Revision protocol

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Checked	C. Koch	digitally released
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Released	J. Poggenburg	digitally released
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0 Introduction

0.1 Our History

For details of our history, see Chapter 11.2.

0.2 What we do

Reimagining motion for a greener, safer, better world of mobility.

At AVL, we are one of the world's leading mobility technology companies for development, simulation and testing in the automotive industry, and in other sectors. Drawing on our pioneering spirit, we provide concepts, solutions and methodologies for a greener, safer and better world of mobility.

We constantly expand our portfolio of high-end methodologies and technologies in the areas of vehicle development and testing. With a holistic approach— from ideation phase to serial production—we cover vehicle architectures and platform solutions including the impact of new propulsion systems and energy carriers.

To achieve the vision of climate-neutral mobility, we drive innovative and affordable solutions for all applications—from traditional to hybrid to battery and fuel cell electric technologies.

As a global technology provider, our offerings range from simulation, virtualization, and test automation for product development to ADAS/AD and vehicle software. We combine state-of-the-art and highly scalable IT, software, and technology solutions with our application know-how, thereby offering customers extensive tools in areas such as Big Data, Artificial Intelligence, cybersecurity, and embedded systems.

Furthermore, we are striving towards a safe and comfortable driving experience for everyone and bring a comprehensive understanding of assisted and automated driving functions in different vehicles and environments into play.

For further information regarding turnover, number of employees, locations, R&D activities etc., see Chapter 11.2.

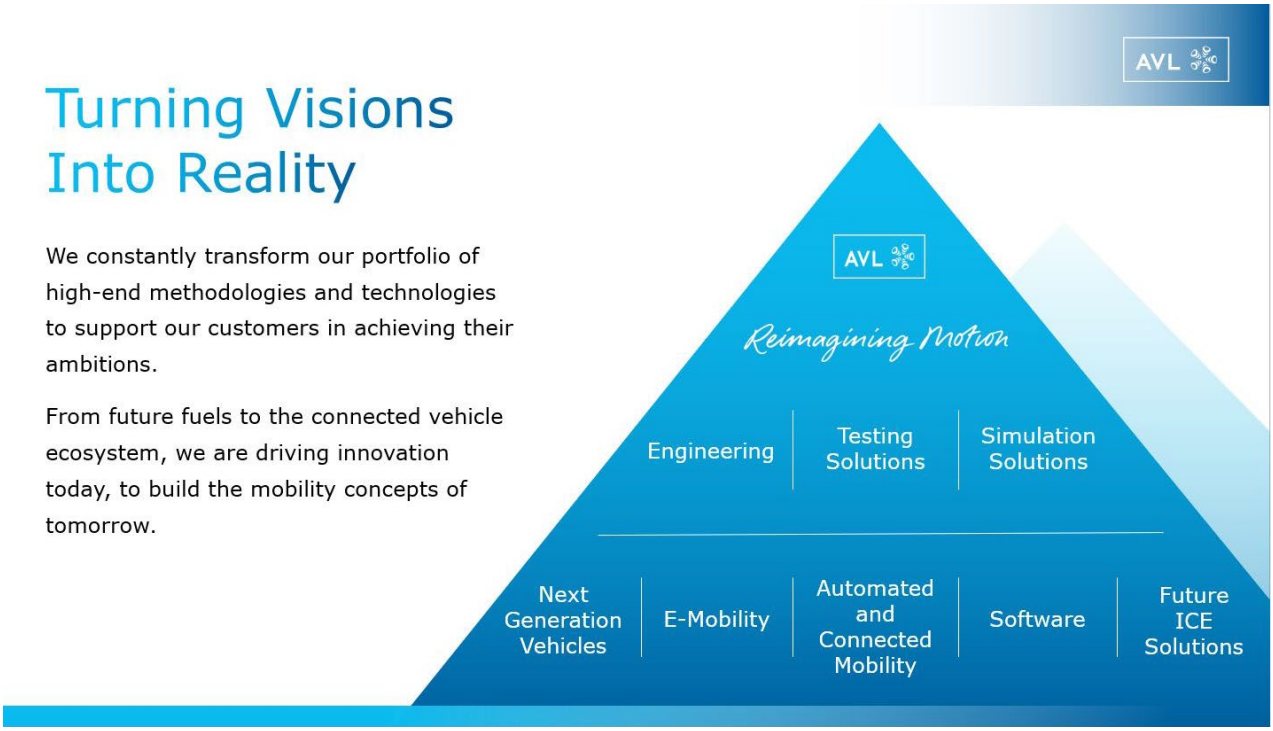

Figure 1: AVL portfolio

0.3 Process-oriented approach

The process model in Figure 2 contains all the requirements for an integrated management system.

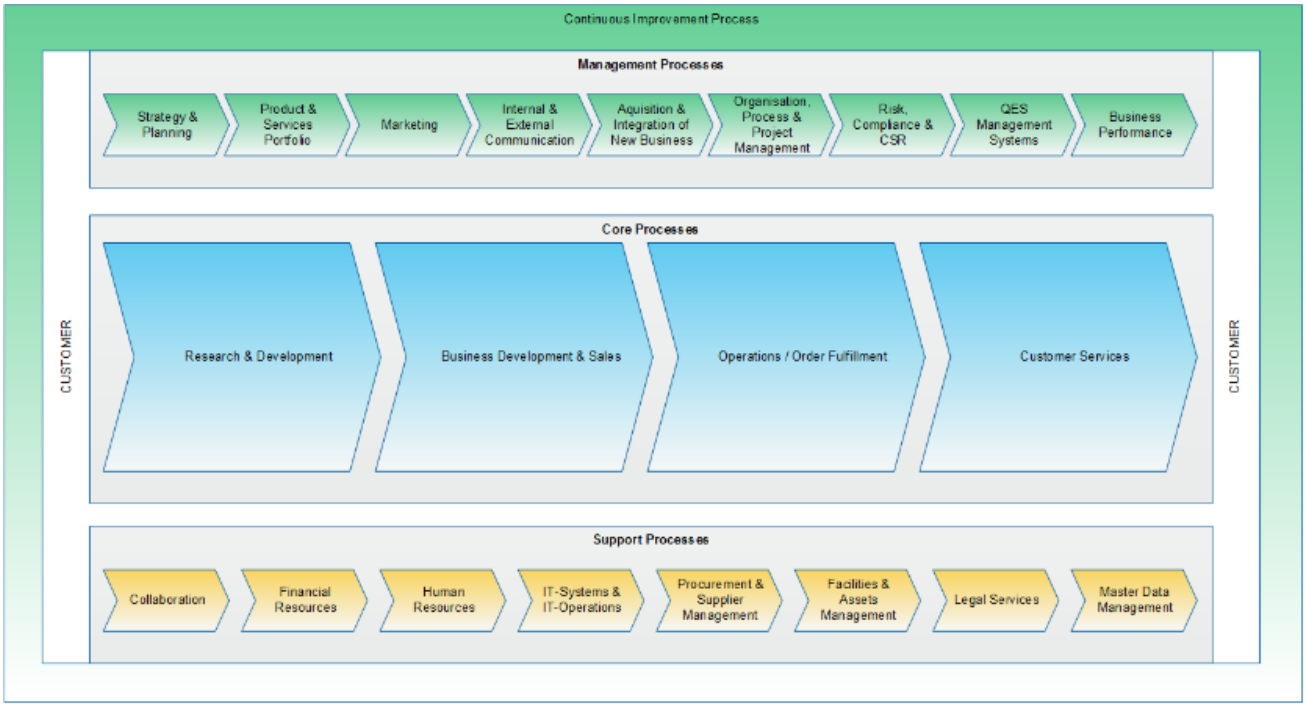

Figure 2: AVL Process landscape

1 Scope

This management handbook documents and presents the requirements for an Integrated Management System. AVL hereby demonstrates the ability to meet customer requirements with regard to both internal and external parties.

The Integrated Management System described applies to the entire AVL including all activities, products and services. It is valid and binding for all employees.

2 Normative references

This Integrated Management Handbook is based on the international standards

DIN EN ISO 9001,

DIN EN ISO 14001,

DIN EN ISO 27001,

DIN EN ISO 45001 and

ISO/SAE 21434

in the currently available and valid versions.

The international standards ISO 9001 (Quality management systems), ISO 14001 (Environmental management systems), ISO 27001 (Information security management systems), ISO 45001 (Occupational health and safety management systems) and ISO/SAE 21434 (Road vehicles – Cybersecurity engineering) have been aligned.

This IMS handbook makes it possible to harmonize and merge management systems already in place at AVL. The requirements of these standards for the Integrated Management System are supplemented by other specific requirements for products and services.

3 Terms and definitions

Term/Abbreviation	Explanation/Description
AST	Advanced Simulation Technologies
AVL	AVL List GmbH including the companies listed in the scope
Employees	All employees
EMS	Environmental management system
HQ	Headquarters
IMH	Integrated Management System Handbook
IMS	Integrated Management System
IMS manager	Respective management system manager
IMS team	Team of the respective management systems
ISMS	Information security management system

ISO 9001	DIN EN ISO 9001 (Quality management systems)
ISO 14001	DIN EN ISO 14001 (Environmental management systems)
ISO 27001	DIN EN ISO 27001 (Information security management systems)
ISO 45001	DIN EN ISO 45001 (Occupational health and safety management systems)
ISO 21434	ISO / SAE 21434 (Road vehicles – Cybersecurity engineering)
ITS	Instrumentation & Test Systems
OH&S	Occupational health and safety management system according to ISO 45001
PTE	Powertrain Engineering
QES	Quality, Environment & Safety/Security (quality, environment and occupational safety / corporate security)
QES documentation	Controlled, internally documented specification, based on the respective management systems, according to relevant requirements.
QMS	Quality management system

4 Context of the organization

4.1 Understanding the organization and its context

The context of the company is defined by the procedure shown in Figure 3 and is coordinated with the responsible management levels. Relevant internal and external issues are taken into account. The detailed procedure is set out in a QES document.

4.2 Understanding the needs and expectations of interested parties

The interested parties are derived from the context analysis and coordinated with the responsible management levels. Furthermore, the requirements of these interested parties that are relevant for the IMS, as well as the resulting binding obligations, are determined. The information on the identified interested parties and their relevant requirements are monitored and reviewed.

