

stdSEM® Overview

Date: 16. 7. 1998

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Overview of stdSEM



This part of stdSEM will provide you with an overview of the content and structure of this online manual and describes its area of application and scope.

Purpose and goal of stdSEM

- [The goal of the SEM development method](#)
- [The SEM process model](#)
- [The derived method stdSEM](#)

Contents and structure of stdSEM

- [Life cycle model](#)
- [How is a phase structured?](#)
- [Milestones](#)
- [Themes relating to multiple phases \(phase-neutral themes\)](#)
- [The structure of this "manual"](#)

Scope of stdSEM

- [stdSEM applies to: Project execution for development, solutions, services, etc.](#)
- [stdSEM does not apply to \(or applies only with restrictions to\): ...](#)

Use of stdSEM

- [Definitions of must, should and may](#)
- [How are these definitions implemented in the project?](#)
- [Must the stated subdivisions of documents always be adhered to?](#)
- [What about maintenance projects and projects where no software is developed?](#)

Differences from other manuals and procedures

- [SEM-VM, guidelines, other derived methods of SEM](#)
- [Customer-specific process models](#)
- [QM manual of Siemens AG Österreich, QA process manual of PSE](#)
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Responsibility for stdSEM

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The Goal of the SEM Development Method

The SEM[®] system development method is used as a **process model** for executing **projects** as part of the program and system development work of Siemens AG Österreich. An initial version of SEM was drafted back in 1983 and was made mandatory in this Group.

In 1993, SEM served as a basis for certifying the PSE Group in accordance with ÖNORM EN ISO 9001.

Why the need for a new SEM?

The SEM process model (SEM-VM) replaces SEM V3.0 as the PSE development method. The main reasons for the revision were:

- To reduce the gap between the development method and the projects being executed.
- To incorporate new trends and methods of software engineering.
- To provide new tools.

Many ideas for revising the model were obtained from the seminars devoted to the SEM development method and the suggestions of PSE staff.

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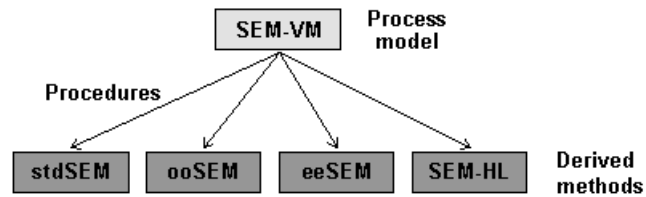


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The SEM Process Model

To put SEM more in touch with specific projects, the particular features of these various areas of applications, product classes and development paradigms must be taken into account. Various **SEM methods** are therefore supported to provide tailored development models.

In order to retain uniform general procedures, the **SEM[®] process model** was drawn up as a basis for defining the rules for the various derived methods:



- SEM-VM forms a mandatory framework for the concrete specifications and instructions for the various derived methods. **Projects** are not executed on the basis of SEM-VM, but rather using a derived methods of SEM.
- SEM-VM is currently not available on the intranet. If you are interested in the SEM-VM manual, please contact your responsible QM or PSE QM.
- SEM naturally continues to be an integral part of the QM system of Siemens AG Österreich and PSE.

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The Derived Method stdSEM

What are derived methods of SEM?

The derived methods of SEM "inherit" specific rules from the SEM[®] process model (SEM-VM) but are adapted to the specific requirements of the particular area or technology, e.g. for specific descriptions of required activities, for required documents and checklists. This brings SEM far closer to the actual project.

The following derived methods currently exist (or are in development):

- **stdSEM[®]**: A general model for developing systems
- **ooSEM[®]**: Development of systems using object orientation methods
- **eeSEM[®]**: System development method for developing electronics, firmware and ASICs
- **SEM-HL**: Development and/or procurement of software for the Semiconductor Group of Siemens AG Berlin / Munich.

What is stdSEM?

stdSEM is a general derived method of SEM-VM and is always to be used for projects where no other, more specific derived method is suitable. stdSEM can therefore be regarded as the "default derived method" of SEM.

Typical projects for stdSEM include:

- Software development projects
- Software maintenance
- Non-SW projects (such as consulting, services, development of organizational solutions, etc.)

