



ASQMS Annual 2026

Driving the Future

Ushering in a New Era of
Automotive Software Quality



Business Ecosystem

Events

Expert Commentary

Career Development

www.asqms.org

Inaugural Statement

Dear Industry Colleagues and Partners:

Amid the wave of intelligent connected vehicles (ICVs), automobiles are no longer merely mechanical assemblies, they have evolved into running code, flowing data, and smart terminals. Software is profoundly reshaping the automotive value chain, user experience, and ecosystem. In the era of "software-defined vehicle", we face both innovative opportunities and severe quality challenges. How to ensure the reliability of hundreds of millions of lines of code, achieve full life cycle safety, and build cross-ecosystem collaboration has become an urgent issue for the industry.

Against this backdrop, the China Association of Consumer Products Quality and Safety Promotion (CACPQSP), in collaboration with leading industry enterprises, technical institutions, and experts, has launched the world's first quality management system standard focused on the automotive software — the Automotive Software Quality Management System (ASQMS) Requirements. Born in China and serving the global industry, it fills the gap left by traditional quality standards in the software domain and provides a systematic framework for end-to-end quality control of automotive software.

The ASQMS Annual 2026 is not merely a technical interpretation of the standard, but also a crystallization of industry consensus, an advocacy for a quality culture, and an invitation to co-build an ecosystem. We firmly believe that quality is the foundation of value and standards safeguard innovation. ASQMS will empower enterprises to enhance efficiency through compliance, foster innovation within established systems, and achieve mutual success through collaboration.

The future is here, and those who prioritize quality will lead the way. Let us work together to drive the future with standards, unlock new chapters with quality, and shape China's answer and global wisdom for the era of automotive software.

Dear Readers,

After 2 years of introduction of a Quality Management Standard for software producing and processing organizations, ASQMS, a new era has started:

The automotive industry is adopting the ASQMS standard worldwide and formed a Supervisory and Steering Committee for ASQMS: ASQMS SSC. We see that besides the founding members of the SSC more OEMs will join soon to lead the future of Quality Management for Software suppliers.

ASQMS Deutschland GmbH as the international oversight office has used the 2 years of preparation and can present their contribution to ASQMS for countries, companies, certification bodies and training organizations.

All training content is now available in English, soon in Korean and French, the exam and certificate system is perfected for online use, the managing office for the oversight is established and acting. The first Certification body is accredited in January 2026. The international SSC will start in 2026.

Moreover, many expert articles have been published, mainly on LinkedIn as an international business platform, several outstanding and renowned training organizations have been contracted, and joint projects are underway with OEMs and 1st Tiers in Europe and East Asia.

2026 will be a decisive year for ASQMS in China and internationally. We all are ready in the areas outside China to support ASQMS with trainings, exams, certifications and events and push it to a real contribution to consumer safety on a global scale! We hope you enjoy reading this yearbook and the valuable expert contributions it contains and sincere thanks to all who have contributed.



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China Association of Consumer Products Quality and Safety Promotion (CACPQSP)

Automotive Working Committee

General Secretary

January 2026



Prof. Dr. Wolfgang Wagner

ASQMS Deutschland GmbH

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January 2026

CONTENTS

■ Business Ecosystem

- Standard Overview 2
- Standard Documents 3
- Management 6
- Ecosystem 10

■ Events

- Key Meetings 16
- Collaborations 25
- Activities & News 33

■ Expert Commentary

- #1: IATF 16949 vs. ASQMS: Bridging the Gap for Automotive Software Ecosystem 46
- #2: Why Do Automotive Software Companies Need an Organizational Level Quality Management System? 49
- #3: Can ASQMS Be Tailored, as Not All Processes Are Applicable to Every Organization? 51
- #4: Why Does ASQMS Merge the “System Development” and “Software Development” Requirements into a Single “V” Model? 52
- #5: Beyond ASPICE: Why Is ASQMS Standard Important To the Automotive Industry? 54
- #6: Why Does ASQMS Require the Management of User Data? 55
- #7: What Role Does ASQMS Play in the Overall Quality and Safety System for Intelligent & Connected Vehicles? 57
- #8: Why Should ASQMS Cover Software Tool Chain Management? 59
- #9: ASQMS: The Road to Innovation in Software Quality Management 62
- #10: ASQMS Requirements on Open Source Software Management 64
- #11: AI-Driven Tools Help You Upgrade Your Software QMS According to ASQMS Standard 65
- #12: ASQMS Guides and Supports the Transition from an IATF Certified to a Certified SDV Supplier 67
- #14: Combination of Software and Security - ASQMS Requirements for Security Monitoring and Incident Response 69
- #15: How Does ASPICE Correlate to ASQMS? 71
- #16: ASPICE vs ASQMS: Complementary, Not Competing 73
- #17: ASQMS: More Than Compliance - A Transformation Blueprint for Software-Centric Organizations 74
- #18: ASQMS: The Golden Triangle of Benefits 76
- #19: How Does ASQMS Systematically Empower Tier 1 Suppliers Under the Dual Challenges of Efficiency and OTA? 78
- #20: Is Organizational Certification the Key to Unlocking the True and Lasting Value of Processes? 82
- #21: From Passive Compliance to Proactive Leadership 85

■ Career Development

- Overview 89
- Professional Levels 89
- Level Maintenance and Advancement 90
- Licensed Training Courses 91
- Professional Seminars 92

PART 01

Business Ecosystem

The ASQMS Ecosystem Mechanism is an integrated system established jointly by key stakeholders, including the ASQMS Steering and Supervisory Committee (SSC), the Oversight Offices, Working Groups, Certification Bodies (CBs), License Partners (LPs), and certified professionals. ASQMS covers a complete life cycle—from standard setting to certification to professional development and continuous improvement. Through a well-defined organizational framework, clear responsibility assignments, and efficient coordination processes, ASQMS ensures its scientific rigor, authority, and long-term sustainability, thereby driving the healthy development of the automotive software quality management.

Standard Overview | Standard Documents | Management | Ecosystem



1. Standard Overview

ASQMS is the world's first specialized quality management system standard focused exclusively on the field of intelligent connected vehicle (ICV) software. It is led by the China Association of Consumer Products Quality and Safety Promotion (CACPQSP), an organization directly under the State Administration for Market Regulation. The standard aims to fill the industry gap in automotive software quality management in the software-defined vehicle (SDV) era and establish a China-led, internationally recognized benchmark for automotive software quality control.

The development of this standard dates back to July 2021, when the contradiction between the explosive growth of the ICV industry and the lack of software quality control capabilities became increasingly prominent. CACPQSP, in collaboration with leading industry enterprises, initiated preliminary research and formally launched the drafting working group in December 2021. After two years of work, the Chinese version was officially released in December 2023, followed by the simultaneous release of the English version in Germany in January 2024. This marks the formal entry of this China-led standard into the international promotion phase, breaking the long-standing overseas monopoly in the field of automotive quality standards.

Amid the wave of SDV, the automotive industry has shifted comprehensively from a traditional "hardware-dominated" model to an ICV ecosystem driven by "core software capabilities", where the value and influence of software have experienced exponential growth.

Currently, the software code volume of a mid-to-high-end ICV has exceeded 100 million lines, with some

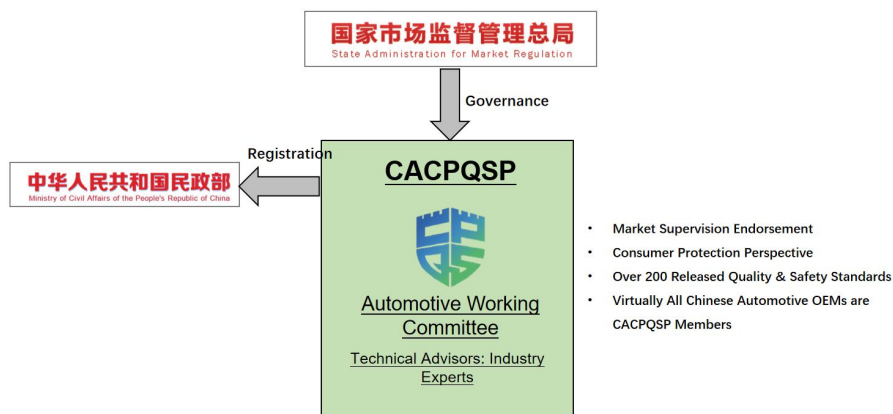
models equipped with advanced autonomous driving functions even reach 300 million lines. This far exceeds the million-line level of traditional vehicles and is equivalent to the total code volume of 10 Windows operating systems.

From a cost structure perspective, software and software-integrated systems now account for over 40% of a vehicle's BOM cost, and this figure continues to grow at an annual rate of 5%. For certain new energy vehicles (NEVs), software-related costs have approached 50%.

Software has not only become the core of differentiation in the automotive industry, whether in the response precision of autonomous driving, the interactive experience of in-vehicle infotainment system, or the functional iteration capability brought by OTA updates, all of which rely on software realization technology, it has also become the key to enhancing user retention, as a high-quality software experience can significantly boost user repurchase intent and brand reputation. However, the inherent characteristics of software — "intangibility, end-to-end, cross-ecosystem, and rapid iteration" — have also introduced multiple industry challenges:

- Difficulty in visualizing and controlling software development process;
- Frequent requirement changes leading to version management complexity;
- Multiple-tiered supply chains with diverse stakeholders, resulting in a broken software traceability chain, making it difficult to pinpoint the root cause of quality issues once they arise;

As a non-profit organization under SAMR, backed by leading automotive institutions, CACPQSP is the most suitable body to publish and manage quality standards in the new era



- Hidden and propagative nature of software faults, potentially triggering cascading failures;
- Low efficiency in customer complaint resolution due to multi-party coordination.

Traditional hardware-centric quality standards such as IATF 16949, as well as process improvement tools focused on project development like ASPICE, are no longer adequate for the new era and fail to cover the key quality control points across the entire software life cycle. Consequently, the ASQMS standard has emerged.

Built upon the foundational framework of ISO 9001, ASQMS deeply integrates the operational and supporting processes unique to automotive software projects. It overcomes the limitations of traditional standards that tend to “emphasize hardware over software” and “focus on projects over systems”, and establishes a comprehensive management system covering three levels: “system, process, and product”. It achieves complementarity and enhancement with existing standards such as IATF 16949, ISO 26262 (functional safety), ASPICE (process capability), and ISO/SAE 21434 (cybersecurity), and forms a distinctive advantage characterized by “multi-standard integration with a focus on software”.

Its core positioning is to serve as the organization-level quality management system benchmark for OEMs and software supply chain enterprises in the SDV era. It does not aim to replace existing standards but rather to supplement and refine control requirements based on software characteristics, achieving “a single system covering all scenarios”.

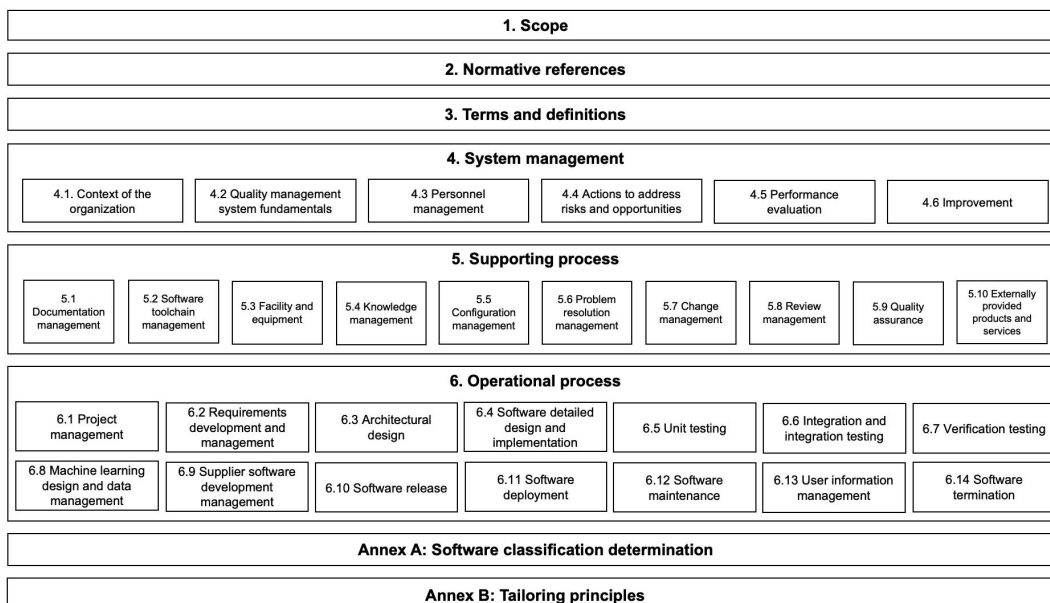
Its scope of application is highly inclusive, covering not only pure software organizations (e.g., in-vehicle operating system developers, autonomous driving algorithm companies), but also organizations producing integrating hardware and software systems (e.g., intelligent cockpit suppliers, domain controller enterprises). It encompasses all entities involved in software development, testing, deployment, operation and maintenance, and services across the automotive industry chain, including OEMs, Tier 1 to Tier N component suppliers, software tool providers, software outsourcing firms, and OTA service operators, etc. This truly enables quality coverage across the entire industry chain and ecosystem.

2. Standard Documents

2.1 Standard Requirements

The core document Automotive Software Quality Management System Requirements serves as the cornerstone and core of the ASQMS standard system. The full text consists of 6 chapters. It is structured around three core modules: "System Management", "Supporting Processes" and "Operational Processes", forming a logically rigorous, comprehensive, and highly practical requirements framework. This framework retains the general principles of quality management systems while refining control points to address the specific characteristics of automotive software.

Among these, the System Management module (Chapter 4) constitutes the top-level design of the ASQMS standard, focusing on the establishment and operation of an organizational-level quality management system. It defines the foundational



requirements for enterprises to establish a software quality management system across six dimensions: context of the organization, quality management system fundamentals, personnel management, actions to address risks and opportunities, performance evaluation, and improvement. This ensures alignment between quality objectives and strategic goals and providing organizational assurance and top-level rules for quality control throughout the entire life cycle.

The Supporting Process module (Chapter 5) serves as the foundational support system for ensuring software quality, covering ten key processes ranging from documentation, software toolchain, facility and equipment, knowledge management, configuration management, change management, etc. By standardizing activities such as document management, toolchain management, problem resolution management, and quality assurance, it provides a stable and reliable resource and environmental base for software development and operations, ensuring that all quality activities are conducted in accordance with established procedures and are fully traceable.

The Operational Process module (Chapter 6) constitutes the core business processes of ASQMS, comprehensively covering the entire software life cycle, from project initiation, requirements development, design implementation, testing and verification, through to release and deployment, operations and maintenance, and ultimately termination. It not only encompasses the key phases of traditional software development but also introduces specific requirements for new scenarios such as machine learning, supplier development, and user information management. It is the core process directly driving the formation of software product quality.

A notable feature of this document is its "balance between compliance and practicality, as well as its integration of general principles with specific requirements". In terms of regulatory compliance, it covers mandatory Chinese regulations such as GB 44495 (Technical Requirements for Information Security of Complete Vehicles) and GB 44496 (General Technical Requirements for Automotive Software Updates), clarifying core requirements such as security control for OTA updates and user information protection. It is also compatible with international standards such as R155 (Cybersecurity) and R156 (Software Updates) under the UN WP.29 framework, providing compliance support for enterprises expanding into international markets.

Additionally, in response to technological development trends of intelligent connected

vehicles, it introduces several new software management elements for the new era, filling gaps in traditional standards. It achieves full coverage of both in-vehicle and off-vehicle software, encompassing all scenarios such as in-vehicle controller software, cloud service software, and roadside collaboration software. It establishes a risk-driven software classification mechanism, categorizing software into Type I (software with neither functional safety risks nor cybersecurity risks) and Type II (software with functional safety risks or/and cybersecurity risks) based on functional safety (ASIL levels) and cybersecurity (SecL levels), matched with differentiated control requirements accordingly. It strengthens Software Bill of Materials (SBOM) management by clarifying the processes for SBOM development, updating, and transmission to support supply chain traceability; standardizing the management of free and open source software (FOSS), requiring the establishment of mechanisms for FOSS selection and evaluation, license compliance checks, and vulnerability monitoring; introducing new requirements for machine learning and AI-assisted tool application, clarifying the boundaries and quality verification standards of AI tool usage during R&D and testing. Collectively, this forms a comprehensive requirement system that meets compliance while aligning with industry practices, covering both traditional software R&D, and adapts to emerging technology applications.

2.2 Standard Certification Rules

The "ASQMS Certification Rules and Requirements for Certification Bodies", as the core document ensuring the impartiality, authority, and consistency of ASQMS certification, establishes a comprehensive control system covering all aspects, including the qualifications of certification bodies, certification procedures, personnel requirements, result determination, and subsequent surveillance.

Regarding **the qualification and admission of certification bodies**, the body must possess independent legal entity status, establish a quality management system in accordance with the ISO 17021 standard, be staffed with qualified registered auditors and equipped with necessary facilities, strictly adhere to the principle of impartiality, and must not provide consulting services for quality management system. After authorization, it must undergo annual office reviews and on-site witness audit to maintain ongoing compliance.

Regarding **standardization of the certification process**, after an organization submits an application, the certification body verifies and accepts it.

Certification is categorized into initial (two-stage), surveillance, and re-certification. Audit man-days are determined based on the company's scale, software types, and existing qualifications. Nonconformities are categorized into major and general nonconformities. For major nonconformities, corrective actions and root cause analysis must be submitted within 30 days, with actions and verification completed within 60 days. General nonconformities must be fully rectified within 60 days. All rectifications must be completed within 90 days after the audit concludes. The audit report is issued within 15 calendar days, and the certification decision is made by a dedicated functional department, with certificates issued to qualified enterprises.

Regarding certification results and subsequent surveillance, results are classified as "Pass" or "Fail."

Those who pass will receive a certificate valid for three years, while those failing to meet requirements must reapply. Subsequent surveillance requires two surveillance audits (with a 12-month interval) during the three-year certificate cycle. Enterprises may transfer to a different certification body once within the three-year period. Special audits are triggered in the event of major changes or complaints.

Certification bodies must establish mechanisms to avoid conflicts of interest, protect enterprise trade secrets, and retain certification records for three years as required, improve procedures for handling appeals and complaints, provide timely feedback on certification information, and cooperate with supervisory inspections to ensure the healthy operation of the certification system and the credibility of its results.

2.3 ASQMS Auditor Guide

The ASQMS Auditor Guide is a practical document developed in conjunction with the ASQMS standard and certification rules. It aims to clarify the audit process and auditor competence requirements for auditors, providing unified guidance for third-party, internal, and second-party auditors. Its core content revolves around two key dimensions: the audit process and competence criteria.

The audit process is divided into three major phases, covering 29 key activities:

Phase 1: Audit Preparation and Off-Site Planning:

The auditor must first collect contract information, management documents, etc. to confirm the client's process interactions, implementation of the ASQMS system, and incorporation of customer-specific requirements. The auditor must also verify six months of performance data and evidence of internal and

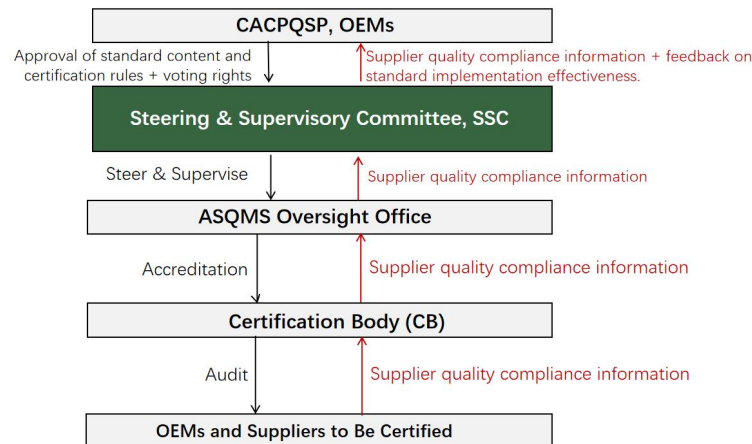
management reviews covering a full cycle to determine whether the client meets the conditions for Phase 2 and issue a report. Off-site planning requires developing an audit plan tailored to the client's process characteristics, clarifying the audit arrangements for external support functions, audit logistics, and resource allocation, with priority given to high-risk areas and customer concerns.

Phase 2 focuses on on-site audits, nonconformity management, and certificate issuance: On-site audits include holding an opening meeting, meeting with top management, conducting audits using a process-based approach, and verifying the effectiveness of corrective actions. Objective evidence must be collected through interviews, observations, and other methods. Audit findings must distinguish between major and general nonconformities, clearly describing the facts of the nonconformity, the corresponding standard requirements, and supporting evidence, while also identifying opportunities for improvement that do not require immediate solutions. Following the closing meeting, an audit report must be issued promptly. The client must conduct a root cause analysis for nonconformities and implement systematic corrective actions. If necessary, special audits or surveillance audits must be conducted, and the certification body will ultimately make the certification decision and issue the certificate.

Phase Three defines the core and general competence criteria for auditors: Core competencies include mastering the process approach and integrating customer-specific requirements into the audit, prioritizing based on customer risks and performance trends, focusing on process performance and the achievement of objectives, proficiently applying ASQMS standard, certification rules, and related interpretations, and possessing the ability to collect and analyze data and draw conclusions. General competencies cover interview techniques, time management, team communication, fulfillment of confidentiality obligations, conflict management, and handling cultural differences. Auditors are required to flexibly adjust audit approaches, effectively coordinate audit team activities, and maintain constructive audit relationships while upholding professionalism.

Through standardized audit processes and competence requirements, this guide ensures the standardization, impartiality, and effectiveness of ASQMS audits, providing critical practical support for the evaluation of automotive software quality management systems.

■ The operational ecosystem rules of the ASQMS standard ensure OEM members' decision-making authority and access to supplier quality compliance information.



3. Management

3.1 Steering & Supervisory Committee (SSC)

The ASQMS Steering & Supervisory Committee (SSC) is the highest decision-making body for the ASQMS standard. It bears ultimate responsibility for the design of the ASQMS standard ecosystem, content iteration, implementation supervision, and effectiveness improvements. Its core mission is to “lead the industry, ensure sound decision-making, and provide supervision and assurance”, ensuring that the standard remains aligned with industry needs and possess authority and foresight.

The Committee consists of the ASQMS Oversight Office and standing OEM members, operating under a “fixed members + dynamic members” structure. Each member organization holds one representative seat and enjoys equal voting rights. Among these, the ASQMS Oversight Office serves as a permanent member, participating throughout the Committee’s decision-making process and responsible for organizing meetings and tracking resolutions, etc. The standing OEM members are automotive original equipment manufacturers (OEMs) that must meet strict eligibility criteria: possessing a comprehensive automotive software R&D and quality management system, having significant influence and representativeness within the industry, and being capable of driving supply chain enterprises to implement the standard.

OEMs applying for membership must formally submit the “ASQMS SSC Membership Application Form” accompanied by supporting materials such as proof of system operation and a statement of industry influence. Admission is granted only upon approval by a majority

(including) of the committee members’ representatives.

The representative appointed by the OEM must be a senior executive from the group-level quality management system or supply chain management, possessing sufficient decision-making authority and industry experience, and capable of exercising voting rights on behalf of the OEM and participating in activities such as standard revision.

In terms of rights, committee members enjoy comprehensive decision-making and supervision rights covering the entire standard life cycle management.

First, decision-making rights over standard content, including the right to approve and authorize the ASQMS Oversight Office to organize working groups to draft or revise standard-related documents, to assign experts from their organizations to join various working groups, and to review and vote on the final versions of standard requirements and certification methods, as well as officially recognized standard interpretations (SI), to ensure that standard content aligns with industry practice.

Second, the right to propose Customer Specific Requirements (CSR): Each standing OEM has the right to propose specific quality requirements for its suppliers based on its own supply chain management needs, requiring the certification body to include CSR reviews in every three-year ASQMS certification cycle for its supply chain enterprises, thereby achieving integrated control management of “standard general requirements + customer-specific requirements”.

Third, the right to supervise standard implementation: It

includes conducting annual supervisory evaluations of the ASQMS Oversight Office's operational processes and effectiveness, and proposing optimization recommendations, reporting instances of misconduct by certification bodies (CBs), software supply chain enterprises that have passed ASQMS certification, and registered professionals (such as non-compliant assessments by CBs, false compliance by enterprises, or unethical practice by registered personnel), and requiring the Oversight Office to investigate and address such issues.

Fourth, the right to propose amendments to the bylaw: Members may propose revisions to the committee's bylaw and working mechanisms in response to industry developments. Such proposals take effect upon approval by a vote.

Additionally, member organizations enjoy priority access to standard training, pilot applications, and international exchange activities, and receive updates on standard revisions and industry best practices as soon as they become available.

