Personnel Certification

Swiss Association for Quality

Federation of Swiss IT Experts

A program of the EXPERT FSIE .ch series.

Expert FSIE™ Engineering

with dicipline sub-specialisations:

- Software Engineering
- Data Engineering
- Test Engineering
- Artificial Intelligence

and technology sub-specialisations (as per reported practice)

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1. Scope

The certification is processed according to the generic SAQ Expert FSIE™ certification scheme (D500) and detailed regulation (D420 including all referenced documents therein). The document at hand describes the specific practices (competences) and requirements for the program **Engineering.**

These must be demonstrated by work testimonials, advanced education graduations, the handed-in case study and in the oral exam. The re-certification encompasses work testimonials and continuing education requirements.

2. Summary of the Profile Engineering

The Expert FSIE™ Engineering develops and/or configures software and/or hardware that fulfils the business requirements. The latter are refined into elementary IT requirements depending on complexity. The engineer's duties normally also encompass the (automated) unit-tests, regression-tests, builds and technical documentation. Development environments are installed and configured.

swissICT "Berufe der ICT" profiles covered:

- Software Engineer
- Developer
- Database Engineer
- Test Engineer
- ICT Systems Engineer

Agile profiles covered:

- Team member
- (DevOps) Engineer
- Integrator
- Solution Engineer – Release Train Engineer

3. Catalog of Engineering Practices and Collaboration Requirements

The practices are further refined in an FSIE-internal document which contains detailed competences descriptions, methods, techniques and sample examination questions.

3.1. Engineering Practices

Practice-ID	Title	Description
eBOC 01	Analysis	Technical feasibility analysis of the business requirements, deriving IT requirements/tasks
eBOC 02	Estimation	Estimate cost and schedule of the engineering tasks, write an offer and commit to a contract
eBOC 03	Architecture	Evaluate and define a software/hardware architecture
eBOC 04	Development environments	Evaluate, define, install and configure software/hardware development environments
eBOC 05	Use frameworks	Evaluate, choose, install and configure frameworks and components aligned with the given architecture
eBOC 06	Develop	Design, develop, build and self-test software applications and/or custom hardware
eBOC 07	Develop frameworks	Design, develop and test reusable frameworks and components, including DSLs
eBOC 08	Data engineering	Data modelling, design and database implementation and test
eBOC 09	Data migration	Data migration analysis, development, test and execution
eBOC 10	Test cases	Specify and execute developer-independent test cases (data, processing, expected results)
eBOC 11	Test automation	Automate test data initialisations, test cases and their execution (incl. comparisons)
eBOC 12	IoT and real-time	Design, develop and self-test IoT and real-time applications

The Expert FSIE™ Engineering is required to reach a level of competence according to Bloom[1] of 4, 5 or 6 (analysis, synthesis, evaluation) for eBOC 01, eBOC 01 and a total of 8 out of the 12 practices. The 4 remaining he/she should master at level 2 (comprehension).

3.2. Engineering Collaboration Requirements

Topic	Description
Expert BRIDGE	Typically, the Expert FSIE™ Engineering is involved in the preparation or execution of medium to large projects by an Expert BRIDGE. The Expert BRIDGE evaluates the offer submitted by the Expert Engineering. The Expert BRIDGE is the customer representative in Engineering tasks (execution and acceptance).
Expert Operations	The planning, preparation, installation and monitoring of platforms and environments are delegated to the respective experts coordinated with the Expert BRIDGE.
Expert UX	The tasks of software/hardware interface design and development are delegated to the respective experts coordinated with the Expert BRIDGE.
Expert Quality	In medium to large organisations, the tasks of IT quality measurements and reporting for continuous process improvement are delegated to the respective experts.
Expert Security	The tasks of IT security risks and threats identification as well as measures definition and implementation are delegated to the respective experts coordinated with the Expert BRIDGE.
Expert Strategy	In medium to large organisations, the Expert Engineering aligns the software/hardware architecture with an the respective experts coordinated with the Expert BRIDGE.
Expert Management	The optional Expert Management leads the Expert Engineering in issues such as sales, marketing, professional development and governance.

When delegating, holders of the titles Expert FSIE™ <xy> in provider lead roles are preferred.

An Expert FSIE™ Engineering must demonstrate the understanding and practical application of the above collaborations with
- BRIDGE
- Management and/or Strategy
- Quality and/or Security and/or User Experience
- Operations

