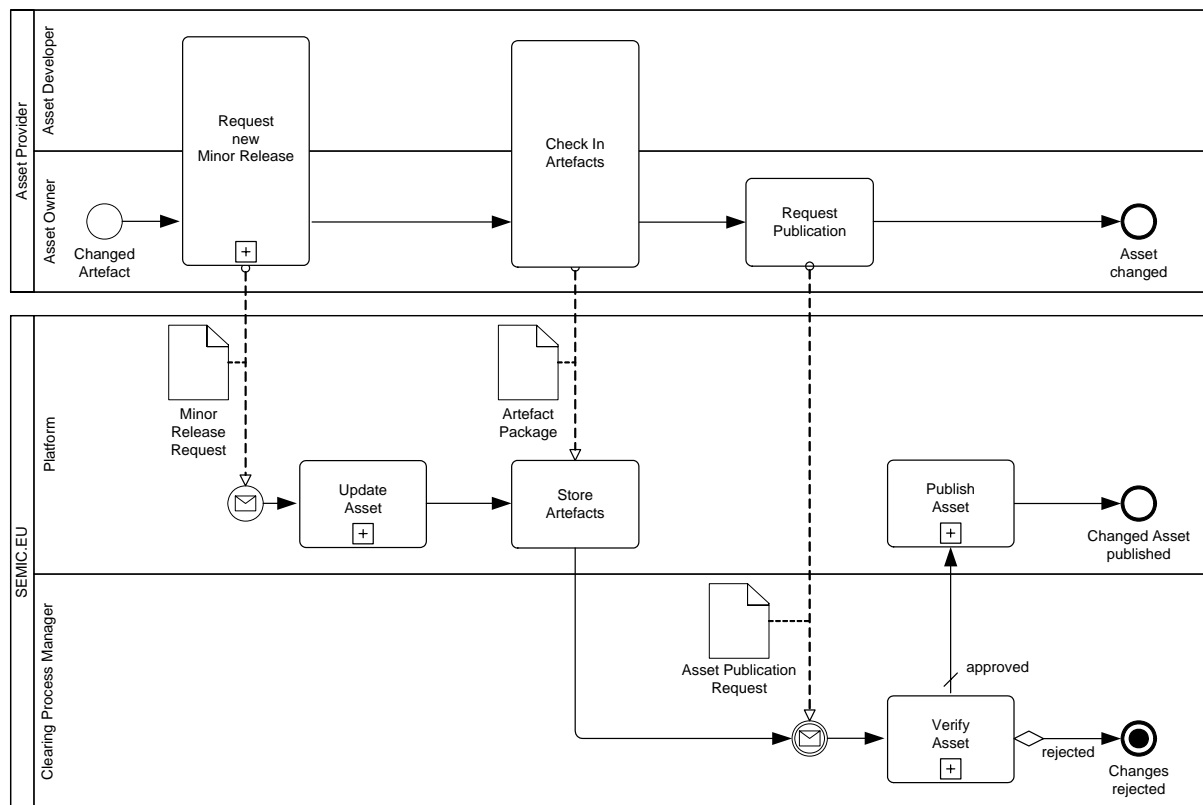


Figure 6-1 – BPMN: Change Process

A more detailed process diagram is given in Appendix D.2. Parts from this detailed chart are used in the following subsections to illustrate the different parts of certain steps in the process.

6.2.1. Request new Minor Version

When a publication request is active for an asset, its workspace is blocked to prohibit changes of the involved artefacts. First, the asset owner has to request a new minor release in order to be able to upload new changes (see figure 6-2). The asset owner should provide an abstract of the changes planned.

On the provider's side, a list of all change requests for the new release should be agreed upon by all members involved. This list should be managed by an external issue-tracking system that enables all stakeholders to observe a release's progress.

The asset providers can start working on the changes at any time but need to wait until the workspace is unblocked before they can upload the results.

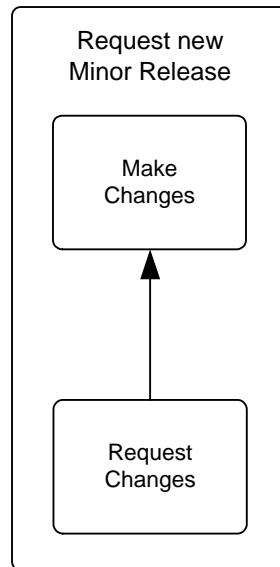


Figure 6-2 – BPMN: Request new Minor Release

The asset owner should update the topics from a domain taxonomy of the asset with respect to the new issues.

6.2.2. Asset Update

As soon as the changes have been received by the SEMIC.EU platform, the platform updates the asset (see figure 6-3).

The minor number will be incremented even if the last publication request was rejected. It is important that all relevant state transitions will be tracked. The final state of each release can be seen in the change history.

Before new content can be provided, the current artefacts are archived together with the meta-information of the asset. Old versions of an asset can be accessed later at any time for traceability.

The current content and meta-information are copied to the new version of the asset and can be overwritten by the asset provider.

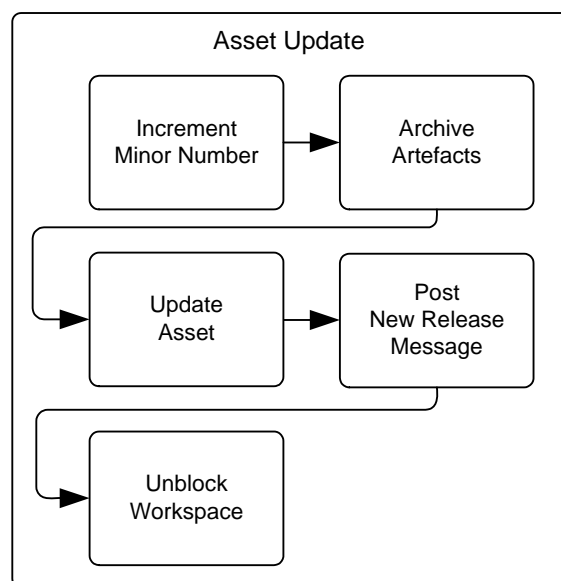


Figure 6-3 – BPMN: Asset Update

All interested parties will be informed that a new release is now under development, including the issues to be addressed. The time between publishing a release and starting a new one can be a relatively long period, e.g. to define and agree upon the issues of the next release.

6.2.3. Check-in Artefacts

At this point, the workspace is unblocked, and a changed artefact package or individual artefacts can be uploaded to the SEMIC.EU platform by the asset owner or asset developers. Artefacts can be overwritten as long as the release has not been published.

6.2.4. Store Artefacts

All changes to an asset are stored in the repository of the SEMIC.EU platform.

6.2.5. Request Publication

As soon as an asset owner and its developer team have completed all changes, the asset owner can request the publication of the changed asset. Only the asset owner can request the publication as he has the overall responsibility for an asset.

6.2.6. Verify Asset

The clearing process manager has to verify the content of the asset (see figure 6-4). This is a formal process to guarantee the correct execution of the clearing process.

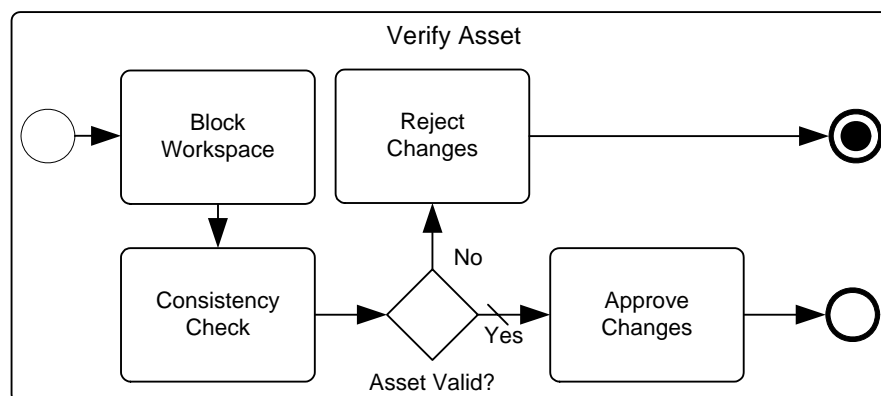


Figure 6-4 - BPMN: Verify Asset

First, the workspace has to be blocked, which means no artefacts can be changed while the asset is being verified and published.

The clearing process manager reviews the content of the asset and verifies that the new content is consistent. The clearing process manager has to check that the meta-information and the content follow the policy of SEMIC.EU, ensuring that no legal violations occur.

If there are any problems, the clearing process manager rejects publication of the asset and creates change requests to the asset owner. These change requests should be documented in the change history. The asset owner then has to change the asset to solve the problems with respect to the requested changes, possibly coached by the clearing process manager. The clearing process manager could further advice and give hints to the asset owner how to better fulfil the expected quality criteria as defined by SEMIC.EU.

6.2.7. Publish Asset

Once the changes have been approved by the clearing process manager, they are published by the SEMIC.EU platform. This means that the changed asset can be found by all SEMIC.EU users. To view and download the content of an asset the user must be registered at the SEMIC.EU platform. Interested users can be informed about the release of a new minor release.

After the asset has been published, the asset owner has to decide if the development of the asset will be continued and a new minor release will be requested or if the maturity is requested for the asset.

7. INTEROPERABILITY ASSET MATURITY PROCESS

The *INTEROPERABILITY ASSET MATURITY PROCESS* is the second step in the SEMIC.EU quality assurance process after the asset registration. The maturity process approves the asset for the usage in practical applications. Typically, the asset will be developed in several steps, which are documented in a roadmap. Each milestone in the development will extend the asset's functionality, adds features and defines the planned quality criteria. The maturity process could be passed for each milestone to confirm to the asset provider that the planned goals have been reached.

An asset owner may request the maturity for his asset. Although there are no particular criteria when the maturity process can be started and the asset owner decides himself to initiate the maturity process. The clearing process manager takes care that the functionality and quality of the asset will meet the asset's community expectation and the goals of SEMIC.EU's quality framework. The asset is subject to an assessment by the clearing process manager and a public review by the asset's community (see overview chart in figure 7-1).

After successful completion of the maturity process, the asset is marked as a “*Mature Interoperability Asset*” (MIA).

7.1. Roles

There are four roles chiefly concerned with the maturity process.

The first role is the asset owner, who requests the maturity for his asset.

The clearing process manager and the asset community¹⁴ accompany the entire process. The asset community is a group of users and experts who take an active interest in the quality and evolution of the asset. They are given the opportunity to influence the maturity process by taking part in the community review of the asset.

Finally, the clearing process manager approves the maturity for this release of the asset.

Other roles may take part in the process as part of the Asset Audience (e.g. other providers, coaches, etc.), or they may be called upon by the clearing process manager to comment on the asset (e.g. working groups, external experts, or the SEMIC.EU Advisory Group).

7.2. Process Definition

The chart in figure 7-1 gives an overview of the maturity process. It shows the four main roles involved in the process and the standard process flow.

A more detailed process diagram is provided in the Appendix D.3. Parts from this detailed chart will be used in the following subsections to illustrate the various parts of certain steps in the process.