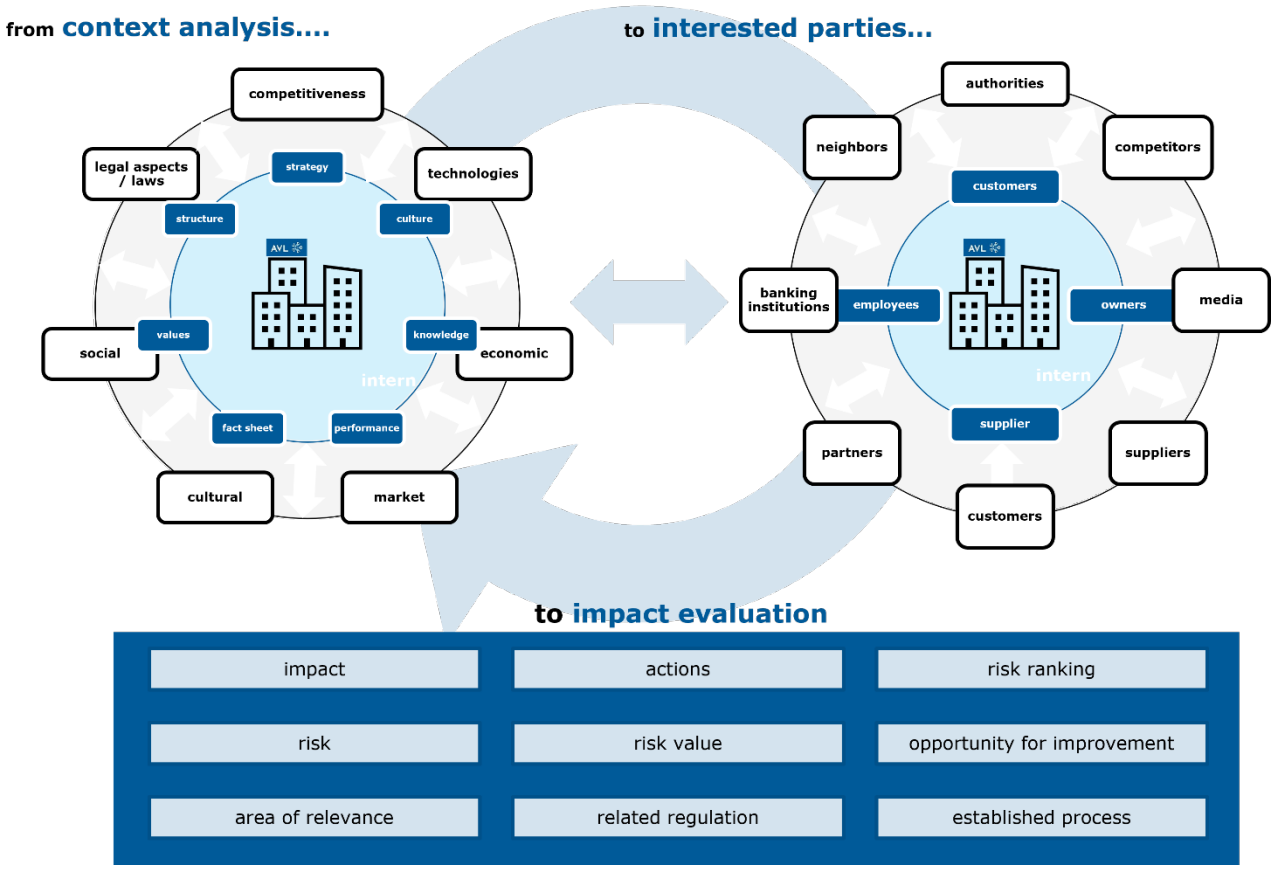

Figure 3: Approach of the context analysis

4.3 Determining the scope of the Integrated Management System

This IMH describes the IMS of AVL. It applies to the entire AVL including all activities, products and services. The scope of application is documented in Chapter 1 and is available for interested parties. It was defined considering relevant external and internal issues, requirements of interested parties, binding obligations, and the organization's products and services.

The certificates are available on the AVL website (see Chapter 11.2).

4.4 Integrated Management System

The structure, documentation, implementation and maintenance of the processes and procedures in the company ensure that the internal and external requirements regarding the respective IMS-relevant aspects are met in the best possible way. The IMS meets the requirements of the standards documented in Chapter 2. The IMS is continually improved.

The local equivalents of quality management and environmental management handbooks as well as other handbooks for standards described in Chapter 2 are also to be converted to an integrated version in which reference is made to this global specification.

5 Leadership

5.1 Leadership and commitment

5.1.1 General

AVL is one of the world's leading mobility technology companies for development, simulation, and testing in the automotive industry, and in other sectors. Drawing on our pioneering spirit, we provide concepts, solutions, and methodologies for a greener, safer, and better world of mobility.

We owe it to the planet – As a company, we are committed to helping solve social, cultural and global issues – especially with regard to environmental protection, sustainability and global emissions reduction.

The executive board's policy statement defines AVL's IMS policy. At the same time, it documents the commitment of the top management to monitor the implementation of the policy and to take corrective action in case of deviations. Furthermore, top management ensures the effectiveness of the IMS, the definition of the IMS objectives and IMS policy, the availability of the necessary resources and the integration of the IMS into the business processes. The top management promotes the application of the process-oriented approach and risk-based thinking. See also our values and philosophy on our website (Chapter 11.2).

The importance of the IMS is communicated to the employees. At the same time, this IMH should serve as a guideline for all employees and form the basis for a general and continuously increasing awareness, thereby enabling continual improvement.

We see it as the social responsibility of the company to create an environment for our employees in which they can make full use of their personal abilities in order to make all their creativity and performance available to the company and thus to our customers out of a feeling of self-respect.

We are committed to making a profit with our company, because this is the only way to finance the growth we strive for and thus to maintain our independence. Furthermore, we want to ensure that we remain a stable and long-term partner for our customers.

5.1.2 Customer focus

AVL is globally focused on the success of its customers and works professionally, in partnership and flexibly. In addition to customer requirements, legal and regulatory requirements are consistently met. The employees face their tasks and challenges competently and with commitment in order to meet the requirements of our customers and to further improve customer satisfaction.

5.2 IMS policy

5.2.1 Establishment of the IMS policy

AVL's IMS policy is created by the executive board and updated regularly in collaboration with the relevant managers and teams. This policy is applicable throughout AVL as per Chapter 1. This policy is appropriate to the purpose and context (see Chapter 4) of the organization and supports its strategic direction. The IMS policy provides the framework for setting IMS objectives and commits to meeting the requirements of interested parties, complying with binding obligations and continually improving the IMS.

5.2.2 Communicating the IMS policy

AVL's Integrated Management Systems Policy (IMS Policy) is available as documented information. Within the organization, the IMS policy is publicized via the intranet so that it can be understood and applied. For external, interested parties it is available on the AVL website (see Chapter 11.2).

5.3 Organizational roles, responsibilities and authorities

5.3.1 Head of the IMS

Together with the top management, the global responsible persons for the respective management systems are in charge of the implementation of the international standards listed in Chapter 2. The responsible persons have been appointed by the top management and are documented and communicated in the organizational charts and QES documents. The current responsible persons are shown in Figure 4.

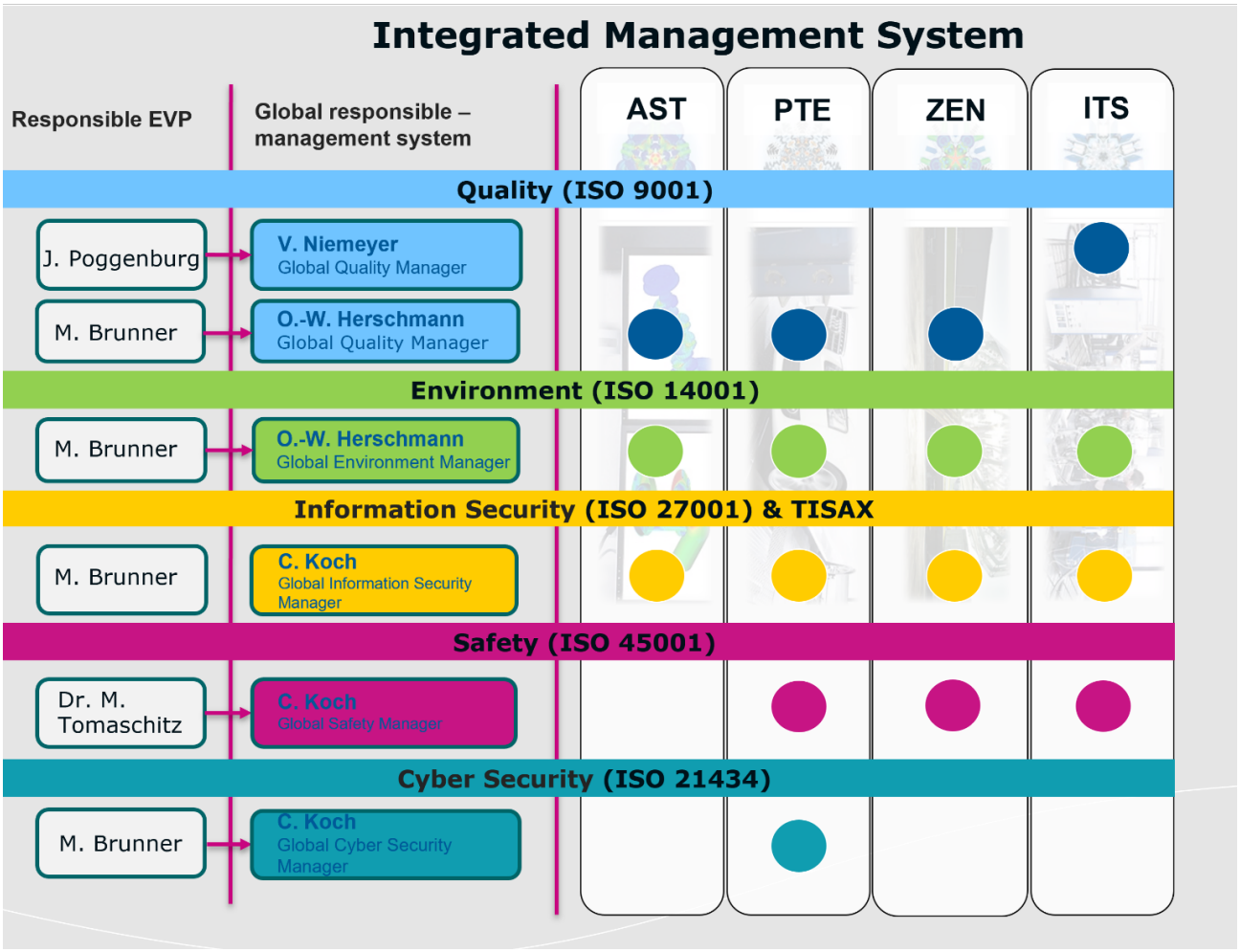

Figure 4: Persons responsible for the respective management systems.