[1] https://en.wikipedia.org/wiki/Bloom%27s_taxonomy

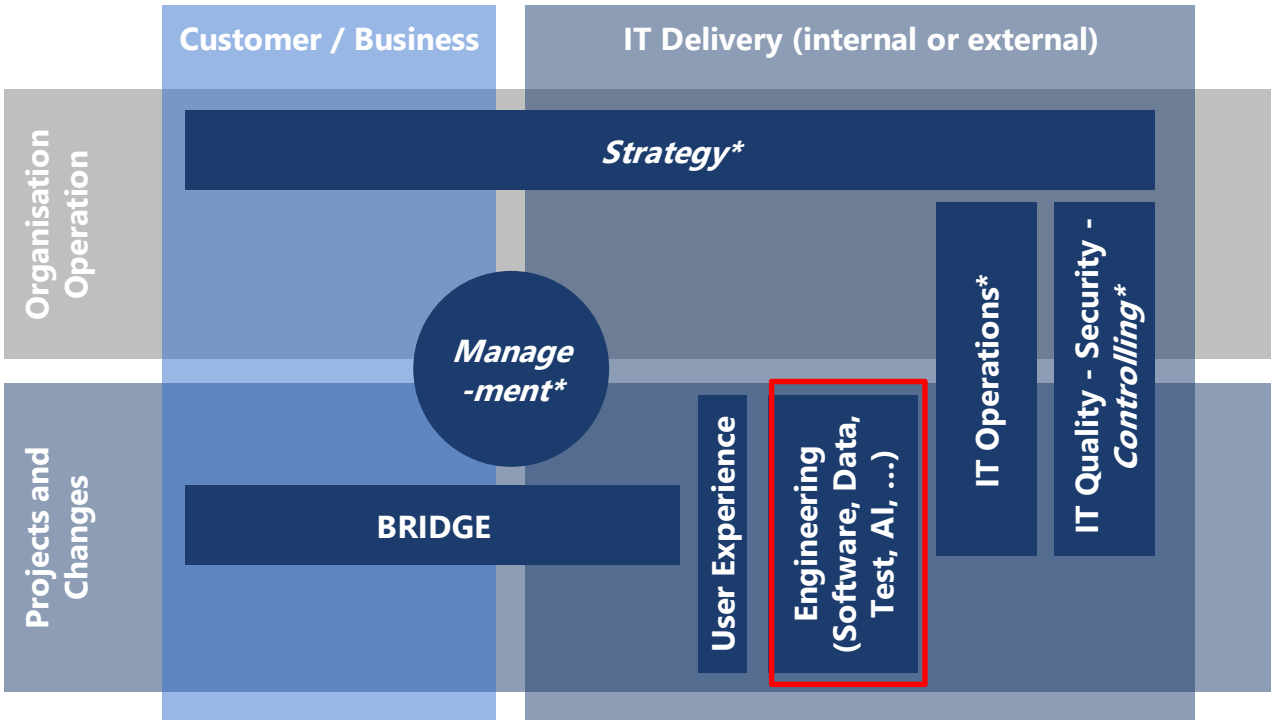
3.3. Work Context Requirements

Before project/change tasks	The Expert Engineering is typically involved in the offering / analysis phase of a project (epic or feature in agile contexts) for his/her tasks. A feasibility statement and effort estimations are typically required.
Project/change tasks	When a contract is accepted, the contract fulfillment (including the technical documentation) is in the responsibility of the Expert Engineering. In medium to large settings he/she is customer-side guided by an Expert BRIDGE who also leads user acceptance test activities.

An Expert FSIE™ Engineering must demonstrate to have taken the lead both above-mentioned contexts at least once.

3.4. The Expert FSIE™ Engineering in the FSIE profiles collaboration and work model

An Expert FSIE™ Engineering has a project/changes-oriented (ITIL: service creation) role.



4. Work Testimonials

The work testimonials are reported using the standard regulation and electronic form (D450-LINK) valid for every Expert FSIE™.

4.1. Requirements

The required minimum is 40% capacity in the past 6 years, i.e. 3'840 hours of practical work covering the 12 practices as per chapter 3.1 not older than 6 years must be reported.

For 8 of the 12 practices, he/she must have a record of >=160 hours.

The collaboration requirements as per chapter 3.2 must be demonstrated.

The work context requirements as per chapter 3.3 must be demonstrated.

4.2. Optional Discipline Sub-Specialization

If the work testimonials of the practices

eBOC 05	Use frameworks
eBOC 06	Develop
eBOC 07	Develop frameworks

for **Software**, **Artificial Intelligence** Systems or **Hardware** surpass 35% (3'360 hours) capacity, then the title holder may carry the respective sub-specialization suffix.

If the work testimonials of the practices

eBOC 08	Data engineering
eBOC 09	Data migration

surpass 35% (3'360 hours) capacity, then the title holder may carry the sub-specialization suffix **Data**.

If the work testimonials of the practices

eBOC 10	Test cases
eBOC 11	Test automation

surpass 35% (3'360 hours) capacity, then the title holder may carry the sub-specialization suffix **Test**.

4.3. Optional Technology Sub-Specialization

If the work testimonials for a technology surpass 25% (2'400 hours) capacity, then the title holder may carry the technology sub-specialization suffix as per the following list:

	Technology
	APL
	C
	C++
	COBOL
	DB2
	FORTRAN
	HTML, Javascript, PHP
	Java
	LISP
	machine code | assembler
	Microsoft .NET/C#
	Microsoft Access
	Microsoft Dynamics
	ORACLE
	PASCAL
	Phyton
	PL1
	PROLOG
	R
	SAP/ABAP (opt. per module like FI, CO, SD, ...)
	Smalltalk
	SQL/RDBMS (Schema definition)
	SQL/Queries
	VB Visual Basic | VBA Visual Basic for Applications
	Zope, O2, ... (object-oriented databases)

This list is expanded as per feedback from the community of Experts.