7.2.1. Request Maturity Process

In order to initiate the maturity process, an asset must have completed the registration process.

The start of the maturity process must be requested by the asset owner. Before requesting the maturity process, the asset owner should be satisfied with the maturity of his asset. This means that the functionality provided by the asset must be applicable for practical applications and the quality should

¹⁴ The asset community may organise itself and grow over time. It consists of registered users seriously interested in this issue. The asset community is not managed by anyone person. If registered users violate any accepted behavioural rules, the clearing process manager or the SEMIC.EU administrators may block those users. Later, it could be an additional requirement to support closed user groups for organisational reasons if the asset owner needs the possibility of restricting the asset community to selected users and restricting the access permissions of users.

achieve predefined milestones with respect to the SEMIC.EU quality criteria. The goals of the functionality and quality progress level should be documented in the roadmap of an asset. More details about the expected quality criteria are given in the paper “*Quality Framework for Interoperability Assets*”.

If an asset has a general importance or is of particular interest in a pan-European context, the clearing process manager may approach the asset owner and suggest the start of the maturity process. SEMIC.EU may also offer coaching and consulting services to asset owners in order to prepare their assets for the maturity process.

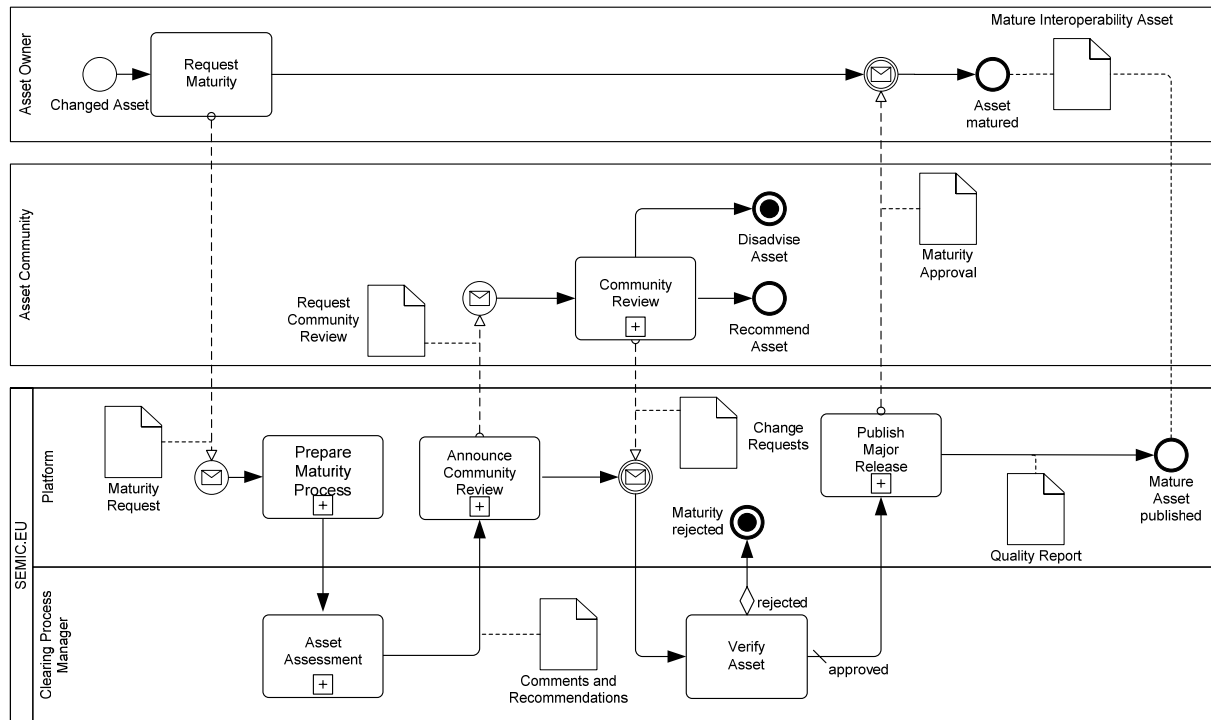


Figure 7-1 – BPMN: Interoperability Asset Maturity Process

7.2.2. Prepare Maturity Process

Before the maturity process is started, some preparations are necessary on the SEMIC.EU platform, as illustrated in figure 7-2.

Firstly, the asset workspace is blocked. This prevents and changes to the assets artefacts as long as the review of the asset is ongoing. In order to preserve the current state of the asset, a new minor release of the asset is created automatically with an increased minor number.

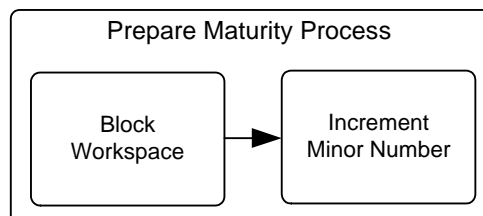


Figure 7-2 – BPMN: Prepare Maturity Process

7.2.3. Asset Assessment

A first step is a detailed assessment of the asset by the clearing process manager. The main purpose of the Asset Assessment is the verification of the assets compliance with SEMIC.EU's quality framework. The SEMIC.EU platform or external tools should support the clearing process manager with this task. The tools may implement certain automated procedures to check the validity of the request and to avoid system misuse¹⁵. The automated tools measure objective quality criteria, which will be shown in the quality report of the asset. There will be a demand for soft quality criteria, too, which are more subjective as they are evaluated by the clearing process manager, experts and the asset community.

Tools may also be used to identify potential misuse by checking for violations of the terms of use or the terms of service. This includes mechanisms to avoid the spamming of the platform with invalid requests and similar incidents. This automated quality analysis may include checking the syntax of an asset and its artefacts. The methods applied depend largely on the type of artefact checked. Some types of artefacts can be checked more easily in comparison to others. It is feasible, e.g., to check XML files for compliance with naming and design rules. It would be much harder to check a documentation file for compliance with specific criteria. Even more complex than a syntactic analysis is a semantic analysis of an asset. This could include checks for the integrity of artefacts, completeness of documentation, etc. The results of all automated analyses are compiled into an analysis report. This report provides as valuable input for the assessment of the asset by the clearing process manager. As long as the SEMIC.EU platform does not support automated analyses, the sole responsibility for the assessment of assets lies with the clearing process manager.

When this has been ascertained, the clearing process manager completes the asset's Quality Report. In addition, the clearing process manager may draft a document detailing his findings and recommendations for the community to review.

In case the asset falls short of SEMIC.EU's quality standards, the clearing process manager may ask the asset owner to implement changes to improve the quality. If the asset cannot meet the quality standards of SEMIC.EU, the maturity process can be aborted by the clearing process manager. The reason for this is communicated to the asset owner.

If the asset meets SEMIC.EU's quality standards, the clearing process manager publishes the asset's revised Quality Report and his comments on the SEMIC.EU platform. Then the start of the community review is announced on the SEMIC.EU platform.

7.2.4. Community Review

The Community Review is an essential part of the maturity process (see figure 7-3). During the community review, users and potential users of the asset get the opportunity to test and evaluate it. If the community does not approve the asset, they may request its owner to make changes.

¹⁵ None of the automated steps mentioned here are part of the first development stage of the SEMIC.EU platform. They may be considered for future upgrades.

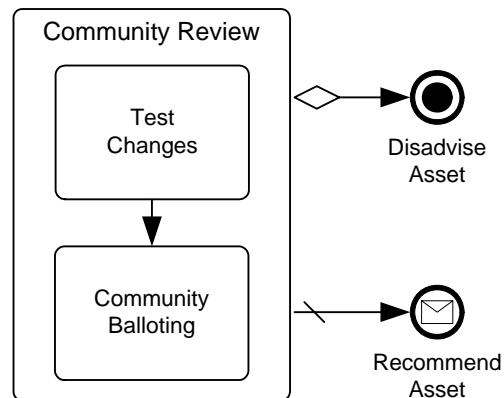


Figure 7-3 – BPMN: Community Review

The community review should end with a ballot. The asset owner should define the formal process for the ballot box voting for that interoperability asset. The ballot-box voting process should be selected from predefined ballot-box process like using the forum of the interoperability asset for voting or using a special vote engine¹⁶. The clearing process manager approves the suggested ballot-box process and supervises the ballot box later. The result of the ballot box is a vote of the community recommending or rejecting the asset. The result of the community review is published on the SEMIC.EU platform.

7.2.5. Approve Maturity

Taking into account the results of the community review, the clearing process manager approves the maturity of the asset or rejects it.

If the asset is rejected, it remains a registered asset, and the asset owner is notified. The asset owner receives a detailed report on the reasons for the rejection. The asset owner has to fix the problems given by the change requests. If required the clearing process manager can provide coaching to the asset owner, especially if the problems are related to the clearing process. The changes have to be uploaded using the change process and then request the maturity, again.

If the maturity of the asset is approved, a new major release is published as a “*Mature Interoperability Asset*”.

7.2.6. Publish Major Release

The final step of the maturity process, once maturity has been approved, is the publication of a new major release of the asset (see figure 7-4).

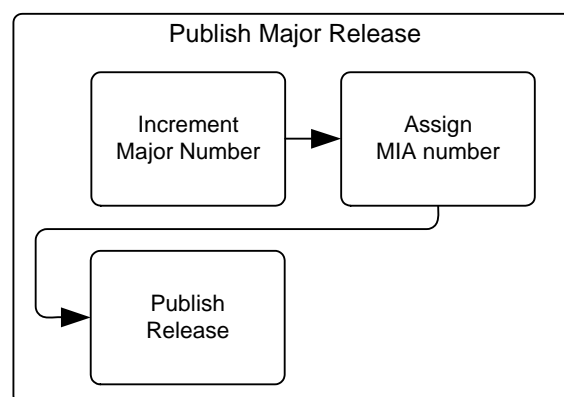


Figure 7-4 – BPMN: Publish Major Release

¹⁶ A vote engine will not be support by the initial version of the SEMIC.EU platform.

The new major release number illustrates the asset's newly confirmed quality status. The asset is now accessible under the label "Mature Interoperability Asset" and includes the updated quality report and branding information.

7.3. Tailoring of the Maturity Process

The process outlined above is considered to represent the standard workflow. It should be possible, however, to tailor this process in order to react to exceptional conditions. In the case of well-established interoperability assets, e.g. assets from national repositories, assets in use by pan-European projects, and international standards, it may be possible to reduce the assessment. In this case, it may even be possible to substitute the community review by the vote of a comparable, public quality or standardisation process already done for the content of the asset. This can minimise the process considerably and allow for the rapid publication of mature interoperability assets.

8. INTEROPERABILITY ASSET CONFORMANCE PROCESS

The Interoperability Asset Conformance Process is the third and final step in SEMIC.EU's quality assurance process. This process step will only be initiated for assets, which have completed the development. That means the entire functionality and all required features have been implemented. The conformance process will approve that the asset fulfils the functional expectations of the proposed and expected target groups. A conform interoperability asset has high quality and is useable by a broad user community. A conform interoperability asset is not a standard or similar. It is up to existing international / national / regional standardisation and other regulation bodies to declare which specifications are standards, mandatory or recommended. Any standardisation aspects are no fundamental components of the SEMIC.EU platform, as this platform targets harmonisation.