The tasks of the IMS managers are documented in the job descriptions. The respective teams are available to support the IMS managers.

5.3.2 Organization and tasks of the IMS managers and teams

The IMS combines the various management systems into one overall system. It provides an overall view of the company's processes, provides the framework for ensuring optimum service quality, protecting all relevant information assets, minimizing risks, exploiting opportunities, avoiding negative impacts on the environment and people, and sustainably improving positive impacts. Resources and synergies can thus be optimally utilized.

All local IMS managers of the affiliates also report to the respective global IMS managers. The **operational tasks of the IMS managers in their areas of responsibility** are documented in job descriptions. The main tasks are summarized below:

- Planning of the IMS and its control.
- Adaption of the IMS to the state of the art.

- Analysis and evaluation of the IMS and its key figures.
- Training and motivation of employees regarding the IMS.
- Coordination of the assessment of IMS risks and opportunities (including environmental aspects).
- IMS-appropriate selection and design of procedures and processes.
- Selecting, adapting and establishing IMS-assuring methods and procedures.
- Monitoring the effectiveness of the IMS measures.

The tasks of the **interdisciplinary, respective IMS teams** are to plan and implement the requirements of the IMS independently of the business units and in responsibility to the top management. These teams support the implementation of the IMS policy and ensure the effectiveness of the IMS, taking into account the risk-based approach. Responsibilities and tasks are documented in job descriptions. In order to fulfil these tasks, the members of the IMS teams have organizational independence and the appropriate authority and resources to, inter alia,

- identify IMS potentials,
- develop solutions,
- initiate corrective and preventive actions, and monitor them through to completion, and
- periodic reporting.

5.4 Consultation and participation of employees

AVL is committed to involving employees and their representatives in the management and revision of the IMS. Involving employees creates a holistic approach for greater employee satisfaction and emotional connection to the company. Through numerous initiatives – such as on health, nutrition, workplace design, leadership culture or mobility – all employees are encouraged to give their best. AVL strives to increase the well-being of all employees and to provide more satisfaction, motivation and productivity.

6 Planning

6.1 Actions to address risks and opportunities

6.1.1 General

Appropriate measures are planned and implemented for the risks and opportunities identified in the context analysis. The measurement and evaluation of the results of the measures to

deal with risks and opportunities is carried out in the management review as part of the performance evaluation of the organization. Risks and opportunities are considered at the corporate level as well as through risk assessments at the operational level.

6.1.2 Risk and opportunity assessment in the IMS

6.1.2.1 Environmental aspects

The activities, processes, products (including life cycle assessment) and services that are related to significant environmental aspects are regularly identified by the IMS Environment Division and the Environmental Team. Together with the sectors concerned, the environmental impacts are assessed in consideration of the IMS policy (environmental risk assessment) and, if necessary, corrective and improvement measures are initiated. Based on these results, the environmental program and environmental targets are defined for the following year. The assessment is updated regularly or when changes occur. Cooperation with other areas is coordinated by the Environmental Managers.

6.1.2.2 Information security risk assessment

The assessment of information security risks is based on a defined process. This process establishes criteria for risk acceptance and conducting the assessment. The information security team identifies risks associated with loss of confidentiality, integrity, and availability of information within the scope of the IMS, taking into account the information security policy. It is ensured that the results are valid and comparable. Risk owners are identified for identified risks. The risks are analyzed for possible consequences and probability of occurrence, compared with the defined risk criteria, and then evaluated. The assessment is updated regularly or when changes occur. The process is defined in a QES document.

6.1.2.3 Hazard identification and assessment of risks and opportunities (OH&S)

The identification of hazards follows a defined process. This includes addressing work organization, management culture and social factors. Furthermore, hazards due to activities and situations, human factors, encountered incidents and potential emergency situations are taken into account during planning. The assessment is updated regularly or when changes occur. This process is defined in a QES document and follows local legislation.

6.1.3 Binding obligations and information security risk management

6.1.3.1 Compliance obligations and other requirements according to ISO 14001 and ISO 45001

Corresponding software systems are used to identify, monitor and evaluate legal, binding obligations. Individual tasks are derived from relevant legal requirements, which are assigned to the responsible persons. Updates are carried out with the help of regular legal amendment services, which are used together with other, external sources. The handling of binding obligations is defined in global QES documents as well as associated local specifications.

6.1.3.2 Information security risk treatment

Measures are taken to address the identified information security risks, which are selected based on the risk assessment. Prior to implementing the information security risk management measures, a plan is defined and must be approved by the risk owners. The risk treatment is updated regularly or when changes occur. This process is defined in a QES document.

6.1.4 Planning actions

The planning of actions is carried out by the development and coordination of the IMS managers with the respective teams and the top management, considering relevant aspects, binding obligations as well as opportunities and risks. Furthermore, actions are planned for the preparation and response to emergency situations. Monitoring of the implementation of the measures and the effectiveness of the IMS is ensured through internal audits and regular meetings of the respective IMS teams.

6.2 Objectives and planning to achieve them

6.2.1 IMS objectives and planning to achieve them

The objectives of the IMS are created by the IMS teams according to the specifications of the top management and relevant line managers and are approved by the top management. These objectives build on the IMS policy and are intended to maintain and continually improve the IMS and its performance.

Input for these objectives includes, but is not limited to, results from previous risk and opportunity assessments (context, environmental aspects, incidents, etc.) and employee consultation, general requirements for the IMS, changes in legal and other relevant requirements, and results from audits.

These objectives contain responsibilities, resources, measures, etc. for the respective time period and are integrated into the respective planning and target processes, as specified in the QES documentation.

The results are regularly reviewed, evaluated and documented in the IMS by the IMS teams (see Chapter 9.1). Actions to achieve the respective IMS goals are integrated into the business processes. The implemented actions of the previous year are evaluated and documented.

6.3 Planning of changes

If changes are necessary in the organization or its processes, the impact on resources, responsibilities, authorities, and the integrity of the management system is considered. Furthermore, attention is paid to the purpose and possible consequences of the changes.

7 Support

7.1 Resources

The top management determines the resources required to deliver services using the systematic approaches documented in the business processes. The necessary investments are determined once a year by the line managers in the course of the planning process in order to ensure the maintenance and improvement of the IMS and the infrastructure required for service provision. Necessary identified resources provided by the organization.

These resources include people, infrastructure, process environment, monitoring and measurement resources, and organizational knowledge.

The top management considers it its responsibility to create an environment in which the employees can fully utilize their skills and best meet the customer's requirements of the organization. The respective persons in charge are responsible for ensuring that operations run smoothly.

The Occupational Health and Safety team supports the line managers in complying with the statutory employee protection regulations.

The areas defined in the QES documents are responsible for the proper execution and documentation of the inspection of the test equipment. The calibration of the test equipment is carried out according to defined test plans by the manufacturer, a qualified company or by AVL itself. The documentation takes place on electronic data carriers defined for this purpose. The respective calibration instructions are defined in the work instructions of the individual labs.

7.2 Competence

Competent employees carry out the activities in the company. The skills and knowledge of the employees determine the areas in which they are employed. The HR strategy is aligned with the corporate strategy. In the event of changes to this, HR analyzes the training requirements and coordinates measures.

The implementation of training and further education measures by the AVL Academy and the responsible HR departments ensures that the qualification profile of our employees is continually improved. The need for education and training is agreed on the basis of skills and target agreements in the annual performance review between the line managers and the employees. The evaluation and effectiveness of the training is reviewed by the line managers at the latest in the next employee appraisal.

The financial resources are determined by the responsible line managers during the annual cost planning process and submitted to the top management for approval. The top management provides the funds within an economically justifiable framework. The training results as well as the feedback and evaluations of the training quality are archived in the AVL Academy and the respective responsible HR departments.

7.3 Awareness

The IMS-relevant information is part of the regular instruction of the employees, which sustainably strengthens the awareness of the employees.

New employees are informed about the IMS policy and their contribution to a functioning IMS during the introductory onboarding event. The topic of IMS is an integral part of the annual employee performance review, information sessions and instructions.

The respective instruction checklists, which are available as QES documents, are used for regular instructions on the implementation of the IMS. Information for external companies is provided in the course of purchasing. Relevant information and QES documents can be found on the AVL supplier portal or are sent to the external companies in the course of the order.

7.4 Communication

7.4.1 General

The communication process at internal and external level is regulated in the QES documentation. Relevant internal topics and information are mainly communicated via the intranet. Organizational charts with responsible persons provide an overview of corresponding contact persons and responsibilities. Documented information is kept as evidence of communication.

7.4.2 Internal communication

Internal communication is mainly ensured through electronic media such as the corporate intranet. In addition, information events are held on a regular basis. This is supplemented by the monthly company magazine “4WEEKS” and, if necessary, via emails and information boards.

Current global information regarding IMS is available on the intranet. The respective teams meet regularly to discuss relevant information and communicate this to the respective areas. Furthermore, there is regular coordination between the IMS managers and teams.

7.4.3 External communication

External communication is carried out by the company spokesperson or by the persons defined in the QES documentation. Inquiries from external interested parties are received, documented, processed and answered – if necessary, in consultation with the responsible managers.

It is ensured that any information communicated is accurate and reliable.

External communication takes place in compliance with binding obligations.

