Appendix 1: AI competencies per role

Guide for reading detailed role descriptions

VDA | Verband der Automobilindustrie

Name of the role

Role: Quality Auditor (System, Process, Product) and Quality Assessor (ASPICE)

Area of activities	Necessary competencies (technical, methodological, personal, digital)	Basic understanding of AI/ML concepts (AI models, data models, model evaluation, validation)	Basic understanding of data analysis and statistics (big data, visualization, data quality).	Working with LLMs (incl. prompting)	Awareness of AI opportunities and risks, AI ethics, AI legal principles and potential harm
QM system audits (ISO 9001 / IATF 16949)	- **Technical**: In-depth knowledge of ISO 9001, IATF 16949 and automotive core tools (e.g. FMEA, APQP, PPAP), ISO 42001, customer-specific requirements - **Methodological**: Audit methodology (ISO 19011), planning and execution of audits, risk-based process analysis - **Personal**: Analytical thinking, communication skills, impartiality, integrity - **Digital**: Handling of audit software/QMS tools and analysis or presentation tools	Can assess AI-relevant content within the scope of audits (basic AI/ML model classes (e.g. classification, clustering) and simple assessment/validation criteria (e.g. precision/recall) to ensure accountability for audit decisions in accordance with ISO 19011. Can leverage AI tools for audit planning and reporting.	Can assess AI-relevant content (data quality rules and basic statistics (sample, trend, outliers)) and justify it within the scope of audits.	Can prompt LLMs in a targeted manner to compare standard texts (ISO 9001/IATF 16949), generate audit questions and summarize documents (e.g., automatically compare process descriptions) without disclosing sensitive content.	Can identify opportunities and risks of AI-based audit tools (bias, data protection, traceability) and propose countermeasures (human-in-the-loop, access controls, sources). Has knowledge to interpret large amounts of data, visualize and critically evaluate AI results.
Process audits (VDA 6.3 / AIAG CQI)	- **Technical**: Knowledge of manufacturing and development processes as well as QM methods (FMEA, SPC, Lean) - **Methodological**: VDA 6.3 process audit methodology (scoring), statistical process analysis, audit planning and execution - **Personal**: Detail orientation, perseverance, team leadership in the audit (mediation and conflict resolution) - **Digital**: Handling of production data and MES systems, data visualization (dashboards)	Can assess AI-relevant content within the scope of audits (basic types of ML (classification/regression) in process and SPC data and validation results) so that detected deviations are justified in accordance with VDA 6.3. Can leverage AI tools for audit planning and reporting.	Can assess AI-relevant content within the scope of audits (statistical process analysis (e.g. control charts, Cp/Cpk) and assess them with justification.	Can use LLMs to process audit documents and standard texts (e.g., automatically compare process descriptions) to formulate audit-related questions per process step, to structure scoring justifications and to summarize action lists.	Can identify risks when using AI in production data (e.g. faulty sensors, distorted data due to maintenance events) and secure the audit evaluation accordingly. Has knowledge to interpret large amounts of data, visualize and critically evaluate AI results.
Product audits (VDA 6.5)	- **Technical**: In-depth knowledge of manufacturing processes, measurement technology and quality standards (tolerance management, inspection plans) - **Methodological**: Product audit methodology (VDA 6.5), sampling, inspection equipment capability (MSA) - **Personal**: Diligence, independence, customer orientation (clarification of deviations) - **Digital**: Dealing with digital measurement systems (CMM, image processing), analysis of inspection data	Can evaluate AI-relevant content within the scope of audits (basic AI/ML principles in the evaluation of measurement and quality data (pattern recognition in error images) / visual inspection (computer vision) and simple model results (e.g. precision/recall)) so that the relevance for fault types can be traced in the product audit. Can leverage AI tools for audit planning and reporting.	Can assess AI-relevant content within the scope of audits (sampling and MSA metrics with AI-supported pattern recognition) and make a reasoned assessment.	Can use LLMs to summarize inspection reports, standardize error classes and structure 8D entries.	Can identify risks of automated image analysis (over/under-detection, data protection for image data) and propose risk mitigation measures. Has knowledge to interpret large amounts of data, visualize and critically evaluate AI results.
Automotive SPICE assessments	- **Technical**: Knowledge of software development methods, automotive SPICE (ISO/IEC 330xx) and associated process-dependent standards (e.g. ISO 26262) - **Methodological**: Assessment methodology (automotive SPICE process assessment), process analysis, metric evaluation - **Personal**: In-depth technical understanding, attention to detail, communication skills (interviews and workshops) - **Digital**: Handling of ALM/PLM tools (requirements management), experience with evaluation of project and test data	Can evaluate AI-relevant content (basic concepts of ML/NLP and their suitability for the search for evidence in ALM/PLM data) and justify it within the scope of assessments. Can leverage AI tools for assessment planning and reporting.	Can evaluate AI-relevant content (software metrics (e.g. defect metrics, test coverage), trend visualization and correlation analyses) and justify it within the scope of assessments..	Can prompt LLMs to analyze extensive documentation (requirements, specifications) in order to identify gaps or inconsistencies.	Can identify legal/ethical aspects of AI use (IP protection, data protection in code repos, traceability) and formulate practical recommendations for action. Has knowledge to interpret large amounts of data, visualize and critically evaluate AI results.

Basic areas of responsibility and activities of the role

Basic competencies for the role (independent of AI)

Relevant AI competencies of the role based on the four main AI competency areas

Role: Employee in supplier quality (SQE, SDE)

