Core Curriculum for SE-ZERT® Level B

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Foreword

The "Certified Systems Engineers (GfSE)®" training according to the regulations SE-ZERT® program provides participants with a solid background in the theory and concepts and processes of systems engineering according to international standards. It provides the necessary knowledge for the practical work of a Systems Engineer and gives ample opportunity for hands-on experience. Upon completion of the course and a successful examination, participants receive the "Certified Systems Engineer (GfSE)® Level C or Level D" certificate of the SE-ZERT® program. The SE-ZERT® program is represented by a group of appointed SE-ZERT assessors, which is located within the independent and non-profit Society for Systems Engineering e.V. (GfSE).

The Systems Engineer certification is offered in 4 levels (Level D to Level A). This document describes for training providers and participants the content specifications in the form of training modules for level B.

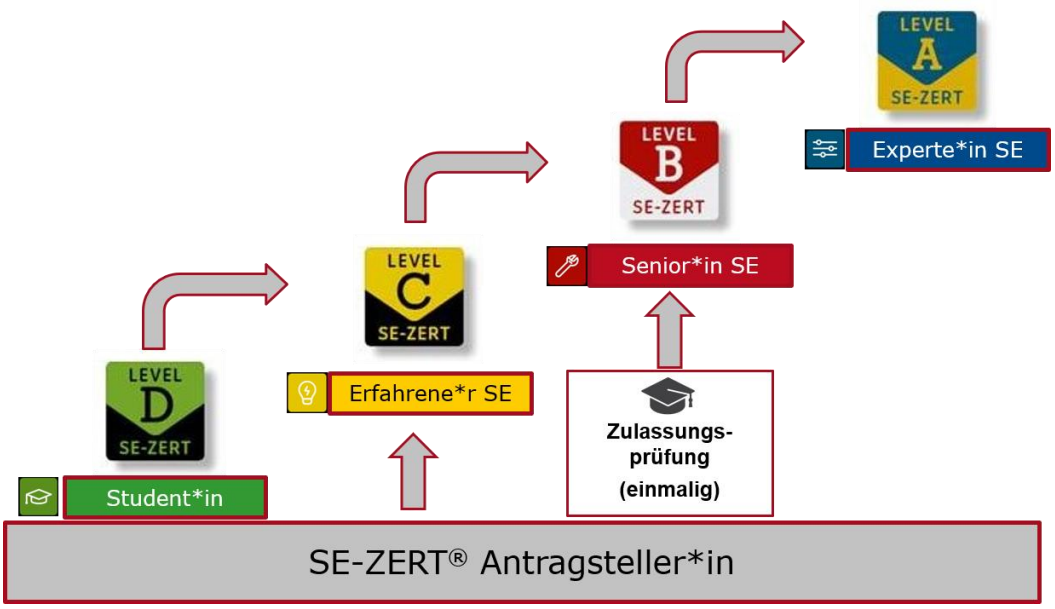

Figure 1: The path to becoming a "Certified Systems Engineers (GfSE)®".

The courses offered by the course providers and accredited universities can be in German or English. The INCOSE Handbook and the applicable norms and standards of systems engineering apply to the English and German language training.

Changes:

Wann	Was	Version:
04.10.2024	Rework Systems Engineering Handbook Fifth Edition	01

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1. Structure of the core curriculum for SE-ZERT®.

The "Certified Systems Engineers (GfSE)®" training is divided into 9 modules (see Table 1). The module contents of the SE-ZERT® are the same for all levels of the SE-ZERT®. However, according to the selected level (A, B, C or D) the competence requirements are different. An overview of the process and procedure is described on the homepage or the respective examination regulations. In this document, the learning objectives for level B are listed.

Table 1: Modules of the SE-ZERT®

	Modules
1	Fundamentals of Systems Engineering (incl. introduction)
2	Interproject interfaces
3	Interfaces of Systems Engineering to Project Management
4	Systems Engineering Management
5	Requirements management and validation & verification
6	Realization processes
7	Cross-cutting functions[1] within development projects
8	Consideration of operational aspects and decommissioning in the design
9	Conflict management and social competence

[1] Cross-cutting functions = subject-related engineering activities (cf. GfSE SYSTEMS ENGINEERING HANDBOOK)

2. Scheme of the module descriptions

The description of the modules was made in a schematized form. Each module is structured in a tabular form, which have the following contents:

- Qualification of the participant
- Suitable learning form (lecture, exercise, seminar)
- Learning objectives (knowledge & skills)
- Course content and depth
- Teaching materials, literature recommendations
- Examination performance
- Other

The arrangement of the contents in the module handbook does not necessarily determine the order of treatment in the course. The listed contents (especially methods) are components of the training and shall be included in the courses.

