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# Catalogue of criteria for the Individual Practical Project (IPP) in the qualification process

## Information Technology, education regulation 2021

Specialization in

- application development
- platform development

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## Weighting:

- Execution and result of the work (PC A, B, C, D, E, F, G, H): 50%
- Documentation: 20%
- Oral exam and presentation: 30%

## Abbreviations:

- AD - Specialisation in application development
- BS - Both specialisations (application development and platform development)
- PC - Professional competence
- PD - Specialisation in platform development

## PC A: Accompanying ICT projects (mandatory criteria BS)

| A01 | **Job analysis and selection of a project method**<br>How is the order analyzed? Which project method is used? |
|---|---|
| Quality level 3 | 1. The project mandate was analyzed, and the findings were documented in writing using appropriate visualization methods (e.g., target structure, use case or context diagram, requirements table).<br>2. The documentation from point one provides the foundation for consistently pursuing the project objectives.<br>3. A project methodology appropriate to the project mandate was selected.<br>4. The choice of project methodology is well-reasoned and clearly justified in writing. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| A02 | **Information research**<br>How is information researched? |
|---|---|
| Quality level 3 | 1. Missing information relevant to the IPP was identified and systematically researched.<br>2. It was refrained from stating generally known facts in detail.<br>3. All information used, including that which is attributable to the use of artificial intelligence or similar technologies, and which is not based on own performance, is declared accordingly.<br>4. The information researched is reliable, up-to-date and valid. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| A03 | **Information processing and utilisation**<br>How is information prepared and used effectively? |
|---|---|
| Quality level 3 | 1. The information used is reflected in clear and concise documentation.<br>2. Suitable visualisation methods such as graphics, diagrams or tables are used.<br>3. The information provided allows a specialist to acquire a comprehensive understanding of the IPP (documentation, solution).<br>4. All information used is in the context of the order and is applied in a meaningful way in the project. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| A04 | **Timetable**<br>What are the requirements for the timetable? |
|---|---|
| Quality level 3 | 1. The timetable is part of Part 1 of the IPP report.<br>2. The timetable is clearly organised.<br>3. The structure and elements of the timetable are based on the chosen project method.<br>4. An absolute time axis has been defined (date), the time axis has a reasonable resolution (e.g. hour blocks).<br>5. The identified activities are appropriate and follow a sensible logic.<br>6. The IPP time requirement is correctly accounted for in the timetable. |
| Quality level 2 | Four or five points are fulfilled. |
| Quality level 1 | Two or three points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| A05 | **Review and visualisation of progress and risks**<br>How are project progress and risks reviewed and visualised? |
|---|---|
| Quality level 3 | 1. Progress was regularly reviewed and documented clearly and correctly.<br>2. There is a precise comparison of the planned and actual schedule (target/actual comparison).<br>3. A periodic risk and problem review was carried out. If a risk or problem occurred, it was dealt with professionally. There is written evidence of this.<br>4. Unachieved targets as well as corrective measures and follow-up work on the IPP are described. If such aspects do not exist, this is justified accordingly. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| A06 | **Performance**<br>How is the performance to be assessed? |
|---|---|
| Quality level 3 | 1. The project objectives were consistently pursued, priorities were identified, and the approach was aligned accordingly.<br>2. Tasks were carried out efficiently and result-oriented, meeting the performance standards expected of an ICT professional.<br>3. The results and working methods are technically correct, practical, and meet the quality and professionalism standards of an ICT professional. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| A07 | **Independent work**<br>How independently was the work done? |
|---|---|
| Quality level 3 | 1. Goals and tasks were pursued independently.<br>2. A strong ability to solve problems was demonstrated; obstacles were overcome independently and/or appropriate help was sought from others.<br>3. The ability to self-motivate was demonstrated and commitment was high.<br>4. The ability to self-reflect was demonstrated. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| A08 | **Use of technical language**<br>How is the use of technical language to be assessed? |
|---|---|
| Quality level 3 | 1. Relevant technical terminology is known and applied consistently and appropriately.<br>2. Technical content is formulated precisely and conveyed accurately.<br>3. The language is logically structured throughout and allows the target audience (external professional) to clearly understand the content. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| A09 | **Application of expertise**<br>How is the application of professional competence be assessed? |
|---|---|
| Quality level 3 | 1. The theoretical knowledge is available and could be successfully applied in practical situations. If there is an obvious lack of theoretical knowledge, this point is not awarded.<br>2. Information and facts were critically assessed in order to reach well-founded conclusions.<br>3. The requirement for the transfer of knowledge is met, as skills and knowledge have been applied to unexpected or novel tasks.<br>4. Methods and tools were selected appropriately for the chosen project method and used effectively |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| A10 | **Interaction within the project team**<br>How is interaction with other project members to be assessed? |
|---|---|
| Quality level 3 | 1. Relevant information from clients, experts, or other project members is carefully collected and accurately documented.<br>2. Feedback or specifications are implemented in a well-reasoned manner and documented in the project report.<br>3. Communication with project stakeholders is conducted efficiently and in a traceable manner, e.g., via project management or collaboration tools. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| A11 | **Mapping of the project organization structure**<br>Which information about the project organization structure is required? |
|---|---|
| Quality level 3 | 1. The roles relevant to the chosen project methodology have been identified.<br>2. The roles are correctly and clearly described.<br>3. The project organization structure is visually represented (e.g., as an organizational chart), is complete, and the dependencies between roles are shown correctly.<br>4. Written evidence of these three points is included in part 1 of the IPP report. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| A12 | **Test execution and documentation**<br>How was the test execution organized and documented? |
|---|---|
| Quality level 3 | Note: There are general requirements as well as additional ones for linear or agile approaches. The supervising professional and the experts determine and declare, based on the chosen project methodology, which approach is to be assessed.<br><br>General requirements:<br>1. A description of the test infrastructure and environment is provided, enabling an external professional to reproduce the tests with identical results.<br>2. Potential improvements as well as rework items are identified. If neither improvement potential nor rework is required, this is justified in a well-reasoned manner.<br><br>Additional requirements for a linear approach<br>3. Relevant test scenarios and test components (e.g., functions, data, documents, performance, interfaces etc.) are described, including the expected results.<br>4. Tests were carried out based on the defined test scenarios. The results are documented accurately and in a clear, well-structured manner.<br><br>Additional requirements for an agile approach<br>3. A Definition of Done (DoD) exists, specifying the conditions that must be met for a user story or work package to be considered complete.<br>4. Tests are carried out based on the Definition of Done (DoD). The results are documented accurately and in a clear, well-structured manner. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

