VDA QMC

Verband der Automobilindustrie
Qualitäts-Management-Center

Joint Quality Management in the Supply Chain

Product development

Maturity level assurance for new parts

Methods, measurement criteria, documentation

3rd, revised edition, June 2022

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Preface to the third edition

Increasing product complexity and greater competition, combined with the higher quality demands of end-users and rising warranty and goodwill costs have an ever-greater influence on the cooperation between automobile manufacturers and the supply industry. Recently, the integration of mechatronic parts and software (scope of supply) into vehicles has further increased the need for ever-closer collaboration.

This cooperation is characterized by the intensive interactions involved in the product development process (product and process development up to the start of series production). Activities within the scope of quality assurance are therefore primarily focused on assessing project maturity in order to ensure lasting and robust series-production quality.

This VDA publication focuses on a comprehensive and consistent presentation of maturity levels within the framework of progress in a project covering new parts, combined with an assessment of the maturity of the product and manufacturing process at agreed times within the product development process.

This present VDA publication can be linked with the VDA standard “Robust Production Process”. Thus, no matter which products are to be supplied, a positive maturity level status in all respects is the starting point for robust production processes and is integral to the set of measurement criteria applied at the start of production. In this regard, the measurement criteria in Section 4 “Standards in the process” marked with an “X” in the listed sets of measurement criteria (“RPP” column) are important prerequisites which must be satisfied. The processing of these criteria can be carried out on the basis of this present publication. The status of these measurement criteria must be demonstrated at the “checkpoint” of the robust production process (cf. also VDA publication “Robust Production Process”, Chapter 4).

The methodology for assessing project maturity based on quantifiable characteristics (maturity level measurement criteria) represents an extension of previous advance quality planning methods and can be integrated in the basic requirements (e.g. IATF 16949) and methods already published (e.g. APQP, PPA [Production process and Product Approval], Project management).

The maturity level assurance method can be applied both in internal customer-supplier relationships (within an organization, e.g. groups of companies) and in external customer-supplier relationships (between an organization and its customer or between the organization and its supplier). A significant element is therefore the rules covering cooperation at all stages in the supply chain, with the integration of all those involved in

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the project. To this end, important customer-supplier relationships are defined within the framework of milestone assessments in projects (new projects, face-lifts or other modification projects initiated by the customer), a concrete cooperation model in the project is described and thus the early, cross-functional integration of all those involved is assured.

Definitions of customer and the products to be supplied:

The **customer** is the recipient of the products to be supplied, no matter at what level of the supply chain. The last customer in the supply chain is the OEM and not the vehicle's end user. **Products to be supplied** are contractually agreed new parts/products (products comprise all result categories, e.g. hardware, services, software and processed materials)[1] with their associated development and production processes (e.g. calculations, design and development, logistics concepts).

This present volume is a revision of the second issue, dated October 2009.

The reasons for the revision were:

- A stronger focus on the use of software in the vehicle
- Requirements regarding maturity level assurance within the framework of agile product development

The most significant changes and adaptations which have been made are:

- Revision of the set of measurement criteria based on user feedback in accordance with a continual improvement process, and new requirements
- Introduction of further measurement criteria for product maturity level assurance
- Integration of further measurement criteria and notes regarding software maturity level assurance, including requirements with regard to automotive cybersecurity
- Additions to the notes on the measurement criteria to include the principles of agile collaboration between the customer and the supplier
- Revision of A, B, and C risk classification, inclusion of specific contents pertaining to the use of software in the vehicle
- Definition of A-, B-, C-, D-samples and assignment to the maturity levels

1 See ISO 9001:2015 A.2

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Glossary

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1 Objective, purpose and scope of the study

The following chapters describe three topics:

- The method of maturity level assurance in the supply chain
- Communication in the supply chain
- Standards in the process

Those using this method will be in a position to identify products where the maturity level is critical and to assess their status at specified project milestones in the product development process on an interdisciplinary basis, using standardized maturity levels. Deviations from the objective are controlled by appropriate action management within the supply chain.

1.1 Objective and purpose

Maturity level assurance is a control method within project management, initiated by the customer. By applying specified rules, including the introduction of so-called “round tables”, online applications, B2B portals etc., both the suppliers of products and the customer’s internal organization are involved jointly at an early stage in the product development process. Additional work and delays can be avoided where the elements of maturity level assurance are consciously integrated at an early stage in project management.

The principal objective of the maturity level assurance method is to improve the launch quality, delivery quality and field quality of the products supplied, by harmonizing the contents and operations in the supply chain.

By employing a structured procedure which interrogates the status of defined measurement criteria relating to the associated maturity levels, which in turn are oriented to the milestones of the overall project plan established by the automobile manufacturer, the agreed quality of the products to be supplied is assured.

The maturity level assurance method:

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- establishes a joint understanding of specialist terms and expressions and their definitions,
- involves stakeholders across the entire supply chain in the product development process at an early stage,
- offers all those involved the opportunity to take an active part in action and escalation,
- and leads to the early detection of deviations from the project targets, so that corrective actions can be taken without delay.

By agreement between the parties, the method can easily be adapted to the requirements of any individual project.

For example, individual maturity levels can be left out within the framework of agile development (in particular ML3, ML4, ML5). The relevant measurement criteria then have to be evaluated at jointly agreed-upon intervals.

The cooperation model described below generates transparency and a joint understanding of the project work by all those involved in the product development process.

It must again be stressed that the method is a project management tool and does not replace project management in any way; instead it expands project management by adding the aspect of maturity level control.

Those involved in the project take part in the relevant “round tables” where an appropriate procedure is agreed (for example, using video and telephone conferences, web meetings, B2B portals). A joint kick-off meeting, to be attended by all parties involved, is recommended at the beginning of the process (initial phase) depending on the risk classification (A, B or C, see Chapter 4.1) or experience using the maturity level assurance method.

1.2 Scope of the study

In principle, the maturity level assurance system can be used for all new products as well as for changes (see also trigger matrix, VDA Volume 2).

1.2.1 Risk classification (prioritizing)

Risk classification is carried out at each stage of the supply chain (Tier ‘n’ stage) by the customer for the product(s) to be supplied by the next stage down.

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After contract award, the classification can be adjusted based on the risk (see ML2, No. 2.6.1 in Chapter 4.3).



Risk classification	
A	High maturity level risk
B	Medium maturity level risk
C	Low maturity level risk

Fig. 1-1: Principle of risk classification

1.2.2 Applying maturity level assurance depending on risk classification

Depending on the risk classification, cooperation within the framework of maturity level assurance is carried out at three different application levels (for the intensity of cooperation, see Fig. 1-2 and Chapter 2.1.3.3 “Carrying out maturity level assurance depending on the risk classification (prioritization)”).