An asset owner may request the conformance process for any of his mature assets. These assets are then subjected to an assessment by the SEMIC.EU Advisory Group and an asset-specific conformance committee.

After successful completion of the conformance process, the asset is branded a "*Conform Interoperability Asset*".

8.1. Roles

There are five roles chiefly concerned with the interoperability asset conformance process.

The asset owner is responsible for the asset and can request the conformance process for the asset.

The clearing process manager is responsible for the valid execution of the conformance process and supports the stakeholders related to the process.

The SEMIC.EU Advisory Group represents the Member States and the bodies of the European Commission in the conformance process. It decides whether the conformance process should be applied and - when successfully completed - approves the new conform interoperability asset.

The conformance committee will be domain experts from the Member States and the private sector. The SEMIC.EU Advisory Group suggests the individuals for the conformance committee. The members of the conformance committee could be members from the Advisory Group itself. It is recommended to invite additional, external domain experts from public administrations or the private sector. The task of the conformance committee is to review the asset and advise required changes. It recommends or rejects the approval of the asset.

The SEMIC.EU platform supports and documents the conformance process.

8.2. Process Definition

Once the functionality and features of an asset are complete and its high quality especially with respect to SEMIC.EU quality framework is generally accepted by the asset community the conformance process can be initiated. However, this does not mean that all quality criteria have to reach the maximum level. The overall quality criteria and the level could depend on the expected target group and application area.

In figure 8-1, an overview of the conformance process is shown. The figure shows the five main roles involved in the process and its standard flow. The detailed process is part of the Appendix D.4.

8.2.1. Request Conformance

To start the conformance process, an asset has to be published before as a major release. It must be a Mature Interoperability asset. The implementation of the asset has to be complete with respect to its functionality and all features planned for the asset. The mandatory core quality labels have to be met. In general the asset should achieve the quality standards as proposed by the SEMIC.EU quality framework.

If all of the above requirements are met, the asset owner can request initiation of the conformance process. This ensures that the process is only started for an asset if the owner is convinced of its maturity. This can be done by filling in a form with the reasons for starting the conformance request.

If an asset has a general importance or is of particular interest in a pan-European context, the clearing process manager may approach the asset owner and suggest the start of the conformance process. SEMIC.EU may also offer coaching and consulting services to asset owners in order to prepare their assets for the conformance process.

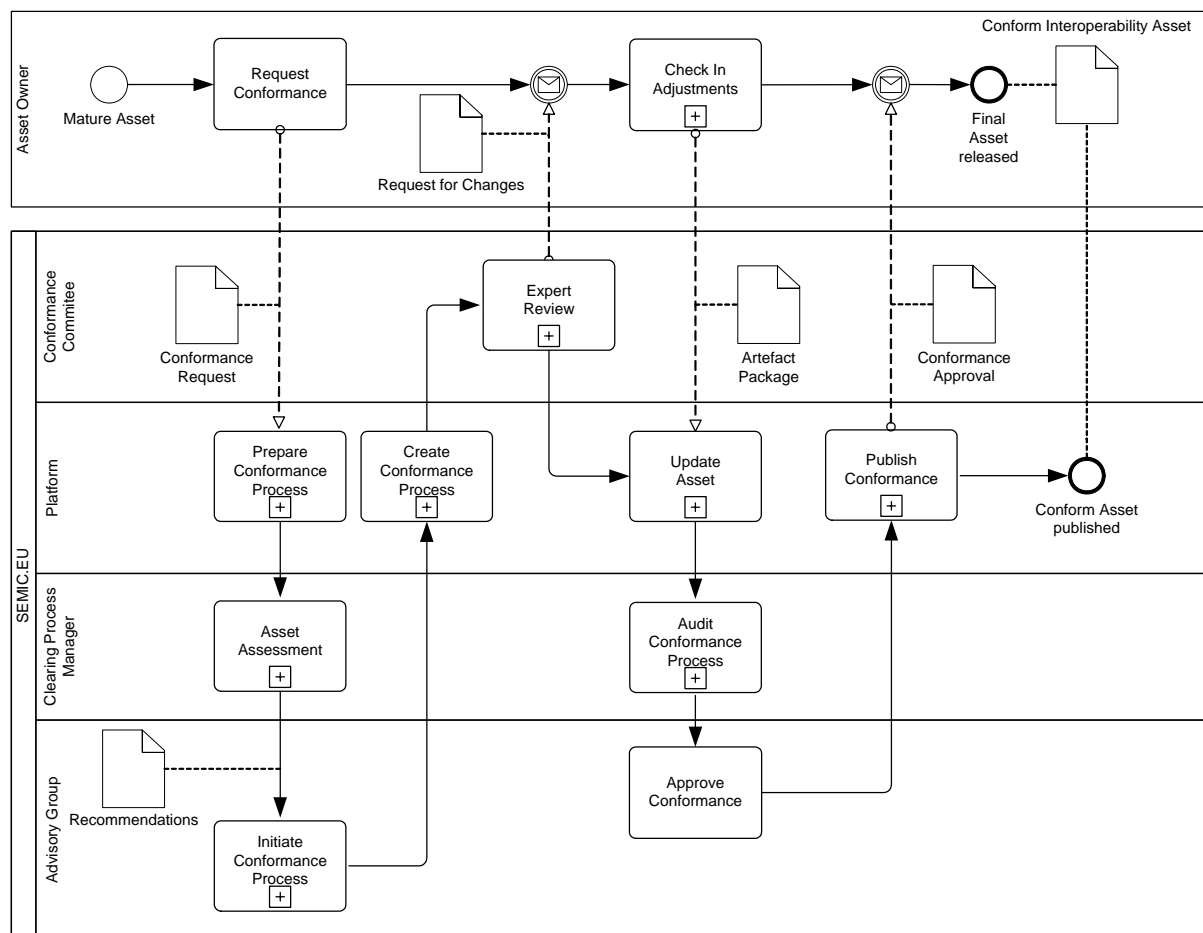


Figure 8-1 – BPMN: Overview on the Conformance Process

8.2.2. Prepare Conformance Process

Asset Developers have to be made aware that any further development on a specific asset is no longer possible. While the conformance process is running - and especially when the asset passes the conformance process - the asset is blocked (see figure 8-2) by the SEMIC.EU platform to avoid changes.

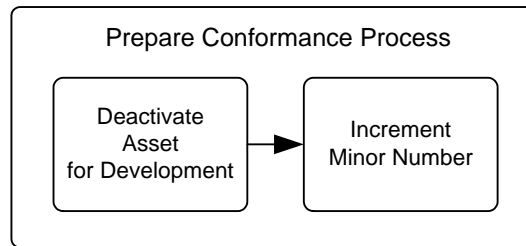


Figure 8-2 – BPMN: Prepare Conformance Process

Only adjustments by the asset owner can be uploaded on demand. Further, a new minor release of the asset will be created, so the actual mature release will remain and all changes or state transitions related to the conformance process will be uploaded to and visible with this special minor release for the conformance process.

8.2.3. Asset Assessment

Because of the high costs involved, prior to beginning the conformance process, an assessment of the asset's status has to be made. The clearing process manager reviews all information about the content of the asset and then writes a detailed recommendation to the Advisory Group whether the conformance process should be started or not.

8.2.4. Initiate Conformance Process

The SEMIC.EU Advisory Group discusses the request and the recommendations made by the clearing process manager. The SEMIC.EU Advisory Group has to decide whether to initiate the conformance process for the asset.

The SEMIC.EU Advisory Group assigns a conformance committee especially for the asset. Some of the members of the conformance committee are selected from the Advisory Group itself. The rest of the members should be domain experts from the Member States and the private sector with the required technical skills and experience.

8.2.5. Create Conformance Process

The platform should provide technical support for the conformance process (see figure 8-3), e. g., by setting up exclusive collaboration tools for the conformance committee members, including the clearing process manager.

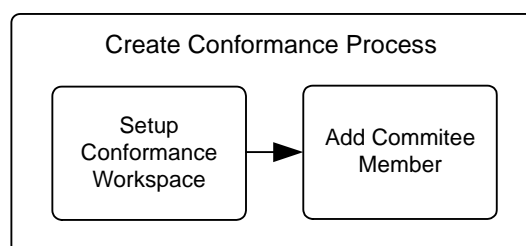


Figure 8-3 – BPMN: Create the Conformance Process on the platform

8.2.8. Audit Conformance Process

Beside the expert's decision, there are formal requirements for an asset regarding the conformance. The duration of the inspection of the review by the experts should be as brief as possible. The experts and the asset community should have enough time to comment on the asset before a decision is made. Furthermore, there should be two working implementations to verify that the specification is unambiguous and complete, and that there are no obvious unwanted interpretations.

The clearing process manager should audit the whole conformance process and support the conformance committee regarding the valid execution of the process (see figure 8-6). After the conformance committee makes a decision, the clearing process manager formally validates the review process and the balloting. The result, together with the relevant facts, is summarized in written form and forwarded to the Advisory Group.

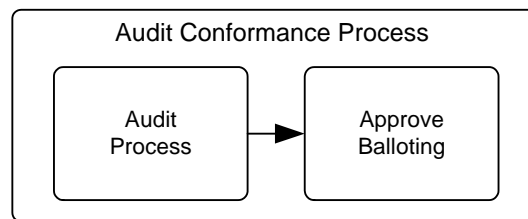


Figure 8-6 – BPMN: Audit Conformance Process

8.2.9. Approve Conformance

Finally, the Advisory Group forwards its approval to the responsible body of the European Commission as to whether the asset should be branded with the conformance label and recommended to the standardisation and regulation bodies of the European Union and its Member States.

8.2.10. Publish Conformance

The conformance statement is published on the SEMIC.EU platform (see figure 8-7).

The development of the asset is finalized, meaning no more changes to the artefacts are possible.

Only adjustments can be published to inform the community about errors and corrections.

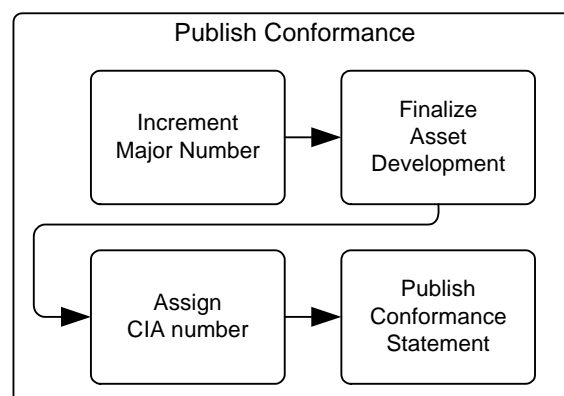


Figure 8-7 – BPMN: Publish Conformance

9. UPDATE PROCESS

It could always happen that even an asset that has been proof read contains mistakes such as syntax or minimal semantic errors. These errors should be fixed as soon as possible. The update process describes how adjustments to published releases of assets will be uploaded to the SEMIC.EU platform. The update process is an exceptional process that can be applied to any minor or major release including conform interoperability assets. The update process should even be applied to older releases of an asset, which are still in use especially mature assets. Therefore, it is required to allow the update process to be used for older releases even when a longer running process like a review is actually executed.

