



# Guideline 1: KEY PERFORMANCE INDICATORS (KPI)

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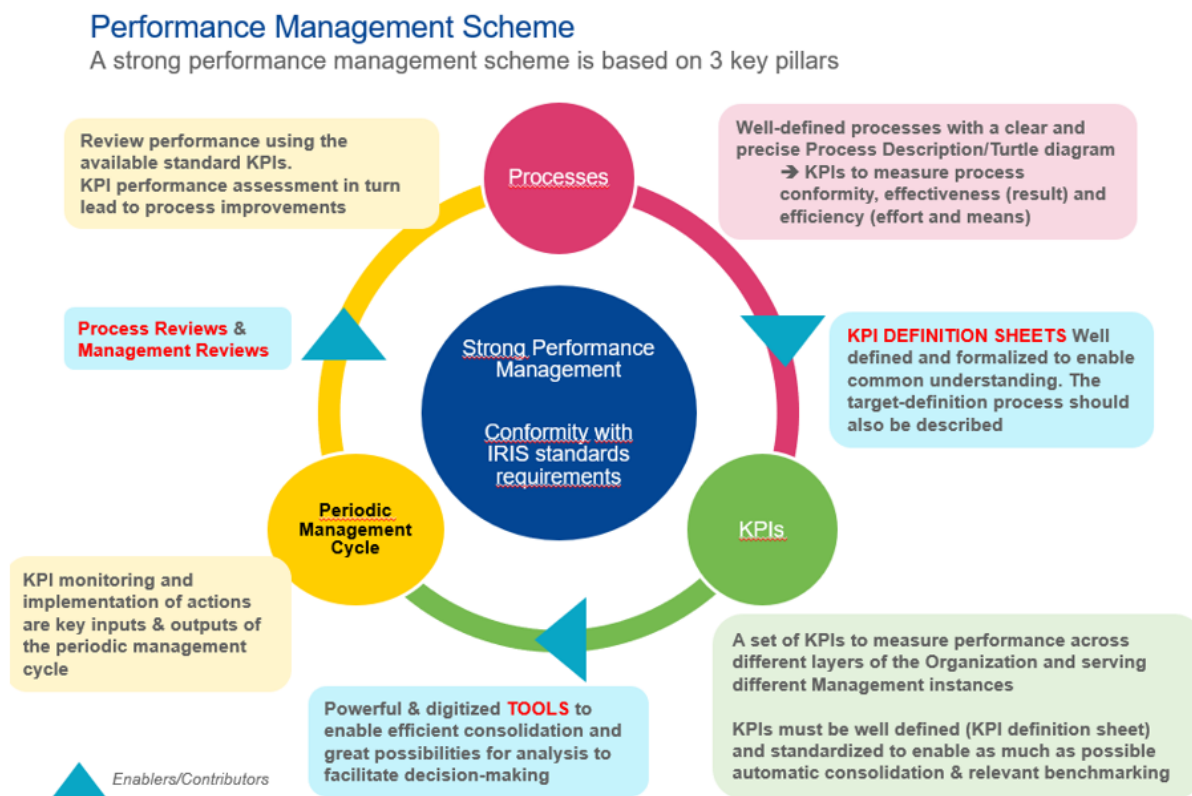
# 1 Introduction

This guideline provides:

- insights to help organizations to build a strong management approach as requested by common business management system standards, based on best practices from the rail industry,
- guidance to implement and maintain an IRIS certified business management system concerning the **Key Performance Indicators (KPIs)** required to comply with the ISO/TS 22163:2017 requirements.

The term KPI should be understood as generic in this guideline.

Exceptional performance management starts with well-formalized processes and their associated KPIs. These KPIs should be well-defined to enable common understanding of the metrics and provide a transparent and accurate view for the periodical review according to the needs of the organization. This in turn feeds process reviews and management reviews which could trigger process improvements, revision of the set of KPIs used or improvement in KPIs used to measure those processes.



**Figure 1: Performance Management Scheme**

The IRIS certification system focuses more closely on the link between effective processes, KPIs and associated management cycles, in order to enable conformity to standards and certification requirements in general and thus fulfilling customer needs.