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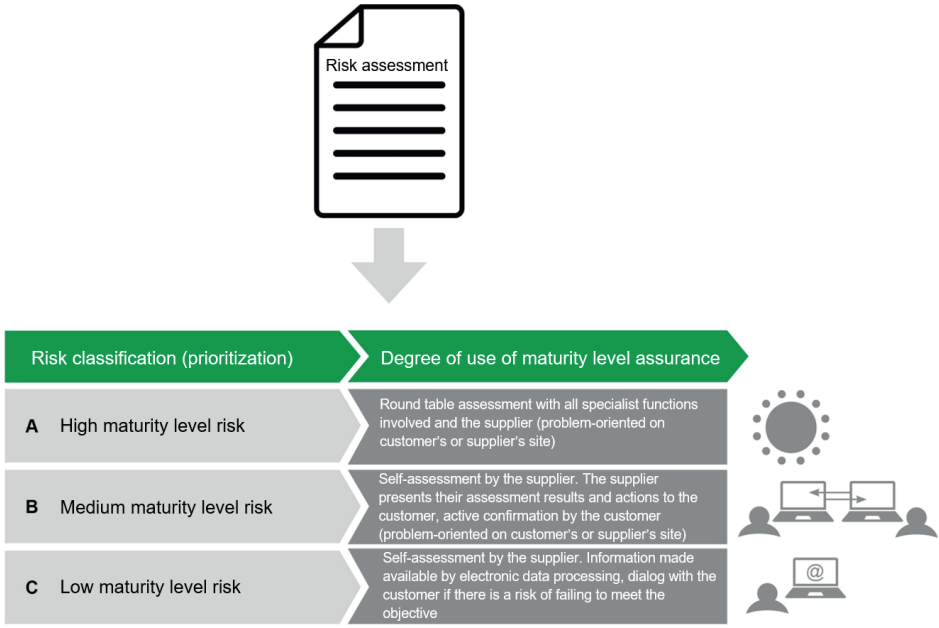


Fig. 1-2: Application levels according to risk classification

1.3 Applying maturity level assurance in the supply chain

Maturity level assurance for products to be supplied is incorporated into the existing project management and is based on a maturity level milestone philosophy with a total of eight maturity levels (ML0 to ML7). The timings of these are agreed jointly between customer and supplier at the start of the project. The maturity level assessments ML0 and ML1 are done by the customer in collaboration with a development supplier, if required. From ML2 onwards, the customer collaborates with the series supplier. Each maturity level describes the status regarding achievement of the objective in terms of the maturity of product, process and project at the agreed milestones. At the same time, potential risks in the overall project are detected at an early stage, so that they may be countered by appropriate actions, schedules and responsibilities. All maturity levels build upon each other and must be assessed in the specified sequence in the product development process on the basis of clearly defined measurement criteria.

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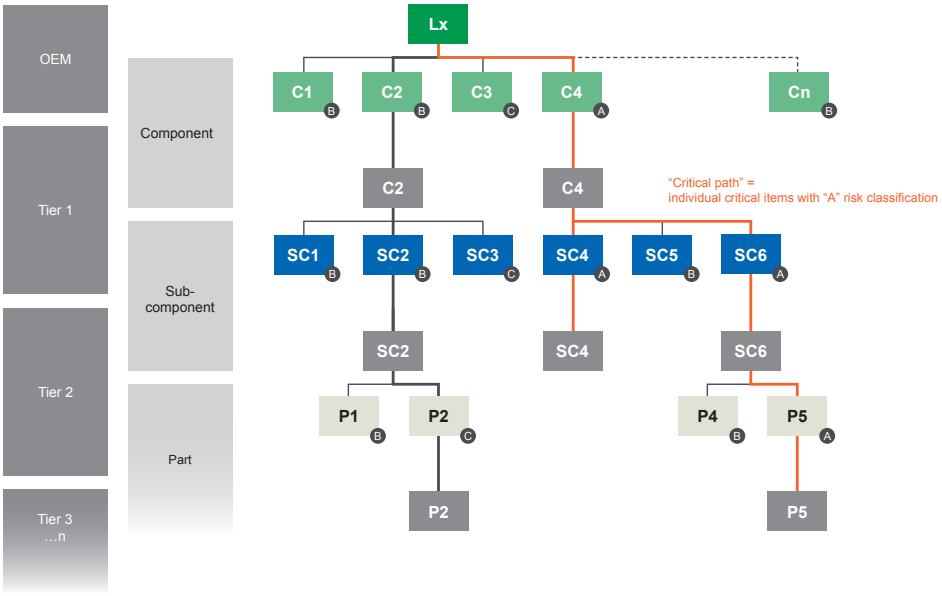


Fig. 1-3: Illustration of a critical path

Note: An essential requirement in achieving the objective is to involve qualified personnel in the maturity level assurance process.

In case of issues critical to the maturity level, Tier n suppliers can be involved in a higher-level "round table" provided that the contractual partners give their consent.

1.4 Sample classification (A-, B-, C-, D-samples)

In the product development process, A-, B-, C-, D-samples serve

- to confirm the functional principle,
- to check the installation space and manufacturability, in order to specify a constructive design,
- to carry out tests,
- to achieve technical release,

to ultimately achieve a release based on the tests in order to achieve release for series production (Production process and Product Approval [PPA] process).

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The complete description / definition can be found in Chapter 4.2.

The sample phases were assigned to the individual maturity levels accordingly (see Fig. 1-4).

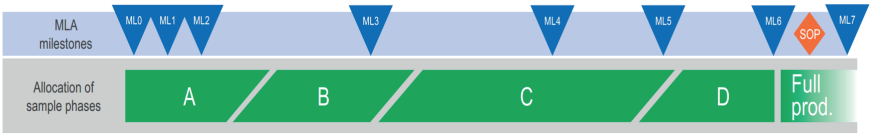


Fig. 1-4: Allocation of the sample phases to the individual maturity levels

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2 Contents of maturity levels

The maturity level assurance model begins with ML0 in the concept phase and ends with ML7 after SOP (Start of Production) - generally not later than 6 months after SOP.