In terms of responsibilities, standing OEMs must undertake the dual responsibilities of “self-discipline and leadership”:

First, the responsibility for internal compliance: They must continuously maintain conformity with ASQMS standards, accept regular certification and random spot checks by certification bodies, promptly rectify identified issues, and proactively report the status of their system operations to the Committee.

Second, the responsibility for supply chain leadership: they must actively incorporate “conformity with ASQMS standard” into the admission criteria and ongoing maintenance requirements for enterprises in their software supply chain. Through supplier training, on-site guidance, and audit supervision, they should promote overall supply chain compliance, establishing an implementation framework where “the OEM takes the lead and suppliers follow”.

Third, the responsibility for meeting participation: the appointed representatives must attend committee meetings on time and may not be absent without cause. If special circumstances arise, leave must be requested in advance, and unauthorized personnel may not be delegated to attend. Representatives must carefully review meeting agendas, vote objectively based on the company's actual situation and industry needs, and actively offer suggestions and insights.

Fourth, the responsibility for standard promotion: members must proactively promote the ASQMS

standard within the industry, share their own implementation experiences, participate in standard publicity and promotion, and drive the overall improvement of the industry's quality standards.

For members that violate the above responsibilities, the Committee will take measures such as issuing reminders, issuing public reprimands, or suspending rights, depending on the severity of the violation. In cases of serious violations, the unit will be forcibly expelled following a vote.

The Committee's meeting mechanisms are standardized and transparent to ensure efficient implementation of decisions

Meetings are divided into regular and ad hoc sessions. Regular meetings are held once every 3–4 months to review routine matters such as the standard revision progress, the operational status of certification bodies, and solutions to issues raised by the industry. Ad hoc meetings may be convened upon the proposal of one or more member representatives to discuss specific issues such as unexpected problems or urgent revision requests.

Meetings may be conducted in-person, online, or in a hybrid format. In-person meetings are generally held at the location of the host manufacturer or the oversight office, while online meetings are conducted via a dedicated video conferencing system to ensure meeting security and confidentiality.

Meeting agenda and resolution rules: The admission of new members to SSC requires approval by a majority (including) of the attending members. The exit of members from the SSC requires approval by four-fifths (including) of the attending members. Other general matters (such as handling of dereliction of duty, non-compliant auditors) require approval by a simple majority (including 50%) of the attending members. Other standard revisions and major organizational adjustments (such as the addition or revocation of certification body qualifications) require approval by two-thirds (including) of the attending members.

Within five working days after the meeting, the Oversight Office must compile meeting minutes that clearly outline the resolutions, action items, responsible parties, and deadlines. These minutes shall be sent to all members for confirmation. Upon confirmation of no objections, the minutes shall be formally issued. The Oversight Office shall also be responsible for tracking the progress of action items and reporting on their implementation at the next meeting to ensure a closed-loop management process.

3.2 Oversight Office

The ASQMS Oversight Office serves as the daily operational management body for the ASQMS standard ecosystem. Its core functions are “central coordination, daily control, and service support”. It is responsible for translating the SSC’s decisions and directives into concrete actions, ensuring the efficient operation of the standard system and the coordinated collaboration among all stakeholders.

The Director of the Oversight Office is appointed by CACPQSP, possessing senior management capabilities and industry influence. As a permanent member of the ASQMS SSC, the Director participates fully in the committee’s decision-making process, and is responsible for organizing meetings, coordinating agenda items, and communicating resolutions, while also bearing overall responsibility for the daily operations of the Oversight Office.

In terms of daily operations and management, the Oversight Office undertakes full-process control responsibilities to ensure the orderly advancement of all tasks

First, member management: The Oversight Office is responsible for receiving and conducting preliminary reviews of applications from OEMs seeking to join the Committee, verifying the completeness and compliance of submitted materials, and submitting eligible applications to the Committee for deliberation. For ineligible applications, the Oversight Office provides timely feedback and guidance on necessary revisions. Additionally, the Oversight Office maintains members’ information, updates representative details and contact information, and regularly distributes standard updates and work briefings to members.

Second, meeting management: The Oversight Office is responsible for organizing both regular and ad hoc Committee meetings. Meeting notices (including agenda items, time, location/link, and meeting materials) are sent five working days in advance. Responsibilities include venue setup, equipment testing, and meeting minutes. Following each meeting, the Oversight Office promptly compiles the minutes, tracks the progress of action items, and regularly reports implementation status to the SSC to ensure resolutions are carried out.

Third, personnel qualification management: The Oversight Office is responsible for the full life cycle management of registered professionals, such as auditors and consultants. This includes receiving training and examination applications, organizing qualification reviews, issuing certificates, recording renewal status, and establishing qualification files.

Additionally, it involves supervising the professional conduct of registered individuals and taking measures such as issuing warnings, suspending qualifications, or revoking qualifications against those who violate regulations.

Fourth, information release management: The Oversight Office is responsible for maintaining official channels for the release of ASQMS standard, including the official website, WeChat official account, and LinkedIn account, and promptly updating content such as standard documents, training information, certification updates, and industry case studies to ensure accuracy and transparency. The Oversight Office is also responsible for responding to industry inquiries, establishing an inquiry log, and compiling and publishing interpretations of common issues.

In terms of standard promotion and ecosystem development, the Oversight Office plays a central driving role in expanding the standards’ influence and coverage

First, standard iteration management: Responsible for coordinating working groups to draft, revise, and interpret standards, collecting industry feedback, organizing expert reviews, and driving continuous standard optimization. For ambiguities arising during implementation, the Oversight Office organizes the preparation of official interpretation documents to ensure a unified understanding.

Second, management of certification bodies and license partners: Responsible for authorizing, supervising, and managing certification bodies and license partners. It organizes qualification reviews for certification bodies and conducts spot checks on the training quality of license partners to ensure compliance with ASQMS certification rules and training requirements. It establishes credit records documenting operational status and violations, which serve as key references for authorizing adjustments.

Third, promotion and outreach: Responsible for organizing promotional activities for the ASQMS standard, including the international automotive quality forum, industry seminars, keynote speeches, and company visits. Invite industry experts and corporate representatives to share experiences to enhance the standard’s industry recognition and international influence, and develop promotional materials such as brochures and videos to disseminate the standard’s value through multiple channels.

Fourth, international cooperation: Responsible for liaising and coordinating with relevant domestic and international institutions and organizations, including the

International Organization for Standardization (ISO), the United Nations Economic Commission for Europe (UNECE), overseas automotive industry associations, and international certification bodies. The Oversight Office promotes the harmonization and mutual recognition of ASQMS standard with other relevant standards, participates in international standard-setting discussions, expands the international scope of application for the standard, and enhances China's influence in the field of automotive software quality standards.

The Oversight Office also serves as the communication and coordination hub between the ASQMS SSC and all relevant stakeholders, building an efficient communication bridge

On one hand, it provides the Committee with feedback on industry trends, standard implementation status, and corporate feedback, offering data support for the Committee's decision-making. On the other hand, it communicates the Committee's decisions and requirements to certification bodies, license partners, and enterprises, coordinating the resolution of various issues arising during standard implementation, such as discrepancies in corporate interpretation of standard clauses, disputes between certification bodies and enterprises, and standard adaptation issues in supply chain collaboration. Additionally, the Oversight Office is responsible for collecting and organizing data on standard implementation, compiling the "ASQMS Standard Implementation Annual Report" each year, analyzing the effectiveness of standard implementation and common industry issues, and proposing optimization recommendations to provide reference for the SSC's work.

3.3 Working Group

ASQMS Working Groups are professional technical teams that support the development, revision, interpretation, and promotion of the standard. Their core mission is "technical support, practical implementation, and iterative optimization". These groups bring together top industry experts to ensure that ASQMS standard is both technically advanced and aligned with practical industrial needs.

Working groups cover multiple specialized areas, including the Standard Drafting Working Group, the Application Working Group, and the Certification Rules Drafting Working Group, among others. Their composition is dynamically adjusted based on operational needs. Each working group is led by one chairperson and several vice-chairpersons. The chairperson is a senior industry expert, while the vice-

chairpersons are drawn from OEMs and technical institutions, ensuring comprehensiveness and balance in the work. Members are selected from relevant industry entities such as OEMs, automotive engineering and technology research institutes, certification bodies, consulting firms, and software companies. They must possess deep professional expertise and practical experience in automotive software R&D, quality management, certification and evaluation, and standardization, and must pass the qualification review conducted by the Oversight Office before joining the working group.

Each working group has clearly defined responsibilities and operates in a coordinated manner, forming a comprehensive technical support system.

The Standard Drafting Working Group serves as the core drafting and technical support team for the ASQMS standard system, comprising senior industry experts and key industry professionals. This Working Group focuses on the development of automotive software quality management systems. It is responsible for the top-level design of the standard, clause drafting, technical validation, and stakeholder feedback collection. It continuously conducts industry research, analyzes requirements, and iterates content, broadly incorporating suggestions from all stakeholders across the industrial chain. This ensures that the standard not only follows the general framework of international quality management systems but also closely aligns with the practical realities of the automotive software industry, providing a solid foundation for the construction of a scientific, applicable, and implementable automotive software quality management system.

The Certification Rules Drafting Working Group is primarily composed of experts from certification bodies and OEM audit experts. It is responsible for formulating the "ASQMS Certification Rules and Requirements for Certification Bodies", clarifying the processes, methods, criteria, and qualification requirements for certification. The group repeatedly validates the rationality and operability of the certification process to ensure the impartiality and authority of the certification work.

The Application Working Group focuses on the implementation of the standard and the refinement of supporting systems, with members primarily consisting of OEM quality managers and supplier technical experts. Its core responsibilities include: collecting problems and feedback encountered by enterprises during standard application; compiling practical documents such as standard application guidelines, case studies, and

operation manuals to provide targeted guidance to enterprises; designing and refining training materials and the qualification exam question bank to support the ASQMS standard, thereby establishing a standardized learning and assessment support system; conducting evaluations of standard implementation effectiveness by selecting pilot enterprises of varying sizes and types to track performance improvements following implementation; collecting relevant data, and providing robust data support for the continuous optimization of the standard and the iterative updating of supporting materials.

Each working group has established standardized and efficient working mechanisms:

First, meeting mechanism: Work is conducted through various means including regular meetings, online seminars, and on-site research. Online meetings is held at least once a month, and a centralized seminar is conducted quarterly to promptly resolve issues encountered during the work.

Second, document management mechanism: A unified document management platform is established to standardize the management of materials such as work plans, meeting minutes, draft revisions, and research data, ensuring that documents are traceable and accessible.

Third, expert review mechanism: For key clauses and core technical issues, external experts are organized to conduct reviews and solicit broad feedback, ensuring the scientific rigor and authority of the work outcomes.

Fourth, progress control mechanism: Detailed work plans are developed, clearly defining tasks at each stage, responsible parties, and deadlines. The team leader is responsible for tracking progress, promptly analyzing the causes of delays, and adjusting plans as needed.

These mechanisms ensure the efficient operation of the working group and provide solid technical support for the continuous iteration of ASQMS standard and the development of the ecosystem.

4. Ecosystem

4.1 Certification Bodies (CBs)

Certification Bodies are professional organizations accredited by the ASQMS Oversight Office to conduct conformity assessments of enterprise against ASQMS standard. As the core implementing entities of the ASQMS certification system, their primary responsibilities are “objective evaluation, impartial certification, and risk early warning”, ensuring the

effectiveness and compliance of enterprise system operations.

Certification bodies must meet strict qualification requirements. The Oversight Office conducts comprehensive reviews across multiple dimensions to ensure that the bodies possess sufficient credibility and professional competence.

First, legal status and compliance: the body must possess independent legal person status, have no record of major violations of laws or regulations, not be listed on the roster of enterprises with serious violations or loss of integrity, and have established a sound mechanism for avoiding conflicts of interest.

Second, quality management system: the body must establish a quality management system compliant with ISO/IEC 17021, including complete certification operation manuals, risk control processes, and confidentiality management systems, all of which must pass the Oversight Office’s audit and verification.

Third, personnel competence: The body must have a sufficient number of qualified, registered auditors covering professional fields such as software development, testing, information security, and quality management. Auditors must have attended ASQMS trainings, passed the official ASQMS examinations and hold the corresponding qualification certificates. Additionally, the body must establish a mechanism for the continuous training of auditors, regularly conducting training on standard updates and technological developments to ensure auditors’ competencies remain up-to-date.

Fourth, physical facilities: The body must have a permanent office space equipped with professional audit tools, confidentiality devices, and information management systems, and possess the capability to conduct both online and offline audits. It must also establish a data security control mechanism to safeguard the sensitive enterprise’s information.

Fifth, professional experience: The body must have experience in certification within the automotive software or related fields, possess a track record of successful cases, and be capable of accurately identifying issues in the operation of an enterprise’s management system.

During the certification process, the certification body must strictly adhere to the "ASQMS Certification Rules and Requirements for Certification Bodies" and conduct certification activities in accordance with standardized procedures to ensure the objectivity, impartiality,

and rigor of the certification process.

The specific content and process of the certification work can be divided into six parts:

I . Certification application and acceptance: Enterprises must submit documents such as legal entity certificate, system documentation, and software scope, clearly specifying whether they are applying for Type I or Type II software certification. The certification body will verify the completeness of the materials, the feasibility of the certification, and its impartiality to determine whether to accept the application. Clients may opt for a pre-certification to identify potential issues in advance. However, personnel conducting the pre-certification cannot participate in the subsequent formal certification.

II . Initial certification: The initial certification consists of two phases: Phase 1 involves reviewing system documentation and performance data to determine whether the client meets the criteria for a comprehensive audit. Phase 2 involves comprehensive verification of the system's compliance with Chapters 4–6 of the ASQMS standard through interviews and document reviews, with nonconformities documented. Clients must complete corrective actions within the specified time frame; upon verification by the audit team, qualified enterprises will receive the ASQMS Certification Certificate.

III . Surveillance and re-certification: During the 3-year certificate validity period, the enterprise must undergo two surveillance audits, focusing on verifying operational compliance and the implementation of corrective actions. Within three months prior to certificate expiration, the enterprise must complete a re-certification audit to confirm the system's continued effectiveness. Those that pass may extend the certificate period.

IV . Special scenario audits: A special audit will be initiated if the enterprise undergoes significant changes to its system, receives major quality complaints, or experiences an abnormal certificate status. Additionally, during the certificate's validity period, the enterprise may apply to transfer to a different certification body. The new certification body will conduct the audit according to re-certification requirements, and audit team members must comply with conflict-of-interest requirements.

V . Management of auditors and certification bodies: Auditors must meet educational, professional experience, and training requirements, and maintain their qualifications through annual continuing education and re-registration every three years. Certification bodies must be accredited, establish their own quality

management systems, adhere to the principle of impartiality, and undergo annual surveillance and witness audits.

VI . Certification exit process: When an enterprise faces serious complaints, fails to undergo a surveillance audit by the deadline, or fails to implement corrective actions, the certification body will initiate the exit process, which may result in the suspension or revocation of the certificate. The suspension period shall not exceed 110 days. The enterprise must complete corrective actions within this period, otherwise the certificate will be revoked, and relevant information will be updated in the ASQMS website.

4.2 License Partners (LPs)

License partners are professional organizations officially authorized by ASQMS to conduct ASQMS-related training. Their core responsibilities include “talent development, capability building, and knowledge dissemination”, providing a solid talent foundation for the implementation of the ASQMS standard. The quality of their training directly impacts the effectiveness of standard implementation and the quality of certification work. License partners may provide training services for various qualification levels, including Certified ASQMS Consultants, First/Second-Party Auditors, and Third-Party Auditors, as well as customized in-house training services for enterprises to meet the training needs of different entities. These LPs possess comprehensive training systems and deep industry expertise, enabling them to integrate standard requirements with industrial practices to deliver high-quality training services. The Oversight Office implements an “license management + dynamic supervision” mechanism for LPs. License is valid for three years and must be reapplied for and re-evaluated upon expiration to ensure that LPs continue to meet training requirements.

License Partners must possess a comprehensive training system and meet strict qualification criteria to obtain official license.

First, regarding qualification compliance: They must possess independent legal entity status, have no record of major violations of laws or regulations, meet the conditions for conducting training operations, and have established comprehensive training management systems and quality control systems.

Second, regarding faculty resources, institutions must have a sufficient number of qualified trainers with over 10 years of experience in automotive software quality management or standardization. These trainers must have passed official ASQMS training and examination, possess extensive practical experience with the

standard and in training, and be able to explain standard clauses using case studies. Additionally, the LPs must establish a mechanism for the continuous development of its faculty, conducting regular training on standard updates and training techniques to enhance trainer capabilities.

Third, training facilities: The LPs must have a dedicated training venue equipped with professional teaching equipment (such as projectors, computers, and simulation review tools), and possess the capability to conduct both online and offline training. For online training, a stable platform must be established to ensure smooth live streaming and interactivity; for offline training, a comfortable learning environment must be provided.

Fourth, training materials: The organization must strictly adhere to official ASQMS materials and develop supplementary training resources (such as case studies, exercise banks, and operation manuals) based on industry practices. The content of these materials must be updated promptly to align with standard revisions and technological advancements, ensuring the accuracy and timeliness of the training content.

Fifth, training management: A comprehensive trainee management system must be established, covering trainee registration, attendance tracking, performance evaluations, and certificate issuance. Trainee records should be maintained to document training progress and evaluation results, and follow-up technical support should be provided to address any questions trainees may have during the application process.

To address the training needs of different qualification levels, LPs provide differentiated and tailored training programs to ensure that trainees can fully master the knowledge and skills corresponding to their respective levels. Furthermore, LPs will offer various training formats based on market demand, including English-language training, customized in-house corporate training, and specialized training on standard updates. At the same time, LPs will establish a post-training service system to provide trainees with a lifelong learning platform, regularly sharing updates on standards, industry case studies, and learning materials, as well as organizing exchange seminars to enhance trainees' professional capabilities and practical skills.

4.3 OEMs and Automotive Software Supply Chain Enterprises

OEMs and automotive software supply chain enterprises are the core application entities and value implementation carriers within the ASQMS ecosystem.

They operate throughout all phases of the automotive software life cycle, including R&D, production, testing, deployment, operation, and maintenance, and serve as the primary beneficiaries and drivers of standard implementation, as well as the foundational support for the sustainable development of the ASQMS ecosystem. As core nodes in the industrial chain, both bear the responsibility for their own compliant operations while jointly driving the improvement of overall automotive software quality, forming the key link of "demand-driven, practice-oriented" approach in the ASQMS ecosystem.

As the leaders of the automotive software ecosystem, OEMs undertake the core responsibilities of "leadership and demonstration, requirements transmission, and supply chain control" within the ASQMS framework. On one hand, OEMs must take the lead in establishing automotive software quality management systems compliant with the ASQMS standard, integrating these requirements into the entire process, from software requirements definition, R&D management, testing and verification, OTA updates, to operations and maintenance services. Through systematic management, they enhance vehicle software quality, reduce the risk of software failures, and improve user experience and brand competitiveness. On the other hand, as the core of the supply chain, OEMs should incorporate ASQMS standard into the key metrics for supplier qualification, evaluation, and continuous improvement. By clarifying customer-specific requirements (CSRs), conducting supplier training, and promoting supplier compliance assessments, they should drive Tier 1 through Tier N software supply chain enterprises to fully implement the ASQMS standard, thereby forming a quality control framework characterized by "OEM leadership and full supply chain collaboration". Furthermore, OEMs must draw upon their own software R&D and application practices to provide feedback on issues and needs encountered during standard implementation to the SSC, Oversight Office, and working groups. This will provide practical evidence for iterative optimization of the standard and promote the deep integration of the standard with industry practices.

Automotive software supply chain enterprises are the direct implementers of the ASQMS standard, encompassing a wide range of entities involved in automotive software-related businesses, such as in-vehicle operating system developers, autonomous driving algorithm companies, smart cockpit suppliers, domain controller enterprises, software tool providers, OTA service operators, and software outsourcing firms. Their core responsibility is to strictly adhere to the requirements of the ASQMS standard, establish their

own software quality management systems, and standardize quality control activities across all stages of software development, testing, deployment, and operations and maintenance. This ensures that the software products or services they provide comply with the standard requirements, OEM specifications, and relevant regulatory standards. Specifically, supply chain enterprises must implement the core requirements of the standard, establish an end-to-end quality traceability system, enhance the controllability of the software R&D process, and reduce software quality risks.

Simultaneously, they must proactively cooperate with OEM audits and certification by certification bodies, promptly rectify nonconformities, and continuously improve the effectiveness of their system operations. By passing ASQMS certification, they can enhance their market competitiveness and obtain OEM supply chain access qualifications. Additionally, supply chain enterprises should actively participate in standard training and pilot applications, share their implementation experiences, and provide practical references for the optimization and refinement of the standard.

Within the ASQMS ecosystem, OEMs and automotive software supply chain enterprises form a symbiotic relationship: OEMs' requirements drive supply chain enterprises to implement the standard, while the compliant implementation by supply chain enterprises provides OEMs with high-quality software products and services. Together, they promote the deep-rooted implementation of the ASQMS standard, elevate the quality standards of the entire automotive software industry, and contribute to high-quality industrial development in the era of software-defined vehicles.

4.4 Certified Professionals

ASQMS certified professionals are individuals who have undergone training by the ASQMS Oversight Office or LPs, passed the relevant examinations, and obtained ASQMS-related qualifications in auditing, consulting, or training. They constitute the core talent pool for the implementation of the ASQMS standard, and their professional competence directly determines the effectiveness of standard application, audit quality, and consulting service level. To meet the needs of different roles, certified professionals are categorized into six qualification levels, listed from lowest to highest as follows:

- Certified ASQMS Consultant
- Certified ASQMS First/Second-Party Auditor
- Certified ASQMS Third-Party Assistant Auditor, Senior Certified ASQMS Consultant

- Certified ASQMS Third-Party Auditor
- Certified ASQMS Trainer
- Certified ASQMS Master Trainer

The training requirements, prerequisites, scope of competence, and renewal conditions for each level are clearly defined, forming a "tiered, step-by-step" talent development system that meets the industry's talent needs at various levels. The Oversight Office has established a qualification management platform for certified professionals to centrally manage the qualification information, training status, practice records, and renewal status of all certified individuals. This ensures that qualification information is verifiable and traceable, while also supervising the professional conduct of certified individuals to ensure compliance.

Certified professionals must strictly uphold impartiality and professional ethics, avoid conflicts of interest, and must not seek personal gain or disclose trade secrets. Examinations are only open to those trained by LPs. The Oversight Office is responsible for setting exam questions, organizing the exams, and grading them (including both theoretical and practical components). The Oversight Office maintains a credit record system documenting training, assessments, professional practice, and violations. Depending on the severity of the violation, violators may receive warnings, have their qualifications suspended, or have them revoked, thereby safeguarding the professionalism and credibility of the workforce.

4.5 Software Quality Experts, Enterprise Key Personnel, and Practitioners

Software quality experts, enterprise key personnel, and practitioners represent the broadest practicing group within the ASQMS ecosystem. This group encompasses various professionals across the automotive supply chain engaged in software R&D management, quality control, functional safety, cybersecurity, and related fields, who voluntarily participate in the ecosystem.

This group serves as a key promoter and practitioner of the ASQMS standard within the industry. In their daily work, they can use the core requirements, management logic, and practical methods of the ASQMS standard as important references for their own software quality management, optimizing internal process specifications and refining quality control mechanisms in accordance with their company's actual business scenarios. In industry exchanges, they can voluntarily participate in ASQMS- or industry-organized activities such as seminars, case study sessions, and technical forums to

share standard application experiences with peers across the supply chain, thereby broadening their professional horizons and expanding their industry networks. Simultaneously, they can follow standard updates and study supporting guidance documents through official ASQMS channels to continuously absorb advanced quality management concepts and methods, which in turn enhance the quality and efficiency of their own work.

As the “practical force” within the ASQMS ecosystem, this group does not undertake officially designated tasks such as auditing or consulting. However, through extensive independent application and voluntary exchange, they drive the deep dissemination of the ASQMS standard and concepts within the industry, expand the ecosystem's influence and practical reach, and provide a vast amount of authentic industry feedback to support the continuous optimization of the standard. They form a vital foundation for the sustainable development of the ASQMS ecosystem.

PART 02

Events

The "Events" documents key development stages of the ASQMS from standard establishment to ecosystem implementation and to global promotion. It comprehensively covers from multiple aspects such as the progress of working meetings, expansion of ecosystem partnerships, industrial activities, and media communications, demonstrating the evolution and industry impact of ASQMS standard. This serves as a clear reference for understanding the developmental trajectory.