3. Description

The on-the-job training to become a "Certified Systems Engineers (GfSE)®" offers participants the opportunity to develop process-related and content-related competencies in the field of systems engineering. The course is based on the participant's perspective and is oriented towards the interests and learning requirements of the participants. The appropriately designed course lets the participants explore the situations and helps them gain experience using various learning methods. In this way, a sustainable conceptual network is acquired and provides confidence in solving tasks and problems.

The task of the course for the acquisition of the certificate level B is to perceive and further the competence development of the participants and to achieve a maximum of independence in the processing of questions as well as independence from pre-structured aids.

The areas of competence required for certification, except for a general introductory area (SE in context), are based on the technically oriented competences that are to be applied in each project. In addition, there are the areas of project management, the cross-cutting functions and soft skills. For teaching the technically oriented competencies, the corresponding sections from ISO/IEC 15288 [6], the interpretation from ISO/IEC 19760 [7], the terminology from ISO/IEC/IEEE 24765:2010 [8] and the current German-language INCOSE manual [1] are mainly used.

The standard ISO/IEC/IEEE 15288 is a process-related standard that internationally forms the basis of systems engineering activities. The implementation of process-related competencies is therefore a key objective of the course. The process-related competency areas comprise the procedures, knowledge, skills and abilities that the participants are expected to understand and apply for level C and D. The participants are expected to understand and apply the procedures, knowledge, skills and abilities that the participants are expected to understand and apply for level D. In this way, the participants should be enabled to apply the knowledge they have learned in everyday company life.

Since a systems engineer usually has to perform his tasks in a project in interdisciplinary teams according to his technical tasks, the promotion of social and personal skills is also important. For this purpose, standards of project management [48], the publications of the GPM [49], as well as literature of the moderator training [2] are used.

For the acquisition of process as well as social and personal competencies, course forms with a variety of methodological elements are used according to the situation. Group and project work are indispensable to promote independent exploration, problem solving, documentation and presentation. The degree of openness of the work assignments is adapted to the learning level of the learning group: in familiar contexts rather open, in complex contexts rather structured.

4. Overview on SE-ZERT®

The 3 core curricula for the SE-ZERT®, level D/C, B and A, have a common basic structure: they identify content-related and process-related areas of competence that are linked to each other. The core curricula of the SE-ZERT® take up this basic structure under subject-specific aspects. The intended didactic approach of the respective module becomes clear through the choice and composition of the competence areas. Within the framework of the SE-ZERT® Level B, the following knowledge is imparted:

- In-depth knowledge of systems engineering and systems engineering management.
- Know, understand and use symbolic or technical language,
- Understand and use subject-specific methods and procedures to gain knowledge,
- Ability to participate in systems engineer tasks and assume appropriate technical responsibilities.
- Ability to participate in multidisciplinary SE teams.

For each module element, a competence level is defined, which determines the level of knowledge that participants should have in the respective element (understand, apply, master) after completing the course.

Table 2: Overview of the definitions for the competence levels for knowledge transfer

Competency level	Interpretation
master	Can apply, delegate, control, evaluate and communicate the procedure himself/herself
apply	Can understand and apply the process in its entirety
understand	Knows the term and can classify it in the appropriate SE area
N/A	Not applicable

The learning objectives for the individual module elements differ according to the defined competence levels. The expressions used and their understanding are uniform for the SE-ZERT® program:

- Understand:
  - This requirement area includes the reproduction and direct application of basic concepts, phrases, and procedures in a delineated area and repetitive context.
  - Possesses knowledge in the relevant SE area and can assign it
  - **Objective:** In this area, the tasks (in daily work and in the examination) are limited to the reproduction and application of simple facts and technical methods, the presentation of facts in a prescribed form, and the presentation of simple references.
- Apply:

- This requirement area involves working through known issues by linking knowledge, skills, and abilities acquired through exposure to SE in a variety of areas.
- Possesses knowledge in the relevant SE field and is able to apply this knowledge
- Applies common SE methods, or techniques, and can summarize and present the results of project work in a meaningful way
- **Objective:** In this area, the tasks require the reorganization and transfer of more complex facts and subject methods, the application of forms of communication appropriate to the situation, the reproduction of evaluation approaches, and the creation of moderately complex references.