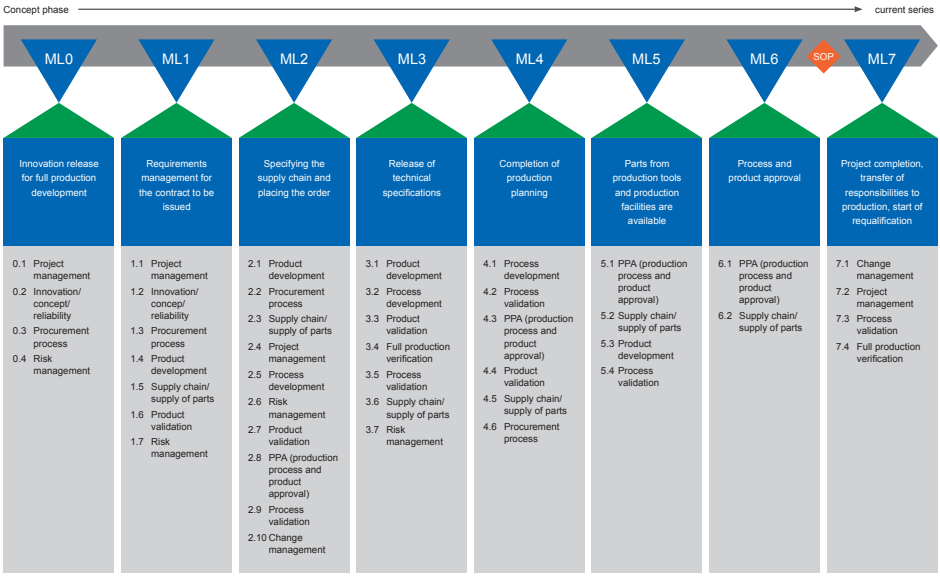
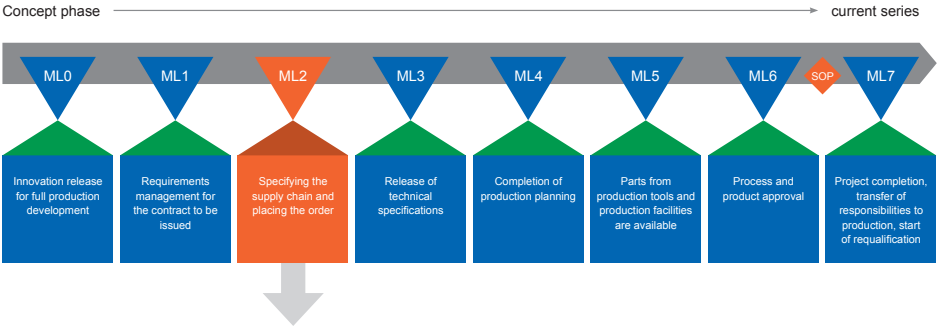


Fig. 2-1: Overview of the contents of maturity levels ML0 to ML7

Maturity levels are aligned both with the project schedule for the vehicle (or the customer's product) and the project-specific timings for the products to be delivered. They can easily be integrated into the associated product development processes established by the OEMs or the suppliers.

Fig. 2-1 gives an overview of the various maturity levels with their associated indicators. Standardized measurement criteria are allocated to these maturity level indicators (see "measurement criteria sets" in Chapter 4.3).

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Maturity level indicator	Profile of measurement criteria
2.4 Project management	2.4.1 The project organization has been specified with contact persons on the customer's side. 2.4.2 The project organization has been specified with contact persons on the supplier's side. 2.4.3 Escalation rules/procedures have been specified. 2.4.4 Data formats/documents, communication paths and the project language have been specified. 2.4.5 The project schedule relating to the products to be supplied has been drawn up, agreed upon and released. 2.4.6 Deviations from the project targets at the level of the products to be supplied have been checked and highlighted, and measures have been defined. 2.4.7 Interfaces to other projects and component applications by the supplier and customer have been clarified. 2.4.8 Strengths and weaknesses analysis and lessons learned documentation have been updated. Actions have been derived.

Fig. 2-2: Allocation of measurement criteria to indicators

The maturity level assurance system is an "open" system. The measurement criteria relating to all maturity levels are defined so that they are universally valid and can be applied for all the functional areas of a vehicle (including software, electrical and electronic components).

The sets of measurement criteria consist of measurement criteria and associated explanatory notes and examples. The measurement criteria should be selected on a product/process-specific basis and expanded, analyzed and evaluated when necessary. Notes on VDA publications in the comment column are only provided for reference purposes and are not part of the basis of assessment. No claims are made that they are complete. To illustrate change-overs from one maturity level to the next, relevant measurement criteria are set again as repeat questions ("R" questions) in the following maturity levels.

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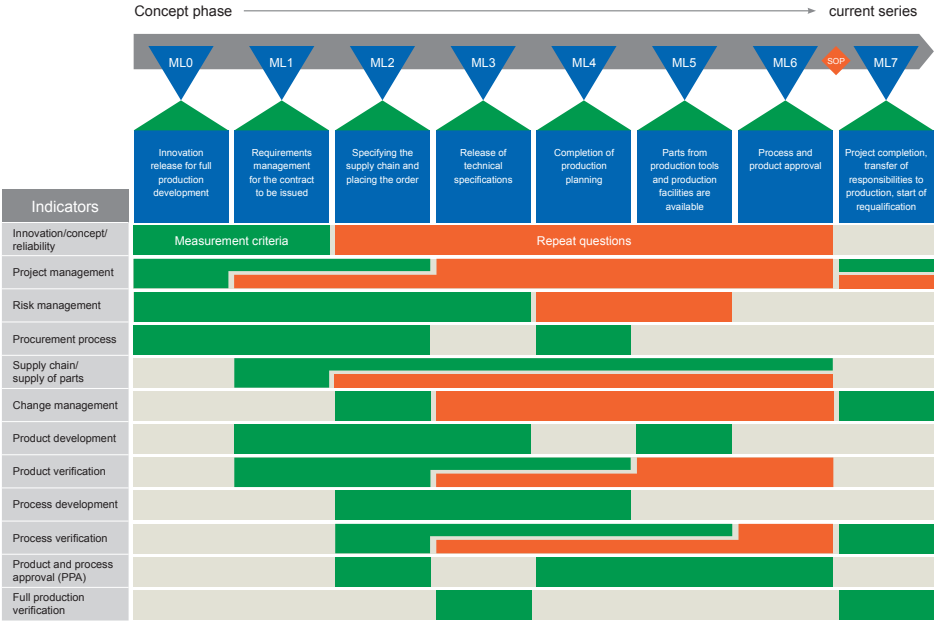


Fig. 2-3: The contents of maturity level assurance

2.1 Phases of maturity level assurance

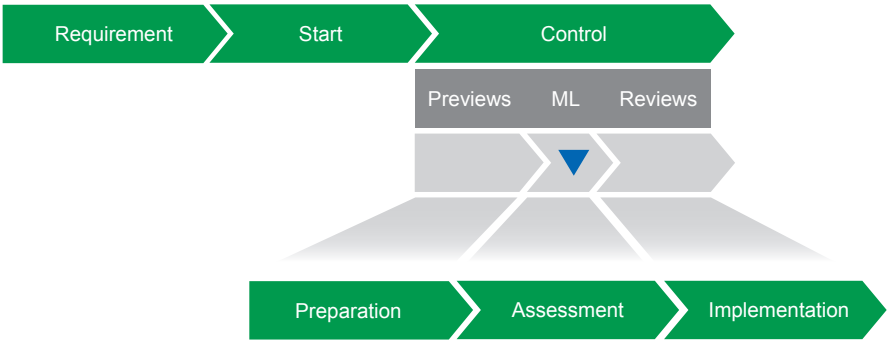


Fig. 2-4: Schematic illustration of the maturity level assurance method

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The three phases for the implementation and realization of maturity level assurance are broken down into:

- prerequisite,
- start
- and control.