In future, the community of Experts of certain technologies may formulate specific requirements for obtaining the title or the re-certification, e.g. defining refresher seminars specific for a technology as mandatory re-certification measures for the sub-specialization.

5. Advanced Education Requirements

The Expert FSIE™ Engineering has graduated >=15 ECTS worth of any of the following advanced education programs (or certificates). The graduation certificates must be provided (scanned).

Education Provider	Name	Link	Attributed Engineering ECTS
Any Swiss University (incl. ETHZ/EPFL and Universities of Applies Sciences)	Master programs Computer Science		40+
	Advanced education programs: MAS Software Engineering (or Computer Science) MAS / DAS Data Science	X	20

Important Note: The list above only encompasses Swiss Engineering advanced education offerings known to the FSIE Engineering specialisation commission. If a candidate is a graduate of a non-listed course that presumably covers all or some of the Engineering practices, e.g. from non-Swiss institutions, he/she shall submit it and the FSIE Engineering specialisation commission will assess the validity and eventually attributable ECTS. If you are a provider of advanced education that is not listed, please send it in for assessment and listing to engineering@fsie.ch.

The graduations must not be older than 6 years.

Temporary regulation:
The graduations can be older than 6 years. Also, they can stem from no longer existing education providers and/or be titles/programs that do no longer exist but were appropriately covering the educational aspects of the Engineering practices as listed in chapter 3.1.

6. Case Study

The case study is written using the standard template (D423) valid for every Expert FSIE™.

Specific Engineering requirement:
The case study must encompass eBOC 01 Feasibility, 02 Estimation, 03 Architecture, 06 Develop, 08 Data engineering and 11 Test automation .

7. Oral Exam

The oral exam is conducted using the standard structure and assessment scheme valid for every Expert FSIE™ (D421).

7 of the 12 practices must be covered in the 2nd and 3rd exam sections of the case study and specialisation questionings.

8. Re-Certification

The re-certification requirements are checked every 3 years.

8.1. Continued work testimonials

The continued work testimonials are reported using the standard regulation and electronic form (D450) valid for every Expert FSIE™.

The required minimum is 40% capacity in the past 3 years, i.e. 1'920 hours of practical work covering the 12 practices as per chapter 3.1 not older than 3 years must be reported by the Expert FSIE™ Engineering.

For 9 of the 12 practices, he/she must have a record of >=80 hours.

For more than 50% of the recorded projects he/she must have taken-on the technical/engineering project lead role (or technical epic/feature ownership in agile settings).

The collaboration requirements as per chapter 3.2 must be demonstrated.

The work context requirements as per chapter 3.3 must be demonstrated.

Discipline suffixes (Software, Hardware, AI, Test, Data):
It is maintained if the reported work capacity in the discipline remains at a minimum of 35% i.e. 1'680 hours.

A new or additional discipline suffix can be obtained if the reported work capacity in the discipline reaches a minimum of 35% in the past 6 years i.e. 3'360 hours.

Technology suffixes (cf. list in chapter 4.3):
It is maintained if the reported work capacity in the technology remains at a minimum of 25% i.e. 1'200 hours.

A new or additional technology suffix can be obtained if the reported work capacity in the technology reaches a minimum of 25% in the past 6 years i.e. 2'400 hours.

If feasible, a onetime extension of 0.5 years to reach the above requirements can be granted.

8.2. Continuing education

The Expert FSIE™ Engineering must achieve the standard amount of 18 CEP with Engineering-specific continuing education in 3 years conforming to the FSIE CEP regulation (D440). Note: 18 CEP can be achieved by attending 9 full-day Engineering (refresher) courses. However, the CEP regulation attributes CEP also to other continuing education measures.

If feasible, a onetime extension of 0.5 years to reach the above requirement can be granted.

9. Title

- The title is valid for 3 years after the initial certification and after each successfully completed re-certification.
- As long as valid, the holder is licensed to use the following title:

  IT Expert FSIE™ Engineering [<discipline-suffix1> [, <discipline -suffix2>]] [<tech.-suffix1> [, <tech.-suffix2> [, <tech.-suffix3>]]]

- As long as valid, the holder is licensed to use 1 of the following alternative titles:

  For discipline Software:
  IT Expert FSIE™ Software Engineer [<tech.-suffix1> [, <tech.-suffix2> [, <tech.-suffix3>]]]

  For discipline Hardware:
  IT Expert FSIE™ Hardware Engineer

  For discipline Test:
  IT Expert FSIE™ Test Engineer

  For discipline Data:
  IT Expert FSIE™ (Data | Database) Engineer

  For discipline AI:
  IT Expert FSIE™ (AI | Cognitive Computing) Engineer

  The holder can request 1 printed certificate with his chosen alternative title.

For the other language variants refer to D461_DE, D461_FR and D461_IT