Key Meetings Collaborations Activities & News



Key Meetings

ASQMS Standard Promotion Working Group Established



On 26th January 2024, China Association of Consumer Products Quality and Safety Promotion (CACPQSP) successfully held the Automotive Software Quality Management System (ASQMS) Standard Promotion Working Group inaugural meeting in Beijing. Wang Kun, Vice Chairman and Secretary General of the CACPQSP, Zheng Yuanhui, Secretary General of Automotive Working Committee of CACPQSP, and two Deputy Secretary Generals Lin Xiaowei and Wang Changsheng attended this meeting. More than 100 people including representatives from OEMs, technical institutions, media representatives and others participated in this meeting online and offline. Representatives from Chongqing Changan, Shanghai GM Wuling, SAIC MAXUS, Dongfeng, XPENG, Great Wall Motors, Geely, Chang'an Ford, GAC Group, GAC Honda, GAC Toyota, Leapmotor, FAW-Volkswagen, Voyah, Deepal, BAIC Foton, Mengshi Automotive, China Automotive Engineering Research Institute, etc. participated in the meeting on-site. BYD, Volvo, NIO, Zeekr, CATARC, Beijing Automotive Technology Center, China Quality Certification Center (CQC), Pan Asia Technical Automotive Center, GRG Metrology & Test, ACCU etc. participated in the meeting online. Dr. Wolfgang Wagner, CEO of ACCU X-Tech, as the person in charge of ASQMS international promotion, also attended the meeting on-site. This meeting was presided over by Mr. Lin Xiaowei, Deputy Secretary General of Automotive Working Committee.

Mr. Wang Kun, Vice Chairman and Secretary General of CACPQSP, pointed out in his speech that with the rapid development of the Internet of Vehicles, intelligent driving, and new energy vehicles, software and automobiles are integrated day by day. Software quality increasingly and significantly affects the function, performance and user experience of the vehicle. The ASQMS standard for automotive software quality management system solves the gap left by the traditional quality management system in the software field in the era of new energy vehicles and intelligent vehicles. The release of the standard not only strengthens China's leadership in the development of global automotive intelligence and networking, but also demonstrates China's innovation capability and international vision in this field.



Mr. Chen Zhitang, senior SQE expert from Shanghai GM Wuling Automotive introduced the content and framework of the "ASQMS Requirements", and Mr. Tang Lintao, chief engineer of the quality department of Chongqing Changan Automotive, analyzed the current development situation and needs of software quality management in the automotive industry. Participants expressed that with the development of intelligence and network connectivity in the automotive industry, software quality management is facing unprecedented challenges and opportunities. The release and implementation of "ASQMS Requirements" comes at the right time.

Mr. Zheng Yuanhui, Secretary General of Automotive Working Committee, announced the official establishment of the ASQMS Standard Promotion Working Group and read out the current member list of 30 OEMs. On behalf of the Promotion Working Group, Mr. Wang Changsheng, read out a joint statement signed by member OEMs, demonstrating the industry's determination of joint efforts to promote automotive software quality management.

Finally, Mr. Zheng Yuanhui concluded the meeting. He emphasized that the Promotion Working Group will give full play to the platform role of CACPQSP, gathering industry's support to implement the ASQMS standard, and to unite the efforts of all parties to advance China's automotive software management level, and to help China move towards a leading position in the development of global automotive intelligence and network connectivity.





Key Meetings

Automotive Software Quality Management System (ASQMS) Application Working Group Meeting Successfully Concluded



On April 24, 2024, the China Association for Consumer Products Quality and Safety Promotion (CACQPSP) successfully convened the Application Working Group Meeting for the Automotive Software Quality Management System (ASQMS) Standard at ACCU Group. The event gathered quality management experts from automotive industry across China to deliberate on strategies for promoting, applying, and implementing the ASQMS standard within the sector.



Participants engaged in in-depth discussions on key topics, including raising awareness of the ASQMS standard, aligning its implementation with specific enterprise contexts, and leveraging technical tools to enhance execution efficiency. There was a consensus that widespread adoption requires a multi-faceted approach—specifically, boosting industry recognition, strengthening training and education, and establishing incentive mechanisms. Furthermore, it was emphasized that enterprises should formulate implementation plans tailored to their unique characteristics and developmental goals to ensure the standard is effectively integrated into daily operations.



Key Meetings

News Express: "ASQMS Certification Rules and Requirements for Certification Bodies" Passed at Review Meeting

On July 10th, the review meeting for the "Automotive Software Quality Management System (ASQMS) Certification Rules and Requirements for Certification Bodies" (hereinafter referred to as the "Certification Rules"), drafted by CACPQSP Automotive Work Group, was held in Beijing, China. The meeting was attended by drafting members and a review panel consisting of software quality experts from more than a dozen OEMs.

ASQMS aims at helping the industry apply systematic automotive software quality management methods through standard requirements. The "Certification Rules" serve as a compliance check for the ASQMS standard, as well as specifying requirements for ASQMS Certification Bodies, auditors, audit requirements, audit processes, and certificate management, providing a basis for managing ASQMS certification.



Experts at the meeting conducted a thorough review of relevant details and were fully convinced of the effectiveness of the "Certification Rules" in the standardized implementation and application of ASQMS. The experts unanimously agreed to the passage of the "Certification Rules" and look forward to the significant role it will play in increasing the software quality management level in the automotive industry.



Key Meetings

News Express: The 2nd Working Meeting of ASQMS Standard Promotion Working Group Held



On August 1st, the second working meeting of the Automotive Software Quality Management System (ASQMS) Standard Promotion Working Group organized by CACPQSP was successfully held.

The meeting was presided by the CACPQSP Automotive Work Committee, and the participating OEM promotion working group members included GAC, SAIC, SAIC Maxus, SGMW, BYD, Geely, Zeekr, Changan Ford, Dongfeng, Volvo, Great Wall, XPeng, Li Auto, Leapmotor, PATAAC, and technical experts from ACCU and CATARC. This meeting was conducted on-site at CACPQSP, joined by online participants, carried out in-depth discussions and analyses on ASQMS standard, aiming to laying a solid foundation and making adequate preparations for the subsequent implementation and promotion of the standard.

The meeting reviewed and adopted the supporting document "ASQMS Certification Rules and Requirements for Certification Bodies". ASQMS aims at helping the industry apply systematic automotive software quality management methods through standard requirements. The "Certification Rules" serves as a compliance check for the ASQMS standard, as well as specifying requirements for ASQMS certification bodies, auditors, audit requirements, audit processes, and certificate management, providing a basis for managing ASQMS certification.

ASQMS promotion working group serves as an important exchange platform for software quality management in the automotive industry, it facilitates communication and coordination for the further implementation of the ASQMS standard.



Key Meetings

The 3rd ASQMS Promotion Working Group Meeting Successfully Held



《汽车软件质量管理体系要求》标准 推进工作组第三次工作会议

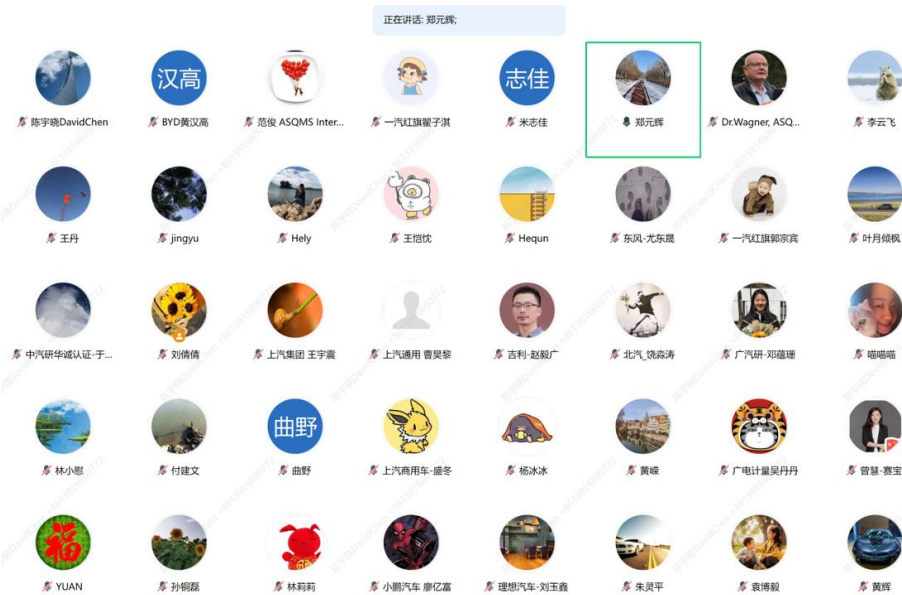
ASQMS现状与展望

2025年6月23日

To enhance the leadership role of the China Association of Consumer Products Quality and Safety Promotion (CACPQSP) in the automotive sector and advance the implementation of Automotive Software Quality Management System (ASQMS) standard, the ASQMS Promotion Working Group held its third official meeting online on June 23, 2025.

The meeting was chaired by Mr. Yuanhui Zheng, General Secretary of the CACPQSP Automotive Working Committee & ASQMS China Oversight. Building on the recent milestones in BYD's and Geely's certification, the meeting covered the topics on the progress of the ASQMS, including establishment of the ecosystem and community, the training and professional development events, OEM and supply chain implementation support, as well as continuous improvement and standard upgrade plan.

Representatives from most of the OEM members of the Working Group, Certification Bodies, License Partners and other associated parties participated in the meeting.



During the meeting, Dr. David Chen from ACCU, the ASQMS CIP Team Leader, delivered a keynote presentation on the current status and future outlook of ASQMS. Dr. Wolfgang Wagner, Managing Director of ASQMS Deutschland GmbH, the International Oversight, shared the latest progress in promoting the ASQMS standard overseas, providing valuable input for future international collaboration.

The successful convening of this meeting further strengthened industry consensus and laid a solid foundation for the continuous improvement and international adoption of the ASQMS standard.



Key Meetings

First Meeting of the ASQMS Standard Revision Working Group Successfully Held



To continue to lead the automotive software quality management practices, China Association for Consumer Products Quality and Safety Promotion (CACPQSP), the oversight office for ASQMS in China, together with ASQMS international oversight office in Germany, are administering task of "Automotive Software Quality Management System (ASQMS) Requirements" revision. On September 23, 2025, ASQMS Standard Revision Working Group successfully convened its first meeting in Beijing, joined by participants online.

Nearly 30 working group members from the ASQMS China and international oversight offices, OEMs and suppliers, as well as certification bodies and license partners attended the meeting online and onsite.



Key Meetings

ASQMS Oversight Teams Align for Global Collaboration

The ASQMS international oversight held an operating meeting in Stuttgart this week, bringing together representatives from ASQMS Oversight China, ASQMS Deutschland GmbH, and the license partner q.sphere GmbH.

The meeting focused on the ongoing international coordination and further development of the ASQMS standard.

Incorporating feedback from the first certified organizations and supported by the strong involvement of OEMs, Tier-1 suppliers, and certification bodies, the upcoming Revision 2 of the standard is already well underway.

Topics under discussion include AI, Software PPAP, SBOM, FOSS, and other emerging challenges in the software-defined vehicle ecosystem.

This dynamic progress demonstrates the growing recognition of ASQMS worldwide and the shared commitment of all oversight partners to simplify compliance and foster intelligent quality management, in future maybe even beyond automotive.

ASQMS aims to reduce the audit burden through smarter, integrated software quality management.



ASQMS Inside OEM Series: A BYD Visit on the Application and Implementation of the Standard



On 23rd October, the ASQMS Promotion Working Group of the Automotive Working Committee of China Association of Consumer Products Quality and Safety Promotion (CACPQSP) started the tour of "ASQMS Inside OEM Series". Led by the Secretary General of the Automotive Working Committee Mr. Yuanhui Zheng, accompanied by the technical advisor Dr. David Chen from ACCU and experts from China Automotive Technology and Research Center (CATARC), the ASQMS Promotion Working Group visited BYD for the exchange meeting.





Mr. Yilin Zhong, Vice President of BYD Automotive Engineering Research Institute, Mr. Banguang Peng, Deputy Director of Software and Digitalization Center, and Mr. Hongbin Xiong, Manager of Software Technology Operations Department and other related colleagues from BYD attended the meeting. Both parties fully discussed the application and implementation prospect of the ASQMS standard in BYD, and committed to enabling the standard's effective role in guaranteeing and promoting the quality and safety of automotive software for BYD.

SAMR, CNCA, CACPQSP ASQMS Delegation visited DEKRA in Stuttgart

From left to right: YU Libo (Chinese Academy of Inspection and Quarantine CAIQ, Manager of Physics and Chemistry Dept.), Dr. David CHEN (CACPQSP Technical Advisor, ASQMS Working Group Leader, ACCU Group CEO), Qian GENG (Technical Unit Director, Dept. of Accreditation, Inspection and Testing, SAMR), Huaning LI (Deputy Director General, Dept. of Accreditation, Inspection and Testing, SAMR), Kun WANG (CACPQSP General Secretary), Front: Andreas LOH (DEKRA, Head of Strategic Development, Service Division Advisory & Training Services), Dr. Wolfgang WAGNER (CEO ASQMS Deutschland GmbH, ASQMS Working Group Committee, CEO ACCU X-Tech GmbH)



ASQMS was started 2021 and now has reached maturity. The requirements, Certification Rules, and auditor guide have been published; training and examinations for first- to third-party auditors have commenced, and the first group of OEMs are prepared for certification.

The oversight of ASQMS lies with CACPQSP in China and ASQMS Deutschland GmbH outside China. Both organizations are strongly connected and professionally managed, including the databases and communication platforms.

Certification bodies in China are established.

Consumer safety and protection is a guard rail for DEKRA as Certification Body.

Consumer safety and protection is the driving force behind ASQMS.

Consumer safety and protection is the goal of the SAMR, State Administration for Market Regulation in China.

Consumer safety and protection is the core task of CACPQSP, the ASQMS issuing body and CNCA, the China National Certification Association.

Deputy Director General LI Huaning from SAMR stressed in his speech the need for a world wide collaboration of the inspection and testing organizations, especially for safety relevant components like batteries.

Kun WANG from CACPQSP and CNCA described the gap in consumer protection in the software area and how it could be filled in time with ASQMS. He also showed how the transformation from a vehicle centered environment to a software dominated mobility ecosystem suddenly created a multitude of new players from all sorts of industries with a lack of regulation. The challenge to maintain consumer safety and protection cannot be managed by vehicle firms alone and their organizations, now the state has to accept that challenge and provide the necessary standards for it. China started to develop ASQMS and now is in the process to internationalize it. All stakeholders are now invited to join and create a safe environment for consumers, supporting the speed of transformation, adding the next level of quality and making safe software experience affordable.

BYD Awarded the First “Automotive Software Quality Management System (ASQMS)” Certificate



On May 7, 2025, the China Association of Consumer Products Quality and Safety Promotion (CACPQSP), a Non-Profit Organization under State Administration for Market Regulation (SAMR), organized the certification of "Automotive Software Quality Management System (ASQMS)" with the issuance of the first ASQMS certificate. This certificate was issued to BYD Automotive Industry Co., Ltd. (hereinafter referred to as "BYD") by Guangzhou CEPREI Certification Body Service Co., Ltd. (hereinafter referred to as "CEPREI"), a subsidiary of Ministry of Industry and Information Technology (MIIT), the third-party certification body accredited by CACPQSP. The global first ASQMS certificate awarding ceremony was held at BYD's headquarter in Shenzhen, China. Attendees included Mr. Zheng Yuanhui, Secretary-General of the CACPQSP Automotive Working Committee, Mr. Du Hongzhong, Director of the CACPQSP Standards and Testing Center, Mr. Zhong Yilin, Deputy Managing Director of BYD Automotive Engineering Research Institute, Mr. Wang Yong, Deputy Managing Director of CEPREI, Mr. Li Yao, Deputy General Manager of CEPREI Certification Center and relevant project representatives.



This certification represents a comprehensive review of BYD's automotive software management. BYD has extended its software quality management activities from the development process to the entire product life cycle through the ASQMS implementation and certification. A comprehensive focus on the impact of software on customers and end-users has effectively improved the efficiency of automotive software collaboration across organizations and departments, has significantly enhanced overall software quality performance, and has ensured better response to the safety risks associated with automotive software quality issues.

With the rapid development and application of new energy vehicles, advanced driver-assistance systems (ADAS), and intelligent connected vehicles, BYD recognizes the critical importance of strengthening automotive software quality management. To ensure software quality at the organizational level, BYD adopted the ASQMS standard as the foundation for establishing a solid quality management system that can largely ensure the quality of automotive software. The certification result shows that BYD has achieved the world-leading capability in automotive software management. In the era of software-defined vehicles, receiving this certification is significant for BYD to maintain its leadership in the automotive industry.

The ASQMS standard was developed spanning over two and a half years by the CACPQSP Automotive Working Committee in collaboration with leading automotive manufacturers, top automotive technology and engineering research institutes. It aims to fill the gap in quality management system standard during the industry's transformation from traditional hardware to software-defined vehicles. The standard reinforces China's leadership in the global automotive industry transformation and demonstrates China's innovative capabilities and international vision in automotive software quality management. The ASQMS standard was first officially released on December 1, 2023 and implemented on January 1, 2024. Its English version was released in Munich, Germany in April 2024.

At present, the ASQMS certification is rigorously managed in accordance with the procedures established by CACPQSP. Three accredited third-party certification bodies, CATARC Huacheng Certification (Tianjin) Co., Ltd., Guangzhou CEPREI Certification Center Service Co., Ltd., and GRG Metrology & Test Group Co., Ltd., are responsible for conducting certifications in China.

Geely Automotive Research Institute Received ASQMS Certificate



On June 23, 2025, Guangzhou CEPREI Certification Center issued ASQMS certificate to Geely Automotive Research Institute, based on audit results of its compliance to the "Automotive Software Quality Management System (ASQMS)" standard released by the China Association of Consumer Products Quality and Safety Promotion (CACPQSP). The certificate ceremony was held at the headquarter of Geely Automobile Research Institute. Mr. Ren Xiangfei, the Deputy Director of the institute, and Mr. Wang Chunhui, the General Manager of CEPREI Certification Center, as well as representatives of both parties attended the ceremony.

At the certificate ceremony, Mr. Wang Chunhui congratulated Geely Automotive Research Institute on obtaining ASQMS certification. He praised the advanced level of Geely's software research and development management system in the industry, and fully recognized Geely Automotive Research Institute's important contribution to promoting the development and application of automotive software standard.

Mr. Ren Xiangfei recognized the significance and re-assured the support of the ASQMS standard and its certification activities, citing the important role of the standard in Chinese automobile going abroad from a strong automotive country, and encouraging Geely Automotive Research Institute to further deepen the quality management of software R&D.



ASQMS certification activities in China are carried out by Third-Party Certification Bodies accredited by CACPQSP, in strict adherence to the ASQMS oversight rules set forth by the CACPQSP Automotive Working Committee. Guangzhou CEPREI Certification Center is one of the accredited Third-Party Certification Bodies.

Geely takes the lead in ASQMS



Geely Automobile Group Joins ASQMS as a Founding Member to Guide and Supervise the Council of Chinese Automakers to Leading Automotive Software Quality Standards Decisions

On December 18, the Steering Supervisory Committee for the Automotive Software Quality Management System (ASQMS) established by the China Consumer Products Quality and Safety Promotion Association officially issued a notice:

Following deliberation and a vote by the committee, the decision was adopted unanimously that Geely Automobile Group Co., Ltd. (hereinafter referred to as "Geely Automobile") has officially joined the ASQMS Steering and Supervisory Committee as one of its core founding members and enjoys full voting rights of committee members. This important event marks a key step for ASQMS standards in building a collaborative ecosystem of "authoritative standards + industrial practices." Moreover, it means that Chinese automotive companies are deeply involved in the top-level design of automotive software quality standards as founding members, injecting Chinese industrial practices into the global Automotive Software Quality Management System.



Geely Automobile's lead participation as a founding member will bring industry-first practical experience to the Commission, helping the ASQMS standard to continuously meet industry needs from the top-level design stage, and lay a solid foundation for the authority and implementation of the standard internationally.

In software quality, China leads the industry and now also the standardization.

Geely Automobile has decided to nominate senior QMS personnel at the group level as representatives to formally participate in the follow-up meetings of the ASQMS steering and supervision committee (ASQMS SSC). The first meeting will be held in the near future. The representatives will exercise the voting rights of members of the committee in accordance with the statute, propose suggestions on key issues such as optimizing automotive software quality standards, improving evaluation mechanisms, and upgrading supply chain control, so as to promote the transformation of China's automotive software quality practice experience into an important part of global standards.

Relevant officials of the China Consumer Products Quality and Safety Association said:

"A top-notch company makes standards. Geely's membership in the ASQMS Steering and Supervisory Committee is not only recognition of its quality management capabilities, but also marks the transition of Chinese automotive companies from "following standards" to "leading standards." In the future, we expect Geely to play a greater role in the global standards system as a founding member, and promote the whole industrial chain to a new stage of high-quality development."

In the future, Geely Automobile will work in close collaboration with the members of the ASQMS Steering and Supervisory Committee to focus on the full life cycle quality control of automotive software, continuously improve the standard system, promote the implementation of standards, and jointly launch a new journey of global automotive software quality management.

Dr. Wolfgang Wagner, member of the ASQMS SSC and CEO of the international ASQMS Oversight Office in ASQMS Deutschland GmbH:

"Geely has been the first OEM to send their high level representatives to the ASQMS working group in 2021 and has strongly shaped the ASQMS standard when it was published in December 2023. Geely contributed enormously to the Version 2.0, which will be launched in a few weeks, bringing fundamental additions to the standard and reflecting that ASQMS covers all three supplychains: Upstream, captive and downstream. ASQMS is the most suitable global standard for a quality management system demanded by the cybersecurity standard ISO 21434. ASQMS is not focused on SDVs alone, it already covers the demands of the ICV age, interconnected vehicles regardless of the powertrain design."



The ASQMS standard made its debut at the 2024 Car Symposium in Bochum, Germany



From June 5th to 6th, the ASQMS (Automotive Software Quality Management System) standard was invited to be introduced to the public at the 2024 Car Symposium in Bochum, Germany. Dr. Wolfgang Wagner, the chairman of ASQMS Deutschland GmbH, delivered a speech at the forum's "Digital Transformation" session. At this forum, **ASQMS provided a systematic solution for the quality management of automotive industry software with its unique organizational and full life cycle perspective.**



Here are the key highlights of ASQMS at the forum:

Witness to Industry Transformation: ASQMS demonstrated the efforts and achievements of the automotive industry's transition from traditional vehicle manufacturers to mobility service providers.

Consumer-Centric Change: Through cases from Škoda and Volkswagen China Sales, ASQMS emphasized the central role of consumer demand in driving industry change.

The Power of Chinese Influence: ASQMS analyzed China's rapid rise in the automotive industry and its impact on the global automotive market, especially in terms of technology, market strategy, and regulations.

Challenges and Opportunities of Regulations: Faced with increasingly stringent regulatory requirements in Europe and China, ASQMS provided a comprehensive quality management solution to help enterprises meet challenges.

Pioneer in Software Quality Management: ASQMS is the first organization to propose quality system guidelines in the field of software, setting a new benchmark for the quality management of automotive software.



The solutions provided by ASQMS include but are not limited to:

Quality Management System Establishment: Assisting enterprises in establishing a quality management system that complies with international standards.

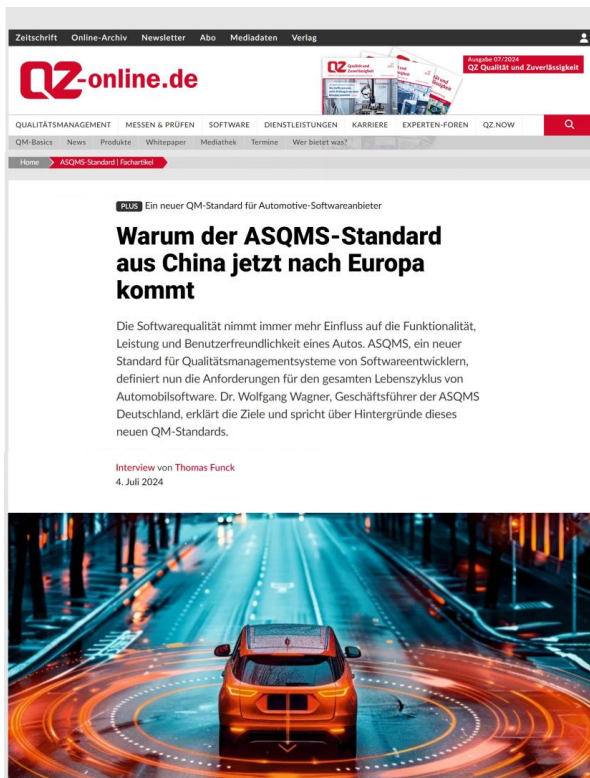
Supply Chain Management: Ensuring that every link in the supply chain meets the quality requirements of ASQMS.

Risk Assessment and Control: Reducing potential quality issues through systematic risk management.

Continuous Improvement: Encouraging enterprises to continuously improve their quality management processes to adapt to the ever-changing market and technological demands.