The update process is not directly a part of the registration process, change process, maturity process and conformance process. It is only used in the conformance process to provide changes while the expert review is ongoing. The update process can be started for each published minor or major release of an asset. The update process cannot be used for the actual release in work.

The update process is a shortened change process and does not require an extensive new review. The clearing process manager will validate that it is a small fix of an error and not a bigger change, which has to be done using the normal change process.

After successful completion of the update process, the asset does not get a new brand and the release does not change its internal state. Only the patch number will be incremented.

9.1. Roles

There are two roles chiefly concerned with the Interoperability asset update process.

The asset owner is responsible for the asset and has to provide the update for the asset.

The clearing process manager is responsible for the valid execution of the update process and supports the asset owner on demand.

9.2. Process Definition

If a simple error was found and reported to the asset owner, he should provide an update and upload the fixed asset to the SEMIC.EU platform. The clearing process manager has to validate the changes and approve the asset before the update will be published on the SEMIC.EU platform. The update process is shown in figure 9-1.

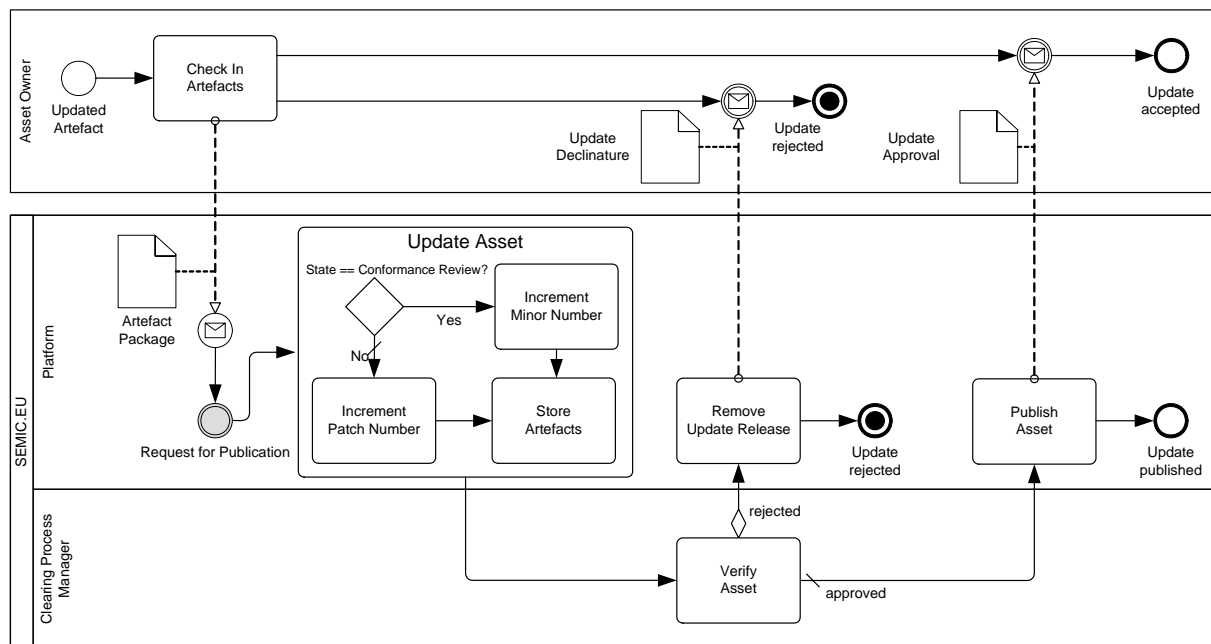


Figure 9-1 – BPMN: Update Process

9.2.1. Check-In Artefacts

The asset provider gets a notice about a mistake in an actively used release of the asset. Based on the content related to that erroneous release the asset provider will implement a fix. It is not permitted to simplify the task by using other releases as the base, e.g. the actual artefacts under development. It could happen that this mistake is part of several releases. Then it could be required to update each of the affected releases.

The updated artefact package or single artefact has to be uploaded directly as an update to the affected release. The asset owner has to enter a reason for the update with the upload, e.g. which mistakes will be corrected.

9.2.2. Update Asset

If the update is conducted for a major release, which will usually be the case, the patch number will be incremented. The only exception is an asset that is currently undergoing the conformance process. This asset is a minor release whose update will create a new minor release with an incremented minor number. The reason for choosing the update process in this case instead of the change process is that changes made during the conformance process should be minor changes that do not have to undergo the entire review contained in the change process.

Before the new content can be stored, the current artefacts will be archived together with the meta-information of the asset. Old releases of the asset can be accessed at any time.

The current content and meta-information are copied to the new release of the asset and overwritten by the new given content.

9.2.3. Verify Asset

As shown in figure 9-2 the clearing process manager will validate if only the announced changes have been done and if they look like simple corrections and no general changes to the asset. If they are simple corrections the update is approved otherwise it will be rejected by the clearing process manager.

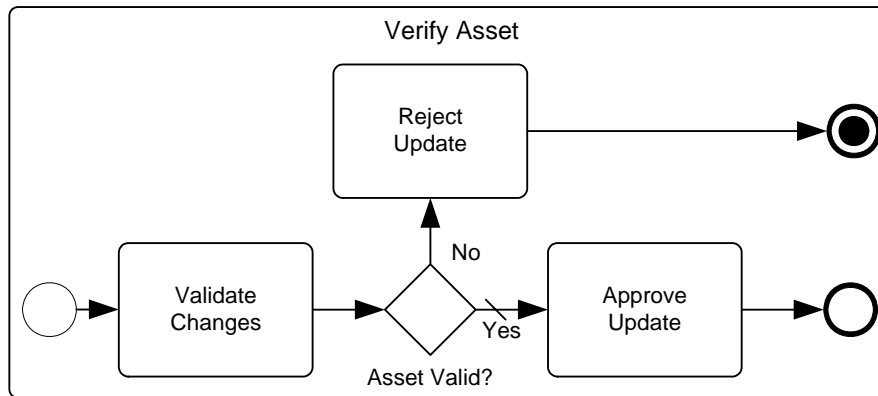


Figure 9-2 – BPMN: Verify Asset

9.2.4. Remove Update Release

If the update was rejected the release should be removed from the SEMIC.EU platform.

9.2.5. Publish Asset

If the update was approved the release will be published and therefore visible to the entire SEMIC.EU audience.

10. SOCIAL NETWORKING

The primary focus of this paper is the definition of the clearing process. This includes exploring the possibilities of filling the SEMIC.EU repository with content and the potential methods of deeply involving the community as active members. An obvious part of the community - related to the clearing process - is the group of asset Developers working together on one asset. Furthermore, there will be asset Audiences interested in special assets.

The social networks of the Web 2.0 have shown that there are many possibilities to identify communities. Most of these communities can be found by analysing the behaviour of a user. SEMIC.EU should exploit the experiences from the Web 2.0 networks and profile its users and assets to identify hidden relationships.

This would support the collection of much more information about the users and assets, which should be used to present information to users according to their personal preferences instead of flooding them with information. Another possibility is to weave a net of related information to provide the user valuable pointers to the content of SEMIC.EU, which could be of interest to users.

This means that the clearing process should be more than simply storing and distributing assets containing specifications. The information related to the clearing process should be used to point at other interesting assets and people as well.

As providing all these functions is a long-term vision and will not be part of the initial platform, collecting the required data should be started early on.

10.1. User and Asset Profiling

The basic principle is to create a profile of a user or an asset. First, all transactions including useful relationships are collected in logs.

However, tracking the behaviour of users is of very sensitive nature. This is not only due to privacy regulatory considerations, but involves also sensitive methodology and proper, adequate information for the user about what data may be stored and processed.

In order to be legally allowed to store and process those profiling information, several preconditions have to be met. Firstly, the user must be adequately informed about the extent of the data collection and he must state an undoubted acceptance to the collection and processing. Secondly, the tracked information must be protected appropriately in full accordance to existing privacy regulations. Any release of personal information to external parties must to be approved by the user prior to its communication. The details of the user profiling, its legal basis and regulations are described in the document "*Terms of Service / Terms of Use*".

By analysing the tracking data, a semantic net is built that mainly analyses the relationships of:

- users, roles, assets, artefacts and their types, topics from the domain, keywords from textual descriptions, sources of referenced artefacts, projects, and the language used in artefacts or by users

Examples of interesting primary relationships could be:

- which developers work together to define an asset, which domain topics are related to an asset, which users are interested in an asset, which assets can be related, in which projects an asset will be used, e.g. by asking a user about the project the asset will be used in before it can be downloaded; what kind of artefacts a developer is familiar with, which keywords are related to an artefact, which artefacts are related

From these relationships, new secondary relationships can be derived, e.g.:

- which topics a developer will work on, which topics a user could be interested in, which projects a user is related to, which keywords are related to a project, which keywords are related to a user, which assets are used by a project ,If quantitative data is also considered, other questions can be answered, e.g., who are the specialists in a topic, who are the specialists for an asset, who are the specialists for an artefact type, which assets are similar, which developers are tightly related, which assets are active, which assets are popular, which topics and keywords are currently popular

The analysis of the data is typically done by using well-known algorithms from data mining, text mining, and machine learning.

The results of the profile analysis are dedicated profiles for users and assets. These profiles should be part of the optional meta-information of a user or asset. This profile should be visible to the user and should be extendable by a user or asset owner.

Another source of profiling is the use of users' opinions. This would enable a user to rate assets with respect to given criteria.

Furthermore, assets can be commented upon by the users. Besides personal opinions about an asset, the comments should include experience and tips for other users.

The state-of-the-art possibilities of user and asset profiling have been presented, here. In the initial phase of SEMIC.EU profiling will not be implemented. Later, it may be used to increase the value of SEMIC.EU. However, the profiling or parts of it will be implemented by clearly taking care of the data privacy and the best practices in this area.

10.2. Search and Navigation

These profiles can be used to support a user for search and navigation. The initial search should be typically based on keywords, including topics. The result list with the abstracts of the assets, artefacts, users, and projects found can be the starting point for further sophisticated navigation.

The topics, keywords, developers, users, roles, and projects contained in the result set are a good base for further refinements by using faceted navigation.

The use of similarity measurements allows finding similar entities by using the characteristics of an entity as the new search term. A visible marker indicating the similarity level is always a good hint for the user as to how exact a match between the search term and a result is.

Additional navigation tips could be to suggest related alternatives that have been preferred by other users.

10.3. Communication

The profiles should be used to optimize the communication with the user.

Public news should be directed personalized to the users with respect to the profile of interests. This would prevent the users from being spammed with information, and only information that is truly interesting for a user can be emphasized.

Even the communication regarding questions and help from other users can be selectively directed to the experts of topics. Each user should get a list of public articles related to his abilities and interests when he logs on to SEMIC.EU. This could be a motivation to help other users or get answers regarding interesting questions for themselves.