Area of activities	Necessary competencies (technical, methodological, personal, digital)	Basic understanding of AI/ML concepts (AI models, data models, model evaluation, validation)	Basic understanding of data analysis and statistics (big data, visualization, data quality).	Working with LLMs (incl. prompting)	Awareness of AI opportunities and risks, AI ethics, AI legal principles and potential harm
Supplier Requirement Management (specification creation, change reconciliation, requirement tracking, traceability)	- **Technical**: material & manufacturing knowledge; understanding product requirements; standards/regulations (VDA, ISO). - **Methodological**: Requirements management, specification and tolerance technology, change/configuration management. - **Personal**: Accuracy, negotiation skills, assertiveness. - **Digital**: PLM/ALM, QMS, basics of SQL/reporting.	Can expertly review ML-based proposals for product and process requirements, define validation criteria, and verify results against VDA/ISO specifications to ensure consistency and traceability.	Can analyze, visualize, and apply data cleansing to the data quality of request data (versions, metadata, sources) such that inconsistencies are detected and documented early.	Can use LLMs with precise prompts to structure specification texts, identify gaps/contradictions and derive clear formulations; results are tested against standards (VDA, ISO).	Can check AI results for hallucinations, bias and legal risks (data protection, IP) and document the check comprehensibly.
Q project planning with suppliers (APQP / VDA maturity level) (project structure, milestones, risk protection, gate reviews)	- **Technical**: APQP/PPAP, VDA maturity level assurance, process/product approvals. - **Methodological**: Project management, scheduling, milestone planning, risk management. - **Personal**: Coordination, moderation, leadership. - **Digital**: Project planning tools, reporting, basic statistics.	Can understand and apply simple forecasting models (deadline, quality, supplier risk) with justification in planning decisions.	Can analyze time series and distributions from project KPIs and communicate uncertainties.	Can use LLMs to pre-structure risk registers, milestone descriptions and review questions.	Can review AI-based planning for risks (e.g. over-optimistic assumptions) and observe ethical/compliance aspects (transparency of assumptions).
Implementation of supplier audits (VDA specifications)	- **Technical**: Audit methodology, VDA audit catalogs, process knowledge (production, quality). - **Methodological**: Audit planning, interviews, observation techniques, reporting. - **Personal**: Objectivity, conflict management, cultural sensitivity. - **Digital**: Audit tools, mobile audit apps, digital checklists.	Can interpret AI results (e.g. image recognition, speech analysis) in the audit context and utilize them to produce evidence.	Can check training data quality for NLP (representativeness, noise) and statistically interpret audit metrics.	Can target LLMs for protocol summaries and questionnaires.	Can ensure and document data protection and consent for AI-enabled recording/image analysis.
Problem-solving methods (e.g. 8D) with suppliers	- **Technical**: Root cause analysis (Ishikawa, 5Why, FMEA), CIP, error types. - **Methodological**: 8D moderation, containment measures, effectiveness testing. - **Personal**: Moderation competence, coaching, perseverance. - **Digital**: CAx data, problem tracking tools, statistics tools.	Can understand ML-based cause hypotheses and apply them in the 8D steps (especially D4/D5 validation).	Can interpret anomaly and cluster analyses and check them statistically (e.g. significance testing) to narrow down causes.	Can use LLMs to structure 8D reports and create standardized phrases.	Can check AI-based root cause analyses for overfitting/artifacts and make risks transparent.
Monitoring & performance (KPIs, SPC, supplier evaluation)	- **Technical**: Key figures (PPM, RTY), SPC, process capability calculation (Cp, Cpk). - **Methodological**: Dashboarding, trend analysis, root cause monitoring. - **Personal**: Analytical thinking, decision-making. - **Digital**: Databases, statistics software, basics of data pipelines.	Can apply ML models for trend/anomaly detection in KPI time series and classify results professionally.	Can check KPI data quality, understand test methods and explain uncertainties for decisions.	Can use LLMs to create understandable status reports with KPI statements.	Can assess risks from automated alerts (false positives/negatives) and ensure compliance of monitoring.
Change Management / Engineering Change Notice (ECN)	- **Technical**: Change processes, technical documents, release processes. - **Methodological**: Impact analyses, stakeholder coordination. - **Personal**: Diligence, negotiating skills. - **Digital**: PLM/ECN tools, document management.	Can understand AI/NLP results for impact analysis and apply them to consistency with technical documents.	Can statistically check data quality and version levels and provide change impact visualizations.	Can prompt LLMs to create change summaries and communication templates.	Can consider legal/compliance aspects (data protection, copyright) in AI-based document analysis.
Error/complaint management & customer interface	- **Technical**: Complaint processes, warranty cases, recalls. - **Methodological**: Claim handling, root cause, cost accounting. - **Personal**: Customer/supplier contact capability, de-escalation. - **Digital**: Ticketing systems, data analysis.	Can understand text classification models (precision/recall balancing) and apply them to the prioritization of complaints.	Can clean up complaint data, check label quality and visualize analyses.	Can use LLMs to structure complaint texts and forward them to relevant teams.	Can protect personal data and assess risks from automated classification.
Measurement system analysis & test equipment management (MSA)	- **Technical**: MSA, calibration, test planning, tolerance analysis. - **Methodological**: Statistics (variance decomposition), tracking of inspection equipment. - **Personal**: Accuracy, diligence. - **Digital**: Management tools for inspection equipment, statistics software.	Can understand ML-supported drift/deviation detection and apply it for inspection equipment evaluation.	Can understand variance decomposition and significance tests, clean up and visualize measurement data.	Can use LLMs to structure MSA reports and precisely formulate deviation interpretations.	Can consider ethical/compliance aspects of measurement data (e.g. personal production data).
Risk management & compliance (Supplier security, IP, sustainability)	- **Technical**: Supplier risks, business continuity, compliance requirements. - **Methodological**: Risk scoring, business continuity planning. - **Personal**: Discernment, integrity. - **Digital**: Risk databases, scoring tools.	Can understand and validate AI-based supplier risk scores (source, bias) and apply them in decisions.	Can assess data source quality and statistically interpret merger/scoring results.	Can use LLMs to summarize risk reports and create catalogs of measures.	Can apply ethical, data protection and legal requirements in AI-based monitoring.
Communication & stakeholder management (internal/external)	- **Technical**: Knowledge of business organization, technical reasoning. - **Methodological**: Stakeholder mapping, chairing meetings. - **Personal**: Strong communication skills, empathy, negotiation. - **Digital**: Collaboration tools, presentation tools.	Can explain basic AI concepts in a way that is appropriate to the addressee, and can translate technical results into decisions.	Can create data visualizations and communicate core statistical messages clearly.	Can prompt LLMs purposefully to create concise status reports and presentations.	Can transparently present risks/uncertainties of AI results (e.g. model boundaries) and address ethical issues.
Documentation, reporting & knowledge management	- **Technical**: Quality documentation, traceability, methodological knowledge. - **Methodological**: Structured document creation, versioning. - **Personal**: Diligence, learning orientation. - **Digital**: DMS, PLM, BI tools, search platforms.	Can understand and apply concepts such as embedding/indexing to knowledge bases.	Can interpret documentation metrics (precision/recall) and perform data quality checks.	Can use LLMs to summarize technical reports.	Can apply governance to AI-generated documents (sign-offs, responsibilities) and risks (e.g. hallucination).