In addition, a well-defined KPI management system is a crucial pre-requisite to achieve the silver quality performance level as per IRIS certification conformity assessment.

The KPI management system should indeed demonstrate high **transparency** on performance, which should be maintained and confirmed during the yearly IRIS audits (see IRIS certification conformity assessment).

Transparency can be characterized when the organization has set-up a KPI system with clearly defined KPIs (and their associated processes) in the management system; whereby the KPIs are accessible through an appropriate tool (e.g.: Excel, enterprise resource planning, business intelligence tool). The organization should aim in the long run at automatizing, as much as possible, the data collection and consolidation, hence highly reducing the risk of misunderstanding of a definition or adverse manipulation of data.

The following are the main benefits of a strong KPI Management system:

- provide all stakeholders with an understanding of how they relate to the overall success of the organization
- strengthen the shared effort to reach common goals through periodic review & publication of KPIs
- KPIs enable decision-makers to assess progress towards the achievement of intended outputs, goals, and objectives
- KPIs enable to speak with data at any level in the organization
- enable organizations to improve and influence their product quality
- transparency in budget control

To conclude, in process-oriented organizations, the strategic goals of a company, whichever size it may have or product/service it delivers, are reached through the implementation of an effective KPI management system, building on strong process management.

This guideline addresses the following target groups:

- process owners and those working with the related sub-processes
- management system responsible
- business performance responsible

The guideline content is a recommendation based on good practices from the rail sector experts and methods and is not subject to be audited by any third-party audit as a mandatory requirement.

## 2 Normative references

ISO/TS 22163	Railway applications – Quality management system – Business management system requirements for rail organizations: ISO 9001:2015 and particular requirements for application in the rail sector
IRISCERTIFICATION® Conformity Assessment:2020	Rules for achieving and maintaining IRIS Certification® recognition



### 3 General concept of Key Performance Indicator (KPI)

A Key Performance Indicator, or **KPI**, is a metric that measures how well an organization performs a business activity that is critical for its current and future success:

- **KEY:** is important to evaluate the performance of the business management system.
- **PERFORMANCE:** only relating to performance when it can be clearly measured, quantified as well as being sensitive to improvement by the organization.
- **INDICATOR:** an indicator provides fact-based information on a recorded performance and should provide leading information on future performance or early signal.

The KPI terminology should be understood as generic for any type of performance indicator. Depending on the organization, some KPIs can be important at several organization levels, from local level to executive management level.

Effectiveness and efficiency are important parameters to be considered to identify the right KPIs:

- **Efficiency:** it is defined as the ability to produce something with a minimum amount of effort and resources. It is an important factor in the determination of productivity.
- **Effectiveness:** extent to which planned activities are performed and planned results are achieved. In contrast to efficiency, effectiveness is determined without reference to costs or resources.

To efficiently and effectively develop and deliver solutions to the customer, it is needed to ensure that processes are built, followed, sustained, and improved over time. In this respect, successful process deployment is crucial to establish a common understanding and provide skills and knowledge needed to perform the process.

In order to define process KPIs, it is important to determine the internal and external stakeholders of the related process and to identify and understand their requirements. These requirements should be taken into consideration when defining KPIs.