2.1.1 Prerequisite

In order for the maturity level assurance method to be used, it is necessary to make customer-specific preparations for the products to be supplied.

Prerequisites:

1. Approval must be given for the use of the maturity level method within the customer's organization
2. A description of the product to be manufactured must be provided (e.g., framework specifications, component specification)
3 There must be initial, provisional planning covering the products to be supplied – that is, alignment with the product development process for the vehicle and the module or component project plan
4. Potential suppliers
5. There must be a common standard covering risk classification in the supply chain
6. A risk classification must be available for all the products involved (see Chapter 1.2.1 Risk classification)

2.1.2 Start

The start of the maturity level assurance process depends on the current situation regarding the award of orders and contracts. The scheduling of the individual maturity levels results from the component-specific schedule; the designations of the maturity levels ML0...7 serve as a reference (e.g. scheduling ML3 in accordance with the planned date of the "release of technical specifications").

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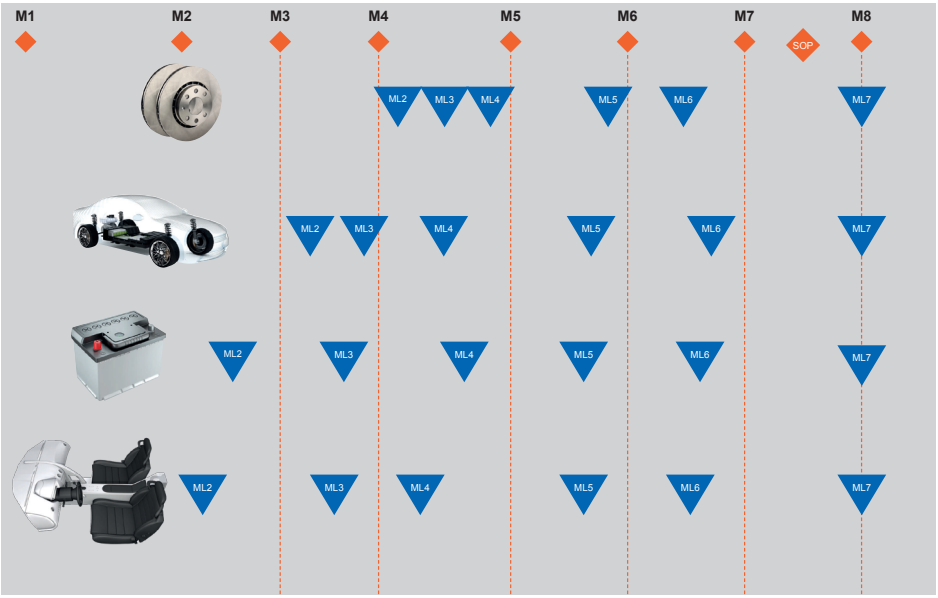


Fig. 2-5: Scheduling of maturity levels, milestones M1 to M8 in the overall vehicle schedule

Maturity levels ML0 and ML1 contain the measurement criteria applicable within the customer's organization. However, they also cover interfaces to concept suppliers and innovation suppliers (development suppliers). At the latest, maturity level assurance with the supplier should begin at ML2 ("Specifying the supply chain and placing the order"). Starting later (that is, after ML2) will significantly limit the controls which can be applied. If a start is made after ML0 (for example, at ML1 or ML2) it is recommended that a check is made on all the criteria for the previous maturity levels (in this example, ML0 or ML0 and ML1) and that their status is assessed.

When starting a maturity level assurance process for a specific product to be supplied, the following points must be agreed upon between the customer and the supplier:

1. Specification of the level of application, depending on the risk classification, and agree on the manner in which it is to be implemented.

2. Documentation of the maturity levels and assignment of the maturity levels to the milestones in the product development process which has been established by the OEM or the customer.

3. Specification of the responsibilities involved in the maturity level assurance process, both on the customer's side and the supplier's side:

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- Responsibility for contents, objectives and the planning of timings and reviews
- Establishing cross-functional teams with agreed methodologies and forms of communication (“round tables”, see Chapter 3.1)

4. Specification of scheduling:

- Generation of the schedule from the overlying project schedules and product development processes
- Communication of the schedule across the entire supply chain (see Chapter 3)
- Integration of the maturity level dates and deadlines into the overall product development process
- Determination of scheduled status reports on the maturity levels to be issued to the respective project monitoring committees, e.g. Steering committee for the project (project control group)
- Specify planned completion dates for the maturity levels, including essential review / preview dates. (Recommendation: At least one review / preview date is for each of the maturity levels; additional dates should be planned, depending on the results of the assessments). The review and preview can be combined for the relevant maturity level.

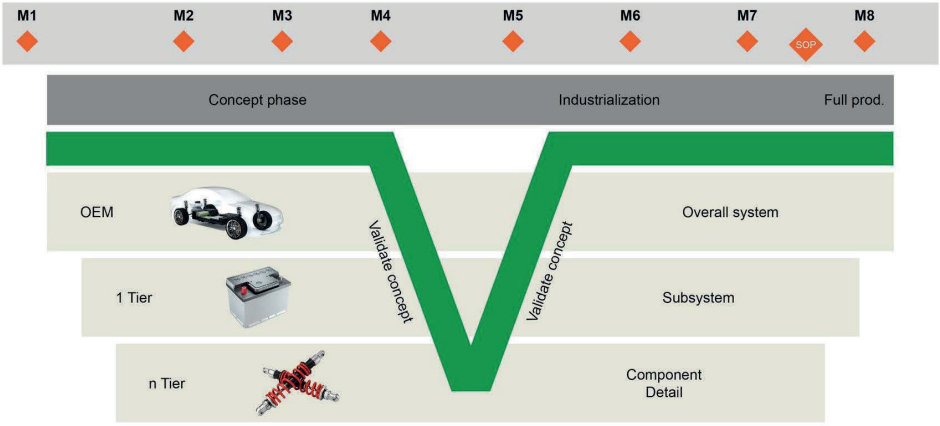


Fig. 2-6: Carrying out maturity level assurance in the supply chain

5. Confirmation of project objectives relating to the product to be supplied:

- Specify the measurement criteria (e.g. criteria covering electrical and electronic parts or software are not relevant to bare metal parts).