Role: Development quality (product development) staff

Area of activities	Necessary competencies (technical, methodological, personal, digital)	Basic understanding of AI/ML concepts (AI models, data models, model evaluation, validation)	Basic understanding of data analysis and statistics (big data, visualization, data quality).	Working with LLMs (incl. prompting)	Awareness of AI opportunities and risks, AI ethics, AI legal principles and potential harm
Quality project planning (APQP) (Quality planning (QVP/APQP), project and inspection plans, deadline and milestone planning/approvals)	- **Technical**: In-depth knowledge of APQP/QVP and IATF16949, VDA guidelines (e.g. VDA Volume 2 Quality Management in Development) and standards (ISO 9001, VDA 6.x). - **Methodological**: Project and risk management, scheduling, use of quality tools (e.g. APQP checklists, milestone tracking). - **Personal**: Strong organizational and coordination skills, strong communication and moderation skills, team orientation across department boundaries, customer orientation. - **Digital**: Experienced in PLM/QMS/project management software, office and database tools, digital document management.	Can implement basic concepts of common AI/ML models (e.g. classification, regression) and apply it to the prioritization of quality risks in APQP/QVP planning, so that gate reviews according to VDA/AIAG are complete and comprehensible.	Can set data quality criteria for project metrics and perform simple statistical evaluations (e.g. trend analyses) to identify deadline and milestone risks early.	Can purposefully prompt LLMs to design, review, and summarize APQP documents (QVP, inspection plans, status reports); documents sources and assumptions according to internal checklist.	Can review the use of AI-based planning and reporting tools for opportunities (transparency, early warning) and risks (hallucinations, data protection, copyright) and keep track of risk mitigation measures.
Risk analysis (FMEA, hazard analysis) (Risk analyses in product and process design (design and process FMEA, if necessary safety analyses according to ISO 26262 in accordance with VDA/AIAG standards)	- **Technical**: Comprehensive knowledge of DFMEA/PFMEA (FMEA methodology), VDA/AIAG-FMEA manual, ISO 26262 (if electrical/electronic) and product specifications (function, materials). - **Methodological**: Risk matrices, fault tree analysis, Ishikawa, 5-Why, statistical analysis of inspection data (SPC). Systematic analysis (e.g. FMEA software). - **Personal**: Analytical and critical thinking, decision-making and assertiveness, accuracy and solution orientation. - **Digital**: Experience with FMEA and QM software, database and statistics tools, solid IT user knowledge.	Can describe basic AI/ML concepts (supervised learning, clustering) and apply them for hypothesis generation for error detection in DFMEA/PFMEA; creates simple validation approaches for assumptions.	Can apply basic statistical methods (Pareto, failure rates, historical error probabilities) to FMEA data and perform data quality checks to objectively justify risk assessments.	Can use LLMs with clear prompts to consolidate FMEA records linguistically, summarize standard texts and prepare checklists; checks facts using source reference.	Can identify AI risks (bias, hallucination, confidentiality) in the FMEA workflow and take appropriate countermeasures (e.g. fact check, access restriction).
Customer requirements management (Recording, analysis and tracking of customer-specific requirements (customer specification, requirement specification). Translation of "Voice of Customer" into technical and quality specifications.	- **Technical**: Knowledge of requirements engineering and customer specifications; handling of standards and laws (e.g. VDA requirements, legal requirements). - **Methodological**: Structuring and traceability of requirements (traceability), change management, application of APQP (coordination section "Plan & Define"). - **Personal**: Customer orientation, empathy, mediation and negotiation skills, accuracy in dealing with detailed requirements. - **Digital**: Experience with requirements management tools, good grasp of English (technical); use of modern research and BI tools.	Can explain basic concepts of NLP/ML and use them to structure customer requirements (e.g. clustering of topics) in order to support traceability.	Can perform simple text and data analyses (frequencies, trend visualization) and check data quality (completeness, duplicates) in requirements data.	Can accurately prompt LLMs to summarize requirement specifications, clarify technical issues and support translations; records sources/versions (evaluation: conformance with customer specification after review).	Can assess AI opportunities (rapid analysis) and risks (confidentiality, IP, GDPR) in dealing with customer data and apply protective measures.
Development-accompanying quality assurance including reviews and assessments (Planning of quality assurance in product development, review and approval of development results, reporting of status and KPI, planning and implementation of development reviews/assessments)	- **Technical**: In-depth knowledge of quality assurance in product development (VDA Volume 4 and maturity level assurance), AutomotiveSPICE - **Methodological**: Project and risk management, scheduling, review and assessment methods - **Personal**: Analytical and critical thinking, accuracy in dealing with detailed requirements - **Digital**: Experienced in the use of office and database tools, digital document management.	Can explain basic principles of ML (regression, classification) and apply them to the analysis of development data to identify anomalies.	Can perform simple text and data analyses (coverage, match) and check data quality (completeness, duplicates) in development results.	Can prompt LLMs to create and consolidate review logs, text summaries, and variance reports to demonstrate criteria compliance. Can use LLMs to create questionnaires for reviews and assessments.	Can detect AI risks (misinterpretation, data protection, inconsistency) in development processes and results and apply appropriate protective measures.
Problem-solving methods (8D, Ishikawa, etc.) (Problem-solving methods (8D method, PDCA). Systematic root cause analysis (5-Why, Ishikawa). Creation and support of 8D reports, measure tracking and lessons learned.)	- **Technical**: Extensive QM tool know-how (8D, Ishikawa, 5-Why, FMEA updates), knowledge of CIP and requalification. Familiarity with IATF 16949 CAPA processes and VDA 2.5 (release after correction). - **Methodological**: Leading interdisciplinary teams, facilitating workshops, leading audits. Systematic problem-solving and decision-making. Data analysis of error rates. - **Personal**: Assertiveness and strong conflict resolution skills, determination, creativity, responsibility. Strong awareness of quality and costs. - **Digital**: Experienced in CAQ systems and quality databases, dealing with digital 8D workflow tools. Knowledge of reporting and visualization tools.	Can understand basic concepts of ML (decision trees, clustering) and apply them to structure error data in 8D cases to form hypotheses on causes.	Can perform basic analyses (Pareto, trend, simple correlation, pattern recognition in data) on complaint and process data; ensures data quality.	Can precisely prompt LLMs to structure complaint texts, summarize proposed measures and generate lessons learned; checks facts.	Can identify AI risks (incorrect conclusions, data protection) in problem/complaint data and apply countermeasures (anonymization, fact check).