## PC A: Accompanying ICT projects (optional criteria BS)

| A13 | **Survey and documentation of needs and environment**<br>How are the needs and the environment assessed and documented? |
|---|---|
| Quality level 3 | 1. The needs assessment followed a structured and appropriate procedure (e.g. questioning techniques, surveys or models). The approach is documented.<br>2. The relevant needs (e.g. costs, time, quality, functions) were precisely gathered and documented.<br>3. The needs are prioritised or structured according to their relevance or urgency.<br>4. Systems and environment as well as the relevant interfaces were correctly identified and documented. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| A14 | **Feasibility study (proof of concept)**<br>How should a feasibility study be carried out? |
|---|---|
| Quality level 3 | 1. The scope of the feasibility study is correctly identified and described.<br>2. Meaningful success criteria were identified and described.<br>3. The feasibility study provides useful conclusions on the applicability of the planned solution.<br>4. The feasibility study provides a solid and documented basis for deciding on the next steps. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| A15 | **Instruction**<br>How is an instruction carried out? |
|---|---|
| Quality level 3 | 1. The instruction is systematically prepared.<br>2. The instruction was carried out.<br>3. The instruction sets the relevant priorities and is sensibly structured.<br>4. The instruction is tailored to the target group.<br>5. The instruction guides the user to success. |
| Quality level 2 | Point two and three further points are fulfilled. |
| Quality level 1 | Point two and two other points are fulfilled. |
| Quality level 0 | The result is lower than quality level 1. |

| A16 | **Carrying out an evaluation**<br>How should an evaluation be carried out? |
|---|---|
| Quality level 3 | 1. The evaluation criteria have been chosen sensibly.<br>2. The weighting scheme is defined before the evaluation.<br>3. Knockout criteria and any applicable threshold values are defined.<br>4. The evaluation was carried out and the results were documented in a comprehensible manner.<br>5. An objective recommendation was derived based on the evaluation results. |
| Quality level 2 | Three or four points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

## PC B: Support and counselling in the ICT environment (optional criteria BS)

| B01 | **Set up a firewall**<br>How is a firewall set up? |
|---|---|
| Quality level 3 | 1. Access control is clearly regulated. This includes, among other things, the definition of authorised and prohibited connections.<br>2. Filter rules have been correctly implemented to control access to applications and services.<br>3. Functions for detecting and preventing intrusion attempts have been correctly activated.<br>4. Data traffic is monitored for suspicious activity and potential threats are blocked.<br>5. Logging has been configured and activated appropriately. |
| Quality level 2 | Three or four points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| B02 | **Installation of the operating system**<br>How is an operating system installed? |
|---|---|
| Quality level 3 | 1. The operating system was set up in accordance with company standards and guidelines, including the required drivers and configuration options.<br>2. After completing the installation, a check was carried out to ensure that the operating system is working properly and that all required components have been recognised.<br>3. It has been ensured that all necessary patches and updates are installed to guarantee the security and stability of the system.<br>4. Before final deployment of the system, user tests were carried out to ensure that all functions work properly and that user expectations are met. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| B03 | **Configuration of the security measures**<br>How are the security measures configured? |
|---|---|
| Quality level 3 | 1. The necessary security measures such as firewall configuration, anti-virus software installation, etc. were implemented in accordance with company guidelines.<br>2. Comprehensive documentation has been created on the security configurations carried out, including the settings, exceptions and updates.<br>3. A security check has been carried out to ensure that the configuration can withstand the current threats and meets the security requirements. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| B04 | **Identification of relevant process information**<br>What does the identification of relevant process information involve? |
|---|---|
| Quality level 3 | 1. The process information was recorded in full and includes at least the name of the process, the triggering event, the expected result, the trigger of the process and the recipient of the result.<br>2. The recorded process information was documented clearly and precisely to enable unambiguous allocation.<br>3. It was ensured that the information recorded fully reflects the actual course of the business process and that no significant details are missing.<br>4. The identification was carried out taking into account the specific requirements of the customer and the industry standards for process documentation. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| B05 | **Breakdown of a business process into individual process steps**<br>How is a business process broken down into individual process steps? |
|---|---|
| Quality level 3 | 1. The business process was systematically analysed in order to identify and record all relevant process steps.<br>2. Each process step was described clearly and comprehensibly in order to clarify its functionality and its position in the overall process.<br>3. It was ensured that the decomposition of the process represents a logical sequence of activities and that no essential steps were omitted.<br>4. The decomposition was carried out taking into account the dependencies between the individual process steps as well as the possible variations or exceptions that may occur. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