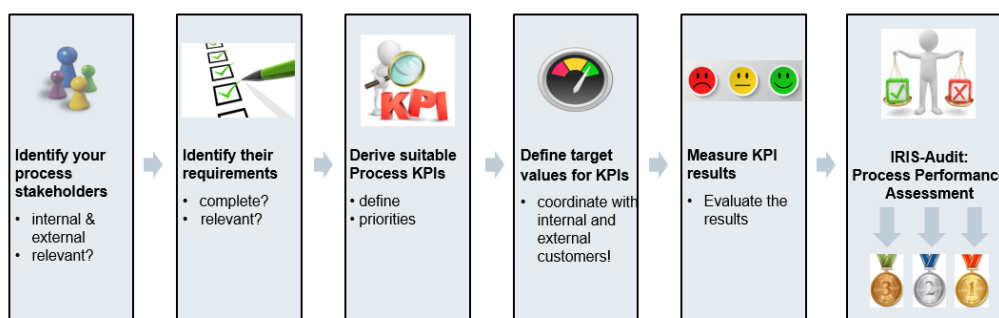


Figure 2: Deduction of KPIs out of Stakeholders' requirements

Only organizations that are able to

- define their **relevant** KPI based on the requirements of the customers of the processes (these might also be other processes within the same organisation),
- synchronise the definition with the customers of the processes,
- assure compliance with internal targets and customer expected results by regular and proper assessment of the KPI performance evolution,
- implement appropriate measures (where needed),

will achieve a higher quality performance level **sustainably**.

## 4 Setting-up a KPI system

It is important for an organization to define a robust KPI system, meaning the set-up by which the company vision and strategic objectives can be supported by an appropriate set of KPIs, used by executive management and cascaded, in coherence, down to local management in locations/plants. In addition, it is important that the organization defines which KPIs are needed for the IRIS certification (local level/executive HQ level) and ensure they are part of the KPI system. See details in section 3.

For small & medium-sized organizations, it is key to ensure KPIs needed for the IRIS certification are known and aligned both in plant/shop floor level as well as the executive committee level.

### Principles for establishing a KPI system – Small/medium sized Organizations

KPIs to be shared across the company, linking Company Vision to local management of performance

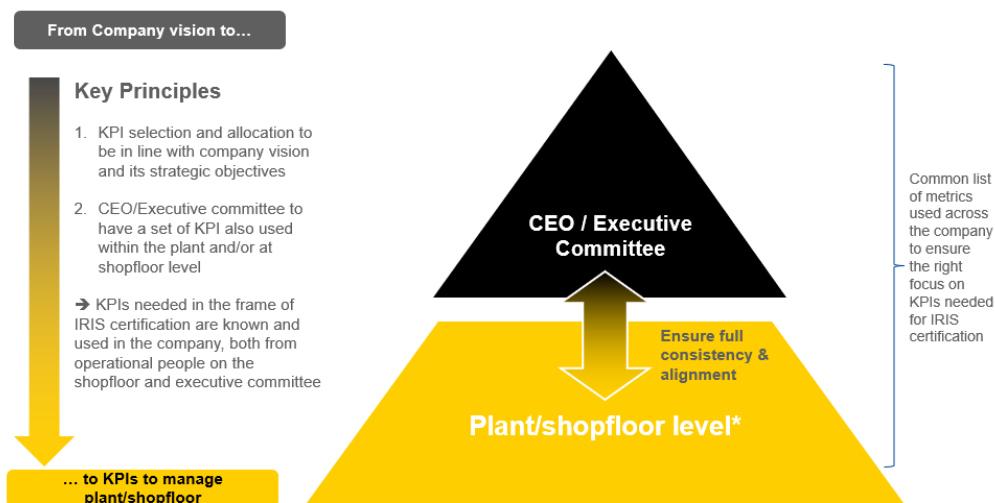


Figure 3: Principles for establishing a KPI system in small/medium-sized organizations

For large organizations with several locations/plants, it is key to well-define what KPIs are followed by executive management, middle management, as well as what is followed locally in projects/sites/plants, ensuring the coherence from top to bottom.

### Principles for establishing a KPI system – Large Organizations

KPIs to be hierarchized, linking Company Vision to local management of performance