- Master:

  - This requirement area includes the processing of complex situations with the aim of arriving at one's own problem formulations, solutions, justifications, conclusions, interpretations or evaluations and communicating these to others.
  - Is able to lead and direct the implementation and use of SE methods, techniques, tools, guides, and policies.
  - **Objective:** In this area, the tasks require the solution-related application and transfer of complex facts and subject methods, the selection of forms of communication appropriate to the situation, the creation of references and the evaluation of facts, as well as the ability to self-reflect.

5. Description of modules and module parts

The following tables describe the required competencies in detail. If individual competencies require competency levels that deviate from the general definition, this is indicated.

Module #1

Table 3: Description Module 1 - Introduction to Systems Engineering for SE-ZERT® Level B

Module #1	**Systems Engineering Introduction for SE-ZERT® Level B**
Qualification	Cf. [3] paragraph 4.2
Appropriate learning form	Lectures and excercises
Learning objectives (knowledge; skills)	The participants should get an insight into the course and the certification according to SE-ZERT®. In addition, the schedule and the SE project to be worked on are to be coordinated with the participants and the registration documents for the certificate of competence are to be gone through. For this purpose, the material will be presented in an overview and the level of knowledge of the participants will be determined. The international terms of SE (product versus system; systems engineering; system of systems) and the definitions of systems engineering must be understood. The procedural models of systems engineering must be understood, and the appropriateness of models must become assessable. The roles of a Systems Engineer in a moderately complex development process must become understandable and assumable. The Certification Level - B must understand the relevant international systems engineering standards (ISO/IEC/IEEE 15288) and be able to adequately identify and use industry standards (aerospace industry, rail industry, medical industry, automotive industry, etc.).
Recommend reading	[1]; [4]; [10]; [19]; [20]; [21]; [29]; [42]; [43]
Other	N/A
Required examination	Participation in the test for the acquisition of the certificate level B

Teaching content and depth	**Competency-level**
• Objective of SE ZERT® program	to apply
• Course and certification overview	to apply
• Context diagram and IPO format	to understand
• Standardized definitions of terms and used abbreviations	to master
• Definition of System, Systems Engineering and System Life Cycle	to master
• Systems Engineering Context & Concept	to master
• Early integration of evidence	to master
• Competencies and Relationships in Systems Engineering	to apply
• Systems Engineering value proposition	to understand
• Life cycle models in Systems Engineering	to apply

• Characteristics and control of the life cycle	to apply
• History, evolution and future of Systems Engineering	to understand
• Domain specific application of Systems Engineering	to apply
• Differentiation of Architectural Frameworks	to apply
• Dealing with different types of systems (technical, organizational, natural, …)	to apply

Module #2

Table 4: Description Module 2 - Interproject interfaces

Module #2	**Interproject interfaces**
Qualification	Cf. [3] paragraph 4.2
Appropriate learning form	Lectures and excercises
Learning objectives (knowledge; skills)	Legal and technical framework conditions of a product development must be understood. Typical business process and business goals in the SE context must be understood as well as the necessary processes. The environment of a project must be recognized, and the technical project control must be understood in order to be able to participate in the development of project infrastructures. The processes for life cycle management, infrastructure management and project portfolio management must be understood in an applicable manner.
Recommend reading	[1]; [4]; [11]; [12]; [47]
Other	N/A
Required examination	Participation in the test for the acquisition of the certificate level B

Teaching content and depth	**Competency-level**
• Corporate processes	to apply
• Overview of Systems Engineering relevant standards	to apply
• Operational goals as drivers of Systems Engineering Processes	to apply
• Tailoring processes to project goals	to apply
• Assesment and continuous improvement of projects and processes	to apply
• Project infrastructure	to apply
• Identification of new business areas	to apply
• Business strategy	to apply
• Project objectives and project results	to master
• Project interfaces	to apply
• Project accomplishment	to apply
• System embedding in the process environment	to apply
• Patents	to apply
• Product liability	to master
• Export laws	to master

Module #3

Table 5: Description Module 3 – Interfaces of Systems Engineering to Project Management