## PC C: Development and maintenance of digital data (optional criteria BS)

| C01 | **Viewing data using the 4V model**<br>How is the 4V model applied to big data? |
|---|---|
| Quality level 3 | 1. The sources of the data have been declared in order to make their origin traceable.<br><br>The following components of the 4V model have been described correctly:<br>2. Volume<br>3. Variety<br>4. Velocity<br>5. Veracity |
| Quality level 2 | Three or four points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| C02 | **Develop data models**<br>How is a data model developed? |
|---|---|
| Quality level 3 | 1. A suitable data modelling methodology (e.g. relational, object-oriented, ER modelling) was selected and the choice was reasonably justified.<br>2. The specific business requirements were correctly reflected in the implementation of the data model.<br>3. The principles of normalisation have been applied sensibly.<br>4. The data model is flexible and scalable.<br>5. The data model is sufficiently documented so that other developers can understand the model and work with it.<br>6. The performance requirements are documented and have been met (e.g. via indexing). |
| Quality level 2 | Four or five points are fulfilled. |
| Quality level 1 | Two or three points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| C03 | **Implement data model**<br>How is a data model implemented? |
|---|---|
| Quality level 3 | 1. A suitable database management system (e.g. MySQL) was selected. The choice was reasonably justified.<br>2. Tables and relationships were created in the database management system based on the data model.<br>3. Data integrity was ensured through the use of integrity rules (constraints) as well as primary and foreign keys.<br>4. Security measures have been implemented to ensure the confidentiality and integrity of the data.<br>5. Measures - such as indexing - were implemented to meet performance expectations. |
| Quality level 2 | Three or four points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| C04 | **Carrying out a data migration**<br>How does data migration work? |
|---|---|
| Quality level 3 | 1. The data migration from the defined sources to the target system was prepared in a structured manner.<br>2. The data migration was carried out in a structured manner.<br>3. The relevant functional and performance tests were carried out, documented, interpreted and analysed.<br>4. The migrated data was correctly checked for completeness and integrity. If irregularities were found, these were either rectified immediately or a detailed procedure for rectification was described. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| C05 | **Planning data security and data protection**<br>How is data protection planned? |
|---|---|
| Quality level 3 | 1. A model has been successfully developed or selected that enables data to be classified according to its worthiness of protection. The model is described.<br>2. The relevant data was classified according to its worthiness of protection.<br>3. Models that comply with the principles of "Privacy by Design" (inclusion of data protection in the entire development process) have been successfully implemented.<br>4. An applicable role concept has been described that defines the assignment of responsibilities and access rights for the various user roles within the system.<br>5. An applicable backup recovery concept has been described. |
| Quality level 2 | Three or four points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| C06 | **Encryption of data**<br>How is data encrypted? |
|---|---|
| Quality level 3 | 1. A suitable encryption algorithm was selected. The choice was justified.<br>2. A robust key management system has been developed that enables the secure generation, storage, distribution and destruction of encryption keys.<br>3. End-to-end encryption has been successfully implemented. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| C07 | **Planning and implementation of a backup recovery concept**<br>How is a backup recovery concept planned and implemented? |
|---|---|
| Quality level 3 | 1. A backup strategy has been developed that correctly defines at least the following: Data scope, frequency of backups, backup method, definition of a secure storage location.<br>2. Backup routines have been designed and implemented so that the data is saved at defined intervals.<br>3. The backup restore process has been successfully tested. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| C08 | **Planning and implementation of a role concept**<br>How is a role concept planned and implemented? |
|---|---|
| Quality level 3 | 1. The corresponding roles have been correctly identified and described.<br>2. A usable authorisation management system has been developed that links the roles with corresponding access rights.<br>3. The principle of least privilege has been correctly applied.<br>4. The concept was successfully implemented. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| C09 | **Analyse and identify data and check validity.**<br>How is the data analysed, identified and checked for data errors and validity? |
|---|---|
| Quality level 3 | 1. The relevant data was analysed using a systematic approach (procedures/methods).<br>2. The essential information was identified.<br>3. Appropriate measures were taken to recognise data errors and ensure the validity of the data. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| C10 | **Prepare, visualise and evaluate data.**<br>How is data visualized? |
|---|---|
| Quality level 3 | 1. Suitable visualisation methods were selected and used.<br>2. Suitable methods were used to ensure the consistency of the data presented. The implementation is documented.<br>3. The results presented are relevant and offer added value (e.g. for decision-making or analysis purposes). |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| C11 | **Use of AI models**<br>How are AI models used confidently? |
|---|---|
| Quality level 3 | The use of AI models led to the following benefits:<br>1. Greater efficiency, e.g. in the form of faster data analysis or via process automation<br>2. Greater effectiveness, e.g. in the form of better decision-making or early detection of errors<br>3. Quality improvement, e.g. in the form of more precise data quality<br>The following application expertise was demonstrated:<br>4. The input values for the AI model were provided by correctly and precisely formulated expectations and specifications.<br>5. The AI model was used appropriately.<br>6. The results were examined objectively. |
| Quality level 2 | Four or five points are fulfilled. |
| Quality level 1 | Two or three points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| C12 | **Train an AI using machine learning**<br>How is an AI trained using machine learning? |
|---|---|
| Quality level 3 | The following steps for developing and training an AI using machine learning were carried out in a targeted manner:<br>1. The problem to be solved and the objective were clearly defined.<br>2. Relevant training data was obtained and processed accordingly.<br>3. A suitable machine learning model was evaluated.<br>4. The training process was successfully completed.<br>5. The AI model was evaluated and improved based on the findings and the limitations were described.<br>6. The AI model was transferred to the utilisation phase. |
| Quality level 2 | Four or five points are fulfilled. |
| Quality level 1 | Two or three points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

## PC D: Delivery and operation of ICT solutions (optional criteria PD)

| D01 | **Analysis**<br>How were processes and information prepared? |
|---|---|
| Quality level 3 | 1. Needs and framework conditions were defined and described in relation to the order.<br>2. Optimisations or missing elements are clearly described in the analysis.<br>3. Implementability is documented and described. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| D02 | **Standardisation, optimisation and automation**<br>How have work and processes been standardised, automated and/or optimised? |
|---|---|
| Quality level 3 | 1. Processes and procedures for automation and/or optimisation were identified.<br>2. Processes and procedures for automation and/or optimisation have been described.<br>3. The added value from the defined processes is described and comprehensible.<br>4. The implementation takes into account applicable standards or best practices and is comprehensible. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| D03 | **Ensuring operation and further development**<br>What needs to be considered so that the product created can be successfully operated or further developed? |
|---|---|
| Quality level 3 | 1. Detailed handover documentation is available, which contains all relevant information for the operator of the product, e.g. instructions for installation, configuration, maintenance and troubleshooting.<br>2. There is a precise description that shows the next development steps or measures. If there are no further development steps or measures, this is justified accordingly.<br>3. Based on points one and two, the operation and / or further development of the solution can be ensured by a specialist without additional assistance from the person authorised in the IPP. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| D04 | **Select and provide platform**<br>How is the platform selected and provided? |
|---|---|
| Quality level 3 | 1. The technical framework conditions for the choice of platform were defined and described.<br>2. The choice of platform is professionally justified and takes into account the framework conditions and the order.<br>3. The technical realisation and configuration for the implementation were defined and described.<br>4. The platform was successfully put into operation.<br>5. Appropriate documentation enables a specialist to customise the platform efficiently. |
| Quality level 2 | Three or four points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| D05 | **Commissioning and handover of an ICT solution**<br>How was the ICT solution put into operation and how was the handover planned? |
|---|---|
| Quality level 3 | 1. Content and technical adjustments and configurations of the peripheral systems are described in a comprehensible manner.<br>2. Commissioning has been coordinated with the stakeholders and the necessary training courses to ensure operational takeover have been defined.<br>3. Commissioning was guaranteed by clear steps and processes to ensure smooth and traceable operation.<br>4. All the information required to continue operating the solution is available and is aimed at a specialist. |
| Quality level 2 | Two or three points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