ASQMS not only focuses on current industry challenges but also looks to the future. As the automotive industry transitions towards electrification, intelligence, and connectivity, ASQMS will continue to update its standards and guidelines to adapt to new technologies and market trends. It is believed that with the guidance and support of ASQMS, the automotive industry will be better equipped to face challenges, seize opportunities, and achieve sustainable development.

"Chinese Automotive Software Quality Standard Going to Europe": a special interview of Dr. Wagner, CEO of ASQMS Germany, by the famous German quality management magazine QZ



The screenshot shows the website 'QZ-online.de' with a navigation bar at the top. The main article is titled 'Warum der ASQMS-Standard aus China jetzt nach Europa kommt' (Why the ASQMS standard from China is now coming to Europe). The article text discusses the increasing influence of software quality on automotive functionality and performance, and mentions Dr. Wolfgang Wagner, CEO of ASQMS Germany, who explains the objectives and background of the new standard. The article is dated 4. Juli 2024 and is an interview by Thomas Funck.



Why the ASQMS standard from China is now coming to Europe?

The impact of software quality on the functionality, performance, and user experience of automobiles is becoming increasingly significant. ASQMS is a new quality management system standard for software developers, defining process requirements that cover the entire life cycle of automotive software. Dr. Wolfgang Wagner, CEO of ASQMS Germany, elaborated on the objectives of this new quality management system and discussed the background of the standard's establishment.

In the tide of globalization, the internationalization of Chinese automotive software quality standards is accelerating.

Recently, Dr. Wagner, CEO of ASQMS Germany, was interviewed by the famous German quality management magazine "QZ". He delved into how Chinese automotive software quality standard have successfully "set sail" to the European market, as well as the challenges and opportunities faced in this process.

ASQMS Launched as a Management System Construction Project for the Electrification and Intelligence Era, in the 4th China Automotive Quality Technology Conference



On October 17th, the 4th China Automotive Quality Technology Conference was successfully held in Liuzhou, Guangxi Province, organized by China Association for Consumer Products Quality and Safety (CACPQSP) under the State Administration of Market Supervision (SAMR), and hosted by SAIC Group and SAIC-GM-Wuling with the theme of "Quality Management in the Era of Electrification and Intelligence". More than 500 representatives from regulators, local government, and almost all leading automotive OEMs and component companies attended the conference to share insights, exchange ideas, and jointly promote the high-quality development of the automotive industry.



During the conference, the ASQMS standard, released by CACPQSP last year and started to implement on January 1 this year, was announced and widely recognized. Ms. Zhang Qinrong, former deputy director of the SAMR and now Managing Director of CACPQSP, pointed out that the intelligent era of automotive has ushered in unprecedented opportunities for the industry. Facing the accompanying new challenges, CACPQSP has a keen insight of the industry trend, and actively plays the role of bridging and platform-building. It administered to develop an industry-leading automotive software quality management system standard (ASQMS), demonstrating China's leadership in innovative standards in the era of automotive electrification and intelligence. The next step is to actively promote the wide adoption and implementation of the system standard, striving to cooperation and sharing to build a harmonious and all-win industrial ecosystem.



ASQMS, as a system standard published for the first time in China focusing on the needs of automotive development, is announced to be launched in the industry as a quality management system construction project in the era of electrification and intelligence. As the highlight of the conference, under the guidance of CACPQSP, leading automotive enterprises and technical institution including SAIC, SAIC-GM-Wuling, BYD, GAC, Geely, and China CQC, jointly participated in the initiation ceremony of this industry-wide quality management system construction project for the era of automotive electrification and intelligence.



The 2025 ASQMS International Day Successfully Held in Germany

Burghausen, a Bavarian town traditionally celebrated for its salt mines and silicon industry, is rapidly emerging as a new landmark in the software sector. On May 16, the town played host to the successful debut of the 2025 ASQMS International Day.

Organized by the ASQMS Deutschland GmbH International Oversight Office, this inaugural event attracted nearly 100 participants, joining both on-site and virtually. The proceedings were presided over by Dr. Wolfgang Wagner, General Manager of ASQMS Deutschland GmbH, who delivered the keynote address. The event also featured a remote address by Zheng Yuanhui, General Secretary of the Automotive Working Committee at the China Association for Consumer Products Quality and Safety Promotion (CACPQSP). Additionally, the agenda included thematic lectures presented by 12 ASQMS experts from various countries.



Covering a broad spectrum of professional topics, the event underscored the critical role of ASQMS in ensuring software quality within the intelligent connected vehicle ecosystem. The successful convening of the 2025 ASQMS International Day has established a high-level platform for exchange among global automotive software quality institutions and experts. Most significantly, it marks the first international export of China-led automotive software quality management system standards, developed specifically from the perspective of consumer protection.

Moving forward, ASQMS aims to further expand its global footprint. By fostering a cross-regional collaborative innovation ecosystem, the organization seeks to promote the mutual recognition of technical standards and the integration of industrial practices, thereby safeguarding quality in the era of software-defined vehicles.

Keynote speech at the 5th China Automotive Quality Technology Conference: ASQMS Standard Ushers in a New Era of Automotive Software Quality



On July 17, the 5th China Automotive Quality Technology Conference, themed “Digital & Intelligent Renewal – Global Automotive Quality Management in the New Era,” convened in Shenyang, a major industrial hub in Northeast China. Quality and technical experts from the global automotive industry, alongside senior executives from leading vehicle manufacturers, gathered to engage in in-depth discussions on emerging topics, challenges, and opportunities in automotive quality and safety management amid the digital and intelligent transformation.



Dr. Chen highlighted that the automotive industry is rapidly evolving into an intelligent, connected ecosystem driven by core software capabilities, with the focus of quality shifting from traditional product quality to perceived user experience. He noted that legacy quality standards are no longer sufficient to meet the demands of the intelligent connected vehicle era. Against this backdrop, the Automotive Software Quality Management System (ASQMS) standard, issued by CACPQSP, address the critical gap in software quality management for this new era.

ASQMS shifts the focus from project-level compliance to organization-level quality governance. Serving as a quality bridge connecting cross-departmental teams within OEMs and fostering collaboration between OEMs and suppliers, it embeds quality management into the core of corporate culture. Furthermore, ASQMS covers the full life cycle of software products, providing a robust process foundation for OEMs and their supply chains to comply with the mandatory Vehicle Type Approval (VTA) requirements for cybersecurity management systems. In today's market environment, ASQMS delivers an "efficiency golden triangle", achieving comprehensive improvements in cost, timeline, and compliance levels.

Owing to its advanced and forward-looking attributes, ASQMS has earned recognition from top-tier OEMs in the industry. BYD and Geely have become the first two OEMs to successfully pass the ASQMS assessment. Additionally, the steady advancement of ASQMS internationalization marks the first global export of China-led automotive software quality standard systems developed from a consumer protection perspective.

In his closing remarks, Dr. Chen called on peers across the automotive industry to actively participate in the implementation and practice of ASQMS, so as to jointly embrace a new era of automotive software quality.

"2025 ASQMS Night" Successfully Held in Shenyang, China



The "2025 ASQMS Night" was successfully held in Shenyang, China on July 17th. Over 40 automotive executives and quality experts gathered here, including representatives from OEMs, suppliers, certification bodies, consulting firms and universities. The event took place in a relaxed and joyful atmosphere on the cool summer night.

Zheng Yuanhui, Secretary-General of the Automotive Working Committee under the China Association for Consumer Products Quality and Safety Promotion (CACPQSP), and Dr. Wolfgang Wagner, Managing Director of ASQMS GmbH Germany, attended and delivered speeches on behalf of ASQMS China and the International Oversight, respectively.

Dr. David Chen, CEO of ACCU, on behalf of the ASQMS Working Group, shared information on topics of common interest, including standard supporting documentation, operations of ecosystem, career development paths for professionals, CIP working group updates, expert community building, and plans for standard upgrades etc.

Representatives from three ASQMS certification bodies — CATARC, CEPREI, and GRG Metrology & Test— spoke to affirm the standard's significance and to outline the future tasks. The representative from BYD, the first OEM who obtained ASQMS certificate, also spoke to revisit the implementation of ASQMS and to reiterate the important role of ASQMS to BYD.



The "ASQMS Night" was themed around "In-Depth Discussion, Networking, Idea Exchange, and Cultivating Insights". During the open session, experts communicated freely and extensively.

This "ASQMS Night" not only deepened everyone's understanding and recognition of the standards but also built a communication platform for professionals in the automotive quality field to expand their networks. More ASQMS events will be launched in the future. In the era of software-defined vehicles, ASQMS partners with you along the journey!

ASQMS Delivers Keynote Speech at Euro SPI Conference



European System, Software &
Service Process Improvement
& Innovation

In cooperation with initiatives
in Asia, Africa and USA



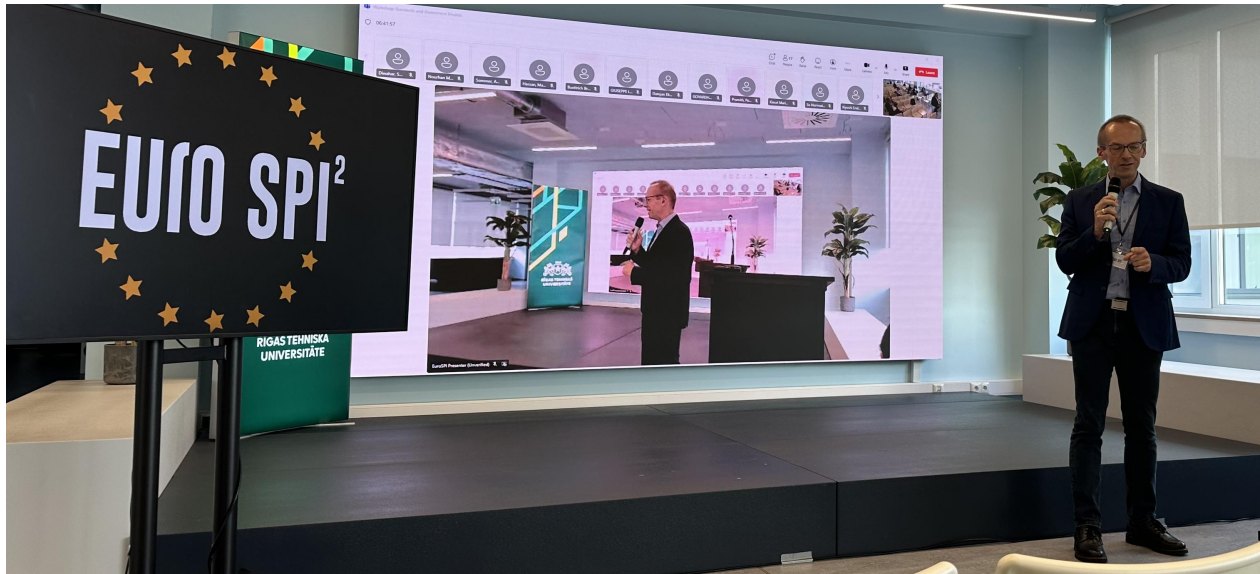
Prof. Dr. Wolfgang Wagner
CACPQSP Automotive Work Group
ASQMS Deutschland GmbH
Riga, 2025-09-19



ASQMS, a new software quality standard for SDVs from China

Abstract: With the tremendous technological advancement of software defined vehicles (SDVs) in China, it was time for the authorities in charge of consumer protection to adjust the landscape of quality management standards. IATF 16949 is considered a very successful QM system standard in China: 50% of the certificates issued worldwide relate to supplier factories located in China. However, the IATF 16949 system standard does not cover software producing, processing and selling organizations and it was not prepared to extend the standard quickly. This created a gap in the field of QM standards. The increasing number of recalls with root causes from E/E and software sectors ultimately prompted China to be the first nation to create a QM system standard. ASPICE as a process standard is tolerated due to a lack of alternatives, but is ultimately not seen by local Chinese companies as covering the gap. In addition, ASPICE focuses on single project assessments while ASQMS has an organizational focus. Due to the organizational focus the claim is that the coverage of the entire software ecosystem is higher. Chinese organizations will prefer this organizational approach above the ASPICE based project focus, especially for maturity levels up to L3. BYD and Geely are now ASQMS certified in their software departments, others are asking suppliers to become ASQMS compliant. The Chinese brands will produce in Europe and will apply their SDV standards to suppliers here. The European industry will necessarily follow in the development of SDVs and it is now time to harmonize the standards, and in a world that still thinks and acts globally, to apply the standards together, develop them together and use only the best components and ideas on both sides. The keynote

- Positions ASQMS in the automotive ecosystem
- Compares ASQMS with other standards
- Describes the benefits for organizations that are ASQMS compliant
- Offers opportunities for co-operation between China and Europe



Euro SPI Core Principles:

- Covering Europe and global regions worldwide
- Embracing and understanding cultural differences
- Balancing industrial practice and academic research
- Continuously innovating the scope of SPI (S7P4I3):
 - S: System, Software, Services, Security, Safety, Sustainability, (New) Software Engineering
 - P: Process, Product, Paradigms, Principles
 - I: Improvement, Innovation, Infrastructure
- Translating and applying knowledge into industry practice
- Promoting networking cooperation at individual and organizational levels
- Facilitating collaboration and exchanges with a global vision

PART 03

Expert Commentary

"ASQMS Expert Commentary" is an article series on ASQMS written by automotive software quality experts around the world, based on their own insights, practices, implementation, or evaluation of ASQMS.

#1: IATF 16949 vs. ASQMS: Bridging the Gap for Automotive Software Ecosystem



Sathiyamoorthy Ramamoorthy

Automotive Software Quality Leader | ASPICE Provisional and CySec Assessor
UL CFSP ISO 26262 | TÜV Nord Cybersecurity Engineer ISO 21434 | TÜV SÜD
AI Quality Engineer

I've noticed that many of you have been inquiring about the similarities and differences between IATF 16949 (Automotive Quality Management System) and ASQMS (Automotive Software Quality Management System). Here's a breakdown of the main clauses and the advantages of adapting ASQMS.

1. Scope:

IATF 16949: Quality management system requirements are for the design and development, production, and, if applicable, assembly, installation, and services of automotive-related products, including those with embedded software.

ASQMS: Software Quality Management System requirements apply to organisations involved in the development, deployment, operation, maintenance, and servicing of software in the automotive industry ecosystem.

Advantage: ASQMS also covers organisations not within the scope of IATF that develop off-vehicle software, such as roadside, cloud-side, and field-side software, as well as software tools.

2. Normative and Informative References:

IATF 16949: ISO 9001 Quality Management Systems Requirements and Control Plan. CMMI and ASPICE are informative references for software process assessment.

ASQMS: Software quality and safety standards (e.g., ISO/IEC 90003 Software Engineering, ISO/IEC/IEEE 12207 Systems and software engineering – Software

life cycle processes, ISO 26262 Road Vehicles – Functional Safety).

Advantage: ASQMS is based on the state-of-the-art software standards.

3. Terms and Definitions:

IATF 16949: Automotive manufacturing terms.

ASQMS: Software engineering terms from ISO/IEC/IEEE 24765 Systems and Software Engineering Glossary.

Advantage: ASQMS utilises software engineering terminology to facilitate the application of software standards such as ASPICE and ISO 26262.

4. Context of the Organization:

IATF 16949: Unique and supplementary requirements on the scope, customer-specific requirements, conformance of products and processes, and product safety, in addition to the ISO 9001 requirements.

ASQMS: ISO 9001 requirements are adopted under Section 4.1, Context of the organisation and Section 4.2, Management system fundamentals

Advantage: Organisations that already have ISO 9001/IATF 16949 quality management systems will find it seamless to implement ASQMS.

5. Leadership:

IATF 16949: Unique and supplementary requirements

on Leadership and commitment, organisational roles, responsibilities, and authorities, in addition to the ISO 9001 requirements.

ASQMS: The ISO 9001 requirements are adopted under Section 4.2, Management system fundamentals

Advantage: Organisations that already have ISO 9001/IATF 16949 quality management systems will find it seamless to implement ASQMS.

6. Planning:

IATF 16949: Unique and supplementary requirements on risk analysis, preventive action, contingency plans and planning to achieve quality objectives in addition to the ISO 9001 requirements.

ASQMS: Simplified requirements under Chapter 4, System Management covering quality policy and objectives and management system changes.

Advantage: Organisations that already have ISO 9001/IATF 16949 quality management systems will find it seamless to implement ASQMS.

7. Support:

IATF 16949: Unique and supplementary requirements for infrastructure, environment, measurement systems analysis, calibration records, laboratories, auditor competency, awareness and documentation in addition to the ISO 9001 requirements.

ASQMS: With a strong emphasis on the software support process, ASQMS has detailed requirements in Chapter 5, supporting processes.

- *Documentation management (5.1)*
- *Software Toolchain management (5.2)*
- *Equipment of facilities (5.3)*
- *Knowledge management (5.4)*
- *Configuration management (5.5)*
- *Problem resolution management (5.6)*
- *Change request management (5.7)*
- *Review management (5.8)*
- *Quality assurance (5.9)*
- *Supplier management and Open source software management (5.10)*

Advantage: ASQMS enables the organization to adapt the software process at the quality management system

level, making ASPICE or CMMI faster to implement.

8. Operation:

IATF 16949: Unique and supplementary requirements for quality management system operations including requirements for process for quality assurance for embedded software development (internal as well as suppliers).

ASQMS: Provides detailed requirements for the software development life cycle process, as well as the service operational process for the connected vehicle ecosystem under Chapter 6, Operational processes.

- *Project management (6.1)*
- *Requirements development and management (6.2)*
- *Architectural design (6.3)*
- *Software detailed design and implementation (6.4)*
- *Unit verification (6.5)*
- *Integration and integration test (6.6)*
- *Verification test (6.7)*
- *Supplier software project management (6.8)*
- *Software release (6.9)*
- *Software deployment (6.10)*
- *Software maintenance (6.11)*
- *User information management (6.12)*
- *Software termination (6.13)*

Advantage: ASQMS extends software quality management from the development life cycle to the full product life cycle and enables compliance for traditional automotive organisations as well as smart mobility providers.

9. Performance evaluation:

IATF 16949: Unique and supplementary requirements for monitoring, measurement, analysis, evaluation of the manufacturing process, customer satisfaction, internal audit program including manufacturing process & product audit, and management review in addition to the ISO 9001 requirements.

ASQMS: Simplified requirements under Chapter 4.4, Performance evaluation covering Monitoring and measurement, analysis and evaluation internal audit and management review.

Advantage: Organisations that already have ISO

9001/IATF 16949 quality management systems will find it seamless to implement ASQMS.

10. Improvement:

IATF 16949: Unique and supplementary requirements for Nonconformity and corrective action and continual improvement in addition to the ISO 9001 requirements.

ASQMS: Simplified requirements under Chapter 4.5, Improvement covering Improvement process, nonconformity and corrective action and continual improvement.

Advantage: Organisations that already have ISO 9001/IATF 16949 quality management systems will find it seamless to implement ASQMS.

Unique aspects of ASQMS:

Process Practices: All software quality activities in the standard are referred to as Process Practices. The Process Practices are divided into three categories:

- Basic Practice, abbreviated as BP
- Advanced Practice, abbreviated as AP

- Recommended Practice, abbreviated as RP

Software classification: ASQMS classifies software into two types

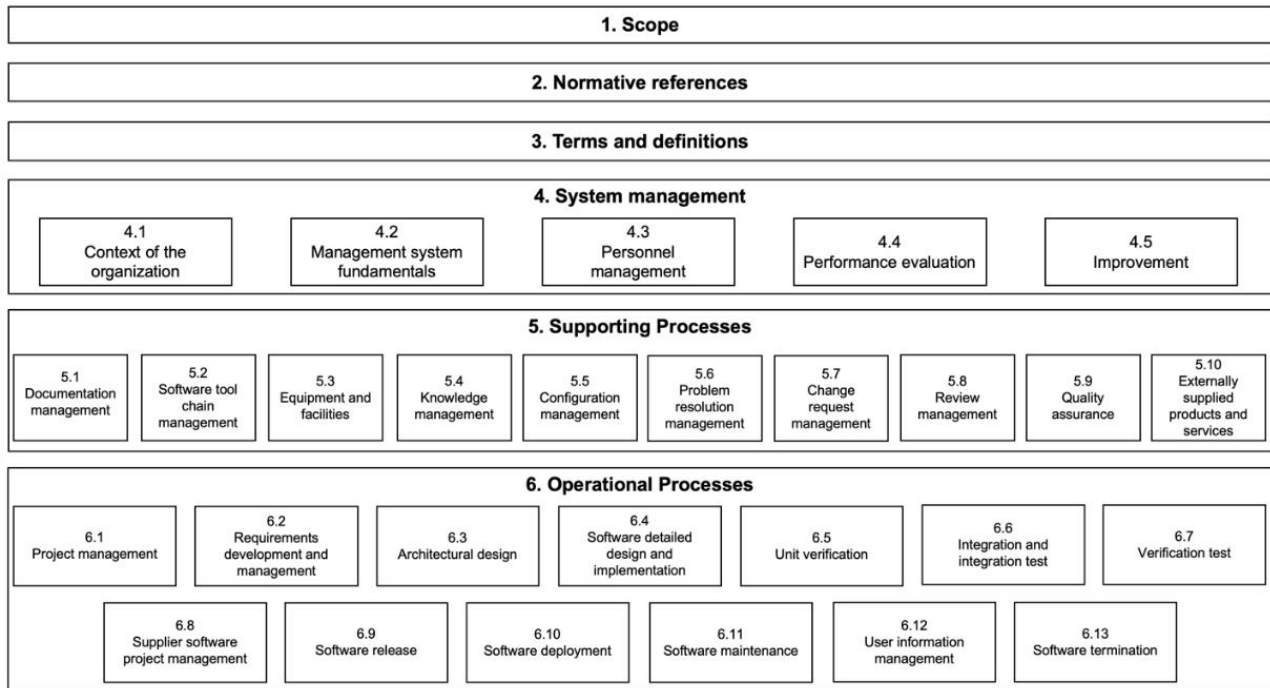
1.Type I software: the software that carries neither functional safety nor cyber security risk

2.Type II software: the software that carries functional safety (ASIL A, B, C,D) or cyber security risk (CAL 1,2,3,4)

Quality requirement applicability: ASQMS requirements are applicable based on the software type.

- **Type I software:** Basic practices are mandatory where as advanced practices and recommended practices are optional.
- **Type II software:** Basic practices and advanced practices are mandatory where as recommended practices are optional.

Summary:



#2: Why Do Automotive Software Companies Need an Organizational Level Quality Management System?



Jibing Yan

Senior Auditor of China Quality Certification Center (CQC) | Senior Auditor of IATF16949 | Member of ASQMS Certification Rules Drafting Work Group | Member of ASQMS Applications Work Group | Distinguished Lecturer of School of Applied Technology | Soochow University

In my opinion, establishing an organization-level automotive software quality management system (ASQMS) has the following implications and advantages:

1. Ensure Software Quality and Services

The quality management system is the management foundation of an enterprise. In the era of intelligent driving and connected vehicles, vehicles are equipped with a lot of software to enhance the function, performance and user experiences, and the quality of these software especially requires software development companies to have a solid management foundation to ensure. ASQMS is one such quality management system standard, which requires a systematic approach to software development and operation management at the entire organizational level, ensuring that all software projects meet customer needs through standardized workflows, control and monitoring of key processes.

2. Enhance Customer Satisfaction

ASQMS standard enhances customer and automotive user satisfaction by identifying customer needs, establishing software quality objectives, and controlling software quality across the organization to meet customer requirements and exceed customer expectations.

3. Continuous Improvement

Unlike ASPICE, where the audit requirements only ensure the quality of the process at one point in time; whereas the conformity to ASQMS standard requires an organization to ensure process quality at every point in time and to carry out continuous improvement, including system improvement, process improvement and product improvement. This ongoing conformity to ASQMS is achieved through ongoing third-party certification body audits, including initial audit and annual surveillance audit and re-certification audit.

4. Improve the Operational Efficiency of the Organization

ASQMS standard clarifies the requirements of an organization's resource allocation, management responsibilities, processes, etc., reducing resource waste and internal loss, efficiently obtaining the desired results.

5. Ensure Compliance and Reduce Risk

The ASQMS standard minimizes potential risks and liabilities by identifying relevant laws and regulations, industry and other relevant party requirements.

6. Improve Organizational Credibility, Reduce Costs, and Increase Competitive Advantage

ASPICE as a capability assessment tool in the

development stage of an automotive embedded software product project, obtaining ASPICE assessment only means that the product project process capability has attained a corresponding level. If an organization develops a new project, it needs to apply for the ASPICE assessment again. This is often a challenge for software organizations in terms of time and cost. Different from ASPICE, if an organization carries out a system build-up in accordance with the ASQMS standard and has passed a third-party certification to prove that the entire organization has and continuously has the ability to develop relevant automotive software that meets customer requirements, it can improve the reputation and brand image of the organization, gain the trust and recognition of the market, and also improve management efficiency, reduce costs, and greatly enhance the competitiveness of the organization.