Role: Production quality staff (process development, industrialization, series production)

Task	Necessary competencies (technical, methodological, personal, digital)	Basic understanding of AI/ML concepts (AI models, data models, model evaluation, validation)	Basic understanding of data analysis and statistics (big data, visualization, data quality).	Working with LLMs (incl. prompting)	Awareness of AI opportunities and risks, AI ethics, AI legal principles and potential harm
Quality project planning (APQP according to IATF16949/VDA maturity level assurance)	- **Technical**: Comprehensive understanding of APQP, VDA maturity level models, IATF 16949. - **Methodological**: Quality advance planning, structured milestone planning, risk assessment. - **Personal**: Strength in communication with project partners, structured work. - **Digital**: Knowledge of digital project management tools, QMS systems.	Can select and apply simple forecast models for deadline and risk forecasts, enabling early identification of critical paths according to APQP milestones.	Can clean up, visualize, and analyze trends in project and maturity level data to identify plan deviations according to the APQP plan.	Can prompt LLMs in a targeted manenr to summarize APQP status reports and generate action lists.	Can assess AI use in project management with regard to transparency and data protection (GDPR) and propose suitable protective measures.
Risk analysis (process FMEA)	- **Technical**: Application of VDA/AIAG FMEA standards, in-depth understanding of processes. - **Methodological**: Cause-effect analysis, RPC evaluation, leading teams. - **Personal**: Diligence, analytical thinking, interdisciplinary cooperation. - **Digital**: Operation of FMEA software	Can apply simple ML models/rules for risk assessment of historical FMEA data and validate results	Can prepare process data for root cause analysis (clean-up, feature creation) and verify it statistically, so that hypotheses on error causes can be substantiated.	Can use LLMs to structure FMEA moderation notes and error hypotheses, as well as to condense session logs with source information.	Can critically assess automatically generated proposals (explainability, false positives) and document AI risks for FMEA.
Customer requirements management	- **Technical**: Knowledge of regulatory requirements, customer requirements, standards. - **Methodological**: Requirements analysis, specification comparison, change management. - **Personal**: Communication skills, customer orientation, solid negotiation skills. - **Digital**: Handling document management systems and PLM tools.	Can apply basic text classification models to translate customer requirements into standardized categories.	Can define and review data quality rules for requirements data and statistically represent deviations from specifications.	Can use LLMs to formulate accurate prompts, summarize specifications, highlight conflicts, and generate resolution questions.	Recognizes and mitigates legal/ethical issues (confidentiality, copyrights, hallucinations) when using NLP/LLMs (compliance checklist).
Inspection processes (MSA, measurement planning)	- **Technical**: Knowledge of measurement technology, selection of inspection equipment, MSA methods according to AIAG/VDA Volume 5. - **Methodological**: Analysis of repeatability/repeat accuracy, process capability. - **Personal**: Accuracy, quality awareness, technical curiosity. - **Digital**: Use of measurement databases, statistical software tools	Can use simple models (e.g. outlier detection) to analyze large series of measurements and classify results professionally.	Can clean up measurement data, compute MSA statistics, and visualize results to detect systematic errors.	Can use LLMs to summarize measurement reports and clearly formulate inspection instructions, while maintaining technical terminology.	Can check AI-supported image/measurement evaluation for risks (misclassification, data protection for image data) and define countermeasures.
Statistical process control (SPC)	- **Technical**: Statistical knowledge, SPC key figures, process capability calculation. - **Methodological**: Working with control charts, interpretation of trends and outliers. - **Personal**: Analytical thinking, problem-solving skills. - **Digital**: Application of SPC software and visualization tools.	Can select and apply ML-based anomaly detection for time series and categorize results.	Can edit time series, calculate process capabilities and visualize trends.	Can prompt LLMs to comprehensibly explain SPC trend reports and to compile policy proposals.	Can assess risks of automated monitoring (drift, misinterpretations) and define clear escalation rules (checklist SPC/KI).
Product approvals (PPAP/VDA PPF)	- **Technical**: Detailed knowledge of sampling, PPF/PPAP requirements. - **Methodological**: Documentation, traceability, quality assurance. - **Personal**: Accuracy, reliability, careful documentation. - **Digital**: QMS systems, documentation tools.	Can apply simple rule-based or model-based checks for completeness and inspection criteria in PPAP/PPF and document the validation comprehensibly.	Can structure and check release data so that deviations are detected early.	Can use LLMs to review sample documents, identify missing content and formulate clear questions.	Can assess data integrity and compliance (e.g. GDPR, customer specifications) in AI-supported document review and determine effective measures (compliance checklist).
Problem-solving methods (8D, Ishikawa)	- **Technical**: Confident working with 8D reports, root cause analysis, 5-why, Ishikawa diagram. - **Methodological**: Leading teams, structured problem analysis, action tracking. - **Personal**: Cooperation, objectivity, tenacity. - **Digital**: Leveraging of problem-solving tools and collaboration software.	Can apply ML evaluations of field data to construct hypotheses on the cause and compare them with 5-Why/Ishikawa.	Can clean up data for problem analysis, compare statistics and evaluate the impact of measures.	Can prompt LLMs for the structured creation of 8D texts.	Can critically assess AI proposals (hallucinations, bias) and transparently justify the prioritization of measures.
Supplier/customer management (complaints)	- **Technical**: Complaint handling, quality agreements, understanding of standards. - **Methodological**: Escalation procedures, supplier evaluation. - **Personal**: Communication skills, diplomacy skills. - **Digital**: QMS and ERP systems.	Can apply simple prioritization models based on error rates and match results to service/quality objectives.	Can clean up, categorize and statistically evaluate complaint data to reveal patterns and clusters.	Can use LLMs/NLP to analyze complaint texts, suggest categories and create precise answers or draft FAQs.	Can assess and document data protection requirements and risks of automated categorization.
CIP – continuous improvement process	- **Technical**: Lean principles, Six Sigma, efficiency assessment. - **Methodological**: Problem-solving, workshop design, value stream analysis. - **Personal**: Innovativeness, initiative. - **Digital**: Dashboards, process analysis software.	Can understand and apply simple optimization approaches (e.g. rule-based/simulation, RL in standard environment) to test improvements.	Can analyze productivity data, create visualizations and quantify effects (decrease: before-and-after analysis).	Can prompt LLMs for idea generation and workshop documentation, and can derive structured task lists.	Can detect risks of iterative model adaptation (drift, overfitting) and design learning loops responsibly.
QM systems and audits	- **Technical**: Quality management systems according to IATF 16949, audit methodology. - **Methodological**: Audit planning, deviation analysis, tracking. - **Personal**: Objectivity, accuracy, trustworthiness. - **Digital**: DMS, audit software, workflow tools.	Can understand and apply AI-based text/pattern analysis to systematically aggregate audit findings and perform validation against standard requirements.	Can structure audit data, calculate metrics and create visualizations for variance trends.	Can use LLMs to summarize audit reports and generate source-referenced questionnaires.	Can check the use of AI in QM for transparency/explainability and compliance and document measures.