## PC E: Operation of networks (optional criteria PD)

| E01 | **Network planning**<br>What needs to be considered when planning a network? |
|---|---|
| Quality level 3 | 1. The operational requirements for the network are comprehensively analysed. These include, for example, the bandwidth, the number of users, the locations affected and the necessary security measures.<br>2. Based on the requirements, a suitable network architecture was derived that guarantees optimum performance, scalability, availability and security.<br>3. The network architecture includes the right network components, the definition of network segmentation and the configuration of routing and switching protocols. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| E02 | **Document and visualise the network**<br>How should a network be documented and visualised? |
|---|---|
| Quality level 3 | 1. The network environment is visualised, the visualization is comprehensive.<br>2. The objects of the visual representation are identifiable in their type and function.<br>3. The documentation includes a record of all functions, services and specifications of the network components, including their technical details and functionalities. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| E03 | **Select network components**<br>What needs to be considered when selecting network components? |
|---|---|
| Quality level 3 | The selected network components take the following into account:<br>1. They fulfil the requirements for bandwidth, speed, transmission protocols and other relevant performance features.<br>2. They can be seamlessly integrated with other network devices and systems (e.g. in terms of compatibility with protocols, standards and technologies).<br>3. Their manageability, configurability and maintenance intensity are appropriate for the situation.<br>4. The required security standards are met. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| E04 | **Commissioning network components**<br>What is the procedure for commissioning network components? |
|---|---|
| Quality level 3 | 1. The physical installation of the network components has been carried out correctly.<br>2. The network components have been configured correctly.<br>3. Connectivity tests, performance tests, data integrity checks and security tests were carried out; any necessary measures were initiated. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| E05 | **Planning the maintenance of network components**<br>What needs to be considered when planning the maintenance of network components? |
|---|---|
| Quality level 3 | 1. Maintenance measures and their cycles are defined and consider the importance.<br>2. The life cycle of the network components and the connected services is documented in detail.<br>3. The functional check after maintenance measures is documented.<br>4. A rollback plan has been developed to enable a quick return to the previous state in the event of immediately unsolvable problems during maintenance. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| E06 | **Definition of network security measures**<br>How should network security measures be defined? |
|---|---|
| Quality level 3 | 1. Security risks were identified and prioritised based on their severity and the importance of the resources to be protected.<br>2. Security guidelines and standards have been defined.<br>3. A plan has been drawn up to continuously monitor network security.<br>4. A plan has been drawn up that describes how to deal with a security incident should it occur. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| E07 | **Implementation of network security measures**<br>How should network security measures be implemented? |
|---|---|
| Quality level 3 | 1. The defined security measures were successfully implemented.<br>2. The implemented security measures were successfully tested.<br>3. Measures have been taken to continuously monitor the system regarding network security.<br>4. The measures were documented transparently.<br>5. The relevant persons have been informed about the procedure and know what to do in the event of a security incident. |
| Quality level 2 | Three or four points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| E08 | **Analyse the performance of a network**<br>How is the performance of a network tested? |
|---|---|
| Quality level 3 | 1. A concept was developed that makes statements on the performance elements to be tested (e.g. bandwidth, latency, packet loss) of a network. The target values were specified.<br>2. The network was tested based on the concept. The test result was recorded in writing and the content is correct.<br>3. The test result leads to sensible recommendations for measures.<br>4. The measures were addressed correctly. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| E09 | **Optimise the performance of a network based on test values**<br>What is the procedure for optimising a network based on test values? |
|---|---|
| Quality level 3 | 1. Relevant optimisation measures were defined, prioritised and include concrete steps to improve network performance.<br>2. The optimisation measures consider restrictions and dependencies, both functional and economic.<br>3. The measures were implemented, the procedure and results were documented.<br>4. Success is confirmed by demonstrable improvements in network performance and the fulfilment of defined objectives. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | One or two points are fulfilled. |
| Quality level 0 | No point is fulfilled. |

| E10 | **Concept for monitoring networks**<br>What does a network monitoring concept look like? |
|---|---|
| Quality level 3 | 1. All components in the defined network are described in a concept.<br>2. A definition of the elements to be monitored for all components is available.<br>3. A justification of the elements to be monitored for all components is described in a comprehensible manner.<br>4. A declaration of the values, their urgency and prioritisation as well as the resulting actions are defined. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | One or two points are fulfilled. |
| Quality level 0 | No point is fulfilled. |

| E11 | **Implementation of network and peripheral monitoring**<br>How is network monitoring implemented? |
|---|---|
| Quality level 3 | 1. Network components to be monitored were defined and integrated according to specifications.<br>2. The elements of the components to be monitored were implemented in accordance with the specifications.<br>3. Actions for the defined threshold values were implemented accordingly.<br>4. The correct functioning of the monitoring system was checked in a comprehensible manner. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

## PC F: Operation of server infrastructure and services (optional criteria PD)

| F01 | **Requirements analysis of the server infrastructure and services**<br>What criteria must be met when gathering requirements for server infrastructure and services? |
|---|---|
| Quality level 3 | The following points were met during the requirements analysis of the server infrastructure and services:<br>1. Operational circumstances were considered.<br>2. The performance criteria appropriate to the order (e.g. computing power, storage capacity, network bandwidth) were defined.<br>3. Scalability was considered in order to address future growth and increasing requirements.<br>4. Relevant security requirements were taken into account.<br>5. The expected costs were reported.<br>6. At least one alternative solution has been documented and proposed. The proposal makes sense. |
| Quality level 2 | Four or five points are fulfilled. |
| Quality level 1 | Two or three points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| F02 | **Configuration of the server infrastructure**<br>What is the procedure for configuring the server infrastructure?? |
|---|---|
| Quality level 3 | The following measures were implemented correctly:<br>1. The operating system was comprehensibly selected and correctly set up.<br>2. The physical server hardware has been configured; e.g. processor, memory, hard drives, network cards or RAID arrays.<br>3. The server's network settings have been configured, including IP addresses, subnet masks, gateway addresses and DNS settings.<br>4. Necessary services and applications have been installed, configured and provided.<br>5. All specifications from the task were implemented (e.g. firewall rules, access controls). |
| Quality level 2 | Four points are fulfilled. |
| Quality level 1 | Two or three points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| F03 | **Acceptance of a server infrastructure or server services**<br>What is the procedure for the acceptance of a server infrastructure or server services? |
|---|---|
| Quality level 3 | 1. The acceptance criteria are clearly defined and suitable.<br>2. A detailed test concept for checking functionality, performance and security is available.<br>3. System dependencies are documented.<br>4. The acceptance is based on points one and two, it was carried out and documented. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| F04 | **Creating and maintaining the operating manual**<br>What needs to be considered when creating and maintaining an operating manual? |
|---|---|
| Quality level 3 | 1. The operating manual describes the infrastructure and services and their dependencies.<br>2. The operating manual describes responsibilities and competences.<br>3. The operating manual describes the documentation procedure for the maintenance and work history (e.g. updates, commissioning of new systems, etc.).<br>4. Access to the operating manual is guaranteed and documented for all persons concerned. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| F05 | **Creation of a maintenance concept**<br>What needs to be considered when creating a maintenance concept? |
|---|---|
| Quality level 3 | 1. The maintenance concept includes the definition and documentation of maintenance tasks.<br>2. The maintenance cycles and their regularity are described.<br>3. Planning and communication of maintenance work are defined and clearly regulated.<br>4. Logging and versioning are described in a comprehensible manner.<br>5. Backup and recovery strategies are in place and are reproducibly listed in the concept. |
| Quality level 2 | Three or four points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| F06 | **Carrying out maintenance**<br>How is maintenance carried out? |
|---|---|
| Quality level 3 | 1. The execution of maintenance is based on a maintenance concept.<br>2. The maintenance was carried out and recorded.<br>3. System availability was checked after maintenance was completed. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| F07 | **Implementation of an archiving solution**<br>How is an archiving solution implemented? |
|---|---|
| Quality level 3 | 1. The implementation of the archiving solution follows an archiving concept.<br>2. Archiving is correctly implemented and documented.<br>3. The archiving function has been ensured and tested. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