7.5 Documented information

7.5.1 General

All relevant specifications of the IMS are documented. This IMS handbook describes the IMS and is part of the QES documentation. It contains the basic rules for all management elements in question, planned fulfilment of the requirements of our customers or affected interest groups. The specifications and regulations of the handbook apply to all company divisions.

The specifications from the IMS are supplemented by organizational charts, processes and QES documents, such as procedures, work instructions, templates, etc., and are available on the intranet. When a hard copy is printed out, it is no longer a controlled document.

All employees of the business units are obliged to adhere to the applicable provisions of the handbook and to observe the responsibilities and accountabilities. Furthermore, each employee is encouraged to make suggestions for maintaining and improving the system.

All documented information required by the IMS standards according to Chapter 2 is part of the IMS.

7.5.2 Creating and updating

The creation and updating of IMS-relevant information is regulated in the QES documentation.

All IMS-relevant information/documents are checked by the responsible persons before release. All information is to be marked with a classification according to the IMS specifications.

As a matter of principle, each individual bears responsibility for the information provided to them or to be processed by them, checks it continuously for appropriateness and, if necessary, initiates changes and additions.

7.5.3 Control of documented information

All IMS-related documents, records and data are checked for accuracy and controlled according to the IMS specifications. This ensures that the necessary documented information is up-to-date, adequately protected, and available to the concerned parties.

The exact procedures and responsibilities for controlling documented information, including distribution, access, retrieval, use, storage, monitoring of changes, backup and archiving are set out in QES documents.

The retention period for documented information is **at least ten years**, unless legal requirements or external/internal specifications stipulate longer periods.

The following documentation must be retained for a minimum of 15 years:

- Records related to ordering processes (order documents, bills of delivery, receipt of goods, etc.).

The following documentation must be retained for a minimum of 30 years:

- Documentation of the serial/final product, including releases.
- Documentation on the current production process.
- Documentation on quality assurance of production planning.
- Documentation on production planning.

Each employee is obliged to keep the **records** required by the relevant specifications and to file and retain them in accordance with the requirements.

Documented information of external origin is identified and controlled in accordance with the requirements of the QES documentation.

8 Operation

8.1 Operational planning and control

8.1.1 General

The processes necessary to meet the requirements of the IMS and the measures identified in Chapter 6 are planned, implemented, managed and maintained. Criteria are defined for the processes and the acceptance of products and services, which are taken into account in the management. If necessary, measures are taken to manage and influence the processes. Processes are defined considering employees, product and service requirements, and environmental requirements. The documentation of the processes takes place on the AVL intranet. This ensures that the processes are carried out as planned and that products and services meet their requirements.

Product and service provision of AVL as a mobility technology company are development, simulation and testing in the automotive industry and in other industries. These services are carried out at AVL in a project-based organization. The necessary workflows are documented in the business processes.

In detail, the following principles, among others, are followed:

- From superior orientation to self-management of the value chain.
- From functional excellence to alignment with customer and supplier requirements.
- From internal optimization to the involvement of suppliers and customers.
- From organization of the workflow to the strategic development of core competencies.
- From orientation on departmental plans to focusing all resources on corporate goals.

- From targets to target agreements.
- From control to delegation of responsibility.
- From sectorial egoism to process thinking.
- From “process follows information technology” to “information technology follows process”.

8.1.2 Eliminate hazards and OH&S reducing risks

Processes for eliminating hazards and minimizing risks are planned, implemented and maintained. If a hazardous work process, operation, etc. has been identified, the hazard is eliminated as quickly as possible.

The “STOP principle” is applied during the elimination of hazards and the minimization of risks:

S – Substitution

T – Technical measures

O – Organizational measures

P – Personal measures

8.1.3 Change management

Defined processes exist for the implementation and management of planned changes – such as the introduction of new or the adaptation of existing products, services or processes. Any planned or unintended changes in the processes are monitored and, if necessary, corrected. IMS-relevant processes for changes are defined in the QES documentation.

8.1.4 Procurement incl. outsourcing

Processes for the procurement of products and services as well as outsourced functions and processes are managed and defined in the corresponding QES documents.

Procurement processes are coordinated with contractors to assess and control hazards and risks to ensure that contractors and their employees comply with the IMS requirements of AVL.

Outsourcing is carried out in consideration of the binding obligations and objectives of the IMS.

8.2 Requirements for products and services as well as emergency planning and information security risk assessment

8.2.1 Requirements for products and services

The specifications in this section serve to check the feasibility of an order as early as the sales phase. The procedure defined for this purpose is described in the associated process.

8.2.1.1 Customer communication

A contact person is defined for each customer transaction. Depending on the phase in which the relationship with the customer is in, the key account manager or project manager is the direct contact person. This guarantees short decision-making processes and the best possible communication with customers.

Project information, inquiries, contracts or order processing, including changes and feedback from customers as well as customer complaints, are handled by these two contact persons in accordance with the regulations provided for this purpose.

8.2.1.2 Determining the requirements for products and services

Before the offer is prepared, the requirements are determined and documented individually for each project by the responsible persons. In addition to customer requirements, legal and regulatory requirements are taken into account. The fulfilment of customer requirements is a top priority for AVL.

8.2.1.3 Review of the requirements for products and services

The commercial and technical review of requirements is carried out by the respective teams, which are composed and led by the responsible persons. This ensures that customer requirements can be met.

8.2.1.4 Changes to requirements for products and services

In the event of any changes to requirements, the associated documented information is adjusted, the impact of the changes to requirements is evaluated and the persons involved are made aware of the changes.

8.2.2 Emergency preparedness and response, and emergency planning and response

As described in Chapters 4 and 6, provisions are made for the identified environmental and occupational safety-related adverse impacts and emergency situations, and preparations are made for hazard prevention by the responsible persons defined in the organization with the involvement of the IMS responsible persons for Environmental and Occupational Safety as well as Facility Management, Human Resources and IT. These measures and persons responsible in case of emergencies are defined in QES documentation and other documented information and are reviewed and revised at regular intervals to prevent or mitigate the consequences of emergency situations.

Relevant information and training of affected employees on the defined emergency preparedness and hazard prevention measures is regularly implemented in a documented manner. The procedures to be followed in the event of occupational accidents and near misses are documented in the relevant QES documents.

Emergency drills are held regularly and documented.

Chains of communication have been established. Communication with external emergency services and their training as required are coordinated in accordance with the relevant national requirements.

8.2.3 Information security risk assessment

Information security risk assessments are conducted regularly, especially when changes occur. The information security team addresses the criteria set out in the QES documentation. Documented information on the assessment process can be found in the associated QES documents.

8.3 Design and development of products and services, and Information Security risk treatment

8.3.1 Design and development of products and services: General

We operate world-class test facilities around the globe. With our leading solutions and innovative methods, we meet our customers' requirements while ensuring the highest quality and reliable results throughout the development process.

To ensure the best possible production and service delivery, a detailed development process is devised, applied and maintained. AVL's technology leadership is secured and further expanded. This is achieved by increasing quality in the innovation area, i.e., by shortening the innovation period (time from idea to delivery to the customer) and optimizing the quality of results and customer benefits for a given innovation effort.

The innovation process supports the effective implementation of the technological and methodological objectives from the strategy process through a systematic approach to the generation and use of ideas, innovations and knowledge, and promotes the creativity of employees. In the area of innovation, it represents the link between the strategy process and the project process/product development process. The innovation process regulates the finding and management of ideas as well as the planning, approval, monitoring and control of R&D projects for technology and methodology development.

8.3.2 Design and development planning

In the context of customer-related developments during order fulfilment, the responsible team is entrusted with development planning. The development of products is planned and controlled by qualified employees. Important factors include the type, duration and scope of

development activities, resources, process phases, responsibilities and documented information.

8.3.3 Design and development inputs

Design and Development specifications are clearly defined for each project. Documentation of inputs considers new developments, changes, customer requirements, standards and third-party regulations.

8.3.4 Design and development controls

The product design and development process is reviewed to ensure compliance with the specified requirements. The reviews are carried out and documented by technically competent employees. Measures are initiated in the case of deviations.

8.3.5 Design and development outputs

The design and development results are documented. This documentation includes statements about whether and how customer requirements were met. The results contain requirements for monitoring and measurement as well as acceptance criteria. The relevant properties of the products in terms of purpose and proper provision are ensured.

8.3.6 Design and development changes

Any planned or unplanned changes in the design and development process are identified, reviewed and controlled. This ensures that there are no adverse effects on product conformity. Design and development changes, results of reviews and initiated measures are documented.

8.3.7 Information security risk treatment

Information security risk treatment is implemented according to plan. Documented information on risk management can be found in the associated QES documents.

8.4 Control of externally provided processes, products and services

8.4.1 General

This control is carried out according to the procedure described in the associated QES documents. All specific documents are clearly traceable from a technical and scheduling point of view and are processed based on the relevant external and internal IMS requirements. Drawings, special identifiers, supplier and customer details, etc. supplement the order specifications. This ensures that externally provided processes, products and services meet the defined requirements.

In addition to the involvement of suppliers and contractors, coordination with customers and other relevant interested parties is also of great importance.

The persons responsible for purchasing according to the QES documentation order from the qualified suppliers in a timely manner and in compliance with the respective defined General Terms and Conditions of Purchase. Details are defined in the AVL Purchasing Handbook and in the respective valid local purchasing specifications. The definition of the incoming goods inspection is made by the requester in the procurement documents. The goods receipt as well as the goods receipt inspection is carried out, registered and the notification is forwarded to the goods recipient as well as the purchaser. An evaluation of suppliers is performed on the basis of criteria defined in the QES documentation.

External suppliers are evaluated, selected and their performance is monitored. Control measures exist for externally provided processes, products and services.

8.4.2 Type and extent of control

Rigorous screening of suppliers ensures that compliant products and services can be consistently delivered to customers. All suppliers providing products, processes or services are evaluated and selected according to the following criteria:

- Quality
- Reliability
- Price
- Delivery terms
- Payment terms
- Service performance
- Sustainability
- Fulfilment of requirements from the IMS-relevant areas

The results of the evaluation are documented and retained.

8.4.3 Information for external providers

Before information required by external providers for service fulfillment is passed on, they are checked for appropriateness in terms of confidentiality, availability and integrity. The external providers receive, for example, information on processes to be provided, products and services, approvals, competences, control and monitoring.