The communication should also be configurable by the user.

11. ROLLOUT OF THE CLEARING PROCESS

One of the most crucial issues for the success of SEMIC.EU is the attraction of early adopters. The feedback these users provide in their own communities will be a major factor in deciding whether SEMIC.EU manages to step into a positive feedback loop, which is a precondition for reaching a critical mass of users.

To attract early adopters, the rollout of the clearing process must be suited to:

- provide a stable and usable platform from the first day on
- elaborate the job profile of the clearing process manager
- provide support for early users with respect to their role as early adopters
- provide initial content as both good practice examples and usable assets

The following sections go through these requirements in greater detail

11.1. Providing a Usable Platform and Process

The SEMIC.EU clearinghouse will be launched as a Web portal in June 2008. The portal will be set up on a repository and registry platform, such that assets of any kind can be persistently stored and maintained.

Most important for the rollout of the platform is its availability, completeness, and stability right from the start. Potential users, attracted to the platform by pre-launch information, will not become “real users” if - based on their first experience - they are under the impression to be merely beta testers for an incomplete and still-hard-to-use product.

To avoid this at launch time SEMIC.EU must fulfil the following requirements:

- Any functionality provided must be stable and complete. It will be better to omit a feature than to provide it untested and unfinished. Using stable, robust, and well-tested technology only (e.g. using an existing framework or platform), keeping functionality straight-forward, and focussing on well-established libraries and standards is generally considered to be a good strategy.
- Navigation must be easy and intuitive with respect to the assets available at launch time. To achieve this, the navigational paths should be designed in a way that the initial asset collection can be browsed and searched easily.

In parallel with the technical platform, initial support functionality - and initial content, even the clearing process - must go live following an elaborate rollout map. Beyond basic technical support for the steps of the defined process, this includes intensive testing and the provision of guidelines on how to live the process.

11.2. User Support

Among the unique features of SEMIC.EU in contrast to other asset-mediation platforms will be a sophisticated portfolio of mechanisms for coaching and supporting asset contributors. In the first run, most of the mechanisms are mapped onto the role of the clearing process manager, who acts as “*one face to the customer*” and is responsible for coaching and supporting asset contributors and users.

For the initial phase, the clearing process manager should provide any support requested. By tracking the provided efforts for various support activities, the further development of guidelines and supporting facilities, as well as a more concrete elaboration of the clearing process manager’s “job profile”, can be supported. The objective during the initial phase should be to evaluate support activities with respect to effect and effort. The resulting matrix can be used as a guideline for the focal points of further development:

- *LOW EFFORT, HIGH EFFECT*: these activities are good candidates to become part of the clearing manager's job profile as they highlight one of the major unique selling points of SEMIC.EU resulting in low costs.
- *LOW EFFORT, LOW EFFECT*: the problems resulting from these activities should be addressed by guidelines, examples, FAQs, and annotated walk-troughs'. The goal must be to avoid burdening the clearing process manager with these activities while still addressing the users' needs.
- *HIGH EFFORT, LOW EFFECT*: problems that are likely to lead to these activities must be addressed at a very early stage of the interaction with the user. Clearing process managers must be trained and supervised not to step into these activities. Even rigid mechanisms like playing these tasks back to the user or not accepting them as viable support actions are valid reactions.
- *HIGH EFFORT, HIGH EFFECT*: these activities should be addressed by providing supportive functionality on the platform in order to lower the effort for the clearing process manager. Even changes of the technical specification or the clearing process definition should be made if this can help to lower effort while maintaining high effects. These activities are, furthermore, good candidates for third-party support offers.

11.3. User Involvement

As stated above, user involvement is a prominent goal of SEMIC.EU. This must even take place before and during the rollout phase. The mechanisms used must be suited to:

- enable early adopters and the SEMIC.EU community to provide feedback and suggestions for improvements
- involve early adopters and other potential contributors in the further development of the platform
- make plans for further development transparent to users and the SEMIC.EU community
- gather experience with running asset lifecycles on the SEMIC.EU platform

In order to improve the platform continuously under real-life conditions, it is very important that assets in all stages of the clearing process be available on the platform at launch time. This will allow for a parallel stepwise evaluation and sharpening of workflows, user interfaces, and community tools for all steps of the process.

11.4. Initial Content

As recommended in the document "*Good Practices in Existing Repositories*", it is important for the start-up phase of SEMIC.EU:

- not to start unfilled. However, the composition of the initial assets is not of extraordinary significance
- to show a significant number of "good examples" in SEMIC.EU
- to provide well-managed platforms for user participation (e.g. a forum) and information (e.g. a newsletter)
- to attract potential asset providers to step into the guided clearing process
- to provide added value for early adopters
- to keep user awareness high by frequently adding new assets to the platform

To reach these goals, the following strategy for the launch and start-up phase of SEMIC.EU is suggested:

- A significant set of assets is derived from existing standards and past projects of the project partners. Two-thirds of these assets should be available on SEMIC.EU at launch time. The other assets – together with assets produced later – should be registered at the platform and announced through the SEMIC newsletter (perhaps with periodic delay) throughout fall 2008.

-
- The clearing status of the predefined assets should be spread through the whole clearing process in order to provide potential contributors with live examples of the different steps of the process.
 - For each kind of asset, there should at least be one “good example”.
 - Many of the existing national asset repositories lack assets that support certain domains or business processes within a domain. With the predefined assets, there should be a strong focus on such assets. This strategy could be a unique selling point for SEMIC.EU.
 - From the very beginning of the project - that is even before launch - potential contributors should be acquired. Special emphasis should be put on attracting contributors who can provide assets located within the lower layers of the SEMIC.EU pyramid (see figure 1-4).

Appendix A. REPRESENTATION FORMATS

The following representation formats are considered to be potential candidates for its application as core formats of the SEMIC.EU platform.

A.1. Extensible Markup Language

XML (Extensible Markup Language) is considered an important structured source-code format. XML may be the preferred choice and used whenever possible.

A.2. Plain Text

The mime type “text/plain” should be generally available, however due to its limitations used as little as possible. This is because automated tools are usually not able to analyse and process unstructured text.

A.3. Structured Text

A lightweight structured text format based on plain Unicode should be available. Such files can be edited using most text editors. Furthermore, it could be used to easily process and layout text fragments entered in development tools, e.g., as comments. Structured text formats use simple formatting rules to identify elements like headings, paragraphs, and numbering.

There are widely supported mark-up languages available. Examples are “*Textile*”¹⁷, supported by various blogging portals and “*reStructuredText*”¹⁸, supported by the “*Python*” module library. The primary structured text format has to be selected, adopted, and defined in a specification for SEMIC.EU.

h1. The heading

This a paragraph identified by a blank line.

This is a numbered line.

This is the next number line.

Figure 9.1: Example of textile-formatted text

The numbering of headings, paragraphs, and enumerations makes it possible to reference text parts easily. Additional labelling is another means to reference text passages. Furthermore, mark-up languages allow referencing of other sources by means of links and can even include figures.

A.4. ISO 26300 Open Document Format for Office Applications (ODF)

Another comfortable document format, which is directly editable by widely available word processing editors, should be a subset of the ODF standard. To process ODF documents automatically, an ODF profile should be defined that represents a processable, restricted subset of ODF. Document formatting that uses paragraph types should generally be supported.

Furthermore, standard templates may be defined. The use of paragraph types allows marking of special information that can later be extracted automatically.

¹⁷ <http://www.textism.com/tools/textile>

¹⁸ <http://docutils.sourceforge.net/docs/ref/rst/restructuredtext.html>

The goal is to be able to extract information from the documents easily and transform or transcode documents on demand. It should make no major difference for the final document whether it was created using structured text with a simple editor or using a full-featured word processing editor.

A.5. ISO 19005-1:2005 Portable Document Format PDF/A (PDF)

A popular format to share, view, and print documents is PDF. However, this is not a standardised format, and it runs under proprietary control of one company. A standardised profile of PDF should be supported, e.g. PDF/A (PDF-Archive¹⁹).

A.6. Source Code

There is a variety of existing source code formats for programming languages and for business or engineering models. These should be supported based on the users' demand.

A.7. Character Separated Values

A CSV file is a simple plain text file to represent tabular data. The format is widely supported by all major databases and spreadsheet editors.

A.8. Tagged Image File Format (TIFF)

The TIFF format is standardised and one of the few formats suited for long-term archiving. Furthermore, it is widely supported by the public administration for exchanging data. It should be the preferred format for multi-page image data. Each document should be available as a multi-page TIFF file with a predefined pixel density, e.g. 600 ppm.

A.9. ISO 10918-1:1994/Cor 1:2005 JPEG

JPEG files are widely used for photos and colour images. It could be an alternative source format for images. However, potential users need to be aware of the specific characteristics of JPEG compression, which includes loss of data.

A.10. References

References link artefacts from foreign sources. The SEMIC.EU community should have a way to be informed about the content of foreign specifications. The most important aspect is to include a full set of specific meta-information in SEMIC.EU for linked content, e.g. to enable the global search of assets.

A regulation system must be put in place that ensures that only artefacts are linkable and not assets. This allows a context-specific composition of artefacts with respect to the intention of the asset. SEMIC.EU-specific content can later be added to the asset.

The foreign source files should be cached locally to improve access speed and to enable to backup and archiving of the linked content.

¹⁹ PDF/A is standardised as ISO 19005-1:2005 - Document management — Electronic document file format for long-term preservation — Part 1: Use of PDF 1.4 (PDF/A-1)

Appendix B. ARTEFACT TYPES

The following artefact types should be the core artefacts to be supported by the SEMIC.EU platform.

B.1. Unified Modelling Language

The UML from the Object Management Group (OMG) is the preferred modelling method to be used in the software development process. There are various development tools and editors to create UML-based diagrams. Besides the native storage format of the tools, there is a standardised exchange format “XML Metadata Interchange” (XMI), which should be used as a representation format in a restricted variant.

UML diagrams can be used to model data structures and the behaviour of Web service interfaces.

B.2. UN/CEFACT's Modelling Methodology

UMM is a UML modelling approach to design the business services that each business partner must provide in order to collaborate. It defines a UML profile to implement the “Business Domain View” (BDV), “Business Requirements View” (BRV), “Business Transaction View” (BTV), and “Business Service View” (BSV).

UMM is used in conjunction with the Core Component Technology Specification. As it is a complex modelling method, SEMIC.EU should work on a profile of UMM that is a subset of UMM that defines an easier-to-use methodology.

The primary representation should be a restricted variant of the “XML Metadata Interchange” (XMI) format.

B.3. Business Process Modelling Notation

The BPMN from the Object Management Group (OMG) is a modelling method used for designing business processes. BPMN is an alternative to UML graphs, especially the activity diagrams, and is easier for non-technical people to work with.

BPMN diagrams can be provided as images, but the primary representation format should be the “XML Process Definition Language” (XPDL) from the Workflow Management Coalition (WfMC).