#3: Can ASQMS Be Tailored, as Not All Processes Are Applicable to Every Organization?



Dan Wang

Member of ASQMS Standard Drafting Committee | Head of Automotive Software Quality Assurance in a Chinese first-tier JV OEM | ASPICE Principle Assessor Certified SAFe 5 Agilist | CMM V1.3 ATM | PMP | Certified Scrum Master, with 20 years of experience in software development, software project management, and software quality management.

With the continuous evolution of automotive electrification, intelligence, and connectivity, automotive software is becoming increasingly diverse and complex. There are significant differences in scale, specialization, and product complexity among automotive OEMs and numerous suppliers. Therefore, ASQMS encourages organizations to adopt customized and tailored implementation strategies based on their own circumstances, so that ASQMS can adapt to their specific product development and management needs.

1. Tailoring the implementation process according to the business scope

ASQMS defines quality management requirements for software from requirements, design, development to deployment, operation and maintenance, upgrade, and termination, covering the entire life cycle of software product delivery. Enterprises can select corresponding process adaptations based on their specialization in software product development and transform them into their own quality management requirements. For example, for Tier1 and Tier2 that only involve software development, if they do not involve software deployment and upgrade activities, the corresponding process requirements can be tailored.

2. Tailoring process practices according to product characteristics

ASQMS classifies software products into two types based on their functional safety and cyber security requirements:

Software Type	Functional Safety ASIL Level	Cyber Security SecL Level
Type I	QM	0
Type II	ASIL A~D	Level 1~4

Combining the necessity of process activities, all process practices that ensure software quality are divided into three categories:

Process Practices	Abbreviation
Basic Practice	BP
Advanced Practice	AP
Recommended Practice	RP

The tailoring method based on product characteristics defined in ASQMS is as follows:

For Type I software, all BP are mandatory requirements, and full compliance with them is necessary to meet the standard's requirements. In contrast, AP and RP are recommended, and their implementation can be optional based on the software's characteristics and the organization's needs.

For Type II software, all BP and AP are mandatory requirements, and full compliance with them is necessary to meet the standard's requirements. In this category, RPs remain recommended.

#4: Why Does ASQMS Merge the “System Development” and “Software Development” Requirements into a Single “V” Model



Hongbin Xiong

BYD Vehicle Software Control and OTA Business Leader | ASQMS Standard Drafting Working Group, Software Management Team Leader | ASPICE Principle Assessor | 15+ years of experience in automotive software development, software management, software upgrades and OTA operations

In recent years, with the rapid development of the "New Four Modernizations" of automobiles and the intensification of market competition, the field of automotive software has developed rapidly, and various new technologies have emerged one after another. At the same time, the repeatedly shortened software development cycle, innovative technical configurations, and continuously increasing software standards and requirements have also brought great challenges to the process management and software quality assurance of software development.

1. Mission of the ASQMS Standard

At the beginning of the drafting of ASQMS standard, we are committed to creating a set of automotive software full life cycle management standards with wide coverage, full range of applicable software types, strong universality and convenient application, so as to ensure the quality of automotive software.

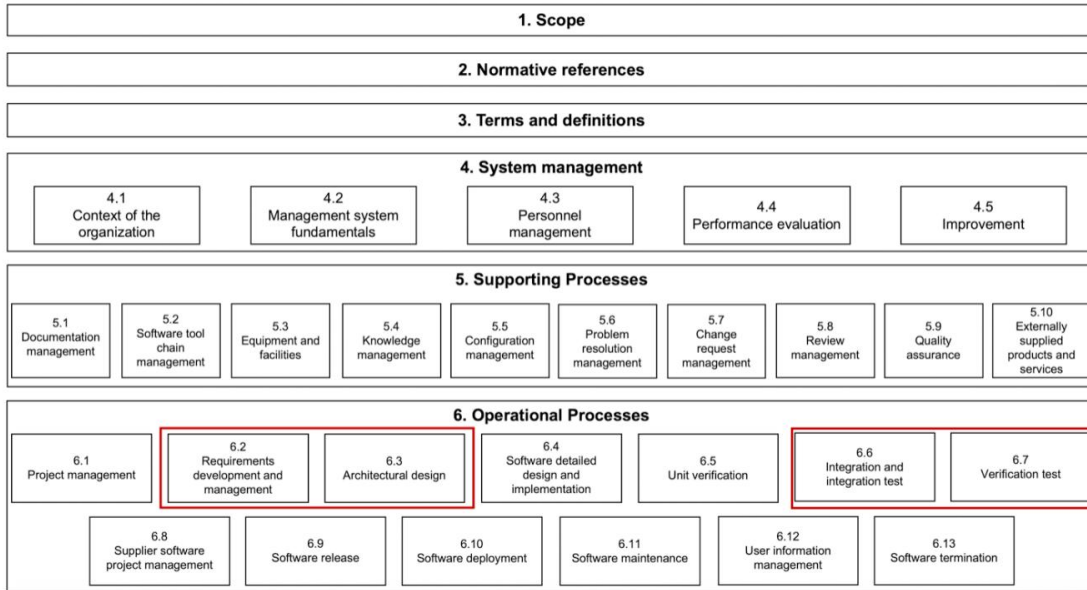
During the drafting process, the working group carried out extensive discussions on the nature of the software development process of embedded, non-embedded, functional safety and cybersecurity, combined with the management characteristics of various mainstream automotive software development enterprises. Adhering to the concept of simplicity and universality, we summarized and refined the key management points of each stage, and formed a set of "one-stop" automotive software quality management standards covering organizational system establishment, software process

development control, mass production product operation and maintenance management. Thus taking into account the requirements of functional safety, cybersecurity and software upgrade management, so as to help enterprises establish the whole value chain software management capabilities.

2. Structure of the ASQMS Standard

The ASQMS standard is mainly composed of organizational system management requirements, organizational process management requirements supporting product development, and the operational processes for in-depth product development and product management.

The design requirements related to "System Development" and "Software Development" are provided in sections "6.2 Requirements Development and Management" and "6.3 Architectural Design", whereas "6.6 Integration and Integration Testing" and "6.7 Verification Test" provide guidelines for the verification of architectural design and the requirements, respectively.



3. Why Merging System Development with Software Development Requirements?

In order to reduce the application burden and to increase development efficiency, ASQMS focuses on the key activities and requirements of the software development process. Through analysis, we concluded that the key requirements of system development and software development are very similar, and therefore we combine the requirements for system level and software level development and testing activities.

Using '6.2 Requirements Development and Management' as an example, this process contains the following process practices:

6.2.1 BP_Understanding the requirement inputs

6.2.2 BP_Accepting the requirement inputs

6.2.3 BP_Defining the requirements

6.2.4 BP_Structuring the requirements

6.2.5 BP_Requirements analysis

6.2.6 AP_Verification criteria

6.2.7 BP_Requirements_traceability

6.2.8 BP_Requirements review

6.2.9 BP_Obtaining an agreed version of requirements

The above process activities are all key activities in the system requirements analysis and software requirements analysis work, and the requirements are applicable to both.

However, the merging of requirements does not mean that the system development activities and software development activities are to be combined. The organization still needs to carry out level-by-level design development and testing, according to the scope of the project during implementation to ensure the granularity of the design.

#5 : Beyond ASPICE: Why Is ASQMS Standard Important To the Automotive Industry?



Sathiyamoorthy Ramamoorthy

Automotive Software Quality Leader | ASPICE Provisional and CySec Assessor
UL CFSP ISO 26262 | TÜV Nord Cybersecurity Engineer ISO 21434 | TÜV SÜD
AI Quality Engineer

After my last post about ASQMS I received questions like: "Why do we need ASQMS when we already have ASPICE or IATF?"

I'm going to give you the details and clarity you need on ASQMS.

1. Beyond Project focus:

- ASQMS is not a project-based maturity assessment standard like VDA ASPICE.
- ASQMS is an organisation level system certification standard for automotive industry organisations such as the IATF. However, it covers the transition to Software Defined Vehicles and the emerging automotive software ecosystem, which is not addressed in the IATF Quality Management System.
- The ASQMS standard defines the entry requirements for software-producing or service organizations that can supply software to the automotive industry. This standard applies to both pure software organisations and organisations of system products that integrate software and hardware.

2. Beyond In-vehicle embedded software:

- IATF and ASPICE address the In-vehicle embedded software.
- The ASQMS standard covers all software, including in-vehicle embedded software, but also off-vehicle software supporting mobility operations, such as those deployed via cloud, at the client-

side, at the roadside, at the field, etc., as well as software development and maintenance tools.

3. Beyond Software development life cycle:

- The ASQM standard goes beyond the ASPICE by covering the complete software product life cycle. It considers everything from requirements to design, development, integration, testing, release, deployment, upgrade, operation and maintenance, and the end of life (similar to ISO 26262 and ISO 21434). This makes perfect sense in the context of continuous software upgrades following SOP.

4. Risk based Tailoring:

- ASQMS adopts a smart approach to software classification. It categorizes software into Type I and Type II based on its associated functional safety and cybersecurity risks.
- Type I: This category encompasses software with neither functional safety nor cyber security risk, where the focus is on realising the intended functionalities and performance.
- Type II: Software deemed to have functional safety or cybersecurity risks falls under this category. ASQMS mandates additional processes to mitigate these risks alongside the practices required for Type I software.

This is a brilliant approach that will save organisations time, money and resources.

I find ASQMS goes beyond existing standards like ASPICE and IATF, offering a comprehensive quality management system for the entire automotive software ecosystem.

#6: Why Does ASQMS Require the Management of User Data?



Guanghui Pu

BYD Automotive Engineering Research Institute, Software Quality Engineer
 Member of ASQMS Standard Drafting Work Group | ASPICE Provisional Assessor
 ISO 26262 Functional Safety Engineer

The requirements of ASQMS encompass the entire life cycle of in-vehicle software development, management, operation, maintenance, and termination. It is dedicated to providing users with consistently reliable software products through comprehensive management, thereby safeguarding users' rights and interests.

Notably, the maintenance section of the standard particularly emphasizes the requirements for user information management, primarily considering the following aspects.



1. In Using Smart Vehicles, Vast Amount of User Data Will Be Collected

- In the era of smart cars, to better serve users and provide them with more personalized and customized functional services, a large volume usage data will be collected. This is to enrich functionalities and analyze user preferences and usage habits, thereby offering differentiated services and control strategies.
- For example, Driver Monitoring Systems (DMS) can obtain drivers' behaviors and status, and combine this information with vehicle speed, direction, etc., to provide a series of safety warning mechanisms. In-car entertainment system terminals can obtain users' location information and record usage habits to offer more convenient navigation and recommendations for resources that better match user preferences. Vehicle cloud services can provide users with cloud storage for personal photos, videos, and other information.
- There are many similar functions in smart cars that rely on obtaining user data to provide customized services. In this process, a significant amount of sensitive information, such as images, videos, audios, geographical locations, communication records, usage logs, etc., is continuously being obtained. Some of this data is stored in the vehicle, some on the cloud, and some is transmitted back to the local locations of automakers or service providers via networks. If proper measures are not taken for management during storage and transmission, it may lead to the leakage of user privacy.



2. Consumers' Heightened Concerns

- As cars serve as "mobile homes," the inner space provides a high degree of privacy, and in-car privacy has always been a key concern for consumers. Effective privacy protection can become a selling point for vehicles and win consumers' loyalty. Consumers are eager to understand what information about them is being collected and what purposes it serves after collection.

3. Planned User Information Management is Necessary Due to Multiple Participants in Automotive Operation and Services

- The automotive operation and maintenance process involves the participation of both automakers and various operation and service providers. There are multiple channels and paths for obtaining user information, and different teams are involved in information handling and use. To ensure user information security throughout the entire process, it requires planning, monitoring, and management from an overall perspective. Additionally, when vehicles are scrapped or no longer in use, all collected user data should be properly disposed.

4. Privacy Leaks Will Have Severe Consequences for Enterprises

- The privacy laws of many countries ensure that people are entitled to the right to privacy, and no organization or individual shall infringe upon the privacy rights of others through means such as probing, disturbing, disclosing, or publishing. For example in China, the Personal Information Protection Law, the Cybersecurity Law, and the Data Security Law put forward management requirements for consumers' personal information.
- The information collected by vehicles falls within the scope of information required by the aforementioned laws. In case of violation, enterprises will not only face legal penalties but will also lose consumers' trust, impacting normal operations. Additionally, the leakage of geographical location information collected during vehicle movement may also affect national security.
- Therefore, sufficient attention must be given to the management of user and vehicle information!

#7: What Role Does ASQMS Play in the Overall Quality and Safety System for Intelligent & Connected Vehicles?



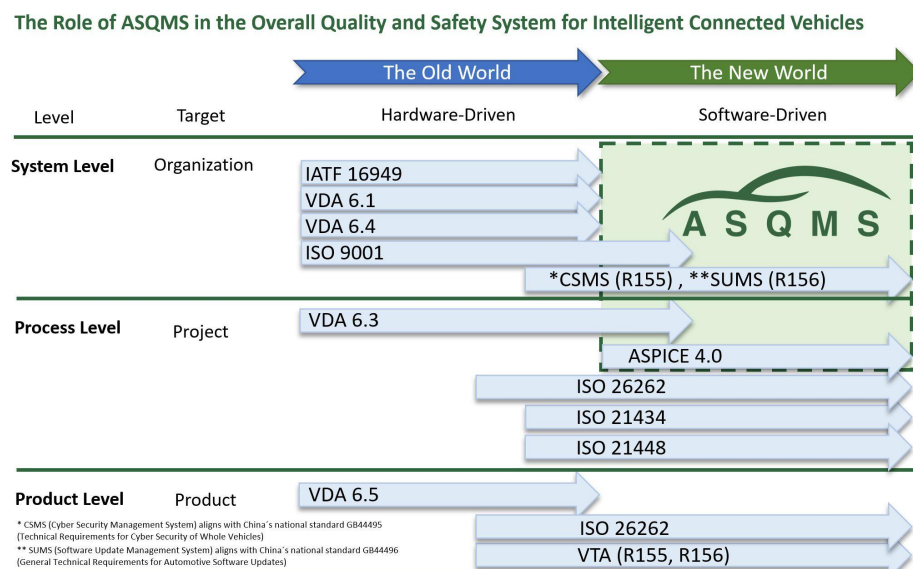
Dr. David Chen

ACCU Group CEO, Technical Advisor to the Automotive Committee of China Association for Consumer Products Quality and Safety Promotion (CACQPSP), Head of the ASQMS Standard Drafting Work Group, Previously with McKinsey, Lucent Bell Labs, and Synopsys

The quality and safety of intelligent connected vehicles not only directly impact the road traffic safety, consumers' experience and trust, but also impair the economics and reputation of OEMs and related suppliers.

To ensure the overall quality and safety of intelligent connected vehicles, it is necessary to have the quality management under control, throughout the entire automotive industrial chain, from upstream suppliers of various levels, to OEMs, and to the operation and maintenance participants in the vehicle usage phase. To achieve this controlled management, comprehensive safeguards are required at three levels. Firstly, all enterprises in the industry should establish an organizational-level Quality Management System (QMS) to ensure that the enterprise has the ability and mindset to consistently provide products that meet the customer and organizational requirements from an organizational perspective. Secondly, by aligning with the quality policy, quality objectives, and quality requirements of the organizational QMS, enterprises shall progress to establish quality management requirements and operational implementation specifications at the project level. Finally, the product development processes shall be monitored and the deviations shall be corrected, so that the products meet their defined requirements and the delivery quality can be ensured.

From traditional vehicles to today's intelligent connected vehicles, from the perspectives of standard guidance and application objects, automotive quality and safety standards can be broadly categorized into system, process, and product 3 levels:



At the system level, traditional vehicles and their hardware suppliers commonly adopt standards such as IATF16949, VDA6.1, VDA6.4, and ISO9001 for their organizational QMS. However, these standards generally do not consider the guidance for software organizations. In the era of intelligent connected vehicles where software dominates, people realize that software as its importance to the vehicles, is posing as significance of potential safety risks at the same time. Therefore, considering the risks associated with cyber security and software upgrade, the European Union has defined the Cyber Security Management System (CSMS) and Software Upgrade Management System (SUMS) standards to regulate organizational systems and capabilities. Whereas China has also introduced its corresponding requirements, namely the "Technical Requirements for Information Security of Whole Vehicles" and the "General Technical Requirements for Automotive Software Upgrade". However, these standards still cannot systematically support the establishment of a software QMS. The ASQMS standard, currently being the only general QMS that can provide software organizational capability build-up for software and integrated software-hardware providers in the industry, can fill the gap.

At the process level, VDA 6.3 is a widely adopted process audit standard for traditional automotive supply chain management, yet only partially applicable to software processes. For automotive embedded software projects, ASPICE 4.0 provides guidance to manage their processes. However, with the rapid development of intelligent connected vehicles, the iteration speed of automotive software has been accelerating, and the endpoint of software services has gradually extended from vehicle delivery to vehicle scrapping (end-of-life), making ASPICE increasingly insufficient to meet the new needs. As a supplement, the ASQMS standard introduces the concept of implementing different control requirements for software with varying levels of risk, improving the software control efficiency, and covering the software life cycle from requirements, to development, to operation and maintenance and upgrades, and to until termination, applicable for both in-vehicle and off-vehicle software. In terms of safety, ASQMS, in coordination with ISO 26262 (functional safety), ISO 21434 (cyber security), and ISO 21448 (intended functional safety), can achieve whole life cycle control for both safety-related and non-safety-related software.

At the product level, VDA 6.5 is an audit standard for traditional automotive suppliers, and ISO 26262 functional safety is also applicable to product requirements. Ultimately, all vehicle models must pass the Vehicle Type Approval (VTA) for market clearance. For intelligent connected vehicles, the United Nations Economic Commission for Europe (UNECE) has formulated R155 and R156 regulations, stipulating that besides passing VTA, OEMs must also have CSMS and SUMS management systems. Therefore, in the era of intelligent connected vehicles, if OEMs do not comply with the combined mechanism of system requirements + product safety, mandatory of R155 and R156, their vehicles will not be allowed to be sold in UNECE-bound countries.

The above overview demonstrates the role of the ASQMS standard within the overall quality and safety system for intelligent connected vehicles.



#8: Why Should ASQMS Cover Software Tool Chain Management?



Xiu Chen

GRGTest Automotive Consulting & Training Center Leader | Senior Engineer | ISO 26262 Functional Safety Engineer | More than 15 years of experience in vehicle functional safety process system building and process management | Member of ASQMS Application Working Group



Dandan Wu

GRGTest Automotive Technical Services Center Deputy Director | Senior Engineer | ISO 26262 Functional Safety Engineer. More than 10 years experience in vehicle functional safety process system building and R & D system management and process management

In the process of software product development, software tool chain plays a very important role. A tool chain is a collection of tools that cover the entire process of development, debugging, testing, and generating software related products.

Software Tool Chain Management in ASQMS

In the ASQMS standard, software tool chain management is located in section 5.2 (Figure 1), and its management framework is shown in Figure 2, which mainly includes tool verification, tool training / use, tool use documentation, continuous evaluation and optimization, etc.

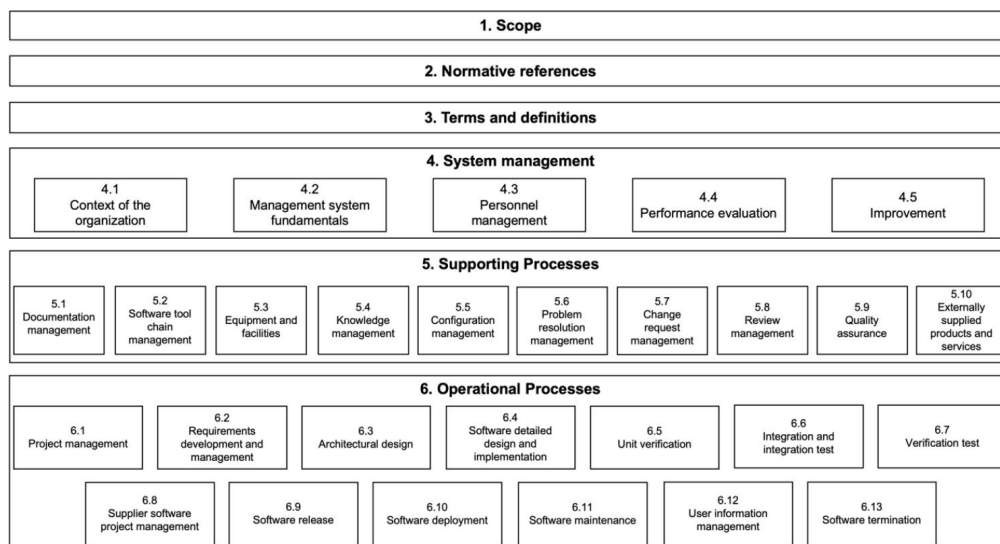


Figure 1 Position of Software Tool Chain Management in ASQMS

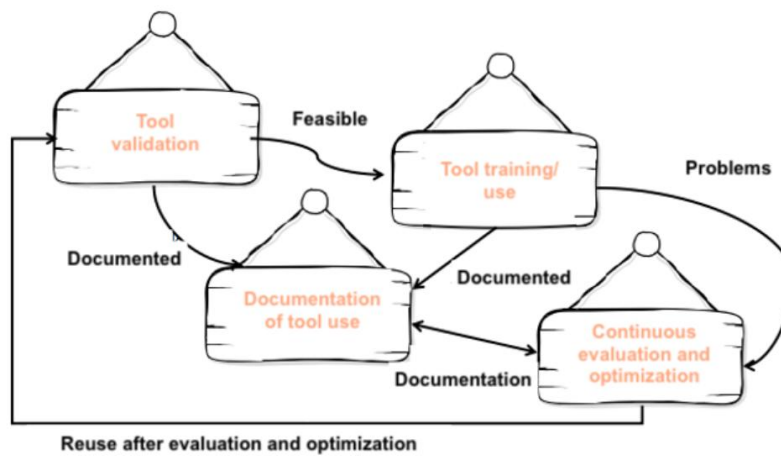


Figure 2 Management of software tool chain in ASQMS

First, we need to identify all the software tools involved in the software product development process. This step is similar to "Planning the use of software tools" as described in Part 11.4.4 of Part 8 of ISO 26262: 2018. Identified include, but are not limited to:

- Confirmation of the use of the software and its version;
- Configuration of software tools;
- Past use cases of software tools;
- The environment needed for the software tool to perform;
- The corresponding failure of the software tool and the resulting error output
- All of the above are valid inputs for tool validation, and if functional safety development is involved, software tool validation is required in accordance with Chapter 11 in Part 8.

Next, when the tool is verified, the relevant developers need to be trained in the use of the tool. During training, you may encounter operational, configuration, and environment-related issues that serve as important inputs for ongoing evaluation and optimization.

In addition, input for continuous evaluation and optimization comes not only from issues in use, but also from the need for new functionality, which can lead to the introduction of new tools or upgrades to existing ones. Therefore, the tool validation activity needs to be restarted.

Throughout the process, all validation reports, training records, problem records, operating specifications, and continuous evaluation and optimization reports, etc need to be documented, standardized and archived as company assets to reduce possible problems in subsequent project development.

Classification of software tools

According to the software life cycle, it can be divided into coding tools, build tools, test verification tools, debugging tools, deployment tools, and management tools, as shown in Table 1.

Nr.	Software phase	Category	Description of functions
1	Design and development phase	Requirements Management Tools	Manage software requirements, ensure consistency, traceability
2		Architecture Development Tools	Software Architecture Development
3		Coding tool	Editing code, preliminary syntax check, etc.
4		Build tool	Used to compile and link source code into executable programs or libraries, and to manage the software build process, including handling dependency management
5	Test validation phase	Test tool	Used to check the functionality and performance of the software, ensure the quality of the software, and detect defects and errors in the software
6		Debugging tool	Can help developers find problems in the code, such as logic errors, memory leaks, etc.
7	Application phase	Deployment tool	For the deployment of software to the target environment, can automate the installation of software, configuration, etc.
8		Calibration tool	Tools for calibrating and determining software-related performance and parameters to ensure that expected functional output is met.
9		Diagnostic tools	Tools for detecting, identifying, and analyzing software faults and problems.
10	Other management phases	project management	Management of schedule, manpower, resources, etc.
11		Configuration management	Version control, such as Git, SVN, to record code change history, branch development and merge, to ensure software version traceability and stability
12		Change management	Work with configuration management tools to track version-specific changes, such as change input, analysis, approval, and resulting reports, while documenting releases
13		Test management	Coordinate with change management, issue management, configuration management tools to document the testing process, including test results, test cases, regression testing, etc.
14		Problem management	Work with change management, test management, project management and configuration management tools to document all issues during software development

Table 1 Classification of software development tools(* Note that this is not a comprehensive listing.)