Role: Customer quality staff (complaints, warranty, field monitoring)

Area of activities	Necessary competencies (technical, methodological, personal, digital)	Basic understanding of AI/ML concepts (AI models, data models, model evaluation, validation)	Basic understanding of data analysis and statistical knowledge (big data, visualization, data quality).	Working with LLMs (incl. prompting)	Awareness of AI opportunities and risks, AI ethics, AI legal principles and potential harm
Customer requirements management (Analysis, assessment and implementation of customer quality requirements)	- **Technical**: ISO 9001, IATF 16949, customer-specific quality requirement profiles (VDA/CQI), product specifications - **Methodological**: Requirements analysis, project management, FMEA, risk assessment - **Personal**: Communication/negotiation skills, customer orientation - **Digital**: Quality and customer management systems, document management, BI software	Can apply basic AI/ML concepts (classification, NLP) to group requirements and detect inconsistencies	Can evaluate and visualize requests using statistical methods (frequency/trend analysis) to derive priorities	Can formulate precise prompts and use LLMs to summarize and structure customer requirements from documents	Can assess opportunities and risks of AI in dealing with customer requirements (data protection, distortions) and plan appropriate inspection steps
Quality project planning (APQP) (Project planning after VDA maturity level assurance, focus on series start)	- **Technical**: APQP, VDA maturity level assurance, AIAG standards, FMEA, PPAP - **Methodological**: Project management, process planning, risk management - **Personal**: Planning/organizational skills, assertiveness - **Digital**: Project management software, FMEA tools, BI tools	Can use basic ML concepts (regression models, simple time series) to forecast forward/risk trends in the APQP	Can analyze project/quality metrics with baseline statistics (SPC, trend charts) and report deviations	Can leverage LLMs to consolidate status reports and risk alerts from project information	Can assess AI risks in project forecasts (data quality, bias) and communicate responsibly
Failure analysis & audit (planning, execution and tracking of field failure analyses, internal/external audits)	- **Technical**: VDA field failure analysis, VDA 6.3, material/component knowledge, inspection technology (microscopy, CT) - **Methodological**: Failure analysis, documentation, continuous improvement process - **Personal**: Analytical, detail-oriented, team player - **Digital**: Metrology software, failure management systems, laboratory data collection	Can apply ML basic concepts (anomaly detection, simple image classification) to inspection and report data to identify anomalies	Can analyze inspection and measurement series with appropriate statistical tools (SPC, distributions) and derive cause information	Can use LLMs to consolidate reports and audit results according to target groups and track open issues	Can consider ethical and legal aspects in AI-based analysis (laboratory/supplier data, audit) and apply protective measures
Standardized complaint process (processing according to VDA QMC incl. QDX/XML)	- **Technical**: ISO 9001/IATF 16949, VDA complaint guidelines, QDX/XML - **Methodological**: Complaint management process, deadline compliance, coordination - **Personal**: Customer orientation, resilience, documentation accuracy - **Digital**: Complaint and CRM systems, databases, SQL	Can use basic ML concepts (text classification) to organize incoming complaints according to criticality and topic	Can evaluate complaint data (PPM, processing times) with basic statistics and derive prioritization criteria	Can use LLMs to categorize and prioritize complaint texts and to generate response templates	Can check and document the use of AI in the complaint process for fairness, transparency and legal compliance (e.g. automated prioritization)
Problem-solving (8D method)	- **Technical**: 8D to VDA, Ishikawa, 5-Why, FMEA, PDCA - **Methodological**: Moderation, root cause analysis, creativity techniques, effectiveness testing - **Personal**: Moderation/communication skills, analytical thinking, conflict management - **Digital**: 8D management software, collaboration tools, data analytics tools	Can understand and apply basic ML principles (pattern recognition, data mining, clustering) to support hypothesis formation in 8D teams in a data-based manner	Can statistically analyze quality data (error codes, process parameters) (Pareto, correlation analysis) to help identify causes	Can use LLMs to structure 8D reports (D1-D8) and clarify formulations	Can detect risks (hallucinations, wrong conclusions) and ensure human validation when using AI in 8D analyses
Field observation & field data analysis	- **Technical**: PPM, failure rates, 8D reporting, Weibull, reliability analysis - **Methodological**: Statistical data analysis, KPI creation, reporting - **Personal**: Analytical, structured, proactive - **Digital**: BI and statistics tools, databases, spreadsheet software	Can apply basic ML concepts (simple forecasting models) to field data (PPM, failure rates) to identify trends early	Can visualize field data (time series, frequencies) and statistically evaluate it (trend, outliers) to justify early warnings	Can use LLMs to cluster free text field reports thematically (topic notes) and create summaries	Can assess ethical and legal aspects of early warning systems (false positives, customer data) and ensure responsible use
Warranty management & callback	- **Technical**: Warranty agreements, product liability, recall/service processes - **Methodological**: Cost/risk analysis, KPI reporting, action control - **Personal**: Cost/result orientation, negotiation skills, assertiveness - **Digital**: ERP/CRM systems for warranty, service management, BI/reporting tools	Can apply basic regression/classification model (ML) concepts to warranty/service data to estimate cost and failure risks	Can analyze warranty/service data with basic statistics (cost, frequency) and support provisioning forecasts	Can use LLMs to create customer-compliant and agency-compliant communication blueprints and consolidate management briefings	Can consider legal framework conditions (product liability, data protection) for AI-supported warranty/recall management and risks