## PC G: Developing applications (optional criteria AD)

| G01 | **Documentation of functional and technical requirements**<br>How were the functional and technical requirements captured and documented? |
|---|---|
| Quality level 3 | 1. The functional and technical requirements are documented in a complete, clear, and comprehensible manner.<br>2. The requirements are described in a solution-neutral way and are marked according to their relevance or priority.<br>3. The requirements are clearly formulated, well-defined, and supplemented with examples or acceptance criteria where appropriate.<br>4. The documentation contains consistent terminology and a clear structure, allowing stakeholders to understand it without difficulty. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G02 | **Validation and alignment of requirements with stakeholders**<br>How were the requirements aligned and validated with the stakeholders? |
|---|---|
| Quality level 3 | 1. The requirements were reviewed and validated in collaboration with all relevant stakeholders, including end users.<br>2. Feedback and change requests from the parties involved were collected, documented, and taken into account.<br>3. The final requirements were jointly agreed upon and recorded in a manner that is comprehensible to all parties.<br>4. The requirements documentation is up to date and includes all changes made during the development process. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G03 | **Development of design drafts**<br>How was it ensured that the design drafts for user interfaces complied with the technical specifications? |
|---|---|
| Quality level 3 | 1. Appropriate graphical tools, such as mock-up software, were used to create design drafts in accordance with the guidelines of the applied technology and the company's specifications.<br>2. User-friendliness and technical feasibility were ensured in the drafts.<br>3. The final design drafts were fully documented, including all modifications and the reasoning behind these adjustments.<br>4. The drafts were reviewed with the client and incorporated into revisions to ensure an optimal user experience. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G4 | **Verification of technical feasibility**<br>How were the technical requirements verified for feasibility, and how was it ensured that the solution is implementable? |
|---|---|
| Quality level 3 | 1. The technical feasibility of the planned solution was verified (e.g., interfaces, data structures, technologies, dependencies).<br>2. Potential risks or technical limitations were identified at an early stage and documented in a comprehensible manner.<br>3. Feasible alternatives or optimizations were discussed with stakeholders or subject matter experts.<br>4. The selected solution is technically feasible and meets the defined requirements. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G5 | **Prototyping and validation of the user interface**<br>How were user interfaces and workflows designed, tested, and improved using suitable prototypes? |
|---|---|
| Quality level 3 | 1. Key functions or workflows were represented using prototypes (e.g., wireframes, mock-ups, clickable models).<br>2. The prototypes were used to evaluate user-friendliness, information flow, and visual design.<br>3. Feedback from stakeholders or test users was collected and incorporated into improvements.<br>4. The final interfaces are clear, consistent, and follow current usability and design principles. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G06 | **Risk analysis and security measures**<br>How were security risks of applications and interfaces identified, and how were they addressed? |
|---|---|
| Quality level 3 | 1. Relevant risks within the project were systematically identified and documented.<br>2. The system environment was analyzed to detect security-related vulnerabilities.<br>3. Appropriate security measures, such as encryption and access protection, were specified and implemented.<br>4. The results and planned measures were reviewed and agreed upon with the stakeholders. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G07 | **Development and adaptation of the requirements catalogue**<br>How was the requirements catalogue for security measures of applications and/or interfaces created or adapted? |
|---|---|
| Quality level 3 | 1. The requirements catalogue was updated and elaborated based on the identified security risks and the measures discussed.<br>2. Security-relevant information was systematically shared within the team and with the community (e.g., OWASP) and integrated into the requirements.<br>3. All security-related risks and measures were documented transparently and clearly communicated in the requirements catalogue.<br>4. The revised requirements catalogue was reviewed with the stakeholders to ensure full alignment with the defined security requirements. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G08 | **Development of implementation variants**<br>How were alternative implementation variants for the application analyzed and assessed? |
|---|---|
| Quality level 3 | 1. At least two possible implementation variants were outlined and described (e.g., workflow, components, technologies).<br>2. Advantages and disadvantages of each variant were documented to provide an objective basis for decision-making.<br>3. The selection of the preferred variant was justified in a comprehensible manner and reviewed with the relevant stakeholders.<br>4. A feasibility study was conducted for the chosen variant to confirm its deployability. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G09 | **Development of the realisation concept**<br>How is the realisation concept for the selected implementation variant developed? |
|---|---|
| Quality level 3 | 1. The functional and technical realisation concept was developed step by step, including use cases, components, layers, processes, interfaces, classes and data model.<br>2. Relevant data, processes, systems and interfaces were analysed and the results precisely documented.<br>3. Suitable tools such as UML and other diagrams were used to document and visualise the concept.<br>4. If necessary, customisations for existing applications were designed and integrated into the concept. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G10 | **Setting up the development and runtime environment**<br>How is a suitable development and runtime environment set up? |
|---|---|
| Quality level 3 | 1. The selection and configuration of the development and runtime environment is based on the realisation concept and the specific company requirements.<br>2. All necessary tools and services for development (e.g. IDEs, databases, versioning systems) are installed and functional.<br>3. The environment supports the development of both the back-end and the front-end and takes security requirements into account.<br>4. The facility enables efficient, structured programming and supports regular testing and debugging activities. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G11 | **Compliant implementation and versioning**<br>How are applications and interfaces implemented and versioned in a compliant manner? |
|---|---|
| Quality level 3 | 1. Back-end and front-end were implemented in accordance with the defined requirements and in compliance with the programming languages, development tools and security specifications.<br>2. Regular checks of the implementation against the requirements (functional, non-functional, security) were carried out, with continuous adaptation and optimisation.<br>3. Compliance with coding guidelines was checked to ensure that the code was comprehensible and easy to understand.<br>4. All changes and enhancements were stored clearly and reliably in a software management system, whereby internal company guidelines were observed. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G12 | **Creation of test concepts and definition of test cases**<br>How were test concepts and test cases for the applications and/or interfaces developed? |
|---|---|
| Quality level 3 | 1. The test environment was fully described, including system, actors, data, users, and permissions, so that an external person can reproduce it.<br>2. A selection of appropriate test types (unit tests, integration tests, security tests, etc.) was made, and the rationale was documented.<br>3. Test cases were clearly described in relation to use cases and requirements, considering different test perspectives, and designed to be repeatable (automated or manual).<br>4. Expected results for each test case were defined and documented in a comprehensible manner. Unexpected results or errors were handled confidently. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G13 | **Carrying out and analysing tests**<br>How are tests organised and their results evaluated? |
|---|---|
| Quality level 3 | 1. A suitable test environment was set up in accordance with the test concept and all automatable test cases were implemented.<br>2. Test cases were carried out comprehensively, with particular attention being paid to the accuracy of the test execution and the traceability of the logging.<br>3. The results of the test runs were systematically analysed and documented; unsuccessful test cases were identified and corrective measures initiated.<br>4. The implementation was reviewed in accordance with the security concept and appropriate corrective measures were taken in the event of deviations. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G14 | **Consideration of secure coding practices**<br>How are secure coding practices applied? |
|---|---|
| Quality level 3 | 1. The software was developed with consideration of secure coding practices, including the avoidance of common security vulnerabilities such as SQL injection, cross-site scripting (XSS), and insecure data transmission.<br>2. Security reviews and tests were conducted, including the implementation of automated tests, to ensure that security-related requirements are met. This includes, for example, unit tests for security functions.<br>3. The documentation includes clear cyber security guidelines, including best practices for secure software development, instructions for conducting security reviews, and a plan for responding to security incidents. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| G15 | **Advanced testing and quality assurance measures**<br>How are advanced testing and quality assurance measures implemented? |
|---|---|
| Quality level 3 | 1. Automated tests were comprehensively implemented, including unit tests, integration tests, and, where applicable, end-to-end tests. The tests are clearly structured and documented.<br>2. Test-driven development (TDD) was consistently applied. The code was developed iteratively, with tests written first to verify the desired functionality.<br>3. Appropriate testing tools and frameworks (e.g., JUnit, TestNG, Selenium) were used to automate tests, and test results were reviewed at regular intervals. In addition, metrics on test coverage were collected and evaluated.<br>4. The project documentation includes a description of the testing strategy, including the automation tools used, the test structure, and the procedure for ensuring test quality. Clear instructions for executing the tests are provided so that other developers can understand and reproduce the quality assurance processes. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| G16 | **Error handling and logging**<br>How should error and exception handling be approached during design and implementation? |
|---|---|
| Quality level 3 | 1. Comprehensive error handling was implemented to appropriately catch both expected and unexpected errors without negatively affecting the user experience. User-friendly error messages were provided.<br>2. Specific exception handling mechanisms are in place to ensure that errors are systematically logged. This includes the use of try-catch blocks or similar structures for managing exceptions.<br>3. A robust logging system is used to generate error logs. These logs contain relevant information such as timestamps, error messages, and the context in which the error occurred, and are structured to assist in troubleshooting.<br>4. The documentation describes the procedures for error handling, including the methods used for logging and notifications. Guidelines are provided on how to respond to specific errors to facilitate maintenance and troubleshooting. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