As shown in Table 1, the whole life cycle of a software product involves a variety of software tools, especially in the design and development phase, tools are the key to the creation of software. In the lack of systematic control, software product quality may have hidden risk. Therefore, ASQMS sets strict requirements in four aspects, i.e. tool validation, training, use and continuous evaluation optimization.

The Importance of Software Tool Chain Management

The software tool chain plays a critical role at all stages of the software product life cycle:

- In the coding stage, the efficient function of code editor can reduce low-level errors and improve the coding efficiency;
- In the compilation phase, the compiler tools convert the high-level language code into machine language that the computer can understand.
- In the testing process, the testing tool comprehensively checks the software function and performance to ensure the software quality;
- In the deployment phase, the deployment tools automatically deploy the software to different environments to improve the efficiency and accuracy of the deployment.
- In the software management stage, management tools such as configuration management tools, requirements management tools, etc., improve management efficiency and ensure product quality.

To summarize, The management of the software toolchain is critical throughout the software product life cycle, yet it is often overlooked. but ASQMS will separate it and put forward relevant management requirements, so as to guarantee the quality of software products more comprehensively.

#9: ASQMS: The Road to Innovation in Software Quality Management



Yiguang Zhao

Head of Quality Management System Business of Geely Automobile Group | He led the formulation of the standard as a "Quality Management System for the Full-Process-Competitiveness of the Automobile Industry" and made it for Geely as a national quality benchmark | Member of the Working Group for the Drafting of the ASQMS Standard

In today's critical period of rapid transformation of the automotive industry, the trend to intelligence and connectivity is becoming more and more obvious. Automotive software continues to grow in importance throughout the automotive system as a key determinant of vehicle performance, safety, and user experience.

ASQMS was born as an organization-level certification standard with a clear positioning. Whether you are focusing on pure software development or providing integrated software and hardware systems, ASQMS can provide comprehensive and practical quality management guidance. For software-only enterprises, ASQMS can help them establish a sound quality management system to ensure the stability, reliability and security of the software. For software and hardware integration enterprises, the standard can promote the collaborative work of software and hardware and improve the quality of the overall system. According to relevant data, more and more companies in the automotive industry are beginning to pay attention to software quality management, and ASQMS meets this need. With concise content and easy implementation, it provides an efficient quality management path for enterprises and helps them stand out in the fierce market competition.

Key features of ASQMS

In the era of smart cars, in order to better serve users and provide them with more personalized and customized functional services, a large amount of usage data will be collected in order to provide richer functions and analyze users' preferences and usage

habits, so as to provide differentiated services and control strategies.

(1) Concise and practical content

ASQMS focuses on the key processes that directly affect the quality of the software, and does not impose specific hard requirements on the output, giving enterprises full flexibility. At the same time, it supports a variety of development models, whether it is agile development or traditional waterfall development, and the appropriate quality management method can be found under the framework of ASQMS. This simple and practical design allows enterprises to quickly understand and implement standards, and focus more on improving software quality.

(2) Good versatility

ASQMS is versatile and can be used for all types of software in the automotive ecosystem. It covers the whole life cycle of software, from requirements analysis, design, development, testing to maintenance, there are corresponding quality management requirements. Moreover, ASQMS is only for management and does not involve specific technical requirements, which makes it easy for enterprises of different sizes and technical backgrounds to apply the standard and improve the level of software quality management.

(3) Treat different software differently

ASQMS classifies software into Class 1 and Class 2 to avoid over-management. ASQMS has different requirements for different types of software, taking into account the characteristics and risk levels of each type of software. For example, for safety-critical software, standards may impose stricter quality management

requirements; For some non-critical software, the requirements can be appropriately reduced to improve the pertinence and efficiency of management.

(4) Determine the scope boundary based on consumer risk

ASQMS defines the scope boundaries with a focus on the risk to the automotive consumer, ensuring that there are no blind spots and no over-bounds management. This means that the standard fully considers the various risks that software quality problems may bring to car consumers, such as safety risks, performance risks, reliability risks, etc., in the development process. By accurately determining the scope boundary, ASQMS can effectively ensure the quality of automotive software and provide consumers with safer and more reliable automotive products.

(5) International universality

ASQMS standards are published in Chinese and English at the same time, which has strong international universality. This not only facilitates the integration of domestic enterprises with the international market, but also provides strong guidance for the improvement of global automotive software quality. With the globalization of the automotive industry, the international versatility of ASQMS will play an increasingly important role in promoting the common improvement of the global automotive software quality management level.

(6) The structure is flexible and expandable

The architecture of ASQMS is flexible and can be updated as technology and management evolutions in the future. In the era of rapid technological development, software technology and management concepts are constantly updated, and the flexible architecture of ASQMS can adapt to these changes in a timely manner, ensuring that standards remain advanced and practical. This provides a sustainable quality management framework for enterprises to continuously improve software quality and adapt to market changes and challenges.

Application and prospects of ASQMS

(1) Already adopted by OEMs

ASQMS has entered many OEMs, such as Geely Automobile. The adoption of ASQMS standards in these companies has resulted in significant improvements in software quality management. Through the strict management of the whole life cycle of software, all links from demand analysis to maintenance are more

standardized and efficient, which provides a solid guarantee for the quality and safety of automotive software. For example, in the demand analysis stage, we can more accurately grasp consumer needs and risk points to ensure the practicability and security of software functions; In the development stage, strictly follow the standard requirements to improve the stability and reliability of the software; In the testing stage, more scientific testing methods are adopted to ensure that the software is free of vulnerabilities and failures.

(2) Challenges

Despite its many advantages, ASQMS also comes with some challenges in its application. On the one hand, there are differences in software development and management levels in different enterprises, and the implementation of ASQMS standards requires a certain amount of time and resources. Some small businesses may have difficulties in terms of human and material resources, and it is difficult to quickly adapt to the standard requirements. On the other hand, as technology continues to evolve, new software quality issues may emerge, and ASQMS standards need to be constantly updated and improved to meet these challenges.

(3) Huge potential and expectations

However, the potential of ASQMS is huge and worth looking forward to. With the accelerated development of intelligent and connected automobiles, the position of software in automobiles will become more and more important, and the requirements for software quality will also become higher and higher. ASQMS will play an even more important role in the future as a standard specifically for automotive software quality management. It can not only help enterprises improve software quality, but also promote the healthy development of the entire automotive industry. At the same time, with the continuous enhancement of international popularity, ASQMS is expected to become an important reference standard for global automotive software quality management, bringing safer and more reliable automotive products to global automotive consumers.

#10: ASQMS Requirements on Open Source Software Management



Lily Lin

Product Engineer of SAIC-GM-Wuling Technology Center | Member of ASQMS standard drafting work group & application work group | 15+ years of quality management experience

Open source software are the software codes that are open to the public and can be freely used, modified, and distributed. Due to its transparency, freedom and sharing, users can view each line of code and modify as needed, so as to achieve rapid software development and iteration. To ensure the quality and minimize the risk, ASQMS requires the organization to manage open source software.

Risk management for open source software

The ASQMS standard requires organizational procedures to identify and assess the related risks of open source software, including license risks, security risks, intellectual property risks, legal risks, etc., and to implement countermeasures and contingency plans to ensure that the introduced open source software will not cause any adverse effects on the product. This is required by an ASQMS certified organization:

- (1) Review the open source license, and estimate whether the open source software code will cause the other code(s) of the organization to face the risk of being forced to open due to the requirements of the open source license;
- (2) Assess the quality of the open source codes to be introduced and the maintenance & support of the open source community;
- (3) Carry out security vulnerability scanning before the introduction of the open source software;
- (4) Assure that the introduced open source software has removed the use of patents and trademarks irrelevant to the organization's product, shall not disclose the organization's trade secrets, and shall not violate the protection of data privacy in accordance with laws and regulations.

Use of open source software

The ASQMS standard requires to ensure the quality and stability of software code before use, through methods such as code review, automated testing, and continuous integration etc. The organization shall also develop a contingency plan before the official release.

During the use of open source software, security vulnerability information shall be collected through tools and/or channels, risk shall be continuously monitored, timely assessment and measures shall be carried out.

Configuration management for open source software

The use of open source software may need modification of codes, leading to rapid software delivery and version iteration. Therefore, configuration management on version control is an important process on open source software management and use.

The ASQMS standard requires that the configuration management processes shall record configuration information such as code change, branching, and code merging, etc. Verification shall be conducted based on the configuration change before release, and the verification results shall be reviewed.

The ASQMS standard not only extends software quality management activities from the development phase to the whole product life cycle, it also takes into account of both the rigor and agility of the software development process. Furthermore, it pays attention to the impact of software on consumers in a comprehensive way.

The requirements of open source software management reflect the practicality and completeness of ASQMS.

#11: AI-Driven Tools Help You Upgrade Your Software QMS According to ASQMS Standard



Peter PEDROSS

CEO and founder of PEDCO Inc. | established Applied SAFe as a Lean QMS across multiple continents, supported by a vast partner network. | Represents AuditPro as AI-tool for audit support | Holds various board memberships, including the Swiss Association of Quality (SAQ) and EuroSPI's Lean&Agile board. Member of the European Technical ASQMS Working Group.

Whether you need certification or not, is not the primary issue.

Having a software QMS is a must for those suppliers who want to survive the transition.

As proven ASQMS support tool, AuditPro has shown in many applications already that it significantly helps how to overcome these challenges.

In today's rapidly evolving automotive landscape, the transition from traditional suppliers to Software-Defined Vehicle (SDV) suppliers has become a critical path for many organizations. As vehicles increasingly rely on complex software, the need for a robust, software-focused Quality Management System (QMS) is paramount. This shift is where the new ASQMS standard comes into play, filling a gap that established frameworks—like IATF—have left open. While IATF 16949 laid the groundwork for automotive quality management, it primarily focused on hardware. ASQMS, on the other hand, targets the unique challenges associated with software development, delivery, and maintenance.

ASQMS: Addressing the Software Gap in Automotive Quality

ASQMS is gaining traction as the next-level standard that ensures software components are developed and managed under rigorous quality principles. For suppliers, this means embracing the processes and controls that ASQMS requires to remain competitive and meet the stringent demands of OEMs and

regulatory bodies. Whether you seek certification or simply want to ensure world-class software quality, implementing a QMS aligned with ASQMS is more than a compliance exercise; it's a strategic imperative. As the automotive industry pivots toward software-centricity, those who lag behind risk becoming obsolete.

From Existing QMS to ASQMS: Adapting, Not Starting Over

The good news? Many organizations need not start entirely from scratch. If you already maintain a QMS—be it based on IATF, ISO 9001, or another standard—you likely have a substantial foundation. Existing documents, processes, and metrics can often be adapted to meet the new ASQMS requirements. Rather than discarding your proven quality management components, the challenge lies in identifying what aligns, what needs refinement, and what must be newly introduced. The transition to ASQMS is less about reinventing the wheel and more about adding the right tires to keep pace with the new terrain.

Yet, even with a solid starting point, adapting a QMS to ASQMS can feel daunting. Every organization's landscape is unique: legacy processes may be deeply entrenched, cross-functional teams may have varying levels of readiness, and the specifics of software engineering life cycles may not yet be fully reflected in existing documentation. This complexity demands intelligent strategies and the right tools to ensure a smooth and efficient adaptation.

Modern AI-Driven Solutions: Lowering the Barrier to Entry

This is where cutting-edge technologies come into play. AI-driven audit and management tools offer a powerful means to accelerate and de-risk your ASQMS journey. AuditPro by PEDCO is one such solution, designed to help you bridge the gap between what you already have and what the standard requires. By combining automation, analytics, and intelligent guidance, AuditPro significantly streamlines the adaptation process.

Leverage Existing Content:

AuditPro's intelligent mapping capabilities help identify how your existing QMS artifacts align with ASQMS criteria. Instead of generating new documentation from scratch, you can refine, reorganize, and supplement what you already have. This approach not only saves time but also preserves institutional knowledge and best practices you've developed over the years.

Targeted Gap Analysis:

An AI-driven system can rapidly pinpoint areas where your current QMS does not fully meet ASQMS requirements. Rather than a scattershot approach to improvement, you receive data-driven insights that let you focus on closing the most critical gaps first. This targeted refinement turns what might have been a large-scale overhaul into a manageable series of strategic adjustments.

Reduced Manual Effort:

Adapting or extending your QMS typically involves time-consuming manual audits and documentation reviews. AuditPro automates many of these repetitive tasks. With AI-Driven support, preparing a QMS for ASQMS-aligned certification can be reduced by 90%, generating a report in a near real-time experience. This significant reduction in effort translates directly into cost savings and faster compliance timelines.

Enhanced Compliance and Accuracy:

Through automated checks and real-time compliance indicators, AI-driven tools help ensure that every addition, modification, or realignment within your QMS is in harmony with ASQMS. The platform's AI capabilities catch inconsistencies or outdated

documents that might otherwise slip through manual reviews, elevating your overall quality and readiness.

Scalability and Future-Proofing:

Once aligned with ASQMS, your organization's QMS won't remain static. Standards evolve, and so do your processes and products. AuditPro's adaptive nature allows for continuous improvement and scaling. Whether you're preparing for an upcoming ASPICE project or anticipating new software quality standards, the tool provides ongoing support for evolving requirements.

Building a Sustainable Future-Ready Quality System

In an era where software complexity is rapidly becoming the defining factor for automotive competitiveness, simply meeting historical quality requirements is no longer enough. ASQMS provides a clear roadmap for managing software excellence, and tools like AuditPro can help you navigate the journey efficiently.

Adapting your existing QMS to meet ASQMS standards is not about tossing out what you've built. It's about intelligently leveraging that foundation and evolving it to meet today's challenges. This approach not only ensures a seamless transition but also lays the groundwork for continuous innovation, resilience, and excellence in a world where software quality is king.

Conclusion

The shift toward Software-Defined Vehicles demands that automotive suppliers evolve their Quality Management Systems to new heights. By embracing AI-driven platforms such as AuditPro, you can more easily adapt your current QMS to align with ASQMS requirements. In doing so, you'll gain agility, cut costs, and ensure that your organization is prepared for the ongoing transformations in automotive software development—ultimately securing your position in this dynamic and competitive industry.

#12: ASQMS Guides and Supports the Transition from an IATF Certified to a Certified SDV Supplier



Prof. Dr. Wolfgang Rainer Wagner

Founding GM of VDA-QMC China | CEO ASQMS Deutschland GmbH Board Member for internationalization of the ASQMS standard promotion work group of SAMR/CACPQSP | founding member of the ASQMS standard drafting work group & application work group | 50 years experience combined in Japan/USA/China/Europe | Chemical/Automotive&Management

We like IATF 16949, ASPICE and Code Notary plus all the technical standards like ISO 26262 and 21434 as representatives of dearly required standardizations with the goal of consumer protection.

I am a little proud of having pushed IATF 16949 as a QM system standard in China to its present size of nearly 50% of the world wide IATF certificates....partly having gained over 80% market share in China for 3rd party auditor qualification for VDA led IATF trainings and exams.

The transition of the automotive industry to the present mobility ecosystem around SDVs has begun around 2002, 23 years ago, when it was clear by statements of the Chinese authorities that they would not follow to road to a clean diesel. But bet on NEVs with an electric drivetrain and the subsequent data based environment.

In Quality Management that road was as well followed. When we look at the 4 elements of QM standardization like

- 1) System
- 2) Project/Process
- 3) Product
- 4) Technical

We observed that for 2,3, and 4 we have representatives in the old auto world and in the new mobility ecosystem.

VDA 6.3 is on the level of ASPICE as an example for 2).

Now in 1) IATF did not follow their colleagues in 2,3, and 4 and stayed resting in silence, thus creating a huge gap for the industry, which had itself already arrived more than 6 years ago in the new age, at least in some countries...and in a lot of heads.



Here ASQMS steps on the stage and exactly fills that gap created by IATF: ASQMS is the only QM System standard for the new mobility ecosystem covering the software producing and handling organizations. The only one with a working oversight, a consistent personnel capability system for Auditors, Trainers and Consultants and already established Certification Bodies for the assessments of the organizations. Parallel and in harmony with IATF 16949.

And ASQMS can do more: Now a lot of SMEs face the challenge of establishing a working QMS system for the software they already produce or handle, buy in and sell to their clients. No help from IATF. But full responsible from the viewpoint of their clients, and of course of the final consumer.

ASQMS and the consulting companies already on board as ASQMS license takers can start now to support the transition from a classic automotive supplier to one who is fit to be part of the new world, be it as supplier to those OEMs and tiers who are already required to comply to ASQMS or simply as an entity who want to do their job in a responsible way.

Regardless even if they engage in the Chinese market or not. ASQMS serves globally as the standard of choice to develop the own QMS....ASQMS has the consultants in their ecosystem to support the transition, has the auditor training you need as 1st and 2nd party auditors and delivers the trainers for your auditors.....and your managers, strategists, directors.....

And the license partners of ASQMS can assist you not only in building up your software QMS, they can deliver the AI-Tools to save mandays in building it up and keep it in an excellent stage. ASQMS is more that a standard, it comes with the whole package of tools and expert support which you will need to stay excellent.

ASQMS will see to it that only those auditors, trainers and consultants which are thoroughly trained, who have the experience in the required areas, can call them themselves ASQMS authorized persons.

They all have undergone the required exams and can show their certificates, and are obliged to constantly improve their level of service in this fast moving and internationally dominated industry. With ASQMS you acquire the contact to the fastest moving markets of the world for your own benefits.



#14: Combination of Software and Security - ASQMS Requirements for Security Monitoring and Incident Response



Ye QU

Senior Software Process Improvement Consultant | ISO26262 Functional Safety Engineer | ISO21434 Cybersecurity Expert | Functional Safety/Cybersecurity Trainer | ASPICE Trainer | ASQMS Application Working Group Member

1. Typical security risks faced by automotive software

With the rapid development of new infrastructure such as 5G, artificial intelligence, and the Internet of Things, intelligent connected vehicles are no longer isolated mechanical units, but are gradually transforming from mobile private spaces to mobile smart network terminals. In this process, the security issues of smart vehicles have become particularly prominent:

A. Overall security risks brought about by increasing vehicle integration and complexity

Currently, intelligent connected vehicles are equipped with up to 150 ECUs and run about 100 million lines of software code. If there are security flaws, it may pose a serious security threat to the driver and passengers and surrounding people.

B. Risk of cyber attacks caused by networking

As a mobile terminal, the vehicle has a lot of data sensing nodes and needs to communicate with the outside world. Bluetooth, Wi-Fi, cellular networks, OTA, etc. have become channels that hackers can use to cause property loss or personal injury.

C. Privacy data protection risk

During the use of the vehicle, the vehicle not only generates driving data (such as driving route, speed, fuel consumption, etc.), but also collects a large amount of personal information (such as name, contact information, home address, etc.). If this information is not properly protected, the risk of information leakage will cause huge damage.

2. The necessity of monitoring security

As security risks are gradually being taken seriously, how to identify security incidents in a timely manner and respond quickly has become the top priority for ensuring the safety of intelligent connected vehicles.

A series of safety-related regulations and standards have been issued internationally, including the EU's R155/156, ISO21434, ISO24089, GDPR, and China's "GB 44495-2024 Technical Requirements for Vehicle Information Security" and "GB 44496-2024 General Technical Requirements for Automobile Software Upgrades".

These regulations and standards set safety control methods at the vehicle level from a safety perspective. As mandatory standards for vehicle homologation, they are prerequisites that must be met.

3. ASQMS requirements for safety monitoring and incident response

ASQMS, as a quality management system standard in the software field, fully considers the importance of safety. Based on the requirements of safety regulations and standards, combined with the characteristics of software development, it creatively defines how to perform safety monitoring and safety incident response in the software development process, which can be used as a practical implementation standard for all software suppliers in the automotive supply chain.

The security requirements of ASQMS mainly include the following aspects:

A. The organization shall establish a dedicated software operation and maintenance team to manage product-related security incidents

The main responsibilities of the team include:

(1) Monitor and collect security incidents, classify and manage security incidents, locate specific products and determine whether there are product-related vulnerabilities, and output effective information to the product development team;

(2) Track security vulnerability countermeasures, organize and arrange the analysis and formulation of corresponding plans for security vulnerabilities, track the implementation and verification of corresponding plans and finally release them;

(3) Use closed-loop management of security incidents, maintain security vulnerabilities in the company's security weaknesses/vulnerabilities list, and report and manage them in accordance with national safety management regulations.

B. The organization shall define a unified security incident management procedure

The security incident management procedure specifies the management process, roles, responsibilities, resources and outputs of security incidents, and continuously verifies and improves them through security incident response.

(1) Monitor regularly security events

- For monitoring methods, it is recommended to use automated tools for real-time monitoring, and the manual monitoring cycle should not be less than 1 month;
- The objects of monitoring include but are not limited to the weakness/vulnerability list maintained by the project team during the development process, industry vulnerability platforms (such as CVE) and national vulnerability platforms, network security forum groups, etc.

(2) Confirm product-related security vulnerabilities

Establish security vulnerability keywords, and effectively identify product-related vulnerabilities through keyword filtering. The scope of vulnerability identification includes:

- Internal and external, including the parts responsible for suppliers at all levels, which also need to be strictly monitored;

- All components involved in the product, including: software modules (self-developed/purchased), operating systems, hardware modules, etc., the organization needs to establish a relevant list and continuously update and maintain it;

(3) Develop effective vulnerability resolutions


- Organize relevant disciplines to fully discuss and develop reasonable vulnerability resolutions;
- Conduct sufficient review and verification, and repair vulnerabilities through security channels such as OTA;
- For vulnerabilities that are accepted in the processing decision, it is necessary to issue a security statement in a timely manner and notify the user end to control the impact of security risks.

(4) Use closed-loop vulnerability management

- Maintain vulnerability content in the company's security weakness/vulnerability list, create patches corresponding to the vulnerabilities, and release them to various products to prevent future products from continuing to expose related vulnerabilities;
- The vulnerability management process needs to be reported and managed in accordance with relevant national security management regulations.


#15: How Does ASPICE Correlate to ASQMS?





DeepSeek

DeepSeek is an AI-Chatbot analog to Chat GPT. Listen what she/he says to our question. This dialogue was initiated by Wolfgang Wagner, CEO ASQMS Deutschland GmbH.



Wolfgang Rainer Wagner

Question placed to DeepSeek:

How does ASPICE correlate to ASQMS?

Answer from DeepSeek:

*Automotive SPICE** (Software Process Improvement and Capability Determination) and **ASQMS** (Automotive Software Quality Management System) are both critical frameworks in the automotive industry, but they serve different yet complementary purposes. Here's how they correlate:

1. Purpose and Focus

Automotive SPICE:

- Focuses on **software process improvement** and **capability determination**.
- Provides a framework for assessing and improving the software development processes used in automotive systems.
- Ensures that software development meets high standards of quality, reliability, and safety.

ASQMS:

- Focuses on **software quality management** at a systemic level.
- Provides a structured approach to managing and ensuring the quality of software throughout its life cycle.
- Emphasizes compliance with industry standards, risk management, and continuous improvement.

2. Correlation and Overlap

Process vs. System:

- Automotive SPICE is more about **process assessment and improvement** (how software is developed).
- ASQMS is about **quality management systems** (how quality is ensured across the entire software life cycle).

Complementary Roles:

- Automotive SPICE can be seen as a tool or methodology within the broader ASQMS framework.
- ASQMS may use Automotive SPICE assessments to evaluate and improve software development processes as part of its quality management system.

Shared Goals:

- Both aim to ensure high-quality software in automotive systems.
- Both align with industry standards like ISO 26262 (functional safety) and ISO 21434 (cybersecurity).

3. Integration in Practice

- Automotive SPICE within ASQMS:

- ASQMS may incorporate Automotive SPICE assessments to evaluate the maturity of software development processes.
- The results of Automotive SPICE assessments can inform quality management strategies within ASQMS.

ASQMS Supporting Automotive SPICE:

- ASQMS provides the organizational structure, policies, and tools to implement and sustain the improvements identified through Automotive SPICE assessments.