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Life Cycle Approach

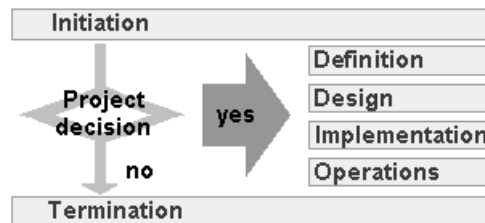
What is a phase?

Phases subdivide the entire development process into **defined sections** with verifiable **results**. They are not set arbitrarily but are determined by the content **goals** which, when reached, are reflected in the results. Each **development step** is concluded by a **test step**.

Course of a project

Projects based on SEM begin with a project kick-off at the start of the **Initiation** phase and always end with the **Termination** phase.

A **positive project decision** in the Initiation phase results in the **Definition** phase being started. This phase involves detailed project planning, processing of requirements and drawing up of the software requirements specification. If the project is to be continued, e.g. following acceptance of the tender, the further phases **Design, Implementation** and, if appropriate, **Operations** are conducted.



Frame phases

The Initiation and Termination phases are known as **frame phases**. They must always be executed. If the project decision is negative, the Termination phase can be kept short (as an absolute minimum, the reason for the negative project decision must be documented).

Execution phases

All other phases are known as **execution phases**. They must be executed using one of the five possible organization forms for phase execution (e.g. waterfall model).



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How is a Phase Structured?

Phases and subphases

Each phase is used to reach specific goals. These goals are reached by executing activities and the result obtained from these. It is often advisable to group together several activities into subphases with relevant subgoals (stdSEM proposes such subdivisions in most phases).

Note: Refer to the "Phase Orientation" section for each phase. This contains important information on goals, mandatory results and possible subphases! - You can access each Phase Orientation by clicking the gray field containing the phase name on the phase overview page.

Preconditions

Every phase has preconditions. The phase can only begin if these preconditions are met.

Activities

Every phase has activities. The activities can be grouped together within the phase to form subphases.

Results

Each phase is characterized by results, which are obtained when executing activities.

Note: The overview page of each phase sets out the preconditions, activities and results of the phase. You can access the overview page by clicking the appropriate phase in the header.

Identifying phase elements

Preconditions, activities and results of a phase can be identified by a prefixed code which provides an unambiguous reference within the phase:

- Digit 1 specifies the type: **p**roject control, **t**echnical, **q**uality assurance
- Digit 2 indicates whether this is a precondition (**V**), an activity (**T**) or a result (**E**)
- Digit 3 is a consecutive number within the phase; this numbering is two-digit for subphases.

Example: **pT2** in the Definition phase specifies project control activity number 2 (risk evaluation).

Note: The consecutive numbering does not suggest the sequence for executing the activities, nor does it imply the priority of preconditions and results! In general, however, these elements should be arranged in a more or less meaningful order in order to ensure an appropriate sequence in simple cases.



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Milestones

What are milestones?

Milestones mark significant points during the course of the project and are generally associated with important events, e.g. **'The project plan is drawn up and checked'** forms the project control milestone in the Definition phase.

When planning a project, the milestones are assigned deadlines which can be monitored well in the project checks using trend analyses. A milestone is considered reached by a project check if all the results associated with this milestone are in place.

Note: The PROCON tool used for project checks within PSE is based very substantially on project milestones.

Where can I find milestones?

Milestones must always be assigned to phases.

Milestones specified by stdSEM can:

- mark the end or an important intermediate stage of a phase, e.g. **'P1: Project enterprise decided'** in the Initiation phase.
- (rarely) also mark the start of a phase, they are then the condition for the start of the phase, e.g. **'P0: Project kick-off'** in the Initiation phase.

Identifying the milestones

Milestones are identified according to their type (project control, technical, quality assurance) and are numbered consecutively.

For example, **"P2: Project plan drawn up and checked"** represents the project control milestone for the Definition phase. Milestones in subphases have a two-digit number. Phase milestones assigned on an individualized basis within the scope of the project would then have a three-digit identification number.

Note: The overview of all milestones predefined in stdSEM can be found on the page containing the stdSEM [overview graphic](#) (click the "Overview graphic" icon on the home page).