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6. Agreeing on the procedure for assessing the measurement criteria:
    - Papers and documents relating to the assessment should be checked by the team regarding their contents (e.g. FMEAs, QM plans, control plans, production sequence plans, layouts).
7. Carrying out a risk assessment for the operations in the supply chain in order to identify potentially critical paths.
8. Specification of documentation requirements for the maturity level management:
    - Project documentation
    - Action management
    - Escalation procedure
    - Reports on the maturity level status
9. Specification of criteria for closing the project and transferring it to series production (see also ML7).

2.1.3 Steering

Steering consists of the following steps:

- Preparation of the maturity level assessment,
- Assessment including the definition of measures in case of results deviating from the measurement criteria,
- Status report to the relevant control groups for the project and confirmation of the defined measures (see Chapter 2.2),
- Implementation of the measures, demonstration of the effectiveness of the measures and post-assessment of the respective measurement criterion,
- Post-assessment of the completed maturity levels

and represents a repeating control loop for each maturity level.

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2.1.3.1 Preparation

The following procedure is recommended as preparation for the maturity level assurance process:

- Obtain necessary maturity level assurances from the supply chain
- The supplier should carry out a self-assessment, including proposed actions if deviations are noted
- Confirmation of the date for the maturity level assessment

2.1.3.2 Assessment

The individual maturity levels are assessed on the basis of “traffic-light” colors.

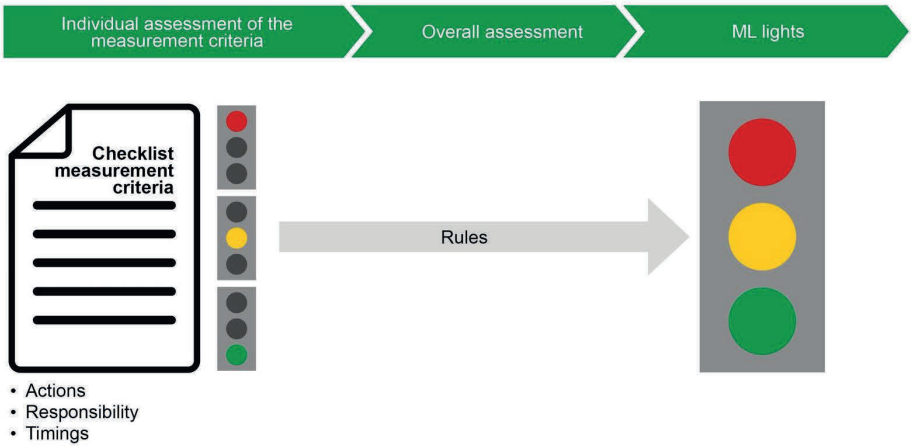


Fig. 2-7: The principle of maturity level assessment

A set of measurement criteria is allocated to each maturity level.

All measurement criteria are formulated that they can be clearly answered with a “yes” or “no”.

Each individual measurement criterion is assessed with a traffic-light color (RED, YELLOW, GREEN). The assessment criteria for the traffic-light colors are defined in Fig. 2-8.

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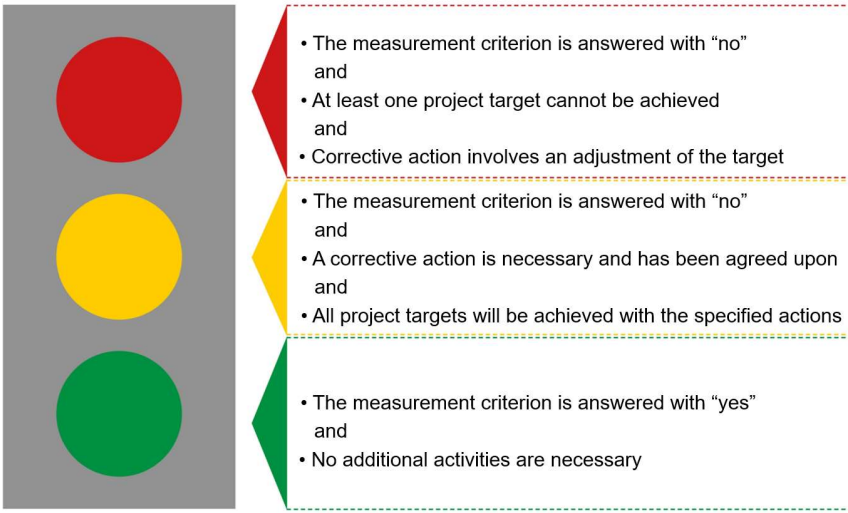


Fig. 2-8: Definition of traffic-light colors for maturity level assessment

The following rules apply for the maturity level assessment:

1. The fulfillment of all measurement criteria is indicated by a “yes” or “no”. Each measurement criterion is assessed with a traffic-light color. The assessment made by the person receiving the result is the assessment which counts.

Maturity level X	Overall assessment		
Measurement criterion	Assessment Producer	Assessment Consumer	Overall assessment by meas. criterion
Criterion 1	Customer	Supplier	
Criterion 2	Supplier	Customer	
Criterion 3	Customer	Supplier	

Fig. 2-9: Overall assessment of maturity level based on consumer’s assessment

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2. Each maturity level is given an overall assessment. This overall assessment is the same as the worst assessment of any of the individual measurement criteria within that single ML.

3. If an assessment of a maturity level is not provided or is incomplete at the time it is due the overall assessment is automatically set to RED and the escalation procedure is launched.

4. Changes which influence the objective of the project (e.g. a change of concept, change of supplier), the influence on the preceding maturity levels must be assessed.

5. The assessment is carried out separately at each level of the product to be supplied. For this purpose, each next-higher level in the supply chain must assess what influence the traffic-light color has on subsequent and higher-level stages of the delivery project (see Fig. 1-3).

6. If the maturity level is assessed as RED the new objectives must be confirmed by the responsible party.

7. Questions answered with “no” require follow-up measures to be defined. Clear timings and responsibilities must be specified for implementing these actions. The objective is to complete the specified actions before the next maturity level is reached and to assess their effectiveness.

8. Actions not yet completed must be tracked until the measurement criteria are assessed as GREEN. This applies in particular to uncompleted actions in the last maturity level (ML7). As long as these have not been completed, ML7 must be repeated.

Once the assessment has been completed, status reports are issued regularly to the control groups handling the project (see Chapter 2.2).

The cascade of maturity traffic lights shown in Fig. 2-10 illustrates how the overall assessment of the maturity level is determined by the worst individual assessment (cf. item 2 in the rules for maturity level assessment).