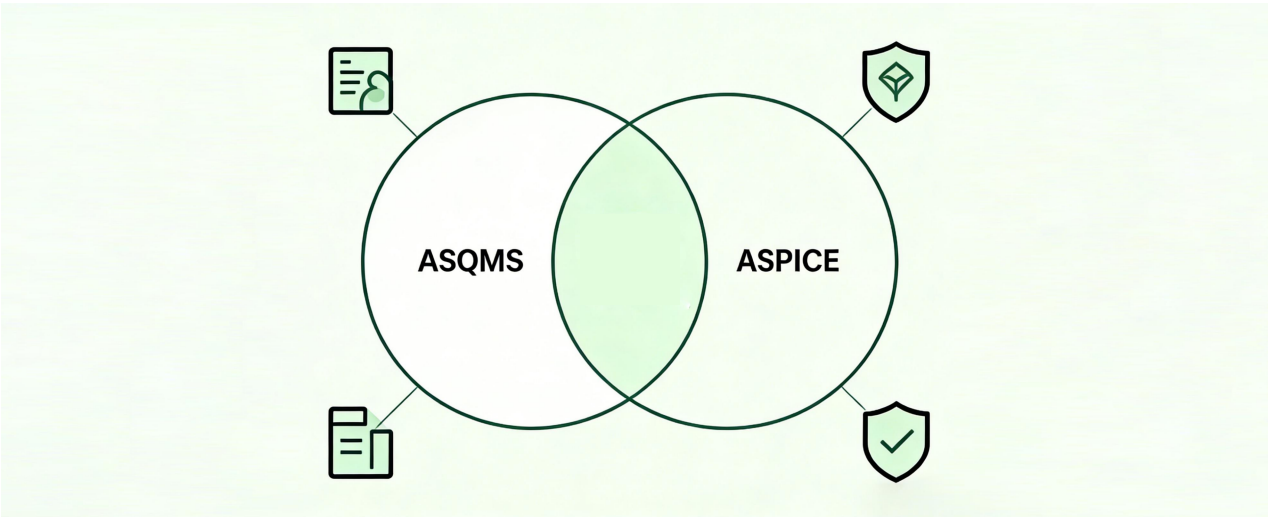
CONCLUSION

Automotive SPICE and ASQMS are not competing frameworks but rather complementary. Automotive SPICE focuses on improving software development processes, while ASQMS provides a broader system for managing software quality. Together, they help automotive manufacturers and suppliers deliver safe, reliable, and high-quality software systems.

End of DeepSeek answer.

4. Industry Adoption

- Automotive SPICE is widely adopted for **process improvement** in software development.
- ASQMS is increasingly being adopted as a **comprehensive quality management system** for automotive software, especially with the rise of connected, autonomous, and electric vehicles.



#16: ASPICE vs ASQMS: Complementary, Not Competing



Petr Švimberský

ASQMS Authorized Trainer | intacs Certified ASPICE Instructor, Principal Assessor
| AI Enthusiast | Court-appointed expert for Cybernetics and SW quality

Are ASPICE and ASQMS incompatible? Should one replace the other?



Are ASPICE and ASQMS incompatible? Should one replace the other?

Absolutely not. These frameworks serve different yet complementary purposes. When used together, they provide a comprehensive approach to managing software quality in the automotive industry.

ASPICE evaluates **project-level process capability** during development.

ASQMS audits **organization-level quality management** throughout the product life cycle.

Let's explore their distinct focus areas, objectives, and how they complement each other.

Aspect	 ASPICE	 ASQMS
Full Name	Automotive Software Process Improvement and Capability dEtermination	Automotive Software Quality Management System
Risk Type	Product-related process risks	Process-related systematic risks
Framework	Combines Process Assessment Model + Process Reference Model	Requirements for quality management + company certification
Scope	Vehicle system/software/hardware products	In-vehicle & off-vehicle software systems and components
Time	Assesses projects at specific time points	Continuous organizational audits and certifications
Base Standard	ISO 330XX (Information technology - Process assessment)	ISO 19011 (Guidelines for auditing management systems)
Excluded Statements	Not making statements about company capabilities nor certifies them	Not making any statements about projects or products

#17: ASQMS: More Than Compliance - A Transformation Blueprint for Software-Centric Organizations



Andreas Grohmann

Andreas Grohmann is an experienced automotive professional and trusted advisor in management consultancy. He has spent over two decades working at the intersection of OEM requirements, process excellence, and digital transformation. As a co-founder of q.sphere, Andreas brings his deep understanding of the automotive ecosystem into the development and implementation of quality management systems with a software-centric focus.

Executive Summary

The rise of software-driven functionality in vehicles is reshaping entire industries. While the automotive sector leads this evolution, the challenges it faces—complexity, life cycle responsibility, and cross-ecosystem integration—are universal. ASQMS is not just another quality management system. It is a structural answer to the question: How can companies become sustainably software-capable?

This commentary explores ASQMS as a transformation lever beyond compliance—one that can rewire organizations for the future of digital products. It also positions q.sphere as a leading voice in the European ASQMS movement.

1. Introduction: Software Has Already Taken the Driver's Seat

From connected cars to autonomous functions, software now defines value and differentiation. As seen at the Shanghai Auto Show, global OEMs—particularly Chinese ones—are compressing innovation cycles and redefining speed to market. Software is no longer a sub-discipline—it is the main stage.

This evolution demands more than code quality; it requires systemic quality management that spans the entire life cycle and ecosystem.

2. Enter ASQMS: A Structural Response, Not Just a Standard

The Automotive Software Quality Management System (ASQMS) offers a comprehensive, organizational-level framework to manage software quality across all phases, all roles, and all partners. Unlike ASPICE, which focuses on project-specific process maturity, ASQMS targets organizational transformation.

Key principles include:

- Life cycle-wide responsibility, from development to decommissioning
- Inclusion of off-board systems, cloud services, and even charging infrastructure
- A role and competence framework for software quality
- Integration of purchased, in-house, and open-source software components

3. More Than Automotive: Why ASQMS Is Industry-Agnostic

While ASQMS is born from automotive, its principles apply wherever software defines system behavior—medical devices, industrial automation, mobility services, and more.

Its emphasis on governance, life cycle management, and cross-organizational collaboration makes it relevant to any industry navigating the transition from mechatronics to digital, software-defined products.

4. ASQMS as a Transformation Lever

Let's be clear: ASQMS is not a checkbox standard. It is an enabler of change. It supports companies in becoming:

- Software-centric in culture, capabilities, and leadership
- Quality-assured in a continuously updating product world
- Audit-ready not only for today's OEMs, but for future regulatory demands

Those who embrace ASQMS aren't merely compliant—they are prepared. They will outpace slower organizations in the race for digital product leadership.

5. Learning from “China Speed”

China's software-driven vehicle development exemplifies why transformation speed matters. At the Shanghai Auto Show, the message was clear: software maturity enables business agility.

ASQMS helps European suppliers and OEMs keep pace strategically, not just react tactically. It sets the foundation for faster decision-making, reuse of competencies, and systematic quality control in software-heavy environments.

6. ASQMS, ASPICE, and ISO/IATF: A Winning Trio

These systems don't compete—they complement:

- ASPICE brings process depth at project level
- ISO/IATF provides the organizational backbone
- ASQMS binds them together with a software-focused lens

Together, they form an integrated, future-proof QMS landscape.

7. q.sphere: Pioneering ASQMS in Europe

At q.sphere, we see ASQMS not just as a standard, but as a shared language for transformation. Our approach combines:

- Hands-on training for awareness, implementation, and auditing
- Tailored consulting to assess readiness, design structures, and support change
- A deep understanding of ASPICE, ISO, and organizational development

We are proud to be shaping the ASQMS movement in Germany and Europe, building bridges between compliance, capability, and culture.

8. Ready to Dive Deeper?

Our new ASQMS Whitepaper offers a concise, practice-oriented introduction to the standard, comparisons with ASPICE and ISO/IATF, and a 5-step roadmap for implementation.

Contact us at office@q-sphere.eu to start your journey. Or visit our website under www.q-sphere.eu.

Let's shape the software future—together.

#18: ASQMS: The Golden Triangle of Benefits



Nils Donath, PMP®

Certified ASQMS 1st/2nd Party Auditor | Experienced in automotive eMobility, Energy & IT industry | Previously with Bosch PMO for Electrified Powertrain



This article lists key-points to describe the largest benefits ASQMS can bring to an OEM or suppliers in a framework of triangle.

ASQMS | TIME TO MARKET IMPROVEMENTS

-“Learning from China Speed”

Chinese OEMs are slashing component development cycles dramatically. Leveraging similar processes, ASQMS helps your organisation match fast-paced ecosystems.

- Built-in Life cycle Structures

From development to deployment and maintenance, ASQMS embeds clear, end-to-end life cycle management.

Agile-at-scale implementations in the automotive industry have achieved up to 30% productivity gains and 60% fewer defects, fast-tracking rollout of features without sacrificing quality.

- Agile Scaling in Automotive

Automotive leaders adopting agile frameworks (e.g., SAFe) have cut time-to-market by up to 20–40%, while modular architectures compound the gains to 40–60% faster delivery. Early agile deployments at scale have additionally shortened cycle times by 30–70%, enabling rapid response to market shifts.

ASQMS | COST IMPROVEMENTS

- Consistency → Less Waste, Rework & Errors

In software, applying ASQMS can yield 2×faster design times, 4×productivity, 3×reused assets, and 100×fewer defects.

- Continuous Improvement & Knowledge Reuse

Software reuse strategies enhance reliability and quality, reducing cost and development time through structured asset reuse.

- Efficiency via Cross-Industry, Cross-Tier Standardisation

ASQMS industry leaders see 30–50% drop in inventory costs, 20% labor savings, and up to 40% improved working capital while reducing rework and support costs.



ASQMS | COMPLIANCE LEVEL ADDED

- Built-In Trust Through Audits & Certifications

ASQMS includes formal audits by authorised certification bodies, ensuring software quality systems consistently meet globally recognised automotive standards. Certified ASQMS compliance signals rigorous process maturity – mitigating risk and reducing exposure.

- Software-Centric Quality Perceived by End-Users

Alignment with ISO26262 and ISO21434 raises perceived product quality – customers increasingly expect “software first” reliability and functional safety.

- Readiness for ASPICE, ISO26262 & Future Standards

ASQMS supports mature practices aligned with ASPICE and offers a framework to integrate ISO26262 and ISO21434 guidelines, facilitating streamlined compliance.

ASQMS | SYNERGY WITH ASPICE

- **ASQMS** = implements organisation-wide quality governance across DevOps, cloud, and roadside systems.

- **ASPICE** = assesses project-level software processes.

- **Combined:**

strategic governance + operational excellence

ASQMS | REAL-WORLD IMPACT & MARKET BENEFITS

- BYD, Geely and other OEMs adopting ASQMS see improved standardisation, safety, and software quality.

- ASQMS is adaptable globally and is industry agnostic, being published in English and Chinese.

- ASQMS helps expand customer base, enhances reputation, primes for future compliance.

ASQMS | TIME & COST EFFICIENCY WITH COMPLIANCE LEVEL

- Call to Action — Becoming a Customer-Focused Software Leader!

- Adopt ASQMS to deliver value across the Golden Triangle.

- Integrate with ASPICE for certified process maturity.

- Leap ahead in digital product leadership and regulatory readiness.

- Assess → Integrate → Certify → Innovate

#19: How Does ASQMS Systematically Empower Tier 1 Suppliers Under the Dual Challenges of Efficiency and OTA?

Ms. Wang

Software Quality Expert at a global Tier 1 automotive supplier, located in China, ASQMS Certified Consultant and First/Second Party Auditor, ASPICE Assistant Assessor with Cyber Security Extension

Introduction - The Dual Reality of Automotive Software Quality Management: Deepening Process Capability and Extending the Life cycle

Under the ASPICE framework, the automotive software industry has established a solid engineering foundation for quality management. As a Tier 1 supplier, adhering to ASPICE for development is the industry standard prove to customers that "we can produce products correctly." However, two major trends are profoundly reshaping our industry reality right now:

First, OEMs are pushing the boundaries of extreme development speed, compressing project cycles to unprecedentedly short durations.

Second, the normalisation of OTA updates is extending the software life cycle indefinitely beyond SOP.

This new model, where "fast-paced delivery" coexists with "long-term maintenance," poses a severe challenge to our traditional project-based process capability development model and exposes a series of new risk vulnerabilities. This article aims to systematically analyze these risks from the perspective of Tier 1 suppliers and explore how the emerging ASQMS (Automotive Software Quality Management System) system standard can serve as a broader and more comprehensive framework to effectively complement the process standard ASPICE, helping us address these challenges.

1: Three-Dimensional Risk Matrix from a Tier 1 Perspective

The risks we face are no longer single-dimensional technical issues but complex challenges intertwined with efficiency, process, and ecosystem boundaries.

Risk Dimension 1: Efficiency Conflict Between Project-Based Assessment Model and Agile Development

ASPICE assessments are project-based and highly effective in ensuring the quality of individual projects. However, in today's fast-paced market environment characterized by multiple concurrent projects and rapid iterations, the efficiency limitations of this model are becoming increasingly evident.

- Repetitive investments and internal friction: An ASPICE CL2 certification for one project cannot be directly inherited by another, especially when teams, product lines, or even R&D locations may change. This means that each new project must undergo a similar process capability building and assessment cycle, resulting in significant time and resource consumption.
- Fundamental time mismatch: According to industry data from ASQMS Expert Commentary #18, achieving ASPICE L2 typically takes 18 to 24 months. However, the total development cycle for many new energy vehicle models is often less than a year. This time mismatch makes it extremely difficult to achieve compliance targets within the project cycle, often leading to the dilemma of "sacrificing process for delivery" or "delaying the project for process compliance".

Risk Dimension 2: Post-SOP Governance Challenges Brought by the Normalisation of OTA

ASPICE focuses primarily on the development process prior to SOP, while OTA shifts a significant portion of quality risks to the post-SOP phase.

- Compliance Risks: The Sword of Damocles Hanging Over Safety and Security
 - Functional Safety (ISO 26262): Every OTA update is essentially a modification to a previously certified product. According to ISO 26262, any changes must undergo rigorous impact analysis. In a context of frequent updates, conducting complete and rigorous impact analysis and regression testing for every OTA update represents a significant compliance burden.
 - Cybersecurity (ISO/SAE 21434 & UNECE R155/156): UNECE R155/R156 regulations mandate that OEMs and their supply chains establish and certify cybersecurity management systems (CSMS) and software update management systems (SUMS). This means that every OTA activity must not only ensure the security of the update content itself but also that the update process is secure, traceable, and auditable. This is no longer a project-level task but a mandatory requirement at the system level. (Note: If the system safeguards and product security mechanisms do not comply with the requirements of R155/R156, vehicles are not permitted to be sold in UNECE member countries.)
- Technical risks:
 - The complexity of continuous integration and validation: With millions of vehicles in the field, each with different configurations, how can we ensure the compatibility of OTA updates and avoid "combinatorial explosion" testing challenges?
 - Unpredictable resource consumption: New features introduced via OTA updates continuously consume fixed hardware resources (CPU, RAM, etc.) in vehicles, potentially leading to performance degradation.

- Process management risks:
 - Loss of configuration management control: How can the precise software version and hardware configuration of each vehicle be tracked to ensure that patches are delivered accurately?
 - Lack of standardized release and deployment: Who approves the releases? What are the release standards? Have the rollback strategies been validated? These critical operational activities lack standardised process constraints outside the traditional development process model.

Risk Dimension 3: Quality Shortcomings in the Boundaryless Ecosystem

The functional implementation of modern automotive software heavily relies on a vast ecosystem. While ASPICE requires interface management, its governance focus remains on the "product" we develop.

- The challenge lies in the fact that our product quality is now constrained by external factors beyond our direct control. For example, a vulnerable development toolchain, an unstable OTA cloud server, or a frequently disconnecting roadside unit (RSU) can directly result in a perfectly developed product "unusable" or "insecure".
- Fragmented governance: As pointed out by ASQMS Expert Commentary #9 (expert from Geely Automotive), OEMs need a unified "language" to communicate with their complex internal or captive software supply chain (including cloud teams, applications teams, embedded systems teams, etc.) and external suppliers. Under the traditional model, we lack a unified quality framework that covers the entire ecosystem.

2: ASQMS as a Systematic Solution: An Integrated, Extended, and Upgraded Framework

ASQMS is not intended to replace ASPICE but acknowledges its value and builds upon it to create a more comprehensive solution that systematically addresses the three major risks mentioned above.

Breakthrough Approach 1: Transitioning from "Project Process Assessment" to "Organisational System Certification" to Enhance Efficiency and Reduce Internal Waste

- Core Transformation: ASQMS is a management system standard that certifies an organization's software quality management system. Once a Tier 1 supplier is certified, it can demonstrate to all customers its capability to consistently deliver high-quality software.
- Strategic Value: Future projects only need to demonstrate compliance with this certified system, eliminating the need for independent, time-consuming assessments from scratch for each project. This significantly lowers project entry barriers and reduces certification costs, freeing engineers to focus on technological innovation rather than cumbersome process documentation. ASQMS enables organizations to achieve Level 3 "faster, more comprehensively, and more sustainably". (ASQMS Expert Commentary #18) .

Breakthrough Approach 2: Risk-Driven Approach Embedding Safety and Security into the Quality System (Core Mechanism)

- Risk-driven software classification: The software classification mechanism (Type I / Type II) is the core essence of ASQMS. It requires organizations to identify software types based on the risk levels of functional safety (ASIL) and cybersecurity (SecL) during the early stages of a project.
- Mandatory Advanced Practices (AP): For high-risk Type II software, ASQMS requires a series of critical safety and security activities as mandatory Advanced Practices (AP). For example:
 - AP 6.11.6 Security monitoring and incident response: This explicitly requires organizations to establish security monitoring and incident response processes, directly aligning with the UNECE R155 requirements for CSMS.
 - AP 6.10.1 Establishing software deployment rules: It requires the establishment of deployment rules for all deployment channels (including OTA), providing a solid process foundation for meeting the SUMS requirements of UNECE R156.
- An auditable framework for regulatory compliance: By processualizing, standardizing, and mandating safety/security/update-related activities, ASQMS builds a comprehensive and auditable management system for Tier 1 suppliers. This makes compliance no longer an additional burden but a natural output of the quality system.

Breakthrough Approach 3: Backward Extension and Forward Expansion to Fully Cover the Entire Software Life cycle and Ecosystem

- Post-SOP Management: ASQMS introduces new process domains such as 6.9 Software Release, 6.10 Software Deployment, and 6.11 Software Maintenance, for the first time incorporating OTA release, deployment, and long-term maintenance activities as standardized, auditable processes into the management system.
- Upstream Ecosystem Governance:
 - 5.2 Software Tool Chain Management: ASQMS has separated tool chain management into a standalone process, requiring systematic validation, training, and continuous assessment to mitigate supply chain risks from the source.
 - 5.3 Equipment and facilities: ASQMS has incorporated the availability and security of critical operational infrastructure such as OTA servers into the quality management scope.
 - Holistic ecosystem inclusion: ASQMS encompasses the entire automotive ecosystem, including cloud, road-side, and field-side components. It mandates that Tier 1 suppliers systematically manage quality requirements and interface specifications for these "ecosystem partners" as part of their own management system through processes like 5.10 Externally supplied products and services.

3: Conclusion - Collaboration Over Competition

ASPICE has laid an indispensable foundation for automotive software engineering. But in the era of "software-defined vehicles" with its entire life cycle and ecosystem complexities, the industry requires a broader governance perspective.

As precisely summarized in ASQMS Expert Commentary #16, ASPICE and ASQMS are complementary rather than competitive relationships.

Comparison Dimensions	ASPICE	ASQMS
Focus	Project-level process capability	Organization-level management system
Foundational standard	ISO 330XX (Process Assessment)	ISO 19011 (System Audit)
Scope	Specific system/software/hardware products	In-vehicle and external software ecosystem
Timing	Project-specific point-in-time assessment	Continuous organizational audit and certification

For Tier 1 suppliers, the most effective strategy is collaborative application: Leveraging ASQMS as the organization-level quality management system framework to ensure compliance and efficiency across the entire life cycle and ecosystem; simultaneously, while adopting ASPICE as a "refiner" for core engineering processes to continuously enhance technical execution capabilities in key projects. This "system + process" dual-engine model will enable Tier 1 suppliers to build a truly sustainable core advantage in the new competitive landscape.

#20: Is Organizational Certification the Key to Unlocking the True and Lasting Value of Processes?



Ute Schmalhofer

30+ years of expertise in maturity models and process improvement. Decade-long experience with Methodpark/UL for technical sales, marketing and training of UL SIS's "Stages" process management software globally.

Processes and standards form the backbone of quality, consistency, and innovation in the automotive industry. When they are well-designed, integrated, and used, they become powerful tools for managing complexity, enabling collaboration, assuring quality, and ensuring long-term success.



Yet, many organizations still use only a fraction of the potential which lies in process management. One recurring pattern illustrates this clearly: Process improvement initiatives are launched within individual projects, driven by the immediate need for compliance or certification. Once the project goal is achieved, the motivation fades. The processes lose relevance, are not actively maintained, and ultimately disappear from everyday operations.

This isn't just a theory. It's a reality that many professionals in the automotive domain have observed, and I have witnessed it myself as well.

During my time selling process management software, I often encountered this scenario: Customers purchased the software-tool to prepare and pass a certification

audit (e.g., ASPICE). Once certified, however, many did not renew the maintenance contract of the software licenses. Why? Because the software, and more importantly, the defined processes within it were no longer being used. The short-term goal was met. But the long-term value of continuous process management was never realized.

The lesson? Certification was seen as an end, not a means to an ongoing improvement journey, although maturity models like CMMI or ASPICE target exactly that.

The Limits of Project-Centric Approaches

Assessment based on projects often only have a limited effect:

- **solated improvements:** Benefits and learnings often remain confined to one project and are not rolled out across the organization.
- **Lack of continuity:** Once a project ends, there is no structured way to ensure process evolution, or reuse. Roles shift, and process responsibilities are often left behind — unstaffed and quickly forgotten.
- **Missing Management Support:** Management may not even hear or see much of such initiatives. If they do, they may support the initiative during the project phase but lose interest once the audit is over.

The result? Processes that aren't embedded or sustained.

Why Process Initiatives Fail to Take Root

From what I've observed, there are a few common root causes:

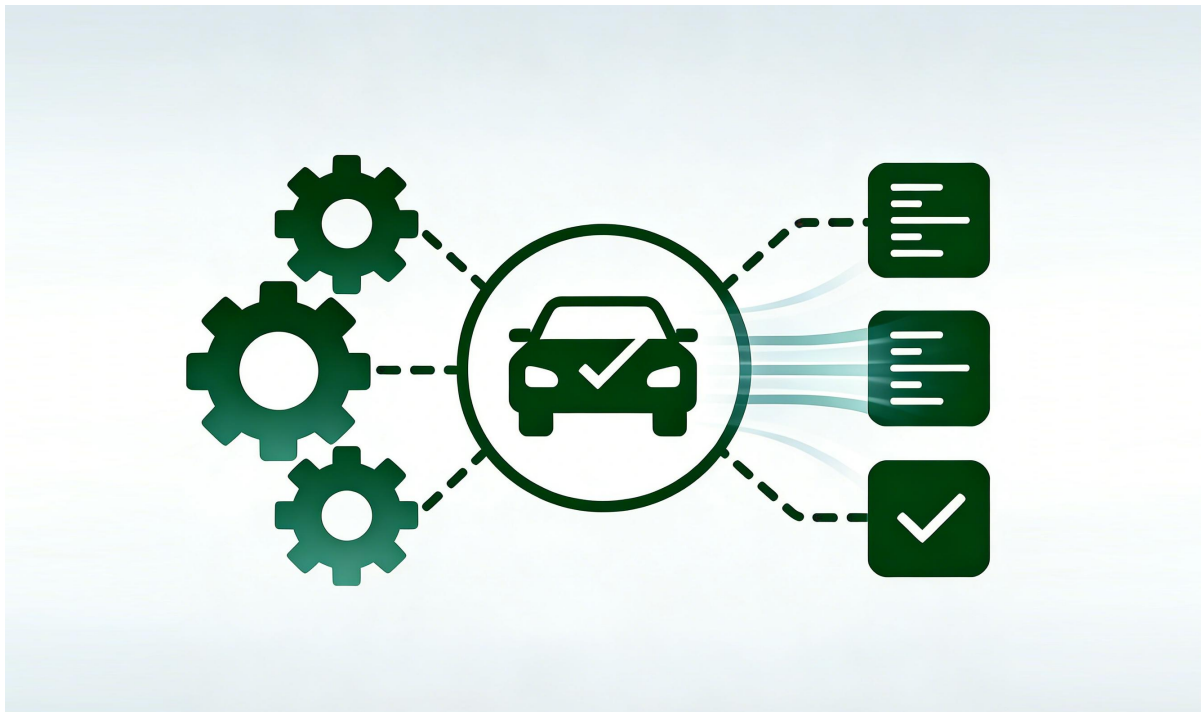
- **Process ≠ Practice:** Many modeled processes reflect the required standards but not how work is actually done. This leads to poor adoption or even rejection.
- **No strategic anchor:** Without clear alignment to business goals, initiatives struggle to gain lasting support from leadership.
- **Siloed definitions:** Processes are often defined by one function (e.g., Engineering or Quality) without cross-functional collaboration.
- **Lack of governance:** There's no process management infrastructure to ensure ownership and continuous improvement.
- **Disconnected interfaces:** Process handovers between departments or disciplines are poorly defined, resulting in friction.