8.5 Production and service provision

8.5.1 Control of production and service provision

The quality and reliability of the entire value chain significantly determines our success. Engineering, simulation solutions as well as the production of measurement technology, test systems and software represent the central value creation processes at AVL.

As a result, production and service provision take place under controlled conditions. This includes, but is not limited to, the availability of documented information and suitable resources, the execution of measurement activities and the use of suitable infrastructure.

Project-oriented order processing enables us to respond individually to the wishes and requirements of our customers. For each project, project teams are formed that represent all capabilities and ensure the processing of orders within the individual objectives to the utmost satisfaction of the customer. The organizational units are considered as service units to ensure all necessary resources.

The project managers are responsible for compliance with quality, costs, deadlines and customer satisfaction. They report regularly to the business unit management on the status of the project and are responsible for the proper maintenance of the data in the respective project controlling systems. The line managers monitor and coordinate the business processes.

The respective core processes are documented in the company's Process landscape (see Chapter 0.3).

8.5.2 Identification and traceability

Outputs from processes that are relevant for the proof of conformity of products and services are identified. The status of the processes is continually monitored. Identification is controlled and documented.

8.5.3 Property belonging to customers or the external providers

Customer requirements are of the highest priority for AVL. For this reason, the handling of property belonging to customers or external providers is carried out with great care.

8.5.4 Preservation

Outputs from service provision and production are documented according to the requirements in the respective applicable software systems during the course of project processing and production. Products are stored and transported according to requirements.

8.5.5 Post-delivery activities

After delivery, the requirements for the products and services agreed with the customer continue to be fulfilled. This includes legal and regulatory requirements, possible undesired

consequences and feedback from customers. The established customer service processes cover the after-sales activities.

8.5.6 Control of changes

Changes in production or service delivery are controlled to maintain conformity with the requirements.

8.6 Release of products and services

Verification and release of products and services is carried out according to the respective specifications in the processes. Release information is documented and retained. This information includes evidence and traceability to the responsible persons.

8.7 Control of nonconforming outputs

Nonconformities may occur during the creation of products and services. Outputs that do not meet the requirements are identified accordingly. These nonconformities are rectified and their recurrence is prevented on a sustained basis. Information on nonconforming outputs is documented and retained. The same applies to issues that are only identified after delivery. If necessary, the affected customers are informed.

9 Performance evaluation

9.1 Monitoring, measurement, analysis and evaluation

9.1.1 General

The performance of the IMS can be assessed by evaluating the defined IMS key performance indicators. Regular audits as well as the evaluation of customer feedback contribute to the performance assessment of the system. The effectiveness of the IMS is regularly reviewed and communicated to the relevant responsible parties.

The monitoring of environmental and OH&S-relevant legal compliance is defined in the QES documentation. Furthermore, regular tours of the company premises are carried out.

9.1.2 Compliance with requirements

9.1.2.1 Customer satisfaction

Customer satisfaction is surveyed, with attention paid to the degree of fulfilment of requirements and expectations. Information on customer satisfaction is documented and retained.

9.1.2.2 Evaluation of compliance

The evaluation of compliance with environmental and OH&S-relevant binding obligations and other requirements is performed regularly. The process is regulated in a global QES document and associated local transitions.

Measures are initiated as required. The results are documented and reported in the management review. A further check of this legal compliance is carried out through internal audits in the respective areas.

9.1.3 Analysis and evaluation

Data collection, evaluation and derivation of necessary improvement measures take place in the respective departments. Based on the results of the analysis, the conformity of products and services, the degree of customer satisfaction, the performance and effectiveness of the IMS as well as the effectiveness of actions implemented to address risks and opportunities are evaluated.

9.2 Internal audit

9.2.1 General

Regular internal integrated audits and continuous observation of day-to-day operations are used to review the effectiveness of the IMS and the efficiency of the company and its processes. In addition, information is collected and assessed to determine whether the IMS meets the requirements of international standards.

9.2.2 Internal audit program

The respective IMS manager is responsible for creating an audit program, including type, frequency, etc. of audits, in cooperation with the associated team. Unscheduled audits may be conducted by the respective IMS managers without internal notice.

Internal audits are carried out in all organizational units, according to their importance for service quality and considering the processes concerned, compliance with legal requirements, any relevant changes and the results of previous audits.

The aim of an internal audit is not only to monitor, measure and evaluate, but also to inform and thus provide a learning effect for the auditees. The respective internal auditors are selected from a qualified and competent group of persons according to the requirements.

The execution of the internal audits and the qualification of the auditors are definded in the corresponding QES documents. The auditors are selected and the audits are conducted in such a way as to ensure the objectivity and impartiality of the audit process.

The audit results, the deviations found, the corrective actions to be taken and recommendations are documented by the auditors in audit reports. The corrective actions are discussed with the audited areas/persons and deadlines for their implementation are agreed upon. The recommendations resulting from the audits are incorporated into the continual improvement process. The results of the audits are brought to the attention of the top management in a condensed form by means of a report.

If approved by the top management, clients are allowed to have an audit to the agreed extent.

9.3 Management review

9.3.1 General

The top management reviews the IMS at regular intervals, but at least once a year. The review serves as a control tool for the top management to check the effectiveness, suitability and appropriateness of the IMS and all regulations created. The review also serves to ensure that the set objectives and the defined strategy of the organization are being pursued. In the event of relevant deviations, the top management immediately initiates corrective and preventive measures and monitors their effectiveness in significantly shorter periods of time. It is an important part of AVL's continual improvement process.

9.3.2 Management review inputs

Forms and guidelines for the management review are defined in QES documents. Inputs for the review include the following:

- Status of measures from previous management reviews.
- Changes in external and internal issues affecting the IMS, including the needs and expectations of interested parties, binding obligations and other requirements, risks and opportunities, and significant aspects of the IMS.
- Extent to which IMS policy has been met and IMS objectives achieved.
- Information on the performance and effectiveness of the IMS, including developments in incidents, nonconformities, corrective actions, risks and opportunities, continual improvement, results of monitoring and measurement, audit results, customer satisfaction, conformity of products and services, compliance with binding obligations, and other requirements, consultation, and participation of employees.

- Adequacy of resources to maintain an effective IMS.
- Effectiveness of implemented measures to deal with risks and opportunities.
- Relevant communication with interested parties.

9.3.3 Management review outputs

The results of the management review include decisions and measures regarding:

- The continuing suitability, adequacy, and effectiveness of the IMS in achieving its intended outcomes.
- Opportunities for continual improvement.
- Any need for changes to the IMS.
- Resources required.
- Actions to be taken if IMS objectives are not achieved.
- Any implications for the strategic direction of the company.

The top management will communicate the relevant results of the management reviews to the employees or their representatives.

The respective management reviews of the affiliates are consolidated by the global IMS managers and serve as input for the global management reviews with the top management. The company retains the documented information as evidence of the results of the management reviews.

10 Improvement

10.1 General

Achievement of the objectives set can only be realized by avoiding or minimizing deviations as far as possible. If deviations are detected, the initiation of corrective measures is an important aspect.

An internally implemented process allows employees to submit suggestions for improvement. They are encouraged to identify suggestions for corrections and improvements and forward them to their superiors or to the IMS managers.

10.2 Nonconformity and corrective action

If nonconformities occur in products, services or processes, they are recorded, and their consequences corrected immediately. If possible or necessary, the causes of a non-conformity are reviewed and eliminated. This prevents a recurrence or the occurrence of

similar nonconformities. The performance of risk assessments is anchored in the QES documentation for different phases in production and service provision.

The effectiveness of the measures taken is reviewed. The IMS is adapted as necessary. The process for dealing with nonconformities is defined in the QES documentation. The company retains documented information as evidence of nonconformities and measures taken.

10.3 Continual improvement

The AVL Improvement Process makes it possible to record improvement suggestions and ideas from employees to improve internal processes and enable more efficient work. This will continually improve the suitability, adequacy and effectiveness of the IMS.

To ensure continual improvement, existing improvement potential needs to be identified and implemented. This is achieved, among other things, through the IMS policy, the objectives, the results of internal audits, the measurement of customer satisfaction and other indicators and other internal and external indications.

Improvements and corrections to the IMS system are the responsibility of the respective IMS managers of the company.

11 Annex

11.1 Applicable Documents

The valid QES documentation can be found in the Document Master List (DML) on the AVL intranet on SharePoint. The QES documents are identified by document number and title and are assigned to the individual standard chapters.

11.2 Table: Relevant links

Chapter number	Path	Section
Chapter 0.1	https://www.avl.com/en/about-avl	Our History
Chapter 0.2	https://www.avl.com/en/press	Key Facts --> fact sheet
Chapter 4.3	https://www.avl.com/en/about-avl/corporate-social-responsibility/integrated-management-systems	Our Certificates
Chapter 5.1.1	https://www.avl.com/en/about-avl	Our Purpose and Values
Chapter 5.2.2	https://www.avl.com/en/about-avl/corporate-social-responsibility/integrated-management-systems	Our Integrated Management Policy