Module #3	**Project Management Interfaces**
Qualification	Cf. [3] paragraph 4.2
Appropriate learning form	Lectures and excercises
Learning objectives (knowledge; skills)	Projects should be managed jointly by PM and SE. However, in individual cases, especially for small projects, these roles can also be combined in one person. In order to be able to bring technical competence into these roles, the technical goals of a project must be fully understood and "technical management processes" must be applicable. The ability to classify projects technologically and to draw the necessary conclusions is a prerequisite for this. For this, the minimum SE processes and their products must be understood and the necessary project infrastructure must be able to be developed. The project planning process; the project evaluation process and the project control process, information management and measurement of process results must be understood. Sound knowledge of the necessary project documentation must be available and the process impacts towards the customer(s) or supplier(s) (acceptance, impact of changes, reviews) must be understood and appropriately applied.
Recommend reading	[1]; [4]; [22]; [23]
Other	Discuss definition and contents of TM (technical management)
Required examination	Participation in the test for the acquisition of the certificate level B

Teaching content and depth	**Competency-level**
• Scope of a project	to apply
• Goals of a project	to master
• Project Structure Plan (PSP, WBS)	to master
• Work packages	to master
• Schedule and budget	to apply
• Project plans	to apply
• Resources, roles, competences and responsibilities	to apply
• Project release	to apply
• Project assessment	to apply
• Reviews and milestones, including acquirer and supplier aspects	to master
• Changes and modifications, including acquirer and supplier aspects	to master
• Corrective actions, including acquirer and supplier aspects	to master
• Preventive actions	to master
• Project closure	to master
• Communication strategy	to apply

• Information distribution	to master
• Information storage	to master
• Definition of adequate measures	to master
• Progress reporting	to master
• Assessment and communication of measures	to master
• Technological classification of a project	to apply
• Planning of Systems Engineering processes	to apply

Module #4

Table 6: Description Module 4 - Systems Engineering Management

Module #4	**Systems Engineering Management**
Qualification	Cf. [3] paragraph 4.2
Appropriate learning form	Lectures and excercises
Learning objectives (knowledge; skills)	The foundations for effective SE management are the processes and products of SE management and technical management. They and the core elements of the configuration management process, the decision management process and the risk management process must be applicable. The capabilities to define baselines and, if necessary, to define consequences for the product development are further elementary parts.
Recommend reading	[1]; [4]; [9]; [10]; [13]; [14]; [15]; [16]; [25]; [26]; [27]; [28]; [36]; [44]; [45];
Other	Configuration Management Plan (CMP), Risk Management Plan (RMP), Systems Engineering Plan (SEP) or Systems Engineering Management Plan (SEMP)
Required examination	Participation in the test for the acquisition of the certificate level B

Teaching content and depth	**Competency-level**
• Types of patterns	to master
• Use of biomimicry	to apply
• Product Line Engineering (PLE)	to apply
• Dealing with different types of systems	to apply
• Modeling methodologies for systems	to apply
• Team leadership in different development methods	to apply
• Added value of Systems Engineering in various industries	to apply
• Decision strategy	to master
• Assessment of alternatives	to master
• Decision recording	to master
• Risk profiles	to master
• Risk identification	to master
• Quantitative risk analysis	to master

• Risk management strategy	to master
• Configuration management & control taking into account different domains	to master
• Configuration control cycle - validation - evaluation - verification - release	to master
• Configuration documentation	to master
• Baselines	to master

Module #5

Table 7: Description Module 5 - Requirements Management and V&V

Module #5	**Requirements Management and Validation & Verification**
Qualification	Cf. [3] paragraph 4.2
Appropriate learning form	Lectures and excercises
Learning objectives (knowledge; skills)	Deriving and securely structuring requirements is a basic prerequisite for a low-risk project and promising architectures. The necessary information can be obtained from scenarios, end-user definition, system boundary definition, etc. The tools for analysis and synthesis for this (structured analysis, system modeling language) must be understood and applied. The preparation and position of comparative studies must be understood and able to be implemented. To cooperate in the definition of design aspects and verification (V &V), the development steps from conception to functional structures to a physical architecture must be understood and be able to be implemented appropriately. Likewise, the definition of interfaces (logical & physical & organizational) and their description must be able to be applied appropriately.
Recommend reading	[1]; [4]; [29]; [30]; [31]; [32]; [37]; [46]
Other	TSA (Traditional Structured Analysis), MSA (Modern Structured Analysis), UML (Unified Modeling Language), SysML (System Modeling Language), FFBD (Functional Flow Block Diagram), IDEF0 (Integration Definition for Function Modeling), N-squared Diagram, operational view, functional view, physical view, Domain Diagrams, use cases, MBSE (Model Based System Engineering), Performance Models, Design Models, Physical Models, Kano Diagram, Key Performance Parameters, TPM (Technical Performance Metrics), MOE (Measure of Effectiveness), QFD (Quality Function Deployment), RVTM (Requirements Verification and Traceability Matrix), Decision Tree, Environmental Impact Analysis, Interoperability Analysis