These issues are not exclusive to the automotive industry but are especially impactful in complex, regulated environments.

broader view. They don't just look at project success; they examine how an organization as a whole develops and improves over time.

What makes them powerful:

- **Strategic alignment:** Organizational certifications require traceability to business goals and priorities.
- **Leadership engagement:** Top-down commitment becomes a necessity, not an option.
- **Sustainable structure:** These models demand process ownership, KPIs, and improvement mechanisms that extend beyond a single project.
- **Cross-functional collaboration:** Organizational initiatives make it easier to form cross-disciplinary teams and involve all key stakeholders — from Engineering to Quality to IT.
- **Holistic process architecture:** handovers between process areas and dependencies are considered as part of a unified process architecture.
- **Silo-breaking effects:** By working across units, organizational certifications help dismantle fragmented thinking and foster shared responsibility.



The Case for Organizational-Level Certification

Organizational certifications, such as ASQMS (Automotive Software Quality Management System) or OMM appraisals (Organizational Maturity Model), take a

- **External signaling:** A mature, organization-wide certification sends a strong message to customers and partners about long-term capability.

The holistic perspective and the structural benefits mentioned – from leadership involvement to process architecture – facilitate the agility and speed in software development often referred to as "China Speed". Fast development cycles rely on clear processes, distinct responsibilities, and streamlined decision-making. But let's be clear: even these certifications are not silver bullets. They must be implemented with care, realism, and a focus on long-term cultural change.

Why Organizational Audits Are Still Rare — and Why That Should Change

While organizational-level certifications and appraisals offer promising solutions, they remain relatively uncommon in practice. Why?

- **Significant Investment:** Organizational audits are large-scale, resource-intensive undertakings, which consequently necessitate executive buy-in.
- **Lack of awareness:** Many organizations are unaware of the long-term strategic benefits and view audits merely as compliance checkpoints.
- **Fear of exposure:** Broader assessments may reveal systemic weaknesses, which some leaders would rather avoid.

At the same time, companies across all industries must adapt to fast-changing regulatory, technological, and market-specific landscapes. For example, the upcoming EU Cyber Resilience Act (CRA) — binding from 2027 — introduces strict, cross-disciplinary demands that only organizations with integrated, agile quality systems will be able to meet efficiently. Meeting these demands requires the kind of embedded processes, clear responsibilities, and organizational agility that formal maturity initiatives and certifications are designed to establish. However, faced with the aforementioned challenges (significant investment, lack of awareness, fear of exposure), organizations too often limit their improvement efforts to standalone projects or the minimum scope required for project-level compliance. This project-centric approach, while perhaps perceived as less daunting, is inherently short-term focused and fails to build sustainable organizational capabilities. It disregards the inefficiency of repeatedly addressing systemic issues at a project level and prevents the necessary holistic transformation. Organizational certifications like ASQMS and OMM, in contrast, represent a more long-term, strategic decision aimed at building enduring maturity across the entire enterprise. They assess how process maturity is established and sustained across departments, programs, and

leadership levels. While ASQMS is a prescriptive standard focused on compliance with a specific set of requirements, an OMM is an unstandardized descriptive model that assesses organizational capability across a spectrum of maturity levels. The advantage of a standard is that it provides a clear, auditable, and universally accepted benchmark for quality, ensuring consistency and trust throughout the entire supply chain.

What makes ASQMS particularly attractive is its deliberately focused scope. By concentrating on software development, it targets the most pressing transformation challenge the automotive industry faces today. As software becomes the primary lever for differentiation and innovation, excellence in this domain will increasingly determine the success — or survival — of OEMs and suppliers alike.

Final Thought

An organizational certification with a more system-oriented approach than process assessment models and a scope deliberately focused on software — like ASQMS — can be a powerful catalyst for the kind of mindset shift that many companies have long postponed. By zeroing in on software, it addresses the most urgent transformation domain in today's automotive industry, where innovation and quality increasingly depend on code.

But certification alone doesn't create lasting change. It takes committed leadership, clear intent, and a shared understanding that process maturity is more than just passing an audit.

It's up to trainers and consultants to foster this mindset — and up to organizations to approach certification not as a mere formality, but as an opportunity to build something sustainable.

Done right, ASQMS can mark the beginning of true transformation.

#21: From Passive Compliance to Proactive Leadership

Ms. Wang

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In the era of Software-Defined Vehicles (SDV), the entire automotive supply chain is undergoing profound transformation. A critical question now faces all industry participants:

Should we proactively adopt emerging quality standards like ASQMS when the market has not yet universally mandated them?

Many companies may view this as "premature." However, based on a deep understanding of industry transformation, the internal challenges faced by most companies, and the latest market intelligence, we must recognize that this is not premature planning but an urgent strategic consensus to ensure the healthy and efficient development of the entire industry in the SDV era.

Below, we will elaborate on the necessity of this strategy from four dimensions.

1. Strategic Upgrade, Not Passive Compliance: ASQMS is a "must-have" for the SDV era

- **Industry transformation is inevitable:** The automotive industry's transition to SDV is irreversible. Software quality has become a core factor determining brand differentiation, user experience, and vehicle safety. Traditional hardware-centric IATF 16949 and project-level ASPICE frameworks can no longer fully address the systemic, end-to-end quality management requirements brought by SDV.
- **The unique value of ASQMS:** ASQMS was created to fill this strategic gap. It provides an organization-wide software quality management system that ensures unified, efficient, and reliable

processes from software development and deployment to OTA upgrades and operations after SOP. It provides a common quality language for the entire ecosystem.

- **Strategic Choice of Industry Leaders:** Industry leaders have adopted ASQMS based on their foresight into future trends and proactive planning, aiming to systematically build world-class software capabilities. This is to ensure that every software product delivered has rock-solid quality.

2. System integration, not an additional burden: Seamlessly integrate ASQMS into existing enterprise processes to maximize efficiency

- **Reinforce, not disrupt:** The key to successful implementation is to integrate and reinforce the requirements of ASQMS into the enterprise's existing mature process system, rather than starting from scratch. This means that engineers will continue to work within a familiar, but more robust and powerful internal framework, thereby minimizing resistance to change.
- **Expert-driven internal optimization:** Process gap analysis and remediation should be led by "process owners" in each field. This approach ensures that improvement measures comply with ASQMS standards and are tailored to the company's actual operations, making it the most efficient and practical way to implement changes.
- **Improving the overall efficiency of the ecosystem:** By establishing a unified organization-wide software QMS, the entire industry can effectively address the significant communication and integration costs caused by inconsistent standards

between OEMs and suppliers, as well as between different suppliers. This allows all participants to benefit from unified best practices, thereby systematically improving development efficiency and shortening product time-to-market.

3. Addressing pain points rather than theoretical discussions: ASQMS is a systematic solution to industry-wide challenges

- **Precise response to OTA and SOP quality pain points:** In recent years, quality incidents have frequently occurred in OTA and software production introduction, and existing processes have failed to fully cover these areas, which is a common pain point in the industry. Many leading companies have established "software life cycle groups" to specifically address this issue, which is precisely in line with the core innovation of the ASQMS standard. ASQMS is the first industry-wide standard to explicitly incorporate post-SOP phases such as software release, deployment, operations (OTA), and termination into its management scope. Therefore, adopting ASQMS is not merely a theoretical exercise but a practical application of a mature, industry-recognized framework to systematically address the industry's most pressing real-world challenges.
- Promoting global collaboration and enhancing cross-border cooperation efficiency: For multinational enterprises, selecting a region for pilot implementation (such as the Chinese market) will serve as an excellent platform to validate and solidify these solutions. Through ASQMS, enterprises can mobilize global resources to systematically study and address quality management challenges in the latter stages of the software life cycle, transforming regional best practices into globally unified standards, thereby benefiting all branches.
- Proactive risk management: In today's world where functional safety and cybersecurity are increasingly important, ASQMS helps companies build proactive, systematic risk defense systems through alignment with standards such as ISO 26262/21434. This is critical for reducing costly recalls and protecting the reputation of the entire industry.

4. Latest Market Intelligence: Ecosystem demands are now a given and are accelerating rapidly

This is the strongest evidence refuting the "too early" argument. The pace of market change far exceeds expectations, and a "wait-and-see" strategy will cause companies to lose their competitive edge. According to the latest industry information, market demand is already very clear and expanding rapidly:

- **Industry benchmarks have been established, and early movers have gained a competitive edge:** Leading automotive companies have taken the initiative. BYD and Geely completed ASQMS system certification in May and June this year, respectively, setting clear quality benchmarks for the entire industry.
- **Mainstream automakers are fully following suit and extending efforts to the supply chain:** Almost all traditional mainstream automakers have joined the ASQMS implementation task force and are closely monitoring the progress of the standards. A major automotive group plans to undergo ASQMS certification in the fourth quarter of this year and has explicitly stated that this will become a requirement for suppliers in the future.
- **Leading new players are following suit:** A leading new player is currently undergoing ASQMS consulting and plans to officially launch third-party certification audits this year.
- **Supply chain requirements are set to be fully implemented:** All certified original equipment manufacturers (OEMs) have stated that they will gradually formalize ASQMS requirements for their supplier networks.

Summary:

For the entire automotive industry ecosystem, beginning preparations and implementation of ASQMS now is based on a deep understanding of the industry's software-driven and intelligent trends and strategic planning. This is not blindly rushing ahead, but rather:

- A strategic upgrade and enhancement across the entire industry: By adopting ASQMS, the industry can establish a unified software quality language and standards, addressing gaps in existing standards across the entire software life cycle and in non-vehicle software domains.
- A collective response to common industry pain points: ASQMS provides systematic solutions to widespread quality issues in areas such as OTA and software integration into production, helping to

enhance collaboration efficiency and product reliability across the entire supply chain.

- A joint effort to seize future market opportunities and meet ecosystem demands: The latest market intelligence indicates that this is no longer a "potential" demand but a reality that is already unfolding and accelerating.
 - For original equipment manufacturers (OEMs), ASQMS is a critical governance tool for managing large and complex software supply chains and ensuring vehicle quality and safety.
 - For suppliers, ASQMS serves as a "passport" to demonstrate their software development and management capabilities and secure future orders.

- For the entire industry, proactively implementing ASQMS is a necessary step to avoid being caught off guard in future global supply chain access audits, significantly reducing compliance risks and collaboration costs across the entire ecosystem.

This is a necessary strategic step to ensure the automotive industry maintains its leading position in the software-defined vehicle era and a responsible response to future market and technological trends.



PART 04

Career Development

The ASQMS Career Development is designed to support professionals across the entire spectra of ASQMS consulting, auditing and training. Through clearly-defined levels and advancement criteria for individuals, backed by officially licensed training program, and enhanced by technical exchange seminars, this system facilitates and cultivates a pipeline of high-caliber professionals for the automotive software quality management sector.

- Overview
- Professional Levels
- Level Maintenance and Advancement
- Licensed Training Courses
- Professional Seminars

1. Overview

ASQMS has established a comprehensive professional career development system covering consulting, auditing, and training. Through tiered qualification schemes, defined maintenance requirements, officially authorized training programs, and industry seminars, it creates clear and sustainable career paths for professionals. This system supports their competence enhancement and career progression while cultivating highly qualified professionals in the automotive software quality management field.

The advanced-level qualification is Certified ASQMS First/Second-Party Auditor. Compared to the Entry-level, the experience requirements are more specific, requiring experience in auditing and mastery of the audit processes and methodologies. The core competencies at this level not only include providing training and consulting services to clients but, more importantly, the ability to independently conduct First/Second-Party audits, assess the operation of an organization's ASQMS system, identify compliance issues, and provide recommendations for improvement.

ASQMS enabled careers for auditors, consultants, and trainers

Level	1 – The Entry***	2 – The Advanced Level***	3 – The Professional Level****	4 – 3 rd Party Auditor****	5 – The Trainer****	6 – The Master Trainer****
Title	Certified Consultant	1 st /2 nd Party Auditor,	3 rd Party Assistant Auditor, Certified Advanced Consultant	3 rd Party Auditor	Trainer	Master Trainer
Training	3 days / exam*	4 days / exam*	3 days / exam*	2 days / case study + exam*	2 days / exam*	Selected on an individual base
Prerequisite	Experience in QMS	Experiences as Auditor	2 years practice min 2 audits	Pass witness audit	Observed as trainer	
Ability	Train clients Consult	Train clients Conduct 1 st / 2 nd party audits Consult	Train clients** Assist 3 rd party audits** Consult**	Train clients** Conduct 3 rd party audits** Consult**	Train Level 1 to 4 Witness auditors and Office auditors	Train Level 1 to 5 Witness auditors and Office auditors
Renewal period	3yr	3yr	3yr	3yr	3yr	3yr
Renewal pre-conditions	2MD of Continuous Personal Development (CPD) / year	1 Audit + 2MD of Continuous Personal Development (CPD) / year	1 Audit + 2MD of Continuous Personal Development (CPD) / year	1 Audit + 2MD of Continuous Personal Development (CPD) / year + 1 Witness audit	1 Training + as 3 rd Party Auditor	As the trainer

2. Professional Levels

The ASQMS professional career path is divided into six distinct levels, forming a complete progression from entry-level to advanced-level. Each level has a clear qualification profile, prerequisites, and a defined scope of core competencies, ensuring that practitioners can systematically enhance their expertise.

The entry-level qualification is the Certified ASQMS Consultant, which serves as the foundational threshold for entering the ASQMS field. To become a Certified Consultant, relevant experience in quality management systems is required, as this is a prerequisite for understanding the core logic and fundamental requirements of the ASQMS standard. The scope of core competencies focuses on providing clients with basic ASQMS-related training and consulting services, helping them gain an initial understanding of the standard framework and implementation key points, and offering foundational support for establishing a quality management system.

The professional-level qualification is Certified ASQMS Third-Party Assistant Auditor and Certified Advanced Consultant. It requires practitioners to have two years of audit experience and to have participated in at least two full audits, thereby accumulating sufficient hands-on experience. In terms of capabilities, in addition to continuing to provide training and consulting services, they may participate in third-party audits. Under the guidance of experienced auditors, they engage deeply in specific stages of the audit process. They also possess more in-depth consulting capabilities to provide clients with more targeted and complex system optimization solutions.

The fourth level is Certified ASQMS Third-Party Auditor. As the core force capable of independently conducting third-party audits, individuals at this level must undergo a specialized witness audit to ensure their auditing competence, impartiality, and professionalism meet official requirements. The core competence at this level is the independent execution of third-party audits, conducting comprehensive, objective, and impartial assessments of an organization's quality management

system in accordance with the ASQMS standard, and issuing authoritative audit reports, while continuing to provide high-level training and consulting services.

The fifth level is Certified ASQMS Trainer. Before becoming a Trainer, practitioners must undergo rigorous observation and evaluation as a Trainer candidate to ensure their teaching skills, standard interpretation capabilities, and practical guidance abilities. Their core responsibilities include training professionals at Levels 1–4, passing on their theoretical knowledge and practical experience to junior practitioners. They are also involved in witnessing the work of CB auditors and performing office audit-related tasks to support the standardization of audit activities.

The highest level is Certified ASQMS Master Trainer. Selection for this level is on a case-by-case basis and open only to trainers with outstanding performance, profound professional expertise, and extensive experience within the industry. Professionals at this level can train all practitioners from levels 1 to 5, cultivating well-rounded, multi-tiered professionals for the entire industry. They also participate deeply in witnessing the work of CB auditors and office audits, playing a vital role in the refinement and optimization of the ASQMS system.

Note: Before taking the examination, practitioners at all levels must complete official training organized by ASQMS LPs or the Oversight Office. Furthermore, they must strictly adhere to impartiality regulations in their professional activities to ensure the objectivity and authority of their work.

3. Level Maintenance and Advancement

3.1 Certificate Validity

All ASQMS professional qualification certificates have a unified validity period of 3 years. This provision aims to ensure that practitioners can continuously keep pace with industry developments, standard updates, and technological advancements, maintaining the timeliness and applicability of their professional capabilities, and preventing outdated knowledge from affecting work quality.

3.2 Renewal Requirements

Renewal requirements vary by level based on role responsibilities and competence requirements, with a core focus on continuous learning and practical application:

- **Entry Level (Certified ASQMS Consultant):** Must complete 2 days of Continuing Professional Development (CPD) training annually. The training content covers updates to the ASQMS standard, the latest industry trends, and cutting-edge concepts in quality management, etc., ensuring practitioners continuously expand their knowledge base.
- **Advanced Level (Certified ASQMS First/Second-Party Auditor):** Must complete one audit practice during the certificate's validity period, along with 2 days of CPD training annually. By combining practice with learning, auditors continuously enhance their audit competence and professionalism.
- **Professional Level (Certified ASQMS Third-Party Assistant Auditor, Certified Advanced Consultant):** Renewal requirements are consistent with the professional level: requiring the completion of one audit practice and 2 days of CPD training annually. This ensures the maintenance of a high level of professional competence when participating in third-party audits and providing advanced consulting services.
- **Certified ASQMS Third-Party Auditor:** In addition to completing one audit practice and two days of CPD training annually, an additional witness audit is required. Through observation and guidance by experienced auditors, auditing practices are continuously standardized, ensuring the rigor and authority of the audit work.
- **Certified ASQMS Trainer:** Must complete at least one training assignment within the validity period while maintaining their Certified ASQMS Third-Party Auditor certificates. This ensures that the latest audit practices and standard requirements are integrated into the courses, providing practical and cutting-edge training content to participants.
- **Certified ASQMS Master Trainer:** Renewal conditions are the same as for Trainer: completing one training assignment within the validity period while maintaining their Certified ASQMS Third-Party Auditor certificate. They rely on their deep professional knowledge and extensive practical experience to provide high-quality support for talent development in the industry.

3.3 Career Advancement Path

ASQMS provides a clear and structured career advancement path for professionals, ensuring practitioners can progressively move to higher levels

based on their competence development:

Basic Career Path: Starting from the entry level (Certified ASQMS Consultant), after accumulating sufficient quality management system experience and completing the required training, advancement to the advanced level (Certified ASQMS First/Second-Party Auditor) is possible. With the appropriate auditing experience and further study and practice, practitioners can lead to the professional level (Certified ASQMS Third-Party Assistant Auditor, Certified Advanced Consultant). This stage primarily focuses on consolidating foundational skills and accumulating practical experience.

Advanced Career Path: Advancement from the advanced level to Certified ASQMS Third-Party Assistant Auditor requires fulfilling the prerequisites of 2 years of audit practice and participation in at least 2 audits, and successfully completing a dedicated witness audit to demonstrate the ability to independently conduct third-party audits. Advancement from Certified ASQMS Third-Party Auditor to Trainer requires undergoing rigorous observation and evaluation to demonstrate teaching and guiding capabilities. Advancement from Certified ASQMS Trainer to Certified ASQMS Master Trainer is conducted through case-by-case selection, requiring the individual to stand out in the industry with comprehensive professional competence and industry influence.

Throughout the advancement process, practitioners need to continuously accumulate practical experience, consistently engage in professional learning, and strictly adhere to industry norms and professional ethics, ensuring their competence after advancement aligns with the role responsibilities and requirements of the corresponding level.

4. Licensed Training Courses

ASQMS licensed training courses are uniformly organized by officially recognized LPs. The curriculum system is designed around the competence requirements for different professional levels, balancing theoretical knowledge, practical application, and standard interpretation to provide strong support for practitioners' career development.

4.1 Core Training Courses

Training courses vary in duration, content, and focus based on the target professional level:

- **Entry Level (Certified ASQMS Consultant):** The training lasts 3 days and includes theoretical instruction and an exam. The course content focuses on the fundamental framework of the ASQMS standard, interpretation of core clauses, and the basic principles and implementation methods of quality management systems. This helps participants build a comprehensive understanding of the ASQMS system and master the core knowledge required to provide basic consulting and training services.
- **Advanced Level (Certified ASQMS First/Second-Party Auditor):** The training lasts 3+1 days. The first 3 days cover the same content as the entry-level course, with an emphasis on solidifying foundational theory. The additional 1-day course concentrates on practical aspects such as the specific processes and audit methods for first- and second-party audits, on-site practical techniques, and audit report writing. This helps participants master the core competencies for independently conducting audits, with a dedicated examination at the end of the course.

- Professional level (Certified ASQMS Third-Party Assistant Auditor, Certified Advanced Consultant): The training lasts 3 days and includes theoretical instruction and an exam. Building on the foundational theory, the course content provides an in-depth interpretation of the ASQMS standard, with a focus on third-party audit process specifications, advanced consulting case studies, complex problem-solving approaches, etc., thereby enhancing participants' professional depth and practical application skills.
- Certified ASQMS Third-Party Auditor: The training lasts 2 days and focuses primarily on case studies and an exam. Through in-depth analysis of numerous real audit cases, participants learn core skills such as handling difficult issues during audits, identifying and controlling risks, and making scientific audit conclusions. The exam assesses participants' practical application and problem-solving skills.
- Certified ASQMS Trainer: This 2-day program includes theoretical instruction and an exam. The course content covers training techniques, course design methodologies, the precise pass-on communication of the standard interpretations, and participant guidance approaches. It helps participants transition from “knowing how to do” to “knowing how to teach” and equipping them with the ability to train entry-level professionals.
- Certified ASQMS Master Trainer: There is no fixed training duration or standardized course for this role. Selection is on a case-by-case basis, evaluating candidates' comprehensively based on their professional backgrounds, practical experience, and teaching capabilities, etc., to identify top-tier talent capable of undertaking advanced training responsibilities and industry leaders.

4.2 Training Information

Training Methods: Primarily online training. Some advanced courses may be offered in-person or as hybrid formats based on actual needs, balancing convenience with interactivity to meet the learning requirements of different participants.

Training Languages: Training is available in both Chinese and English. Chinese training sessions are held from 09:00 to 17:00 China Time, while English training sessions are held from 09:00 to 17:00 Central European Time. ASQMS Master Trainers are invited to deliver the courses, ensuring training quality meets international standards.

Registration: Interested individuals can register using the contact information provided by ASQMS. Email: info@asqms.org.

Certificate Validity: Upon completing the respective training and passing the exam, participants will receive an official qualification certificate issued by ASQMS. Certificate information will be recorded on the ASQMS official website, making it globally recognized and providing strong endorsement for professionals' career development.

5. Professional Seminars

ASQMS regularly organizes professional seminars to provide a high-level platform for industry experts and professionals at all qualification levels to exchange technical knowledge, share experiences, and discuss cutting-edge trends. This initiative supports professionals in continuously enhancing their expertise and drives the high-quality development across the industry.

5.1 Core Formats of the Seminars

Thematic Workshops: These seminars focus on core topics within the ASQMS domain, including but not limited to ASQMS standard revisions, analysis of industry hot topics (such as the application of AI-assisted tools in quality management, and quality control of machine learning software), overcoming practical challenges in audits, and cross-industry quality management best practices. Through keynote speeches, breakout sessions, and roundtable discussions, participants are guided to engage in in-depth exchanges of views, stimulate innovative thinking, and collaboratively explore solutions.

Case Studies: Experts from leading companies that have successfully passed ASQMS certification, along with experienced auditors and consultants within the industry, will be invited to share typical case studies, best practices, and guidelines for avoiding pitfalls during ASQMS implementation. These cases will cover the establishment, operational optimization, and audit preparation of the ASQMS system across organizations of different sizes and business scenarios, providing participants with actionable practical references.

International Exchange: Leveraging the resources of the ASQMS International Oversight Office, cross-border seminars are organized, inviting scholars, experts, and industry leaders from the global automotive software quality management field. Participants can gain insights into the latest international trends in automotive software quality control, learn from advanced international practices, and showcase China's

achievements and innovations in the ASQMS field to international peers, thereby fostering global industry exchange and cooperation.

5.2 Participation Methods and Benefits

Target Audience: The seminar is open to all professionals interested in automotive software quality management, including certified ASQMS professionals at all levels, quality management leaders in the automotive industry, quality management personnel from software R&D companies, and supply chain quality control specialists.

Information Access: ASQMS will release seminar announcements through multiple channels, including the official ASQMS websites (ASQMS.org, ASQMS.de, ASQMS.org.cn), the WeChat Official Account (ID: ASQMS), and the overseas LinkedIn account (ASQMS Deutschland GmbH). These announcements will clearly outline the seminar's theme, schedule, participation methods, and registration channels, allowing attendees to register according to their individual needs.

Core Benefits: For attendees, the seminar serves as a vital channel for obtaining updates on standard revisions and official interpretations, enabling them to stay abreast of the latest industry policies and standard requirements. By learning from the practical experiences of leading companies, participants can effectively enhance their ability to solve complex problems in daily work. Furthermore, the seminar provides industry professionals with an efficient networking platform, helping to build professional exchange networks across companies and fields. Additionally, participation in seminars can be considered as part of CPD activities, supporting certificate renewal and contributing to career advancement.



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