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Themes Relating to Multiple Phases (Phase-Neutral Themes)

What are phase-neutral themes?

Phase-neutral themes do not relate directly to a phase, but rather to the entire project. The following types of such themes exist in stdSEM:

1. The **life cycle approach**, i.e. the form in which the execution phases are executed by stdSEM.
2. **General themes** which relate to several phases in the same way or cannot be uniquely assigned to a single phase.

Life cycle approach

stdSEM supports **five different forms** of life cycle approach (see the full description of **life cycle approaches**). A decision is normally made for one of these models (the most suitable) in each project.

Irrespective of this, **overlaps** are allowed in the execution phases if the final results for a phase are available and these results represent the exact preconditions for the activities to be performed in the follow-up phase (decisions on the permissibility of overlaps are taken by the project manager in consultation with the project QA manager).

General themes relating to several phases

- A detailed description of the general themes can be accessed by clicking "**Themes relating to multiple phases**" on the home page.
- However, special features also need to be taken into account for each phase, e.g. CM in the Definition phase. Consequently, every phase has a separate page which describes the specific features of this phase for all themes. Jump to the **phase overview page** and click the appropriate icon in the margin (a **green "i"**).

What phase-neutral themes are there?

PM	Project management PM consists of project planning, project checks and control (effort, deadlines, milestones, etc.), coordination, organization and administration. Effective project checks enable countermeasures to be initiated in good time if values deviate from the plan.
QA	Quality assurance Quality assurance encompasses all measures for planning and ensuring that the defined product quality is reached. These measures include reviews of documents, code analyses and checks of client-supplied products. It is particularly important that problems are identified (e.g. in the quality reports), so that appropriate measures can be taken as quickly as possible.
CM	Configuration management CM encompasses all tasks related to the orderly management of all events which occur and the items which are required in this regard (management of documents, sources, program components, error messages, etc.).
RR	Reuse and reusability RR can cut project costs considerably. It involves not only the reuse of product parts, but also methods, tools, designs, documents, data and all forms of project experiences (key word: "Patterns")!

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The Structure of This "Manual"

Why is stdSEM on the intranet?



stdSEM is primarily provided in hypertext form on the Siemens intranet. This offers you a number of distinct advantages, e.g. you always have the latest version online. Revisions, e.g. to checklists or tool pages for an activity, can be executed quickly. We also provide you with all the document templates for downloading.

The structure of stdSEM

Basically speaking, stdSEM consists of three parts: **Overview** (the part you are currently in), the description of the **individual phases** (the largest part) and **phase-neutral themes** (general description of sequences and themes relating to several or all phases).

Where
am I?

The "**Where am I?**" icon is used for describing the **detailed structure** and for better orientation. Clicking this icon takes you to a page that displays the web structure. In many cases, it will also show your current position in red. You can find this icon in the header of each page. Try it now and see what happens!

Is stdSEM also available in paper form?



Print files

Unlike SEM V3.0, stdSEM is not available in a printout folder form, but only online on the intranet. However, you can download and print out parts of the web as **pdf** or **PostScript files**. The print page can be accessed from the home page by clicking the "Print files" icon.

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stdSEM® Applies to:

Projects

stdSEM is tailored to enterprises which are executed as **projects**. Projects are one-off enterprises which are geared to achieving a specific result (project goal) and for which an execution plan, a defined time span and a defined budget are available. stdSEM is not only suitable for pure software development projects, but also for **general** projects relating to program and system development. stdSEM is mainly used for software projects, however.

What type of projects does it cover?

- ✓ Software development projects
- ✓ Software maintenance projects
- ✓ Non-software projects such as
 - Services (elaboration of training measures, elaboration of networking concepts, etc.)
 - Consulting (planned execution of consultancy services)
 - Development of organizational solutions ("orgware")
 - ... "Everything that can be planned"

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stdSEM Does *Not* Apply to:

- ✗ Enterprises which are **not projects** (e.g. irregular advice and hourly consultancy without planned preparation, error elimination on request, routine lectures, etc.).
- ✗ Projects which are better covered by **other instances** (e.g. ooSEM, eeSEM, etc.).
Activities by bodies which are only involved indirectly in projects but **do not form part of the development section**, such as
 - ✗ ● commercial sectors
 - sales sectors
 - central services sectors

stdSEM applies *with restrictions* to:

- ✗ Projects executed using **customer methods** (e.g. PEPP, SNI-PHB, etc.). In these cases, only the **frame phases** are mandatory according to stdSEM. The execution phases, however, will be dealt with exclusively using the pre-specified customer method.