Required examination	Participation in the test for the acquisition of the certificate level B
Teaching content and depth	**Competency-level**
• Stakeholder identification and analysis	to apply
• Requirements analysis	to master
• Types of Requirements o Functional requirements o Performance requirements o Quality requirements o Constraints	to master
• Define and management of Requirements	to master
• Requirements for requirements	to master
• Traceability of requirements	to master
• Identification and consideration of constraints	to master
• Feasibility analysis	to master
• Identification of scenarios	to apply
• Creation of Life Cycle Concepts documents	to apply
• End user description	to apply
• Definition of functional boundaries	to apply
• Derivation of functional requirements	to master
• Definition of performance requirements	to master
• Identification of applicable standards	to master
• Identification of the system of interest, system boundary, system context (operating environment, external systems) and system elements	to apply
• Identification of interfaces and interaction at the system boundary and between the system elements	to apply
• Consideration of design aspects o implementation o operation o transition o maintenance o disposal	to master
• Definition of verification criteria	to master
• Derived requirements	to master
• Definition of non-functional requirements	to master
• Impact of non-functional requirements on system design	to master
• Allocation of requirements to System Elements	to master
• Strategies for requirement analyses	to master
• Structured analysis	to master
• Development of functional, technical/physical architectural views	to master
• Synthesis – derivation of technical/physical architecture from functional architecture	to master

Relationship between functional architecture and the physical elements (off-the-shelf)	
• Identification and assessment of the influence of constraints on the system architecture definition and design definition	to master
• Trade studies	to master
• Transforming stakeholder needs into technical descriptions	to master
• Define solution spaces of different architectural designs (alternatives)	to master
• Methods of system design in different life cycle phases	to master
• Creation of a system integration strategy, taking into account appropriate integration approaches	to master
• Baselines and configuration management at the system level	to master
• Leading the requirement definition and design processes	to master

Module #6

Table 8: Description Module 6 – Realization Processes

Module #6	**Realization Processes**
Qualification	Cf. [3] paragraph 4.2
Appropriate learning form	Lectures and excercises
Learning objectives (knowledge; skills)	The realization process requires that the knowledge and skills for the development phases can be applied from detailed design to implementation, integration, verification & validation to handover. The methods and standards of verification (V&V) and commissioning of the product up to the final acceptance/handover by/to the customer and the legal consequences thereof should be understood and implemented. Configuration management and corrective action are indispensable means of achieving the ultimate goal of a product that meets the requirements. The activities of the QM must be able to be applied appropriately to cover safety-relevant aspects and product liability claims.
Recommend reading	[1]; [4]; [29]; [30]; [31]; [32]
Other	Discuss Training Needs Analysis (TNA)
Required examination	Participation in the test for the acquisition of the certificate level B
Teaching content and depth	**Competency-level**
• Design definition	to master
• Implementation strategy	to master
• Configuration management	to master
• User training	to master
• Realize of system elements	to master
• Quality assurance	to master

• Verification and validation of system elements	to master
• Interface requirements	to master
• Verification and validation of system element interfaces	to master
• Interface control documents (ICDs)	to master
• Verification procedures	to master
• Verification enabling systems	to master
• Verification methods	to master
• Verification process	to master
• Requirements verification and traceability matrix (RVTM)	to master
• Corrective actions	to master
• Validation procedures	to master
• Validation enabling systems	to master
• Validation methods	to master
• Final approval of system	to master
• Operational environment	to master
• Approval of installation and verification	to master
• V&V during lifecycle phases	to master
• System Integration, Verification and Validation (SIVV) Plan	to master
• "Building the right system" and "building the system right"	to master