B.4. Functional Modelling Concept

The FMC block graphs have been defined by the Hasso Plattner Institut (HPI) in Potsdam, Germany. They are a simple method to describe architectures and have the advantage of being easily understood by non-technical people. The FMC block diagrams should be provided as images. An XML-based notation is not known that could be used as the primary source.

B.5. Core Components Technical Specification

The CCTS from UN/CEFACT allows the specification of representation-independent data schema. It allows the specification of context-free core components and context-related business-information entities.

B.6. XML Schema

The most popular way to describe complex data structures is the use of XML schema, which was defined by the W3C. It replaced the old DTD specifications.

It is itself represented as XML. This should be the primary representation for an XML schema.

B.7. Schema View

A graphical view of a XML schema may generated by software tools. This graphical notation should cover all fundamental features modelled in a XML schema. These graphs should be provided as images, which then can be included in the documentation.

B.8. Relax NG

Relax NG by the Organization for the Advancement of Structured Information Standards (OASIS) is an alternative, more elegant, approach than XML schema to specify XML formats.

It has a primary representation as XML format. A user-friendly alternative representation is the plain-text-based compact syntax notation of Relax NG, which should be the preferred source format for Relax NG specifications.

B.9. Schematron

Schematron is a rule-based validation language for making assertions about the presence or absence of patterns in XML documents. It is standardised as ISO/IEC 19757-3:2006. Schematron is widely supported by XML editors.

Schematron can be used as an adjunct to RELAX NG and XML Schema. It allows co-occurrence constraints, non-regular constraints, and inter-document constraints.

Schematron itself is primarily represented as an XML file.

B.10. Web Service Description Language

The basic architecture for state-of-the-art developments is Service Oriented Architectures (SOA) using Web services defined by the WSDL. It allows specification of the interfaces offered by a service with it functions.

WSDL is primarily represented as XML files.

B.11. ebXML Process Descriptions

Building on a basic XML regulatory set, ebXML coordinates and exchanges interface descriptions, collaboration profiles, and business-process requirements. It strongly supports an SOA-like architecture of automatically communicating pre-defined artefacts on demand.

ebXML not only features syntactical and semantically regulations and guidelines but provides complete business integration processes, an XML-based registry/repository implementation, and advanced messaging services for XML-based e-business applications.

The ebXML types and definitions are represented as XML files.

B.12. Code lists

Code lists enumerate values and constants simply in a tabular form, e.g. instance identifiers like OIDs.

Code lists may be represented as CSV or XML files.

B.13. Mappings

One possibility is the data mapping between two different data structures. This could be a simple copy of a value from an attribute in the source structure to a new attribute in the target structure, e.g. from the XPath “personRecord/@firstName” to “personenDaten/@vorname”. More complicated cases require the use of functions, e.g. to compose/decompose values like “*Example, Joe G.*”

Such data mapping requires a transformation of XML structures. This can be done using “XSL Transformations” (XSLT) or the more powerful and preferred approach using “XQuery”, which is based on a functional language. Both notations use an XML representation format.

The other possibility is to map fixed data values. This is usually done with categories that are defined by a code list or taxonomy. This mapping is not required to be bi-jjective in every case.

The mapping may be defined in a tabular form and can be represented as a CSV or XML file.

B.14. Taxonomies

Taxonomies define a hierarchical relationship between categories, typically a generalisation or specialisation. A category and its path from the root allow specifying a context in addition to its value. A category is a predefined value and it should be used to restrict the possible range of values assigned to an attribute.

A set of categories is used to classify items. This can be used to calculate similarities and facets. Another application is to search for categories.

Taxonomies can be defined using the Topic Maps (XTM) standard ISO 13250 or the Resource Description Framework (RDF) from W3C. Both use XML for representation.

B.15. Ontologies

Ontologies or semantic nets are used to represent knowledge. Ontologies are usually built up by triples, which define subject-predicate-object expressions.

The Resource Description Framework from W3C is a popular approach to specify ontologies. Its representation is an XML format.

Appendix C. USE CASE WITH RELEASE NUMBERING

This is an example with comments on how the Release Number and the State should be set based on typical actions done by the related stakeholders of the asset. The actions can be found in the descriptions of the relevant processes.

The actions described below are based on the processes described in this vision document. During the development of the SEMIC.EU platform, it may be decided to merge actions for usability reasons.

	Action	Comment	Release	State
1.	A user registers a new asset and sends the filled in registration form.	The asset is only visible to the asset owner and developer and not to all users as long as the asset is not published.	0.1.0	under development
2.	The asset owner requests the publication of his asset.	A review by the clearing process manager is initiated.	0.1.0	request for publication
3.	The clearing process manager approves the asset.	The asset will be visible to all users of the SEMIC.EU platform.	0.1.0	draft
4.	The asset owner wants to continue the development of the asset. He requests a new minor release for the asset.	The asset developers are now able to upload changes to the latest release of the asset.	0.2.0	under development
5.	The asset owner requests the publication of the release after the changes have been finished.	The asset developers can no longer upload changes to the asset.	0.2.0	request for publication
6.	The clearing process manager verifies the asset and approves it.	The asset developers can no longer upload changes to the asset. The changes are visible for the public.	0.2.0	draft
7.	The asset owner wants to publish his asset for production use. He requests the maturity process.	The asset developers can no longer upload changes to the current asset release. A new minor release is created to preserve the current release.	0.3.0	request for maturity
8.	The clearing process manager updates the quality report of the asset and starts the community review.	With a balloting message the clearing process manager invites the asset community to review the asset.	0.3.0	community review

	Action	Comment	Release	State
9.	The maturity will not be recommended by the community and the clearing process manager rejects the maturity request.	A request for changes will be sent to the asset owner and developers.	0.3.0	maturity rejected
10.	The asset owner requests a new minor release to continue the development of the asset.	The asset owner and developers are now able to upload changes to the asset	0.4.0	under development
11.	The asset owner requests the publication of the new release after the changes have been finished.	The asset owner and developers can no longer upload changes to the asset.	0.4.0	request for publication
12.	The clearing process manager verifies the asset and approves it.	The asset owner and developers can no longer upload changes to the asset. The changes are visible for the public.	0.4.0	draft
13.	The asset owner wants to publish his asset for production use. He requests the maturity process.	The asset developers can no longer upload changes to the asset.	0.5.0	request for maturity
14.	The clearing process manager updates the quality report of the asset and starts the community review.	With a balloting message the clearing process manager invites the asset community to review the asset.	0.5.0	community review
15.	The maturity is recommended by the community and the clearing process manager.	The state of the minor release is set to its final value.	0.5.0	maturity approved
16.	The clearing process manager approves the maturity.	The asset is now published for production use.	1.0.0	mature
17.	The asset owner wants to continue the development of the asset. He requests a new minor release for the asset.	The asset owner and developers are now able to upload changes to the asset.	1.1.0	under development

	Action	Comment	Release	State
18.	The asset owner requests the publication of the new release after the changes have been finished.	The asset owner and developers can no longer upload changes to the asset.	1.1.0	request for publication
19.	The asset owner updates the last major release by uploading a small fix.	Only small corrections are allowed especially the semantics should not change. This action is not in sequence with the ongoing development of the asset.	1.0.1	request for publication
20.	The clearing process manager approves the update.	The updated major release will become visible to all users of the SEMIC.EU platform.	1.0.1	mature
21.	The clearing process manager verifies the asset and approves it.	The asset owner and developers can no longer upload changes to the asset. This continues action 18 and it is not influenced by the update process (actions 19. + 20.).	1.1.0	draft
22.	The asset owner wants to publish his asset for production use. He requests the maturity process.	The asset owner and developers can no longer upload changes to the asset.	1.2.0	request for maturity
23.	The clearing process manager updates the quality report of the asset and starts the community review.	With a balloting message, the clearing process manager invites the asset community to review the asset.	1.2.0	community review
24.	The maturity is recommended by the community and the clearing process manager.	The state of the minor release is set to its final value.	1.2.0	maturity approved
25.	The clearing process manager approves the maturity.	The asset is now published for production use.	2.0.0	mature
26.	The asset owner will issue a request for conformance.	The conformance should only be requested if the development has finished, the entire functionality has been implemented and the SEMIC.EU quality criteria have been highly fulfilled. A new minor version is created to preserve the mature asset.	2.1.0	request for conformance

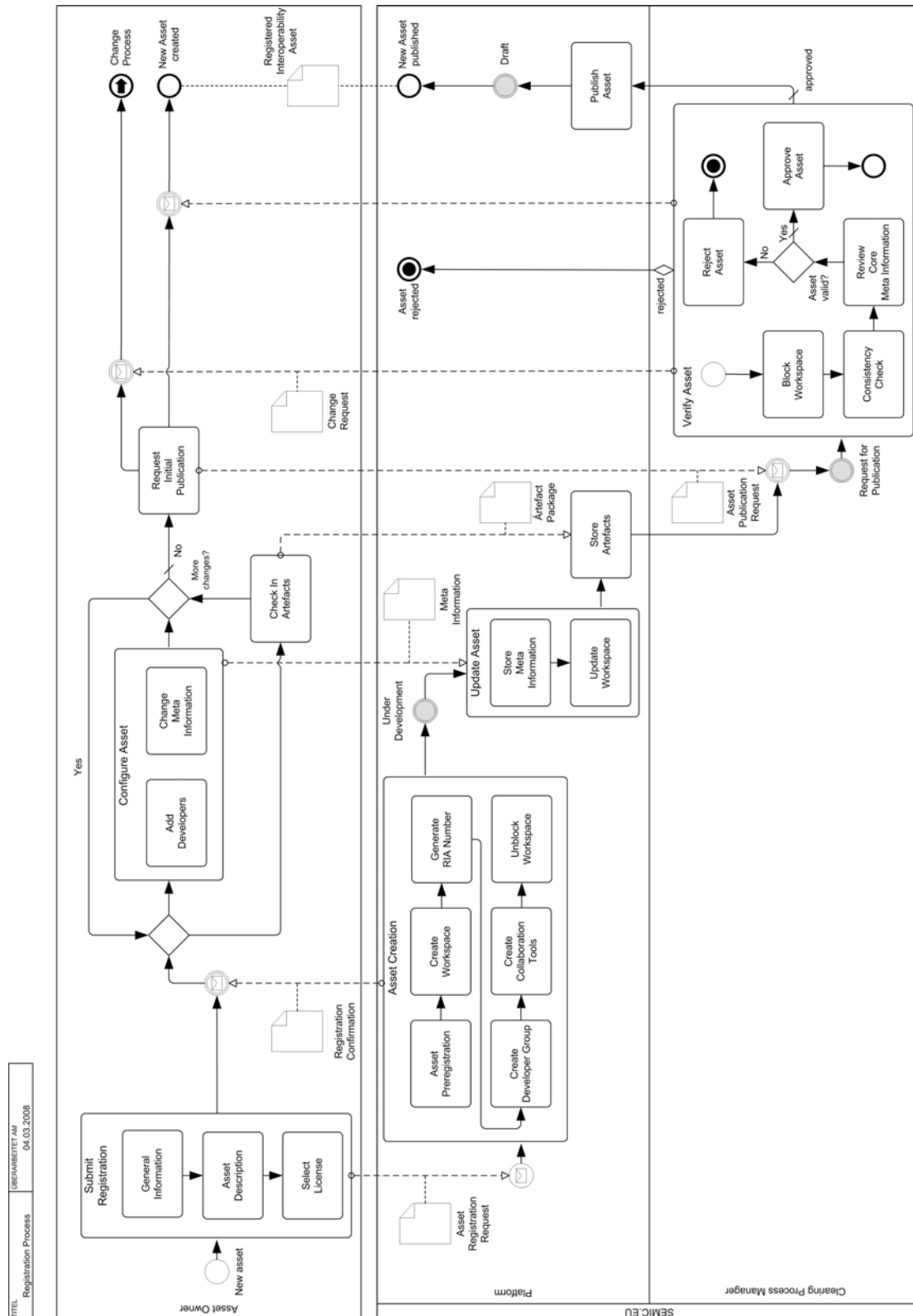
	Action	Comment	Release	State
27.	The advisory group approves starting the conformance process based on the advice by the clearing process manager.	A conformance committee will be implemented with experts from the member states and the private sector. The conformance committee reviews the final asset.	2.1.0	conformance review
28.	The conformance committee advises further change requests.	The asset owner has to fix the requested changes, which should be only small adjustments.	2.2.0	conformance review
29.	The conformance committee recommends the asset. The advisory group finally approves the conformance of the asset.	The development of the asset is finished.	3.0.0	conform
30.	A small syntax error is found in the specifications.	The asset owner is allowed to update the asset by small adjustments.	3.0.1	conform

The complete history of the final release states could be depicted as follows.