Role: Quality management systems staff (QMS owner)

Area of activities	Necessary competencies (technical, methodological, personal, digital)	Basic understanding of AI/ML concepts (AI models, data models, model evaluation, validation)	Basic understanding of data analysis and statistics (big data, visualization, data quality).	Working with LLMs (incl. prompting)	Awareness of AI opportunities and risks, AI ethics, AI legal principles and potential harm
Maintenance and further development of the quality management system	- **Technical**: Knowledge of standards (e.g. ISO 9001, IATF 16949) - **Methodological**: Process management, PDCA cycle - **Personal**: Structured working method, communication capability - **Digital**: Experience with QMS software, basic knowledge of databases	Can apply basic ML concepts to maintenance and further development of the quality management system: Select model class for trend and deviation analysis, define training/test data, and interpret validation metrics correctly so that PDCA improvements are comprehensibly justified.	Can statistically evaluate QMS-KPI time series and check data quality (completeness, accuracy), visualize results in dashboards and derive improvement measures.	Can prompt LLMs purposefully to create QMS documents (change requests, process descriptions, KPI narratives); requests sources and conducts technical reviews so that content is traceable and verifiable (human-in-the-loop).	Can systematically assess opportunities (e.g. automation of reports) and risks (bias in KPI data, data protection) of AI use in QMS and implement appropriate protective measures (pseudonymization, access controls).
Ensuring compliance with norms and standards (e.g. IATF 16949, ISO 9001)	- **Technical**: Expertise on standards (e.g. IATF 16949, ISO 9001) - **Methodological**: Ability to analyze standards and risks - **Personal**: Assertiveness, precision - **Digital**: Use of standards management software	Can explain and apply how ML models support compliance monitoring (e.g. rule/anomaly detection) and which validation proofs (robustness, reproducibility) auditors expect, so that standard requirements (ISO 9001/IATF 16949) can be verified.	Can track data sources, create sampling plans and statistically secure proof of compliance (e.g. confidence intervals) so that compliance assessments are resilient.	Can use LLMs to research and summarize standard changes; designs prompts to generate references and verify text points so compliance decisions are sound.	Can apply governance requirements (audit trail, accountability, data retention) to AI-driven compliance processes and identify gaps to meet legal and regulatory requirements.
Preparation, implementation and monitoring of certification and customer audits	- **Technical**: Knowledge of audit methods (e.g. VDA 6.3, IATF audits) - **Methodological**: Experience in audit planning and implementation - **Personal**: Presentation and moderation skills, diligence - **Digital**: Competence in digital audit platforms	Can clearly classify model services and validation concepts for certification and customer audits and explain the significance of the key figures, so that audit questions are answered on the basis of proven evidence.	Can create auditable reports (e.g. distribution analyses, representativeness checks) and statistical key figures so that audit records can be traced and checked.	Can prepare audit documents, checklists and Q&A scripts with LLMs and preliminarily test responses; ensures that critical content is reviewed manually to consistently support audits.	Can explain and apply transparency requirements and traceability of training data and define measures to minimize damage in the event of model errors, thus reducing audit risks.
Definition, monitoring and evaluation of quality indicators	- **Technical**: Knowledge of KPI requirements and relevant key figures (e.g. PPM, FPY, rework rate) - **Methodological**: Measure definition, data analysis and interpretation - **Personal**: Problem-solving ability, critical thinking - **Digital**: Experience in reporting tools, databases, statistical software	Can clearly define ML-relevant KPIs (accuracy, precision/recall, drift) and apply them to deployed models so that measurement frequencies and acceptance criteria are consistently defined (evaluation: complete KPI specification). Can explain and apply basic principles of anomaly detection and AI-based monitoring (e.g. thresholds, drift indicators) so that quality indicators are reliably monitored and retraining triggers defined (evaluation: defined alarm and shutdown criteria).	Can set and apply measurement frequencies, sampling schedules and statistical thresholds for ML/LLM KPIs to create reliable monitoring processes. Can perform trend and root-cause analyses using appropriate statistical methods (e.g. regression, ANOVA) and quantify anomalies so that prioritized corrective actions are derived.	Can use LLMs to provide a structured description of incidents and prioritize actions; designs prompts with fields for facts, evidence, and risks so follow-up actions are clearly documented. Can define and apply evaluation metrics for LLMs (factuality, hallucination rate, consistency) and establish a prompt evaluation process so that deployment boundaries are transparent.	Can define fairness, data protection and damage KPIs and set escalation/shutdown criteria for violations, ensuring responsible use of AI systems. Can assess business risks due to false positives/missed alerts and ensure data integrity and access controls so that monitoring systems are used responsibly.
Implementation of management reviews and derivation of improvement measures	- **Technical**: Knowledge of reporting and review methods (e.g. SWOT) - **Methodological**: Strategic thinking, derivation of measures - **Personal**: Moderation skills, persuasiveness - **Digital**: Experience with presentation tools, reporting software	Can correctly interpret and apply model outputs including uncertainties (e.g. confidence intervals) for management reviews, so that decisions are based on reliable evidence (evaluation: documented derivation of measures).	Can apply forecasting, sensitivity and scenario analyses to quality data and visualize results for decision-making so that management measures are derived in a targeted manner.	Can use LLMs to summarize review protocols and formulate policy proposals; checks hallucination risks through source matching so decision-makers get robust information.	Can assess the ethical and legal implications of proposed measures (data protection, automation consequences) and communicate them to decision-makers so that risks are addressed early on.
Coordination of QM-relevant training and qualifications	- **Technical**: Knowledge of training requirements in the automotive industry - **Methodological**: Organization and planning of training activities - **Personal**: Communication and coordination skills - **Digital**: Knowledge of learning platforms	Can didactically explain basic ML concepts (supervised/unsupervised, training/validation data) and apply them in a practical way to design training content for user level (success criterion: learning objectives achieved according to feedback and test questions).	Can develop and apply training content on basic statistics (position/scatter measurements, sampling errors) and data quality, so participants interpret data correctly.	Can create prompt guidelines and practical examples and apply them in training sessions, so participants can use LLMs safely.	Can integrate modules on AI ethics, data protection and secure operations into training and explain their relevance in practical cases, so participants can identify and avoid risks.