## PC H: Delivery and operation of applications (optional criteria AD)

| H01 | **Component dependencies and their selection**<br>How are dependencies between components analyzed? |
|---|---|
| Quality level 3 | 1. All relevant dependencies between components (e.g., microservices, existing software, interfaces/APIs) were identified.<br>2. Potential risks and constraints arising from dependencies were analyzed and documented.<br>3. Dependencies were assessed to facilitate the selection of appropriate platforms and technologies.<br>4. The analysis was documented in a comprehensible manner and is understandable to stakeholders. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| H02 | **Platform selection**<br>How is the choice of an appropriate platform carried out? |
|---|---|
| Quality level 3 | 1. The platform (e.g., local installation, server-based, web-based, container-based) was selected based on the technical requirements and dependencies of the application.<br>2. The platform selection considered technical feasibility, such as support for required services, interfaces, and components.<br>3. The platform was practically set up or configured so that the application can be executed on it.<br>4. Security and data protection requirements were identified, and the available platform services (e.g., user permissions, encryption, backups) were utilized accordingly. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| H03 | **Resource selection and consistency check**<br>How is the selection of required resources and the consistency check carried out? |
|---|---|
| Quality level 3 | 1. Necessary resources were selected based on the platform provider's recommendations (performance, memory requirements, availability, costs, access).<br>2. The chosen resources support the planned functionality and performance of the application.<br>3. The selection was reviewed for consistency within the team and/or with the stakeholders, and necessary adjustments were made.<br>4. The results of the selection and consistency check were documented and recorded in a comprehensible manner for all participants. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| H04 | **Integration practices for delivery processes**<br>Which integration practices are suitable for the delivery process? |
|---|---|
| Quality level 3 | 1. Dependencies between the various components with regard to the delivery process are analysed and documented.<br>2. Suitable integration practices (e.g. Git flow, trunk, continuous integration) are determined on the basis of the application type and the selected process model.<br>3. The selected integration practices are clearly defined and communicated to all relevant team members.<br>4. Plannable migrations (code first, database schema) are taken into account with regard to the architecture and integrated into the integration process. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| H05 | **Deployment practices and artifact management**<br>How are deployment practices and artifact management defined and implemented? |
|---|---|
| Quality level 3 | 1. Appropriate deployment practices (e.g., continuous delivery, automated deployments) were practically defined and implemented.<br>2. The application was successfully deployed to the intended environment (e.g., test, development, or local environment).<br>3. Deployment steps were executed in a logical sequence to ensure that dependent components start correctly. For example, the database is deployed first, followed by the backend, and finally the front end.<br>4. It was verified that the application runs correctly; core functions were tested, and any issues that occurred were resolved to ensure stable and usable delivery. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| H06 | **Automation of the delivery process**<br>How is the delivery process efficiently automated? |
|---|---|
| Quality level 3 | 1. The delivery process was automated, correctly configured, and functioned flawlessly.<br>2. The delivery process was documented and made comprehensible to external parties.<br>3. The automation process was reviewed for efficiency and error-free operation and optimized as needed.<br>4. Appropriate control mechanisms (e.g., logs, notifications, monitoring) were implemented to detect issues at an early stage. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| H07 | **Management and testing of the delivery process**<br>How are application components managed and the delivery process tested? |
|---|---|
| Quality level 3 | 1. Application components are provided and correctly integrated into the runtime environment (e.g. Docker, container).<br>2. Artefacts are systematically managed and versioned to ensure traceability and consistency.<br>3. The entire delivery process is checked according to specifications and the functionality of the application is confirmed by means of a test concept (e.g. integration test).<br>4. Improvement and optimisation measures for the delivery process have been identified and implemented on the basis of the test results and practical application. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| H08 | **Monitoring the stability and performance of applications**<br>How is the stability and performance of the application monitored? |
|---|---|
| Quality level 3 | 1. Critical performance indicators (e.g., response times, CPU/memory usage) were defined.<br>2. Tools or mechanisms for monitoring were set up and correctly configured (e.g., log levels, measurement points).<br>3. Performance was regularly reviewed; deviations were identified and documented.<br>4. Optimizations or adjustments were carried out based on the reviews to ensure stability. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| H09 | Monitoring the security of applications<br>How is the application monitored for security-related events? |
|---|---|
| Quality level 3 | 1. Relevant security metrics or events (e.g., failed logins, permission changes, access to critical data) were defined.<br>2. Monitoring mechanisms or logs were set up to capture these metrics.<br>3. Security-related incidents were regularly reviewed and documented.<br>4. Appropriate measures were implemented or proposed for identified issues (e.g., correcting permissions, configuring alerts). |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| H10 | **Analysis and resolving of problems during operation**<br>How are problems analysed and resolved during operation? |
|---|---|
| Quality level 3 | 1. A structured procedure for analysing problems has been established, including error reproduction and systematic error elimination.<br>2. The up-to-dateness and security settings of the applications and interfaces are regularly checked based on the latest manufacturer information.<br>3. A target-oriented procedure for solving the problem is defined.<br>4. Measures implemented to rectify problems are documented and lead to an expansion of the test cases in order to minimise future incidents. |
| Quality level 2 | Three points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