11.3 Organizational Charts

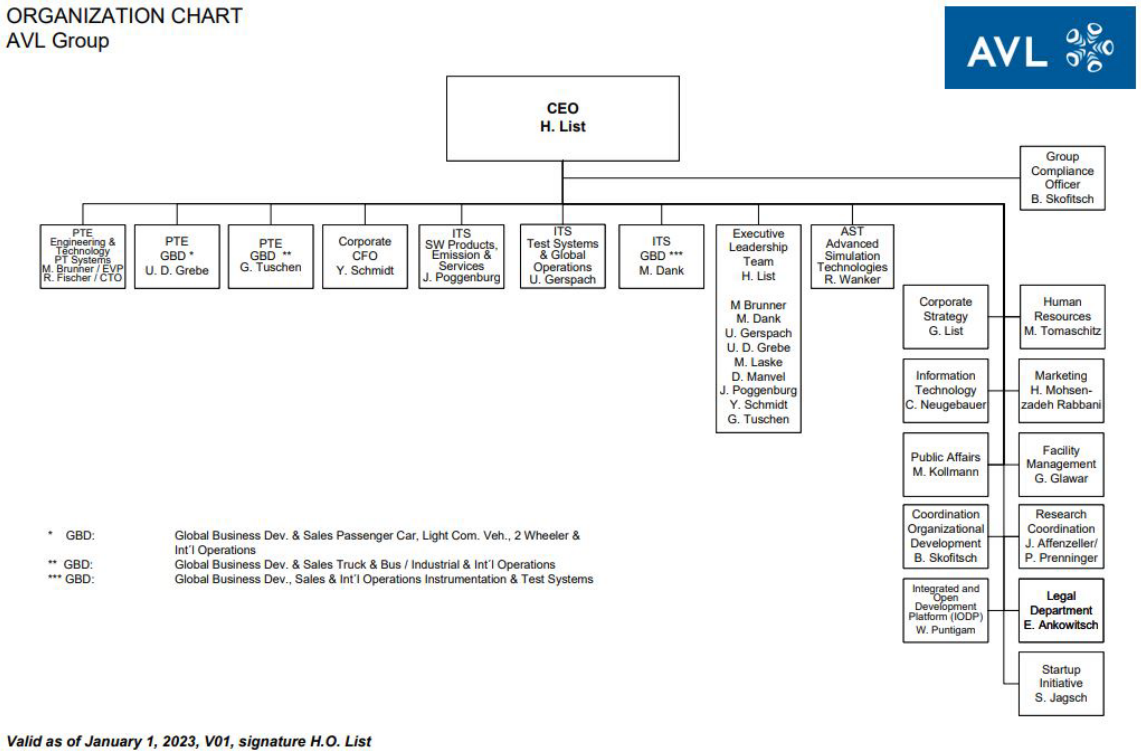

Figure 5: AVL Organization – General overview

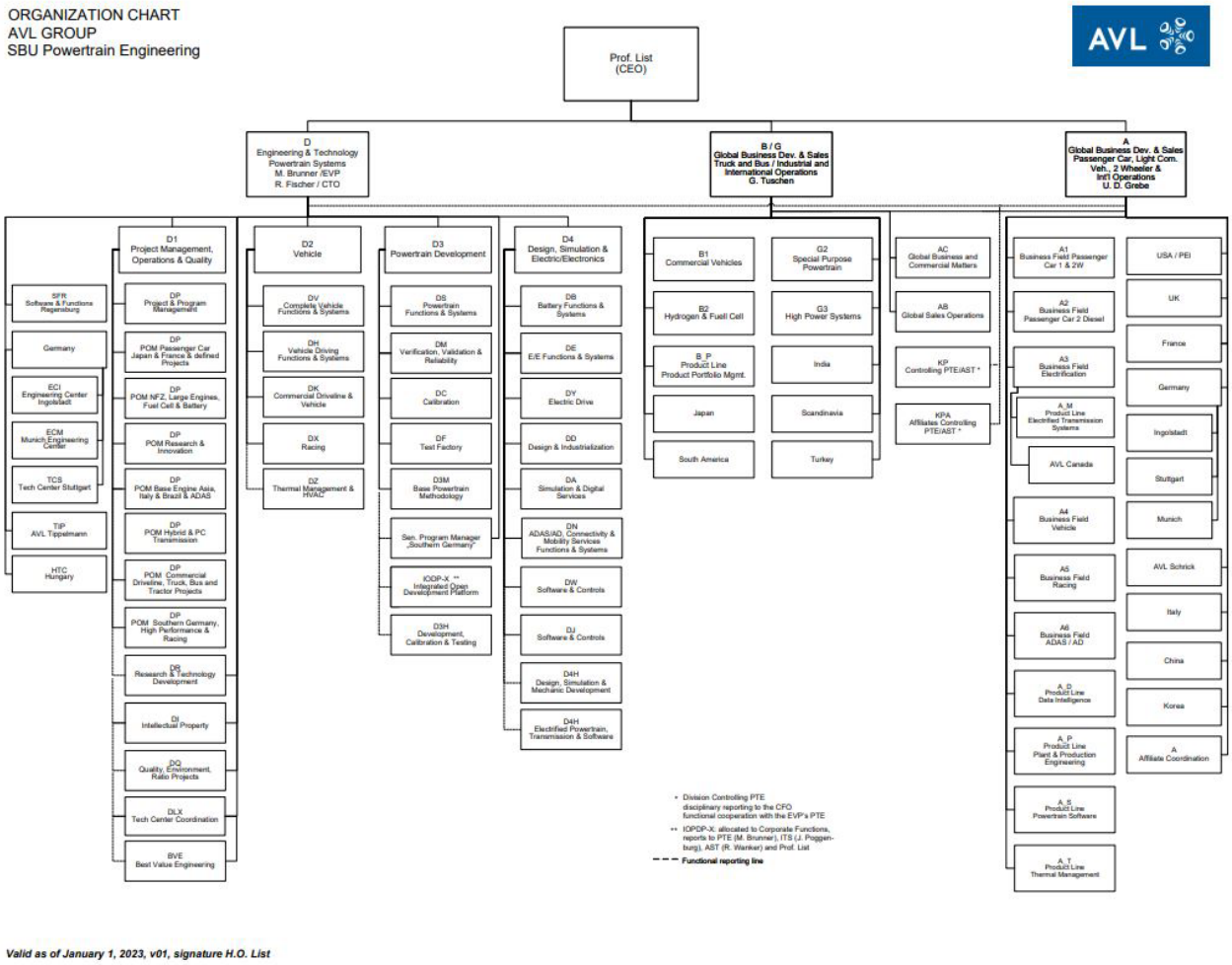

Figure 6: Organizational Chart, SBU Powertrain Engineering

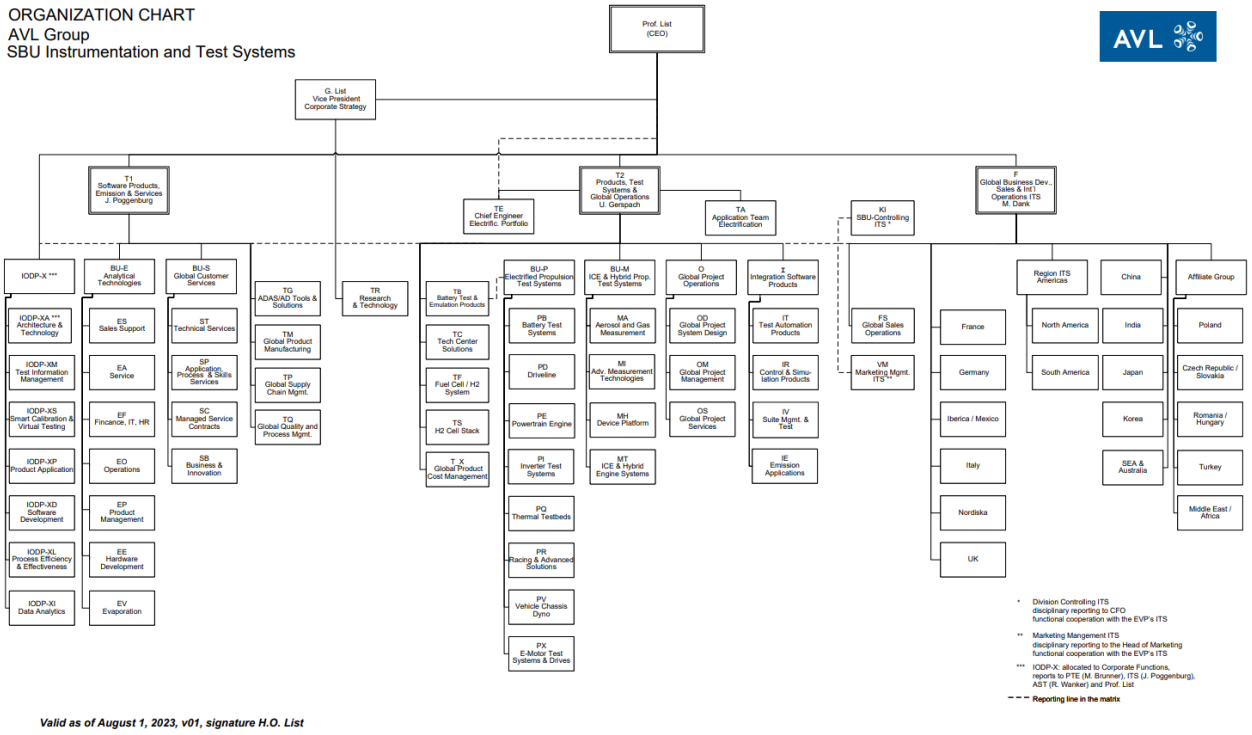