Role: Quality auditor (system, process, product) and quality assessor (ASPICE)

Area of activities	Necessary competencies (technical, methodological, personal, digital)	Basic understanding of AI/ML concepts (AI models, data models, model evaluation, validation)	Basic understanding of data analysis and statistics (big data, visualization, data quality).	Working with LLMs (incl. prompting)	Awareness of AI opportunities and risks, AI ethics, AI legal principles and potential harm
QM system audits (ISO 9001 / IATF 16949)	- **Technical**: In-depth knowledge of ISO 9001, IATF 16949 and automotive core tools (e.g. FMEA, APQP, PPAP), ISO 42001, customer-specific requirements - **Methodological**: Audit methodology (ISO 19011), planning and execution of audits, risk-based process analysis - **Personal**: Analytical thinking, communication skills, impartiality, integrity - **Digital**: Handling of audit software/QMS tools and analysis or presentation tools	Can assess AI-relevant content within the scope of audits (basic AI/ML model classes (e.g. classification, clustering) and simple assessment/validation criteria (e.g. precision/recall) to ensure accountability for audit decisions in accordance with ISO 19011. Can leverage AI tools for audit planning and reporting.	Can assess AI-relevant content (data quality rules and basic statistics (sample, trend, outliers)) and justify it within the scope of audits.	Can prompt LLMs in a targeted manner to compare standard texts (ISO 9001/IATF 16949), generate audit questions and summarize documents (e.g., automatically compare process descriptions) without disclosing sensitive content.	Can identify opportunities and risks of AI-based audit tools (bias, data protection, traceability) and propose countermeasures (human-in-the-loop, access controls, sources). Has knowledge to interpret large amounts of data, visualize and critically evaluate AI results.
Process audits (VDA 6.3 / AIAG CQI)	- **Technical**: Knowledge of manufacturing and development processes as well as QM methods (FMEA, SPC, Lean) - **Methodological**: VDA 6.3 process audit methodology (scoring), statistical process analysis, audit planning and execution - **Personal**: Detail orientation, perseverance, team leadership in the audit (mediation and conflict resolution) - **Digital**: Handling of production data and MES systems, data visualization (dashboards)	Can assess AI-relevant content within the scope of audits (basic types of ML (classification/regression) in process and SPC data and validation results) so that detected deviations are justified in accordance with VDA 6.3. Can leverage AI tools for audit planning and reporting.	Can assess AI-relevant content within the scope of audits (statistical process analysis (e.g. control charts, Cp/Cpk) and assess them with justification.	Can use LLMs to process audit documents and standard texts (e.g., automatically compare process descriptions) to formulate audit-related questions per process step, to structure scoring justifications and to summarize action lists.	Can identify risks when using AI in production data (e.g. faulty sensors, distorted data due to maintenance events) and secure the audit evaluation accordingly. Has knowledge to interpret large amounts of data, visualize and critically evaluate AI results.
Product audits (VDA 6.5)	- **Technical**: In-depth knowledge of manufacturing processes, measurement technology and quality standards (tolerance management, inspection plans) - **Methodological**: Product audit methodology (VDA 6.5), sampling, inspection equipment capability (MSA) - **Personal**: Diligence, independence, customer orientation (clarification of deviations) - **Digital**: Dealing with digital measurement systems (CMM, image processing), analysis of inspection data	Can evaluate AI-relevant content within the scope of audits (basic AI/ML principles in the evaluation of measurement and quality data (pattern recognition in error images) / visual inspection (computer vision) and simple model results (e.g. precision/recall)) so that the relevance for fault types can be traced in the product audit. Can leverage AI tools for audit planning and reporting.	Can assess AI-relevant content within the scope of audits (sampling and MSA metrics with AI-supported pattern recognition) and make a reasoned assessment.	Can use LLMs to summarize inspection reports, standardize error classes and structure 8D entries.	Can identify risks of automated image analysis (over/under-detection, data protection for image data) and propose risk mitigation measures. Has knowledge to interpret large amounts of data, visualize and critically evaluate AI results.
Automotive SPICE assessments	- **Technical**: Knowledge of software development methods, automotive SPICE (ISO/IEC 330xx) and associated process-dependent standards (e.g. ISO 26262) - **Methodological**: Assessment methodology (automotive SPICE process assessment), process analysis, metric evaluation - **Personal**: In-depth technical understanding, attention to detail, communication skills (interviews and workshops) - **Digital**: Handling of ALM/PLM tools (requirements management), experience with evaluation of project and test data	Can evaluate AI-relevant content (basic concepts of ML/NLP and their suitability for the search for evidence in ALM/PLM data) and justify it within the scope of assessments. Can leverage AI tools for assessment planning and reporting.	Can evaluate AI-relevant content (software metrics (e.g. defect metrics, test coverage), trend visualization and correlation analyses) and justify it within the scope of assessments..	Can prompt LLMs to analyze extensive documentation (requirements, specifications) in order to identify gaps or inconsistencies.	Can identify legal/ethical aspects of AI use (IP protection, data protection in code repos, traceability) and formulate practical recommendations for action. Has knowledge to interpret large amounts of data, visualize and critically evaluate AI results.