Module #7

Table 9: Description Module 7 – Cross-Cutting Functions

Module #7	**Cross Cutting Functions**
Qualification	Cf. [3] paragraph 4.2
Appropriate learning form	Lectures and excercises
Learning objectives (knowledge; skills)	Product characteristics such as maintainability, reliability and flexibility significantly determine the usefulness of the product for the end user. The necessary methods and tools must be understood (FMECA, FTA, SSA). In order to be able to reliably understand the effect of further performance characteristics (handling of the product by the operator/user, EM hardening, costs, safety) on the system design and system design, the SE must have sufficient applicable knowledge in other specialist disciplines. The type of product production creates requirements for the system design, which must be competently introduced into the right phases by the SE. During the operational operation of a product, the SE must be able to understand and classify customer feedback in order to be able to evaluate the performance of the delivered product in operational operation.
Recommend reading	[1]; [4]; [9]; [17]; [33]; [38]; [39]

Other	FMECA, Level of Repair Analysis, LSA, System Security Analysis, System Safety Assessment, LCC, TCO, Safety & Health Hazard Analysis, Design-to-Cost, Value Engineering, LCCA (Life Cycle Cost Analysis), Usability Analysis, Manufacturing & Producibility Analysis, LL
Required examination	Participation in the test for the acquisition of the certificate level B

Teaching content and depth	**Competency-level**
• Maintainability and supportability	to master
• Affordability	to apply
• Cost benefit analysis	to apply
• Disposability	to apply
• Packaging, handling, storage and transportation (PHS&T)	to apply
• Producibility	to master
• Flexibility, standardization and interoperability	to apply
• Reliability and availability	to master
• Resilience, survivability, vulnerability	to master
• Analysis methods	to master
• Ergonomics	to apply
• Environmental impact	to apply
• Human systems integration (HSI)	to apply
• Workforce	to apply
• Mass Property Engineering (MPE)	to master
• Modelling, simulation and prototypes	to master
• Digital twin in life cycle phases	to master
• System Safety Engineering	to master
• System Security Engineering	to master
• Loss-Driven-Systems Engineering	to apply
• Maintainability analysis	to master
• Life cycle costs	to master

Module #8

Table 10: Description Module 8 – Operational aspects and disposal in design

Module #8	**Consideration of Operational Aspects and Decommissioning in the Design**
Qualification	Cf. [3] paragraph 4.2
Appropriate learning form	Lectures and excercises
Learning objectives (knowledge; skills)	The basis of all activities of a company is its operating strategy, which must be considered accordingly in system designs. The analysis of the

	future operating data of the product and the planned maintenance strategy, as well as the disposal of the product, can lead to design restrictions and must be considered in the system design. Necessary consumables (e.g., oils, batteries) can influence the system design and make the operation and disposal (e.g., deactivation, further use and/or reuse) at the end of product use considerably more complex. In-house developments are not always useful or necessary. Selection and monitoring of suppliers for system elements or partners are therefore indispensable. A product delivery is not only of a technical but also of a legal nature (transfer of ownership). The actions planned at the beginning of the project at the end of the project (e.g., preparation of the end user support, completion of the configuration) are therefore of great importance for a company.
Recommend reading	[1]; [4]
Other	ISO9000 and following; Audits (different from reviews etc.); Difference in configuration control (serial number / order); Supply chain aspects, procurement; Quality Management Plan
Required examination	Participation in the test for the acquisition of the certificate level B

Teaching content and depth	**Competency-level**
• Operation strategy	to apply
• Assessment of operation data	to apply
• Impact of consumables to operation and maintenance	to apply
• Handling user feedback and tracking of system performance	to master
• Maintenance strategy	to master
• Constraints from maintenance aspects	to master
• Failures during operation	to master
• Capture effectiveness and performance.	to master
• Disposal strategy	to apply
• Constraints from disposal aspects	to master
• Deactivation and decommissioning	to master
• Recycling	to master
• Quality assurance	to apply
• Quality planning and management	to apply
• Perform quality control	to apply
• Acquisition planning	to apply
• Request for supply	to apply
• Supplier selection	to master
• Monitor agreement	to apply
• Acceptance of service or products	to master
• Respond to request for proposal	to apply
• Contractual impact on design	to apply
• Transition to clients and acceptance	to master