## Documentation (mandatory criteria BS)

| Doc01 | **Structure**<br>How is the documentation structured? |
|---|---|
| Quality level 3 | 1. The IPP report is divided into Parts 1 and 2 as well as any appendices: Part 1 comprises the additional content required by the examination organisation, while Part 2 contains the implementation documentation. Any source code or other supplements such as guidelines are part of the appendix.<br>2. The chapter structure is based on the relevant focal points. It is clearly organised to ensure easy navigation and comprehensibility for the reader.<br>3. The structural characteristics of the chosen project method are implemented in Part 2. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| Doc02 | **Design of the documentation**<br>How is the documentation designed? |
|---|---|
| Quality level 3 | 1. A standardised format is used to ensure consistency and provide the reader with clear orientation.<br>2. Balanced spacing is used between texts and elements.<br>3. The design of headings, text and graphics facilitates the flow of reading and does not hinder it.<br>4. The headings contain relevant information and make it easier for the reader to find their way around.<br>5. Qualitative page breaks ensure that there are no single lines at the end or beginning of a page. |
| Quality level 2 | Four points are fulfilled. |
| Quality level 1 | Two or three points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| Doc03 | **Formal requirements of the IPP report**<br>What are the requirements regarding the formal completeness of the IPP report? |
|---|---|
| Quality level 3 | The IPP report contains...<br>1. on all pages (optional title page) a header or footer, correct page numbering, the current print date and the candidate's name.<br>2. a complete table of contents.<br>3. an alphabetically sorted glossary that provides precise explanations of the technical terms and abbreviations used. The glossary entries are tailored to external professionals. No more than three relevant components are missing.<br>4. a complete and valid list of sources.<br><br>Additional Formal Requirement<br>5. The IPP report is digitally searchable (screenshots and graphics are exempt from this requirement). |
| Quality level 2 | Four points are fulfilled. |
| Quality level 1 | Two or three points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| Doc04 | **Written brilliance**<br>How should spelling, punctuation and grammar be assessed? |
|---|---|
| Quality level 3 | 1. The writing style is fluent, the text is written clearly and comprehensibly throughout.<br>2. The sentences are complete and detailed.<br>3. Spelling, punctuation and grammar show no or only a few minor weaknesses. |
| Quality level 2 | Quality level 3 was not fully achieved. For example, for the following reasons: The writing style shows some weaknesses, the clarity of the text could be improved. Some sentences are not complete or detailed enough. Spelling, punctuation and grammar show minor weaknesses that do not affect readability. |
| Quality level 1 | Quality level 3 was significantly missed. For example, for the following reasons: The writing style is not very fluent, the text has considerable comprehension difficulties. Many sentences are incomplete or concise. Spelling, punctuation and grammar show clear weaknesses that significantly impair readability. |
| Quality level 0 | Quality level 3 was not nearly achieved. For example, for the following reasons: The writing style is poor, the text is difficult to understand. Many sentences are incomplete, unclear or missing completely. Spelling, punctuation and grammar show considerable deficiencies that severely impair the overall quality. |

| Doc05 | **Visual requirements for illustrations**<br>What visual criteria must be met for illustrations (e.g. graphics, images, diagrams and tables)? |
|---|---|
| Quality level 3 | 1. The illustrations are easy to read, with sufficient contrast and appropriate size (the printout on A4 format serves as a reference).<br>2. The illustrations are clear and comprehensible to allow easy interpretation and information absorption.<br>3. The illustrations have meaningful captions/legends to explain and contextualise the content. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| Doc06 | **Summary of the IPP report**<br>What are the requirements for a summary? |
|---|---|
| Quality level 3 | 1. The summary is part of Part 2 of the IPP report.<br>2. The core information is reproduced, neither more nor less.<br>3. The summary is limited to one A4 page and does not contain any graphics.<br>4. The summary has a clear structure and contains 3 to 4 chapters.<br>5. The focus on the target group is guaranteed.<br>6. The summary ends meaningfully, e.g. with a conclusion or a recommendation.<br>7. The summary is objective and does not describe personal experiences. |
| Quality level 2 | Five or six points are fulfilled. |
| Quality level 1 | Three or four points are fulfilled. |
| Quality level 0 | Less than three points are fulfilled. |

| Doc07 | **Keeping the work journal**<br>What should be considered when keeping the work journal? |
|---|---|
| Quality level 3 | 1. The work journal forms one component of part 1 of the IPP report.<br>2. The presentation is clear, concise, and easy to understand.<br>3. The work journal consists of individual daily reports.<br>4. All activities according to the schedule as well as overtime and unplanned work are mentioned.<br>5. Successes and failures are mentioned. Failures are reflected upon critically.<br>6. All types of support used, including assistance and the use of AI tools, are fully listed and justified. |
| Quality level 2 | Four or five points are fulfilled. |
| Quality level 1 | Two or three points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| Doc08 | **Personal conclusion**<br>What needs to be considered when writing the personal conclusion? |
|---|---|
| Quality level 3 | 1. The personal conclusion is part of Part 1 of the IPP report.<br>The personal conclusion provides an objective insight into the following components:<br>2. The challenges<br>3. Learning experience<br>4. Development perspectives. It shows what will be done better or differently in a similar project in the future.<br>5. Assessment of success. |
| Quality level 2 | Three or four points are fulfilled. |
| Quality level 1 | Two points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