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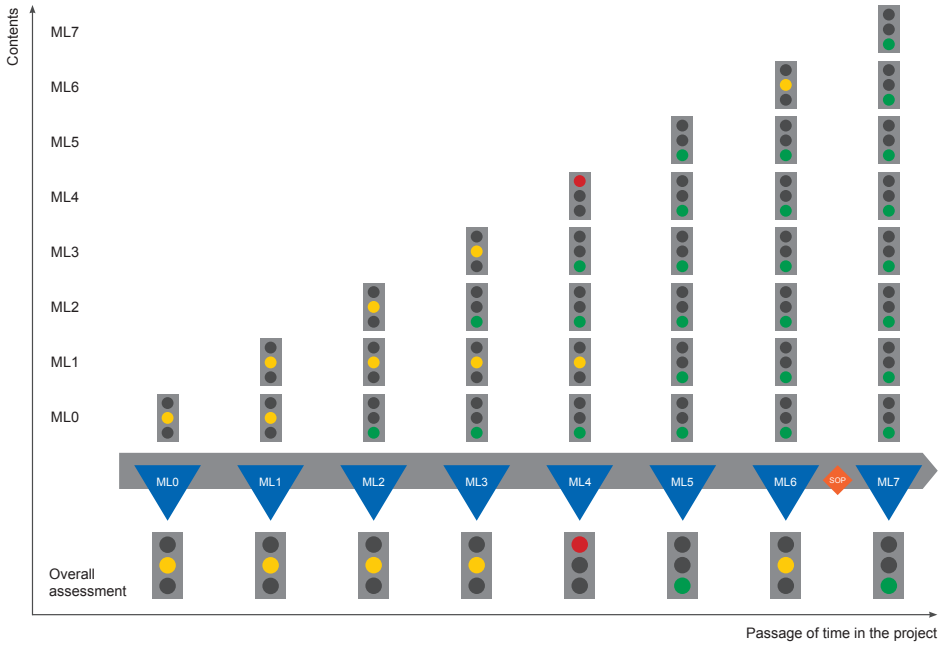


Fig. 2-10: Example of a cascade of maturity level traffic lights

The cascade of maturity traffic lights ensures transparency and traceability of the maturity level status depending on the objective, both at all maturity levels for a component and at all maturity levels within a project.

In the vertical plane, the topmost traffic light in the cascade (Fig. 2-10) automatically adopts the worst color of all the preceding traffic lights below it, i.e. the overall status depends on the individual results. For example, if a maturity level is not set to GREEN when the next maturity level stage is reached, this next maturity level stage automatically adopts the color of the previous one, regardless of the individual assessment:

- ML3 is assessed overall as YELLOW because the worst individual result is YELLOW (ML1 and ML3)
- ML4 is assessed overall as RED because the worst individual result is RED (ML4)
- ML5 is assessed overall as GREEN because all the other individual results are also GREEN

In addition to displaying a cascade of maturity traffic lights in a single illustration which shows in full the progress of maturity levels in a project, it is also possible to measure

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the quality of individual processes, so that potentials for improvement can be derived (see Fig. 2-11).

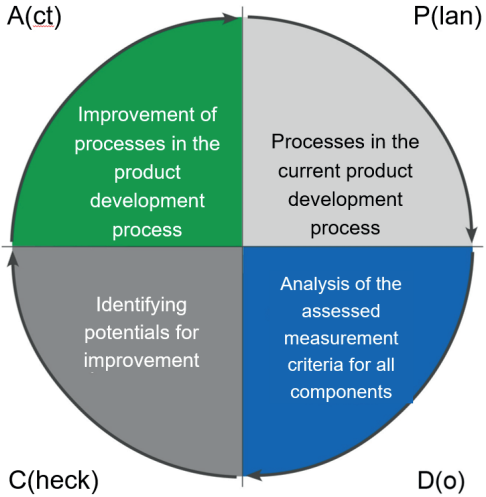


Fig. 2-11: Analysis of the measurement criteria for all components based on a maturity level for assessment of process quality

2.1.3.3 Carrying out maturity level assurance depending on the risk classification (prioritization)

For parts classified as “A” risks (prioritized) the person carrying out the assessment and the person receiving the result must assign a traffic-light color. In the case of “B” and “C” risk-classified (prioritized) parts the supplier must carry out their own assessment (self-assessment). In other words, the supplier assesses the fields in which they are producer or consumer in the same way as for “A” risk-classified (prioritized) parts. In this case, however, the customer does not carry out an assessment. The result of the assessment is then entered in the “Overall assessment” column.

For “B” risk-classified (prioritized) parts the supplier presents their assessment results and actions to the customer and the customer gives active acknowledgment of the assessment results (plausibility check).

In the case of “C” risk-classified (prioritized) parts, the supplier transmits their assessment results to the customer in the manner agreed upon.

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If the maturity level risk changes in the course of work on the project, the maturity level assurance may deviate in individual cases from the “ABC” risk classification system. For example, “round table” meetings may be held for a “B” risk-classified (prioritized) part if, e.g., changes are involved which jeopardize the achievement of the project objectives.

2.1.3.4 Implementation

For activities carried out after the maturity level assessment, the following procedure is recommended:

- Definition of actions in order to achieve the measurement criterion, responsibility and deadline
- Demonstrate that the agreed actions have been carried out on time and effectively
- New assessment of the criterion after confirmation of the effectiveness of the actions

2.2 Status report covering maturity level, corrective actions and escalation

Significant elements to ensure the effective use of the maturity level assurance method are a reporting system (ideally standardized), agreed throughout the entire supply chain, a procedure for specifying and tracking corrective actions and an escalation procedure.

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Fig. 2-12: The reporting principle in terms of hierarchy

2.2.1 Maturity level status report

The reporting - including its format and frequency - on the maturity level status throughout the supply chain is specified in the “Start” phase of the project (see Chapter 2.1.2) and will depend on:

a. the risk classification (see Chapter 4.1 in conjunction with Chapter 1.2.1)

b. and the customer’s specifications.

The contents of the status reports are determined from the measurement criteria. A procedure must be agreed between customer and supplier for specifying and tracking corrective actions, including their documentation.

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2.2.2 Escalation

Escalation is initiated by the assessment of a maturity level as “RED”.

The escalation procedure in the customer’s organization and the supplier’s organization must be specified at the start of the project. The relevant responsible contact persons in the organizations’ hierarchy must be named.

Escalation takes place in accordance with the maturity level status and the status regarding the implemented measures. It can therefore be understood by everyone involved.