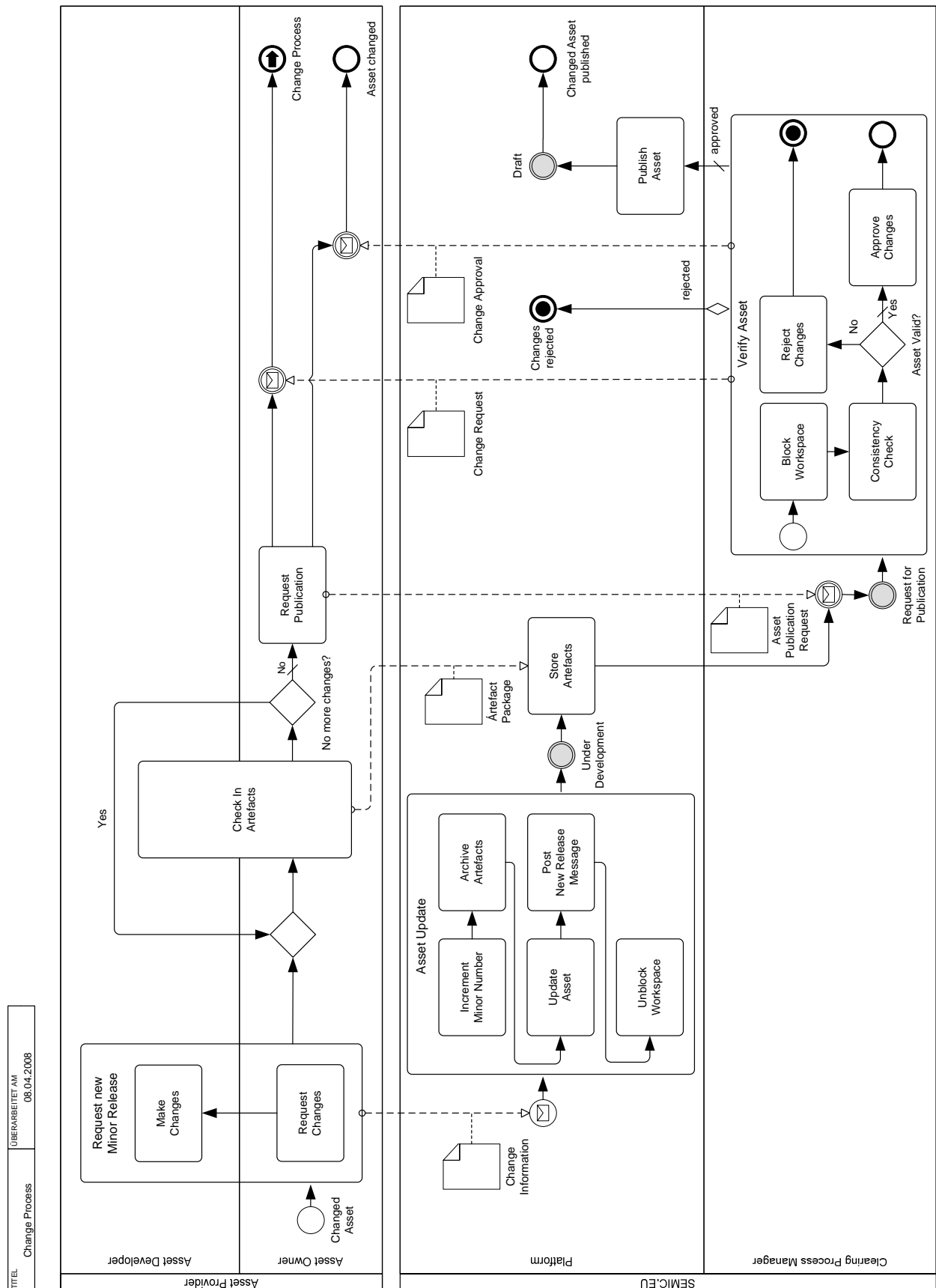
Release	State
0.1.0	draft
0.2.0	draft
0.3.0	maturity rejected
0.4.0	draft
0.5.0	maturity approved
1.0.1	mature
1.1.0	draft
1.2.0	maturity approved
2.0.0	mature
2.1.0	conformance review
2.2.0	conformance review
3.0.1	conform