Figure 7: Organizational Chart, SBU Instrumentation and Test Systems

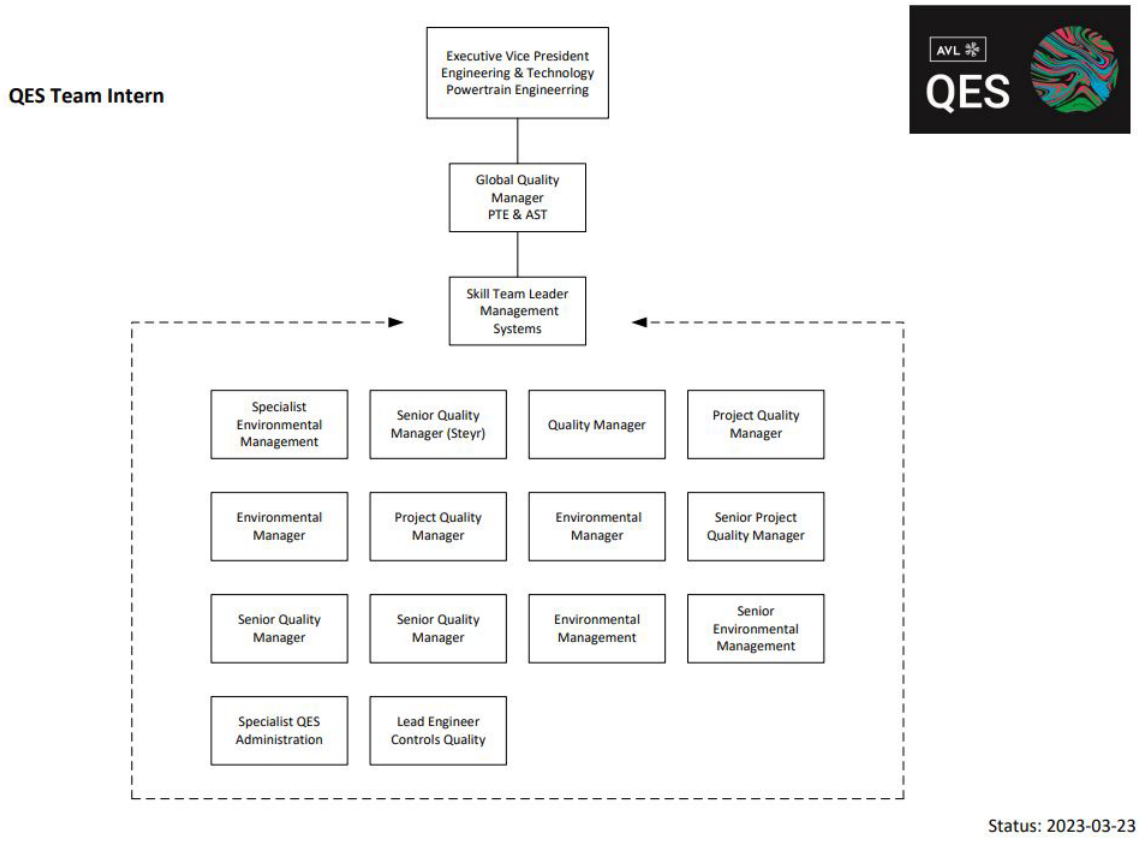

Figure 8: QES Team internal

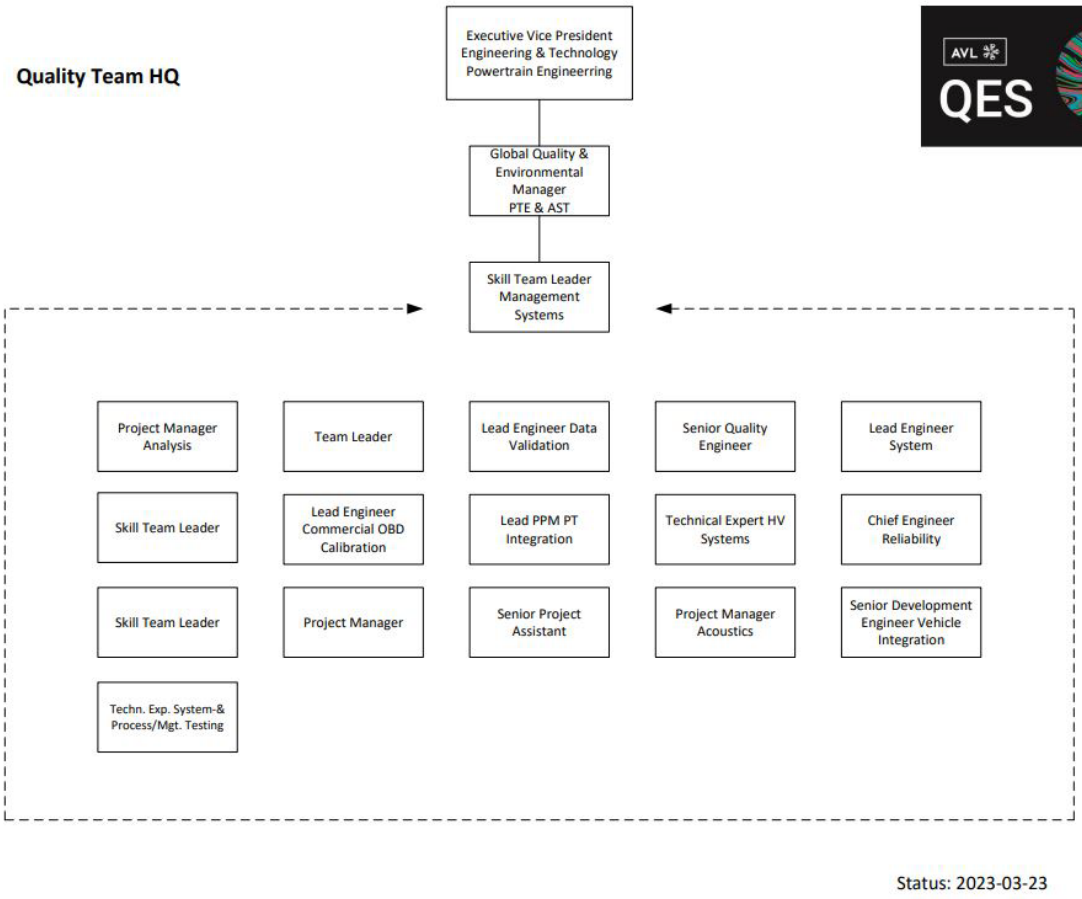

Figure 9: PTE Quality Team (Headquarters)

Organization Chart – ITS Global Quality and Process Management (ITS TQ)