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Must, Should and May - Degree of Obligation for Results

All documents and results have a specific degree of obligation in stdSEM:

must

A "must" specification is **mandatory**. Such documents and results must be produced (at the latest at the end of the phase to which they are allocated).

should

A "should" specification is **strongly recommended**. If a specification of this type is not performed in the project, a reason for this must be included in the QA plan.

may

A "may" specification is a **recommendation**. No reason is necessary if a specification of this type is not complied with. Nevertheless, you should consider whether this document or result can simply be disregarded.

Where can I find these specifications in our web?

Which results
must be produced?
must **should** **may**

Each phase has a page which lists the results with **must/should/may**.

Jump first to the phase home page (click the appropriate phase in the header of any page). Then click the "Phase Orientation" bar in the overview graphic. Finally, click the "What results must be produced?" icon on the orientation page.

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How are these Degrees of Obligation Implemented in a Project?

All phases required by stdSEM must be executed

The phases required by SEM are a **minimum requirement for standard projects** and must therefore always be executed. This naturally does not apply to special cases (e.g. if the project is aborted or if no Operations phase is required). The **frame phases** (Initiation and Termination) must always be executed.

Subphases generally constitute a group of associated activities which provide a useful subdivision for a phase (in particular technical activities which pursue specific subgoals). If required, additional subphases can be defined on a project-specific basis.

Documents do not necessarily need to comply with stdSEM requirements 1:1

The required contents must exist, but the required documents do not necessarily have to exist as individual documents. The stdSEM subdivision is seen as a proposal for "standard projects". Project execution can nevertheless deviate from this proposal if required. An example: In the case of **small projects**, it may be quite expedient to combine planning documents (e.g. project plan, CM plan and RR plan). In **large projects**, on the other hand, it may be expedient to divide up some documents into subdocuments (e.g. several detailed design specifications or test specifications). Refer to the [next page](#) for the degree of obligation of subdivisions.

The stdSEM specifications relate first and foremost to results

The stdSEM specifications relate first and foremost to **results** which must/should/may be available. It is not important when executing a phase to execute all the specifications (descriptions of activities) down to the very last word, but rather to ensure an expedient implementation in the project. The document checklists and examples should be used in particular to demonstrate the meaningfulness of measures so that the latter can be implemented - suitably adapted if necessary - in the project.

What is left as the "hard core"?

What remains are the **'must' results** as defined in stdSEM!

The "must" results which apply for each phase can be found in the Phase Orientation!

How to use additional specifications within a project

In principle, additional specifications - as far as is expedient - are possible within a project.

Method-related measures which are not required or recommended by stdSEM must nevertheless be checked to ensure non-contradiction to stdSEM and must be recorded in the project's QA plan (e.g. check of CASE tools for their suitability in meeting all the requirements made on the project configuration management).



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Must the Suggested Document Subdivisions Always be Complied With?

Subdivisions of the document templates (= results checklists)

- In all documents, only the **1st subdivision level** (heading1) **is mandatory**, i.e. it must be contained in the finished document. Should this section not be relevant, the heading must be retained and marked "not relevant".
- All other subdivision levels (heading2,...) are **recommendations** to assist you in structuring the document.
- **Blue italicized** text provides you with information on the contents of the relevant section. This text must not occur in the final document. Word for Windows templates use a special print format for this purpose (annotated content: "Kommentierter Inhalt") which you can either hide or delete globally once the work has been completed (replace function).
- **Normal text** provides you with formulation proposals which you can adopt (changed if necessary) into your document.