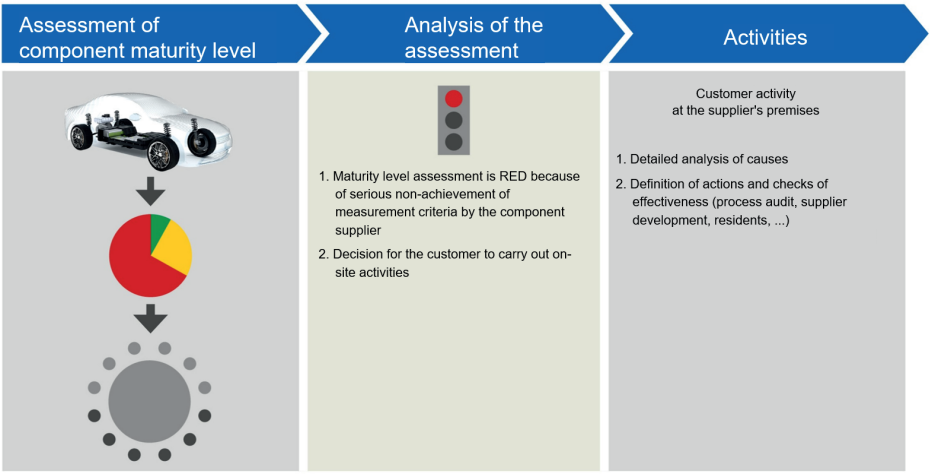


Fig. 2-13: Example of escalation: customer activity at the supplier’s premises

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3 Communication in the supply chain

Communication flows from the customer (OEM, Tier n) to the suppliers involved in the supply chain (Tier n +1). The customer is the driver for carrying out communication.

Rapid and prompt communication at lower levels is absolutely essential in order to ensure that on-time evaluations can be made on higher-level maturity levels, e.g. Vehicle maturity level at the OEM. This must be borne in mind by those involved when specifying the milestones.

The following figure provides an illustration of the principle of a communication cascade, based on ML2.

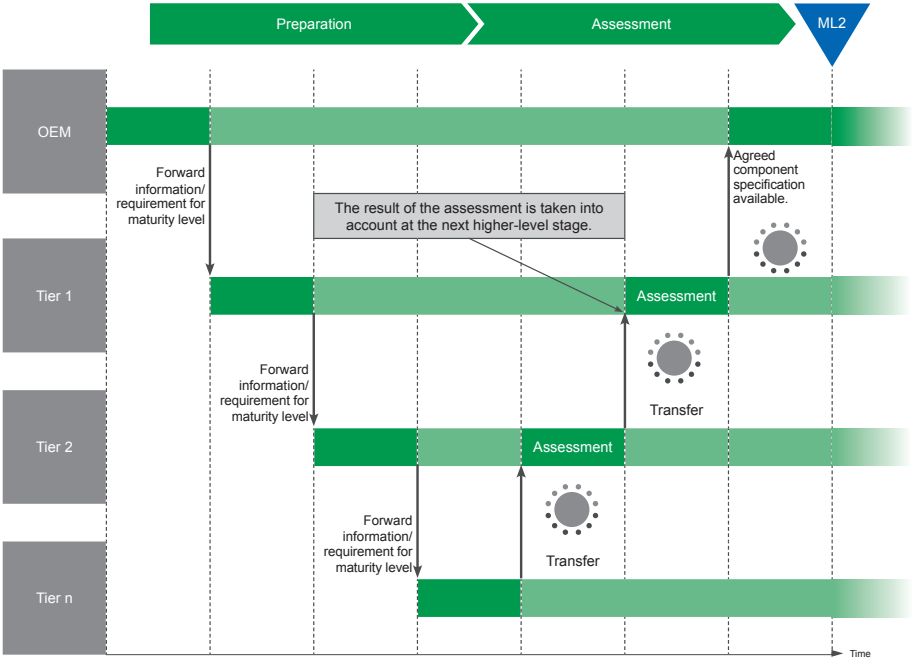


Fig. 3-1: The principle of a communication cascade based on ML2

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3.1 Exchange of information at “round table” meetings

A core element of communication in the supply chain is the introduction of so-called “round table” meetings. The “round table” meetings are attended by representatives from specialist departments, both from the customer’s and the supplier’s organization e.g.:

- Quality management
- Development
- Purchasing
- Logistics
- Production planning
- Sales
- Project Management

As described above, a “round table” is a team of experts assembled on a cross-functional basis. It is important to establish the make-up of the team at an early stage and to ensure that the same expertise is represented both on the customer’s and the supplier’s side. If the “round table” is expanded in individual cases to include other specialist departments, this “mirror-image” representation should be maintained.

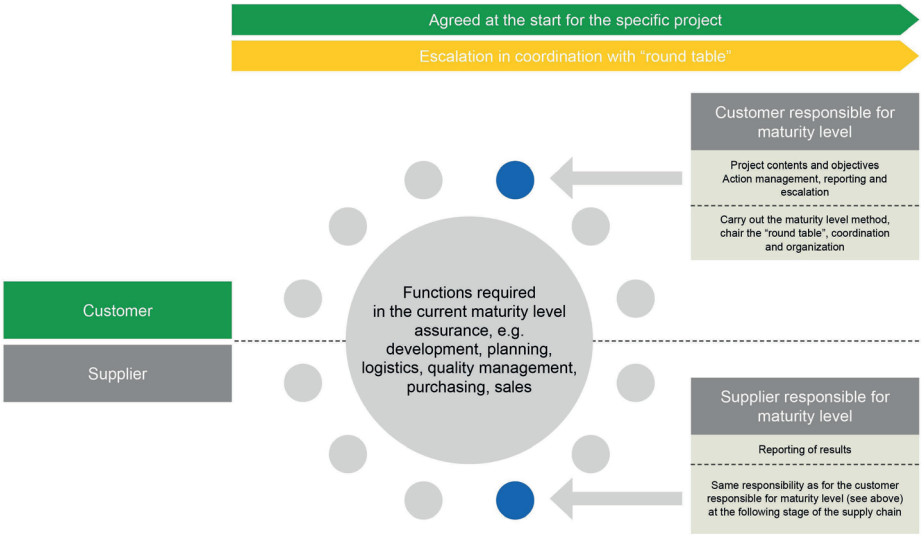


Fig. 3-2: “Round table” organization

The “round table” must not be regarded as a “separate committee” which is responsible only for maturity level assurance. It is the central steering committee between customer

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and supplier, dedicated to achieving all project objectives and is an integral part of the project activities. This also means that participants of the “round table” should also be involved in the project (for further types of collaboration, see VDA Volume Agile Collaboration). “Round table” meetings can be held at the customer’s premises or at the supplier’s premises and can also take place in the form of online meetings if this is agreed upon.