Role: Quality manager (management function for personnel, budget, strategy)

Area of activities	Necessary competencies (technical, methodological, personal, digital)	Basic understanding of AI/ML concepts (AI models, data models, model evaluation, validation)	Basic understanding of data analysis and statistics (big data, visualization, data quality).	Working with LLMs (incl. prompting)	Awareness of AI opportunities and risks, AI ethics, AI legal principles and potential harm
Quality strategy	**- Technical:** Quality policy, strategic quality management, ISO 9001/IATF 16949 **- Methodological:** Strategy development, goal definition (SMART), scenario planning **- Personal:** Visionary thinking, decision-making ability, strategic thinking **- Digital:** Strategic planning tools, BI systems	Can explain basic ML model classes (classification, regression) and use them for scenario comparisons in the quality strategy	Can consolidate quality performance data sources and generate statistical evaluations (trend, correlation) to derive strategic priorities	Can generate structured decision templates with LLMs (e.g. scenario comparisons, risk/reward lists) by precise prompting	Can identify opportunities and risks of AI in the quality strategy (bias, data protection, liability) and apply legal/ethical requirements
Team management	**- Technical:** Team leadership, personnel management, competence development **- Methodological:** Coaching, conflict management, feedback methods **- Personal:** Leadership, empathy, communication skills **- Digital:** HR tools, learning management systems, digital communication platforms	Can explain basic AI concepts and apply them to team competency analyses (e.g. classification models for skill gap recognition)	Can evaluate and comprehensibly visualize team data (performance metrics, learning progress) using basic statistics	Can leverage LLMs to generate individualized learning paths and constructive feedback	Can address ethical aspects of AI-supported personnel decisions (fairness, transparency, data protection)
Budget and resources	**- Technical:** Financial controlling, resource allocation, cost accounting **- Methodological:** Cost-benefit analysis, budget planning, forecasting **- Personal:** Analytical thinking, responsibility, affinity for numbers **- Digital:** ERP systems, financial tools, controlling	Can evaluate and apply simple cost and resource forecast models (e.g. linear regression, scenario simulation) to budget planning	Can check data quality (completeness, consistency) and apply basic statistical methods (time series trends) to budget/resource data	Can use LLMs to structure cost/benefit analysis, make assumptions transparent, and list risks/alternatives	Can identify AI risks in financial decisions (e.g. model risk) and consider compliance/audit requirements
Crisis management	**- Technical:** Risk management, sustainable business management, compliance **- Methodological:** Risk assessment, sustainability strategy, stakeholder management **- Personal:** Ability to cope with pressure, problem-solving skills, resilience **- Digital:** Risk and sustainability software	Can apply basic anomaly and risk model concepts to identify quality risks early on	Can analyze event and risk data (frequency, trend) and create meaningful visualizations	Can leverage LLMs to summarize incident reports, design action options, and articulate building blocks for communication with stakeholders	Can consider ethical/legal requirements for AI-based risk monitoring (transparency, data protection, accountability)

AI quality data engineer
Focus: data acquisition and processing

Tasks	Competencies related to AI
Building & running data infrastructure	Can design and implement databases and data lakes for QM data (cloud infrastructure), knows the different databases and can integrate data from heterogeneous sources (sensors, MES, ERP, inspection systems). Can develop and extend scalable data pipelines over time and make them available to data analysts.
Ensure data quality, governance and compliance	Understands the rules of data governance and applies them in data projects to ensure high data quality. Ensures data can be maintained long-term. Understands data protection, IT security and compliance regulations and can anchor them in the data architecture.

AI quality data analyst
Focus: Data analysis and visualization

Tasks	Competencies related to AI
Analyzing data & detecting patterns	Knows the typical statistical and analytical methods for QM and can apply them (e.g. measurement data for statistical process control SPC, process capabilities, MSA, FMEA data evaluation). Can apply hypothesis tests to samples and analyze correlations (e.g. quality indicators, trends and error patterns). Understands the limitations of models ("garbage-in/garbage-out") and has the ability to correctly interpret AI results.
Using AI tools & interpret results	Can apply existing AI tools (ML models, LLMs, generative AI) to support analyses and structure quality data, including hypothesis formation and anomaly detection with AI tools. Can create dashboards and reports to present complex analyses in a user-friendly and understandable way.
Ensuring governance, compliance and ethics	Knows the underlying QM standards (ISO 9001, IATF 16949, etc.), as well as the AI and data protection guidelines (GDPR, EU AI Act). Can understand audit requirements for data and data analysis and assess data ethics and AI risks.

AI quality data scientist
Focus: development of data analysis methods

Tasks	Competencies related to AI
Developing & training ML models	Knows and can evaluate "state-of-the-art" AI methods (classical machine learning, statistical methods in QM and the statistical motivation behind AI methods, deep learning architectures such as CNNs or transformers, time series analysis, AI architectures). Can translate technical issues into ML tasks (classification, regression, clustering, automation, agent workflows). Understands feature engineering methods for QM-specific data (time series analysis, preventive and predictive maintenance, image processing). Is confident in model selection and hyperparameter tuning when training larger AI models (including requirements for data volume and data quality).
Experimentation & evaluation	Can quickly develop AI experiments and proof of concepts to prove the feasibility of AI applications (e.g. replicating classical methods in QM (e.g. A/B testing) with AI). Can evaluate the quality of AI models and recognize their weaknesses, also in terms of data quality.
Making models productive	Understands the methods for model versioning and documentation for long-term reproducibility in applications of the AI models used. Can maintain AI models and ensures the robustness of AI models, including monitoring of models in production (e.g. through model drift).
Ensuring governance, compliance and ethics	Knows the underlying QM standards (ISO 9001, IATF 16949, etc.), as well as the AI and data protection guidelines (GDPR, EU AI Act) Can understand audit requirements for data and data analysis and assess data ethics and AI risks.

AI quality data manager
Focus: AI data strategy, data governance and compliance

Tasks	Competencies related to AI
Defining data roadmap and identifying use cases	Can define the data roadmap for the QM area and can identify and prioritize use cases. Knows both the areas of quality management and AI, knows the most important data sources and can estimate the chances of success for data projects. Can critically examine the results of AI. Can create and evaluate the return on investment of data initiatives.
Establishing data governance and setting data policies/standards	Understands the relevant regulations for the use of AI methods and data (e.g. GDPR, EU AI Act), creates data guidelines and standards and can actively implement them. Can evaluate the AI applications from quality management with regard to criticality according to relevant regulations. Can advise on data governance in quality management.
Steering data technology & architecture	Can evaluate the tool landscape and work with IT to select the required tools. Can make data architecture decisions (e.g. cloud vs. on-premise) to ensure scalability and future viability.