Example (part of the RR plan)

1 Introduction

1.1 Purpose of the document

This section must specify the general and project-specific reasons for applying reuse and reusability and must do so as specifically as possible (e.g. "substantial savings to the order of ... through standardized solution for ..."; "measures only expedient in this part of the project, since..."; "greater effort expedient, since comparable follow-up or related project, etc.". Formulation proposal:

The purpose of this RR plan is to define project-specific measures for reuse and reusability and, in doing so, to support the most efficient possible SW development. Within the framework of project <xyz>, this means in particular that...

The 1st subdivision level (heading1) is mandatory
The 2nd level (heading2) is a recommendation

The blue italicized text provides information on the content of this section. This text must not appear in the final document!

This text provides you with a formulation proposal which you can adopt (changed) into your document.



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What about Maintenance and Non-Software Projects?

Maintenance projects

A project is termed a maintenance project if it involves performing work on an existing product. There can be three reasons for changing an existing product:

- Eliminating **errors**
- Performing **functional changes** (extensions, adaptations)
- Performing **non-functional changes** (porting, optimizations).

Virtually all maintenance projects are dealt with using the evolutionary development model. Each shipment results in a new product version (following error elimination, incorporation of change requests or optimizations). Since a maintenance project is always based on an existing product, the software code is accompanied by documents generated during earlier versions.

What about maintenance projects?



Every phase contains information which is particularly relevant for maintenance projects in this phase. To obtain information, simply click the "What about maintenance projects?" icon on the Phase Orientation page (can be accessed from the Phase Overview).

Non-SW projects

All activities and results required by stdSEM must also be applied for non-SW development work (services, consultancy, orgware, etc.; the eeSEM instance exists for HW development). This can be applied directly for some activities (e.g. kick-off activities, reviews, etc.). With other activities and results, however, the requirements as per stdSEM must be applied **analogously** (e.g. specifications, tests, etc.).

What about non-SW development?



Every phase contains information which is particularly relevant for non-SW projects in this phase. To obtain information, simply click the "What about non-SW development?" icon on the Phase Orientation page (can be accessed from the Phase Overview).

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SEM-VM, Guidelines, Other Derived Methods of SEM

SEM-VM

The **SEM[®] process model** (SEM-VM) prescribes general rules which must be observed when producing a derived method of SEM. Consequently, the SEM-VM is not suitable as a development method when executing **specific PSE projects**. The **derived methods of SEM are provided for this purpose!**

Other derived methods of SEM

In addition to stdSEM[®], other derived methods also exist (or are being developed) for the following areas of application:

- **ooSEM[®]**: Development of systems using object orientation methods
- **eeSEM[®]**: Development of electronics, ASICs, firmware and loadware
- **SEM-HL**: Development and/or procurement of software for the Group HL OI of Siemens AG Berlin / Munich.

If the relevant area of application of the derived method applies to the specific project, this method is selected right at the start of the project and is used for executing the project.

Guidelines

Guidelines are concise practical instructions for selected aspects of the process model (a complete listing of all available guidelines can be found on the → [QM page: Manuals and Guidelines](#)).

Guidelines contain information on the methods, processes and tools to be applied as well as proposals for document contents and checklists, etc.

Two examples of guidelines:

- SEM Guideline "Project Initiation", V 1.0 (→ [Hypertext version](#)) / (→ [ini-l-10.doc](#))
- SEM Guideline "Reviews", V 1.0 (→ [Hypertext version](#)) / (→ [rev-l-10.doc](#))



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Customer-Specific Process Models

What are customer-specific process models?

It is frequently the case in Siemens AG PSE that projects are executed using development methods specified by the customer / client. This is a reflection of many clients' wish to employ uniform standards throughout all their projects. Popular customer-specific process models include SEPP, SNI-PHB, SNI-MHB, etc.

If the client requests the compliance of specified development methods, we must naturally adhere to these. Two things must be taken into account, however:

1. The frame phases are nevertheless mandatory

Even if the customer-specific methods are used, the **frame phases** (Initiation and Termination) required by SEM must be executed. Each project must be initiated and terminated by us, even if the customer does not request this.

2. The QA plan is always mandatory

Even if a customer-specific development method does not explicitly require a QA plan, we must nevertheless **draw up a QA plan**. This is done in our own interests and to reinforce our results (irrespective of the fact that this is a requirement of our QM system).