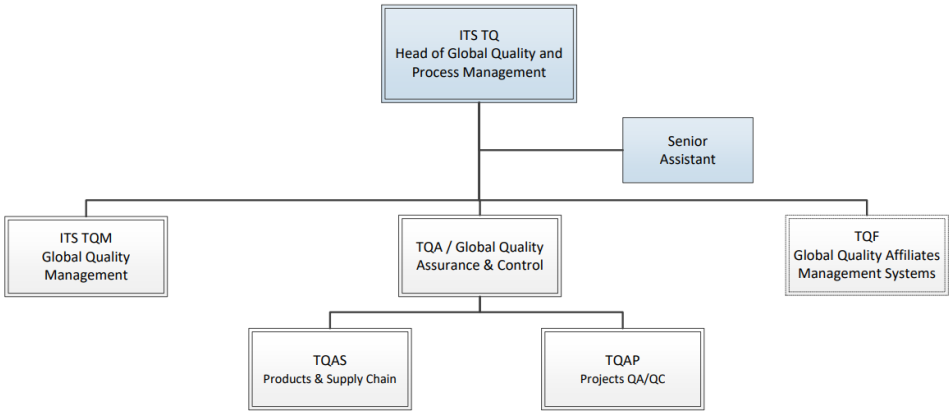

Figure 10: ITS Quality Team Global

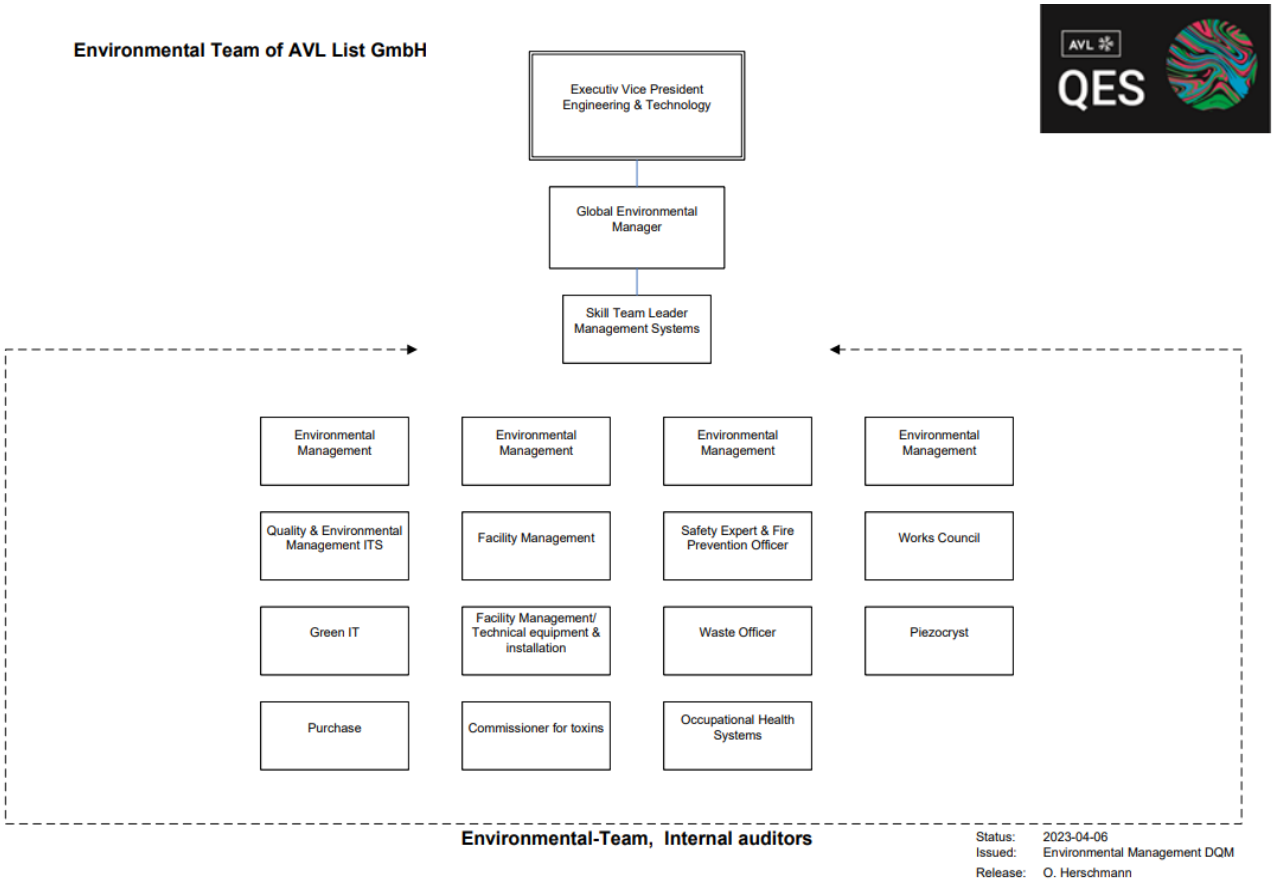

Figure 11: Environmental Team AVL – Headquarters

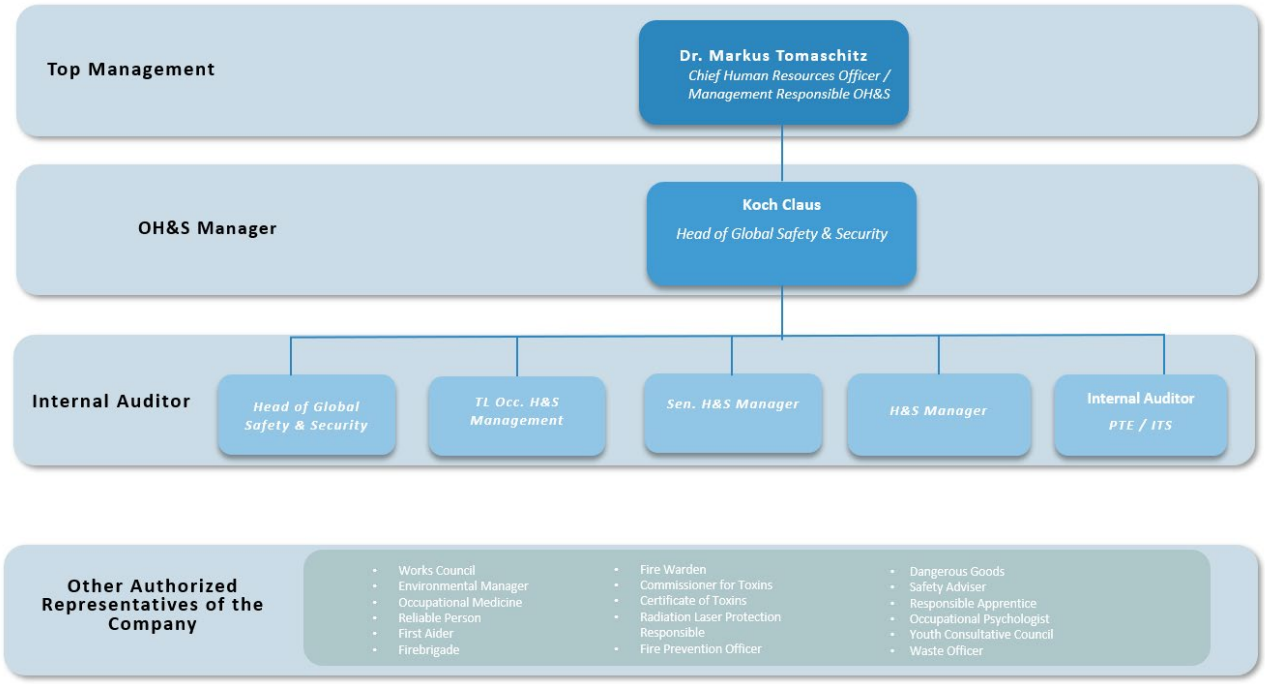

Figure 12: OH&S-Team

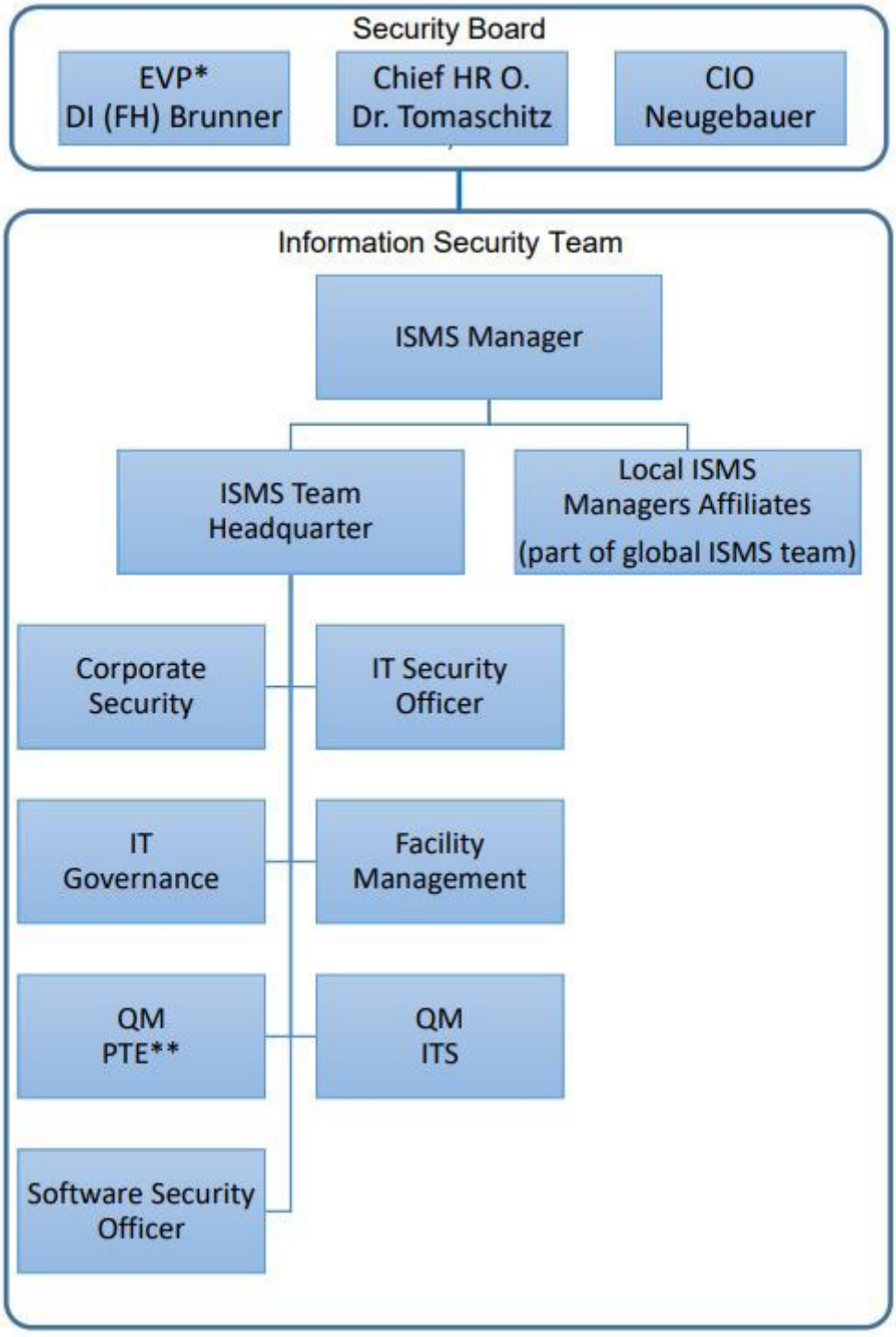

Figure 13: Organization Chart Information Security Management

11.4 Standard closes

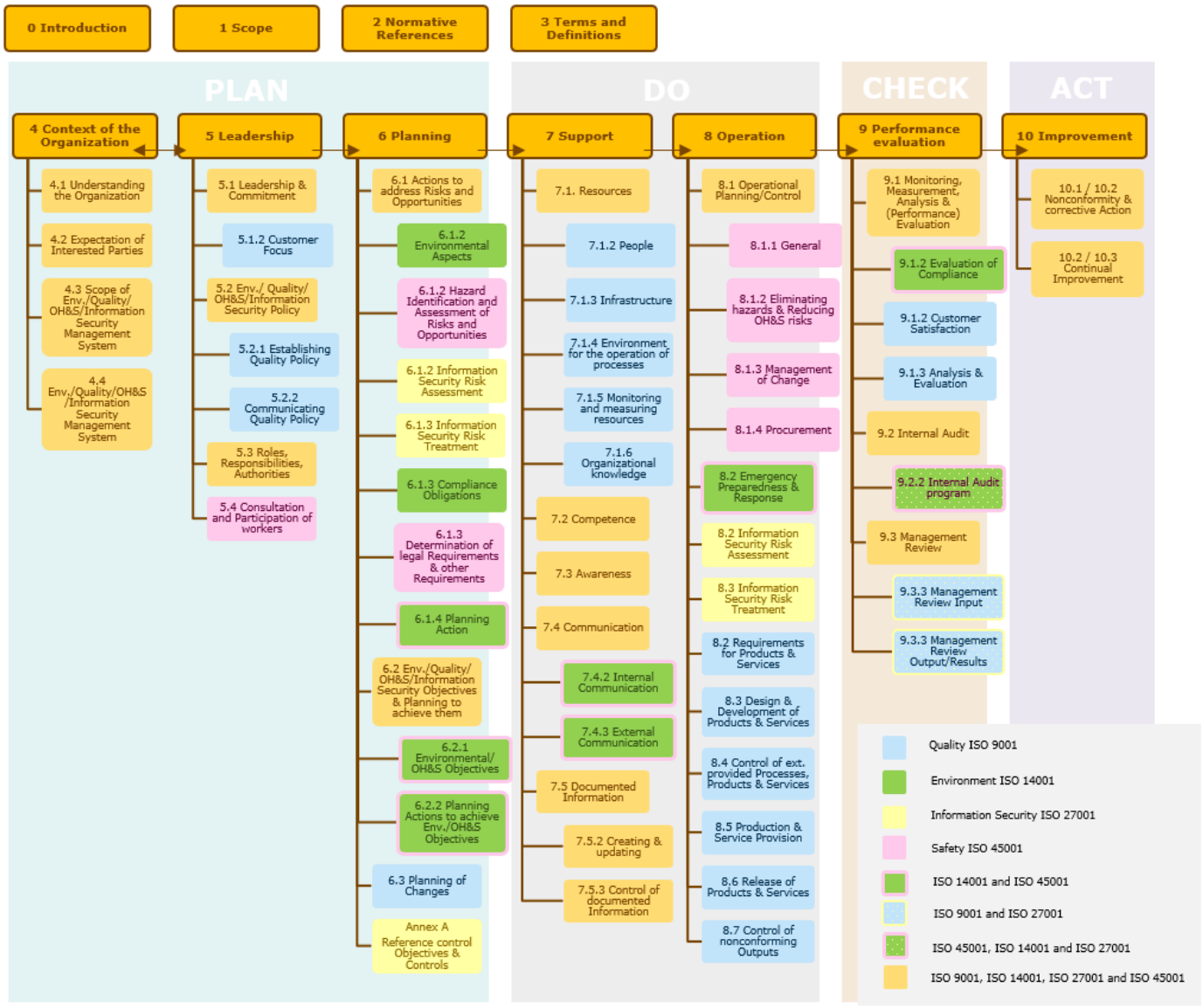

Figure 14: Integrated management system – standard chapters

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