• Aspects of the end of projects	to master

Module #9

Table 11: Description Module 9 – Conflict Management and Social Skills

Module #9	**Conflict Management and Social Competence**
Qualification	Cf. [3] paragraph 4.2
Appropriate learning form	Self-study and practical experience
Learning objectives (knowledge; skills)	On the one hand, systems engineers are intermediaries between project management and the technical disciplines. On the other hand, they have extensive management tasks in the definition of new products and the subsequent implementation of product ideas with the support of the professionally oriented engineering disciplines (e.g. SW; V&V). Leadership competence means to steer a team consisting of different characters with very different professional knowledge towards a common goal and thereby have a balancing and motivating effect on the personalities. Respect for the personality and competence of the other project participants are indispensable elements. The responsibility towards the company must be guaranteed, which requires political and cultural awareness, decisiveness, negotiation skills and a high degree of communication skills from the person of the system engineer.
Recommend reading	[2]; [18]; [34]; [35]; [40]; [41]
Other	N/A
Required examination	Participation in the test for the acquisition of the certificate level B

Teaching content and depth	**Competency-level**
• INCOSE code of ethics	to apply
• SE competency	to apply
• SE Approaches for teams	to apply
• Basics of communication and team leadership	to apply
• Own behavior and personality	to apply
• Collaboration of diverse personalities	to apply
• Time management and personal working style	to apply
• Problem oriented creativity techniques	to apply
• Interpersonal communication and negotiation techniques	to apply
• Methods of conflict management and motivation	to apply
• Socially competent behavior	to apply
• Communication structures	to apply
• 4 aspects of a message (message square acc. to Friedemann Schulz von Thun)	to apply
• Self image - image of others	to apply

• Johari window (Joseph Luft, Harry Ingham)	to apply
• Feedback principles and active listening	to apply
• Basics of team leadership	to apply
• Principles and traits of a team leader	to apply
• Definition of "team"	to apply
• Successful teams - features and specialties	to apply
• Phases of team development	to apply
• Situative team guidance	to apply
• Key elements of situative guidance	to apply
• Task orientation vs. relationship orientation (Hersey, Blanchard)	to apply
• Characters in a team, personality models (e.g. Riemann-Thomann), proximity and distance, endurance and alteration)	to apply

6. Acronyms and Glossary

GfSE	Gesellschaft für Systems Engineering e.V.
NORSOK	Norsk Sokkels Konkuranseposisjon (Norwegian Standardisation Organisation)
CBA	Cost Benefit Analysis
CMMI	Capability Maturity Model Integration (Trademark of Carnegie Mellon University)
CMP	Configuration Management Plan
FFBD	Functional Flow Block Diagram
FMECA	Failure Modes, Effects and Criticality Analysis ([39] 3.2.9)
FMEA	Failure Mode and Effect Analysis (3.1164)
FTA	Fault Tree Analysis[2] (Fehlerbaumanalyse)
HMI	Human Machine Interface
HSI	Human Systems Integration
ICD	Interface Control Document
IDEF0	Integration Definition for Function Modeling[3]
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
INCOSE	International Council on Systems Engineering
ISO	International Standards Organization
CIP	Continuous improvement process
LCC	Life Cycle Cost (Lebenszykluskosten)
LCCA	Life Cycle Cost Analysis[4], (Lebenszykluskostenanalyse)
LL	Lessons Learned
LSA	Logistics Support Analysis
MBSE	Model Based System Engineering
MOE	Measure of Effectiveness

[2] IEC 1025: 1990 Fault tree analysis (FTA)

[3] Federal Information Processing Standards Publication 183

[4] LCCA: a technique used to evaluate the economic consequences over a period of time of mutually exclusive project alternatives (vgl. z.B. NORSOK O-CR-001; LIFE CYCLE COST FOR SYSTEMS AND EQUIPMENT)

MPE	Mass Properties Engineering
MSA	Modern Structured Analysis
PHS&T	Packaging, Handling, Storage, and Transportation
PM	Projekt Management
PSP	Work breakdown structure
QFD	Quality Function Deployment
QM	Qualitäts-Management
RMP	Risk Management Plan
RVTM	Requirements Verification and Traceability Matrix
SE	Systems Engineering
SEMP	Systems Engineering Management Plan
SEP	Systems Engineering Plan
SSA	System Safety Assessment
SysML	System Modeling Language
TCO	Total Cost of Ownership
TM	Technical Management
TPM	Technical Performance Metrics
TNA	Training Need Analysis
TSA	Traditional Structured Analysis
UML	Unified Modeling Language
V&V	Validierung und Verifikation
WBS	Work Breakdown Structure

7. References for SE-ZERT®

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