The QA plan must always set out the mandatory nature of the customer method and refer to the external quality documentation.

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QM Manual of Siemens AG Österreich, QA Process Manual

QM manual

The QM manual of SAGÖ describes the *quality policy and structure of the QM system* operated by Siemens AG Österreich. The manual is of modular design and is available → [online](#).

QA process manual

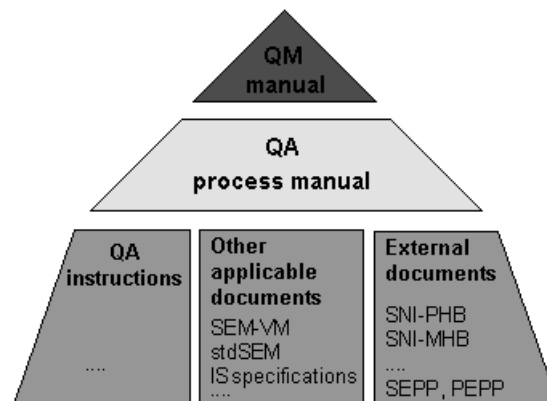
The QA process manual of SAGÖ has the same structure as the QM manual and contains **QA process instructions** which apply for all areas of SAGÖ (SAGÖ part) and those which are PSE-specific (QA process manual, PSE part). It must be complied with (mandatory) throughout SAGÖ / PSE. The PSE-specific process instructions are available from PSE QM → [online](#).

Other applicable documents, QA instructions, external documents

The bottom level in this hierarchy of QA specifications is occupied by the "other applicable documents", QA instructions and external documents:

- **Other applicable documents** generally consist of detailed descriptions or additional procedures for the QA process instructions. SEM has the status of an "other applicable document"; other examples include the IS specifications and the audit process manual.
- **QA instructions** are drawn up in the organizational units (Division / Business Unit / Group / Project, etc.) and are used for the practical concretization of superordinate QA process instructions. They are mandatory for the scope defined in the QA instructions.
- **External documents** forming part of the QA specifications include customer-specific process models (SEPP, PEPP, SNI-PHB, etc.). The extent to which these documents are mandatory must be set out in the QA plan.

Graphic representation of the hierarchy of QA-specific specifications (example, with external links in some cases):



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Area-Specific Procedures

In addition to the area-neutral procedures set out in the QM manual and QA process manual, there are a large number of **area-specific rules** and process instructions which may need to be taken into account during project execution (an area can be a Business Unit of the PSE, a Division or the entire PSE). A number of important examples include:

- **Area-specific QA instructions:**
These are used for the practical concretization of superordinate QA process instructions (e.g. for executing reviews of tenders in the area).
- **Area-specific guidelines:**
These relate to concrete rules for dealing with general themes such as **information security** or **data backup, ordering/procurement** etc.
- **PSE notes:**
These are issued on a whole range of themes and relate to both procedures on general themes such as organization plans, work plans, quality goals, expense accounts and to procedures for project-relevant themes such as:
 - **SEM releases**
 - **Executing cross-departmental projects**
 - **Project controlling**
 - **Order sheets**
 - **Charging rates**
 - **etc.**

Most of these procedures are already available online (via the → [QM home page](#) and then further to the -> QM system).



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Responsibility for Publishing

Responsible for content:

Quality Management Circle in PSE (QM Circle).

Responsible for publishing:

Management of PSE QM (Mr. Held, PSE QM)

Author:

SEM Circle (Circle spokesman: Mr. Tippold, PSE KB 1)

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Maintenance and Upkeep of stdSEM

Who is responsible for the upkeep of stdSEM?

The upkeep and further development of stdSEM is commissioned by PSE QM (responsibility for upkeep lies with PSE QM QI). At the current time, PSE KB1 has been commissioned with development and upkeep (for contact persons, see the footer on each page).

Announcement of new versions

New versions will be released by PSE QM and announced in the PSE-internal media.

Help us to help you!

If you have any criticism or suggestions for further development, please contact us by e-mail (contact persons at the foot of each page). The great advantage of an electronic manual lies in the fact that changes and expansions can be made with ease.

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