3.1.1 Responsibilities

Within the scope of the “round table” communication, responsible persons must be named both on the customer’s and the supplier’s side, e.g. for:

- Chairing the “round table” meetings
- The specification of the project contents and objectives
- Coordinating and organizing reviews, previews, etc.
- Action management
- Reporting of results
- and the initiation of escalation, if required

To the extent possible, this principle (see Fig. 3-1) must be cascaded in the supply chain – i.e., the customer’s “maturity level officer” will sit at a “round table” with the supplier’s “maturity level officer” to discuss products which have been identified as subject to risk.

3.2 Exchange of information via “supplier self-assessment”

3.2.1 The supplier presents their assessment and actions to the customer (“B” risk-classified (prioritized) part)

The organization and responsibilities, both for the customer and the supplier, must be carried out in a similar manner to that described for the exchange of information using the “round table” system (Chapters 3.1 and 3.1.1). The supplier’s maturity level officer presents the result of their assessment and actions to be taken to the customer. For the customer, representatives of quality management, development, purchasing, logistics, etc. take part in this meeting. In this way the results of the assessments and actions can be communicated directly and confirmed by the customer.

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3.2.2 Information provided by the supplier (“C” risk-classified (prioritized) part)

The assessment is carried out as described in Chapter 3.2. 1. The results of the assessment and actions to be taken (if required) are made available to the customer’s maturity level officer in the agreed format (e.g. In the form of an Excel document or using the customer’s IT system).

> The contents of the maturity level assessment and the dates when they must be provided for “C” parts will be decided by discussion and an appropriate contractual agreement with the customer. Dialog takes place between the customer and the supplier if it is expected that the objective will not be achieved.

3.3 Software maturity level meetings

The purpose of the software maturity level meetings is for the supplier and the customer to discuss the status of the software development. Essential participants include those involved in development and quality management for the purpose of maturity level tracking and reporting (“4 eyes” principle).

Steering is done by using MLA maturity levels and a software-specific milestone plan including synchronization points (deliveries of functions and software releases) the timing of which - e.g. every 4 weeks - is determined jointly by the customer and the supplier (see measurement criterion No. 2.7.4. In conjunction with repeat question W5.1 in Chapter 4.3).

As part of the software level meetings, relevant project maturity level assessments are carried out, which essentially serve to achieve two goals.

Firstly, the maturity level and the quality of the software project at the current time are assessed, and a prediction for future points in time can be done. Secondly, problems can be detected and identified early on in the software project, and relevant counter-measures can be initiated.

The evaluation of development process conformity is based on Automotive SPICE or comparable evaluation models for the respective project.

The software maturity level meetings can be held as bilateral talks - e.g. between the customer and the supplier - but also with several internal and external participants in terms of agile project management using agile methods (Scrum, sprint planning, etc.).

For this purpose, the customer, for example, invites all required software suppliers (internal and external, taking the competitive situation as well as competition law/com-

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pliance into account) for overall coordination of software contents and software interfaces, while also chairing the meeting.

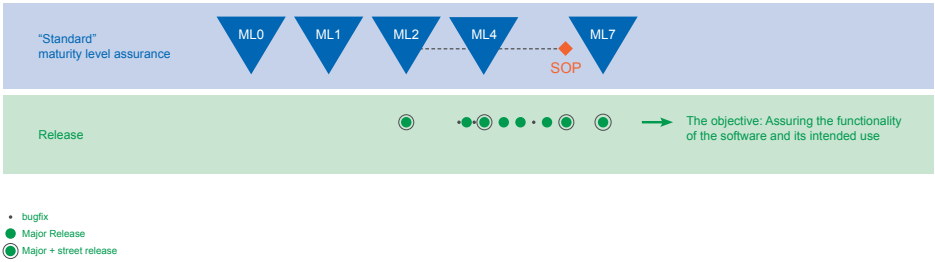


Fig. 3-3: Timing of software maturity level meetings, depending on release planning/software delivery

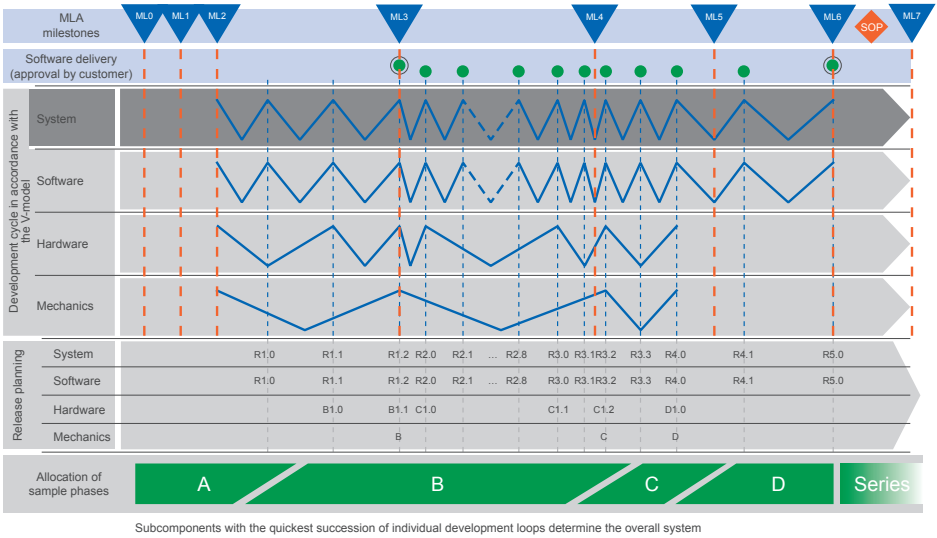


Fig. 3-4: Example of timing for hardware, software and mechanics

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4 Standards in the process

4.1 Risk assessment and classification (recommendation)

Risk classification A, B or C			
1.	**Product-related criteria (product)**	1.1	**Complexity** (type and number of functions, level of system integration, number of system/communication interfaces, integration of further software deliveries, number of variants (vehicle configuration), number of development partners / locations involved)
			high = 2, average = 1, low = 0
		1.2	**Product innovation** (concept, design, material, function, appearance, feel, new functions, new system/software architecture, networking in the vehicle)
			basically new = 2, new = 1, known = 0
		1.3	**Critical problems in the past** (field rejects, in-house problems, warranty costs)
			No. of incidents: very frequent = 2, frequent = 1, low = 0
		1.4	**Launch problems in the past** (high number of unplanned releases)
			high = 2, average = 1, low = 0
		1.5	**Development efforts, including software** (expertise, capacity, change of development processes/- methods (e.g. change to agile development), new development sites)
			critical = 2, fairly critical = 1, not critical = 0
		1.6	**Product integrity** (product safety, ASIL level, customer-specific/country-specific/statutory requirements, automotive cybersecurity)
			high = 2, average = 1, low = 0

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