Appendix D. DETAILS OF THE CLEARING PROCESS

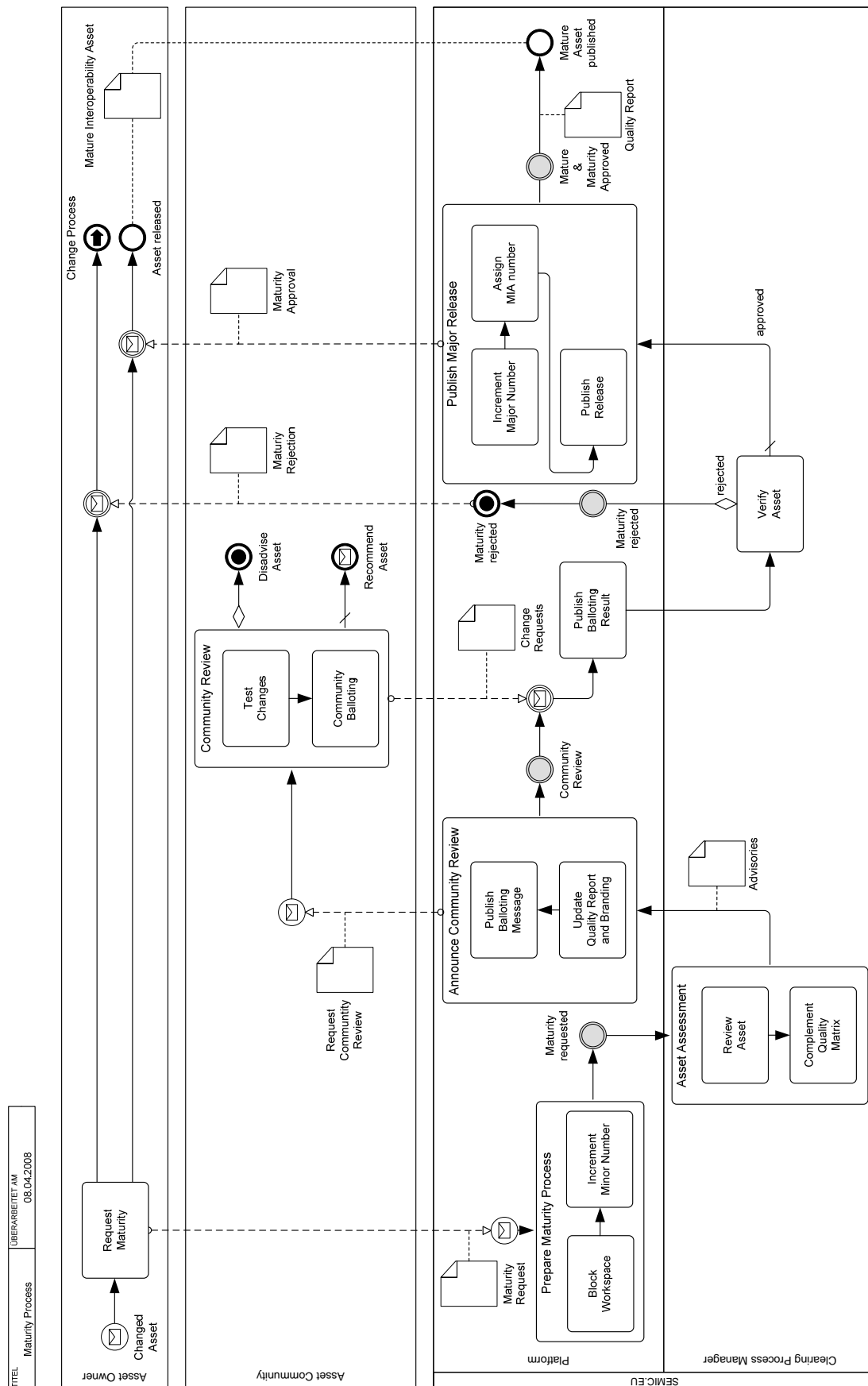
D.1. Asset Registration



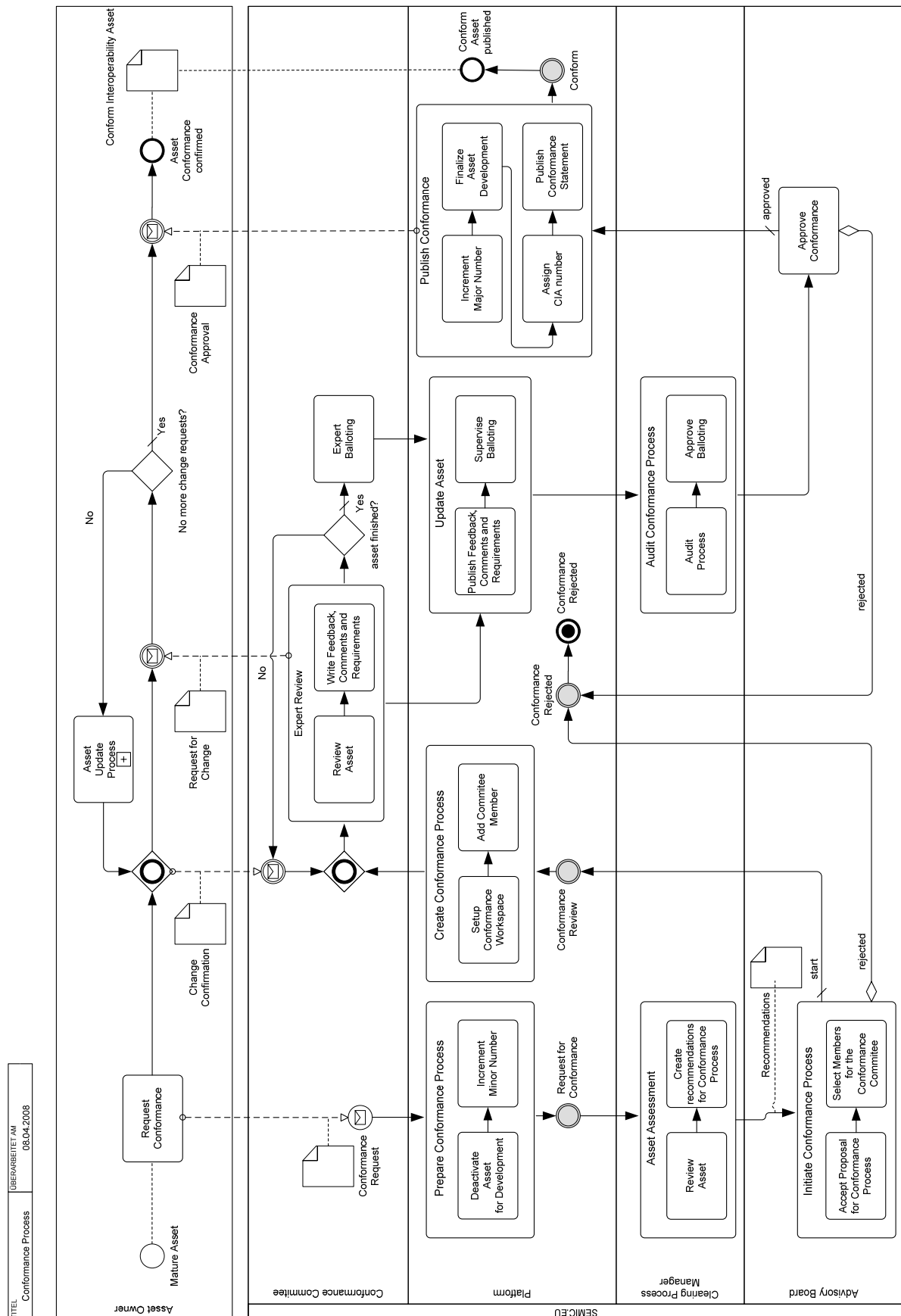
D.2. Change Process



D.3. Maturity Process



D.4. Conformance Process



Appendix E. BUSINESS PROCESS MODELLING NOTATION

The »Business Process Modelling Notation« (BPMN)²⁰ is standardised by the Object Management Group (OMG)²¹. The Scope of BPMN is defined by the OMG as follows:

“The Business Process Management Initiative (BPMI) has developed a standard Business Process Modelling Notation (BPMN). The primary goal of BPMN is to provide a notation that is readily understandable by all business users, from the business analysts that create the initial drafts of the processes, to the technical developers responsible for implementing the technology that will perform those processes, and finally, to the business people who will manage and monitor those processes. Thus, BPMN creates a standardized bridge for the gap between the business process design and process implementation.”

This short introduction to the BPMN only describes the core elements used in the graphs of this document. There are three kinds of flow elements: Activities, Events and Gateways. Activities (see figure E-1) are a generic term for work a process describes. A task describes rather detailed what should be done. Multiple tasks could be bundled as a sub-process. This is used in an overview of a process. In the detailed diagram, the task is expanded and all details are included.

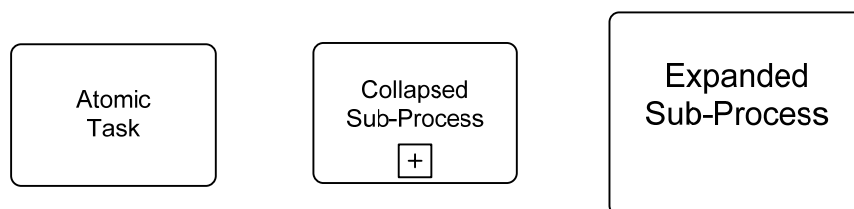


Figure E-1 – BPMN: Activities

Every process has one or more starting points and ending points. These are illustrated as events (see figure E-2). Intermediate results and waiting points are also represented as events. The type or trigger of an event can be highlighted by a symbol. An external “message” to start a process or symbolising the result is very common. A negative result is marked by a “termination” event. A “link” is used if the process is to be continued by another process. A grey coloured event represents a state transition of the asset.

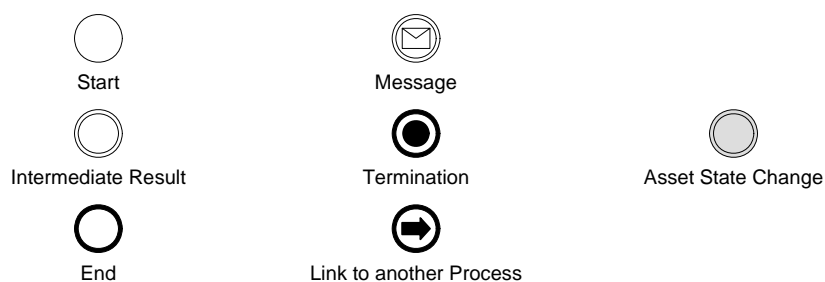


Figure E-2 – BPMN: Events

“A gateway is used to control the divergence and convergence of sequence flow” (see figure E-3). An important use case of gateways is concurrency (parallel sequence) and decisions points.

²⁰ <http://www.bpmn.org/>

²¹ <http://www.omg.org>

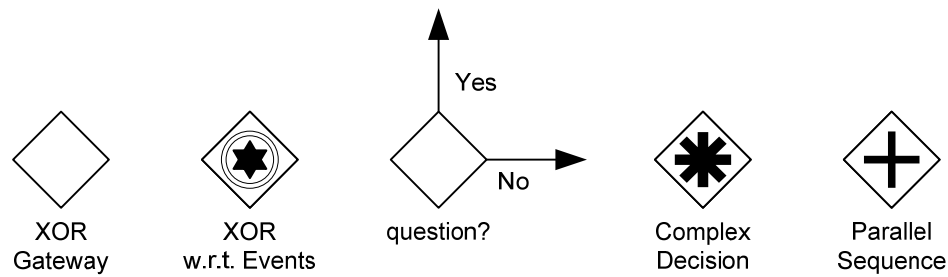


Figure E-3 – BPMN: Gateways

The events and activities are interconnected in order to illustrate the flow of information (see figure E-4). The most important connection is the sequence flow, which defines one or more paths from the starting to the ending points. The sequence flow specifies a continuous process inside a pool or a single lane. A sequence flow can be attributed by a condition or marked as the default sequence flow. The message flow describes an external collaboration between two pools or single lanes. Artefacts are used to complement a message flow to signal the exchange of data objects.

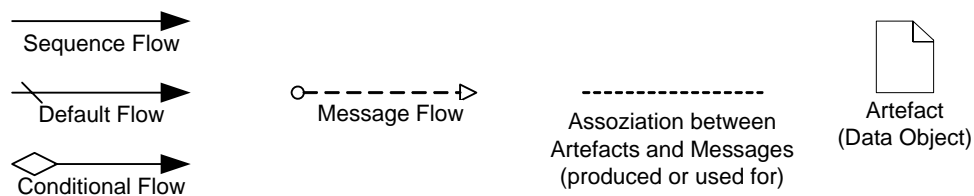


Figure E-4 – BPMN: Connections

The primary modelling elements are the lanes and the pools (see figure E-5) which are used to outline a process. A lane or pool is assigned to a role that may be a person, system or an abstract entity. A pool subsumes multiple roles and is typically a more abstract role like an organisation.

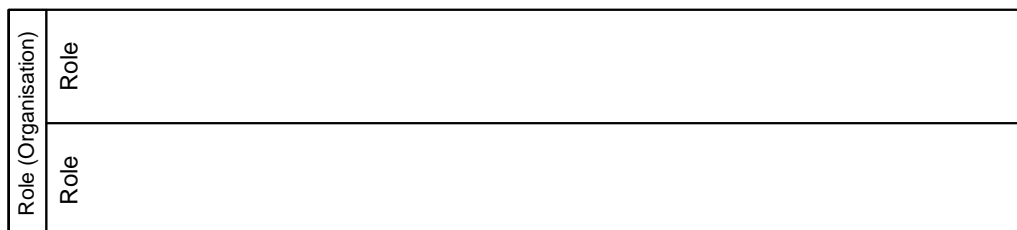


Figure E-5 – BPMN: swim lanes

Comments are written inside a bracket (see figure E.6) and attached to the related graphical object.

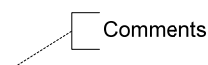


Figure E-6 – BPMN: Comments

Appendix F. FUNDAMENTAL MODELLING CONCEPTS

Fundamental Modelling Concepts²² (FMC) provides a framework to describe software-intensive systems. It strongly emphasizes the communication about software-intensive systems by using a semi-formal graphical notation that can easily be understood. FMC distinguishes three perspectives to look at a software system:

- *Structure of the system*
- *Processes in the system*
- *Value domains of the system*

FMC defines a dedicated diagram type for each perspective. FMC diagrams use a simple and lean notation. The purpose of FMC diagrams is to facilitate the communication about a software system, not only between technical experts but also between technical experts and business or domain experts.

Compositional structure diagrams depict the static structure of a system, and the relationships between system components. System components can be active or passive. Agents are active system components. They perform activities in the system. Storages and channels are passive components, which store or transmit information.²³

In this document only composition of storages are used (see figure F-1). Storage is a container for data like documents. Storage can be nested to visualise the containment, e.g. a file can be contained in a folder. The storages in a structure variance are optional components to be contained.

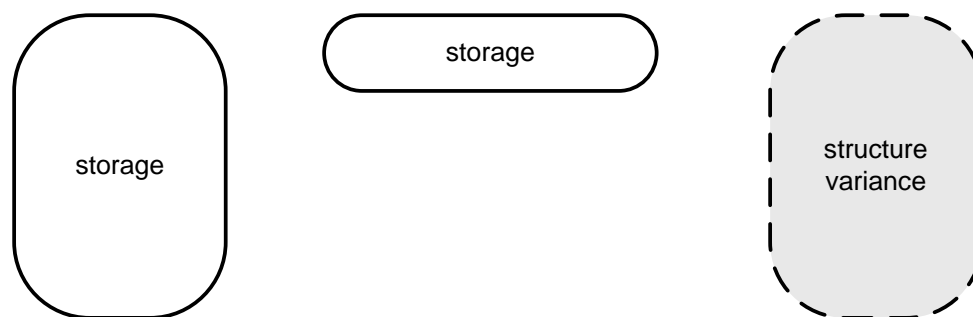


Figure F-1 – FMC block diagram: storages

²² <http://www.fmc-modeling.org/>

²³ http://en.wikipedia.org/wiki/Fundamental_modeling_concepts