## Oral exam and presentation (mandatory criteria BS)

| E&P01 | **Presentation: Structure and time management**<br>How should the presentation be structured, and what time limit must be adhered to? |
|---|---|
| Quality level 3 | 1. The presentation includes an introduction, a main part, and concludes with a critical reflection.<br>2. The presentation sets meaningful, relevant focal points.<br>3. The information is presented in a logical and coherent order.<br>4. The time limit of 15 to 20 minutes was adhered to. |
| Quality level 2 | Points four and two additional points are fulfilled. |
| Quality level 1 | Two or three points are fulfilled; however, the requirements for quality level 2 are not met. |
| Quality level 0 | Less than two points are fulfilled. |

| E&P02 | **Presentation: Use of media and technology**<br>What should be considered when using media and technology during the presentation? |
|---|---|
| Quality level 3 | 1. The equipment and software used worked perfectly. In the event of unforeseen difficulties, everything indicates that the preparations were made professionally.<br>2. The use of media and technology makes sense, is relevant to the content and supports the presentation effectively.<br>3. The presentation documents are visually appealing. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| E&P03 | **Presentation skills**<br>What characterises great presentation skills? |
|---|---|
| Quality level 3 | 1. Information was presented clearly and comprehensibly so that those present could easily understand what was being said.<br>2. Language and media use are harmonised and complement each other.<br>3. The presentation impressed with its self-confident demeanour, both verbally and through convincing body language. |
| Quality level 2 | Two points are fulfilled. |
| Quality level 1 | One point is fulfilled. |
| Quality level 0 | No point is fulfilled. |

| E&P04 | **Demonstration of the product**<br>How should the product of the specialised work be presented? |
|---|---|
| Quality level 3 | 1. The demonstration took place directly on the product in the state of the deadline and live.<br>2. The main product features/functions were shown.<br>3. The demonstration was well prepared.<br>4. The demonstration is logically structured.<br>5. The demonstration is understandable and comprehensible for the audience. |
| Quality level 2 | Four points are fulfilled. |
| Quality level 1 | Two or three points are fulfilled. |
| Quality level 0 | Less than two points are fulfilled. |

| E&P05 | **Oral exam: Subject area 1**<br>How professionally are the experts' questions regarding the technical work answered? |
|---|---|
| Quality level 3 | The answer to the question deals with all aspects in a professional and differentiated manner. All statements made are - where necessary - backed up with examples or logical conclusions. The answers are technically competent and correct. The candidate is able to provide precise information on details. |
| Quality level 2 | The answer to the question ignores one or more secondary aspects, or a central aspect is not sufficiently differentiated. Most statements are supported by examples or logical conclusions where necessary. The candidate usually gives correct answers and can usually provide precise information on details. |
| Quality level 1 | The answer to the question completely ignores a central aspect or is not sufficiently differentiated with regard to the majority of the central aspects. Many statements are not supported by examples or logical conclusions where necessary. The candidate frequently gives incorrect or imprecise answers. |
| Quality level 0 | The questions on the IPP cannot be answered correctly. |

| E&P06 | **Oral exam: Subject area 2**<br>How professionally are the experts' questions regarding the technical work answered? |
|---|---|
| Quality level 3 | The answer to the question deals with all aspects in a professional and differentiated manner. All statements made are - where necessary - backed up with examples or logical conclusions. The answers are technically competent and correct. The candidate is able to provide precise information on details. |
| Quality level 2 | The answer to the question ignores one or more secondary aspects, or a central aspect is not sufficiently differentiated. Most statements are supported by examples or logical conclusions where necessary. The candidate usually gives correct answers and can usually provide precise information on details. |
| Quality level 1 | The answer to the question completely ignores a central aspect or is not sufficiently differentiated with regard to the majority of the central aspects. Many statements are not supported by examples or logical conclusions where necessary. The candidate frequently gives incorrect or imprecise answers. |
| Quality level 0 | The questions on the IPP cannot be answered correctly. |

| E&P07 | **Oral exam: Subject area 3**<br>How professionally are the experts' questions regarding the technical work answered? |
|---|---|
| Quality level 3 | The answer to the question deals with all aspects in a professional and differentiated manner. All statements made are - where necessary - backed up with examples or logical conclusions. The answers are technically competent and correct. The candidate is able to provide precise information on details. |
| Quality level 2 | The answer to the question ignores one or more secondary aspects, or a central aspect is not sufficiently differentiated. Most statements are supported by examples or logical conclusions where necessary. The candidate usually gives correct answers and can usually provide precise information on details. |
| Quality level 1 | The answer to the question completely ignores a central aspect or is not sufficiently differentiated with regard to the majority of the central aspects. Many statements are not supported by examples or logical conclusions where necessary. The candidate frequently gives incorrect or imprecise answers. |
| Quality level 0 | The questions on the IPP cannot be answered correctly. |

| E&P08 | **Oral exam: Subject area 4**<br>How professionally are the experts' questions regarding the technical work answered? |
|---|---|
| Quality level 3 | The answer to the question deals with all aspects in a professional and differentiated manner. All statements made are - where necessary - backed up with examples or logical conclusions. The answers are technically competent and correct. The candidate is able to provide precise information on details. |
| Quality level 2 | The answer to the question ignores one or more secondary aspects, or a central aspect is not sufficiently differentiated. Most statements are supported by examples or logical conclusions where necessary. The candidate usually gives correct answers and can usually provide precise information on details. |
| Quality level 1 | The answer to the question completely ignores a central aspect or is not sufficiently differentiated with regard to the majority of the central aspects. Many statements are not supported by examples or logical conclusions where necessary. The candidate frequently gives incorrect or imprecise answers. |
| Quality level 0 | The questions on the IPP cannot be answered correctly. |

| E&P09 | **Oral exam: Subject area 5**<br>How professionally are the experts' questions regarding the technical work answered? |
|---|---|
| Quality level 3 | The answer to the question deals with all aspects in a professional and differentiated manner. All statements made are - where necessary - backed up with examples or logical conclusions. The answers are technically competent and correct. The candidate is able to provide precise information on details. |
| Quality level 2 | The answer to the question ignores one or more secondary aspects, or a central aspect is not sufficiently differentiated. Most statements are supported by examples or logical conclusions where necessary. The candidate usually gives correct answers and can usually provide precise information on details. |
| Quality level 1 | The answer to the question completely ignores a central aspect or is not sufficiently differentiated with regard to the majority of the central aspects. Many statements are not supported by examples or logical conclusions where necessary. The candidate frequently gives incorrect or imprecise answers. |
| Quality level 0 | The questions on the IPP cannot be answered correctly. |

| E&P10 | **Oral exam: Subject area 6**<br>How professionally are the experts' questions regarding the technical work answered? |
|---|---|
| Quality level 3 | The answer to the question deals with all aspects in a professional and differentiated manner. All statements made are - where necessary - backed up with examples or logical conclusions. The answers are technically competent and correct. The candidate is able to provide precise information on details. |
| Quality level 2 | The answer to the question ignores one or more secondary aspects, or a central aspect is not sufficiently differentiated. Most statements are supported by examples or logical conclusions where necessary. The candidate usually gives correct answers and can usually provide precise information on details. |
| Quality level 1 | The answer to the question completely ignores a central aspect or is not sufficiently differentiated with regard to the majority of the central aspects. Many statements are not supported by examples or logical conclusions where necessary. The candidate frequently gives incorrect or imprecise answers. |
| Quality level 0 | The questions on the IPP cannot be answered correctly. |