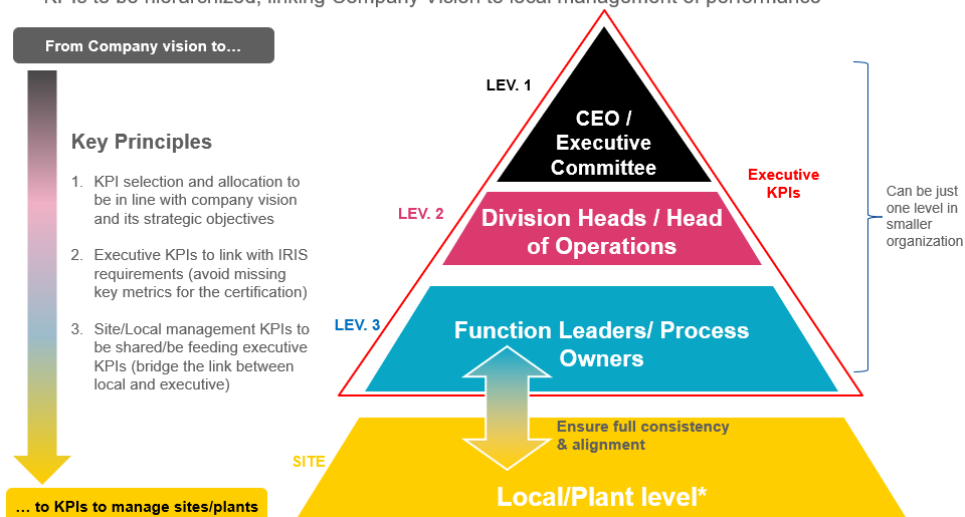


Figure 4: Principles for establishing a KPI system in large organizations

When appropriate, depending on the specific process, KPIs are based on data taken during the lifecycle of business projects. The defined measures for a process should be collected within projects (transversely, cross-sites) and then be aggregated to a higher level by the process owner to monitor the process itself.

The organization should define which KPIs will be reviewed at which level. Obviously, the most critical ones reviewed at CEO level and more operational KPIs (which contribute to the executive KPIs) to be monitored locally.

The selected KPIs would need to follow the three guiding principles below:

## 4.1 Reflect the organisational objectives

It is important to have KPIs that **enable the follow-up of the strategic vision of the organization** and link them with the local operational performance and stakeholder expectations.

Once an organization has analysed its vision, identified all of its stakeholders and defined its objectives, it needs a way to measure progress towards those objectives. Key Performance Indicators are those measurements.

The definition of a KPI should consider the relevant stakeholders along the value stream to ensure an alignment of its objectives.

## 4.2 Apply SMART principles

A KPI should follow the SMART criteria.

**Specific:** it should be clear what exactly the indicator measures with one accepted definition. The KPI should be linked to the process and its objectives.

**Measurable:** the KPI should be quantifiable to state the actual value versus the target value.

**Achievable:** it is important for the acceptance of the KPI that the target value is challenging but achievable. The desired level of performance should be realistic, even if challenging, taking into account historical data that the organization has already gathered.

**Relevant:** the KPI provides more insight into the performance of the organization or processes in being consistent with the business management system of the organization. A KPI is only relevant if the organization's processes and its stakeholders can influence it.

**Time framed:** it is important to express the values of the KPI in a specified time frame.

## 4.3 Fulfil the characteristic of well-defined KPIs

A well-defined KPI should:

- **be a simple concept:** a KPI should speak for itself and be easily recognized in the organization about what it measures.
- **be easily connected** to at least one of the three core drivers Quality, Time, Costs;
- **be consolidated at all management levels:** there is more value in the analysis of the KPI if it can be consolidated from the working level up to the top management, so that each managerial level can influence it;
- **be sensitive to improvement:** the choice of KPI and associated time scale should be made to allow the KPI evolution to be visible, so the organization can immediately take appropriate actions;
- **be auditable:** it should be possible to audit the KPI, by comparing how the tools/user calculate a KPI vs. a reference document (KPI definition sheet);

- **be standardized:** this is key especially for large organizations, where a KPI should be standardized across all locations/businesses to enable common understanding and accurate representation of the group’s total result;
- **be capable of automatic retrieval and reporting:** it is recommended to have KPIs which can be calculated automatically (with no human intervention) to avoid errors/ interpretation and ensure compliance to the KPI definition sheet;

## 5 Implementing KPIs

The definition of each KPI, required in the frame of IRIS certification, should be in line with the ISO/TS 22163 clause 9.1.1.1 a) to f) (see below).

Specifically, regarding fulfilling IRIS certification requirements, the organization should clearly indicate which KPIs measure the twenty-two (22) mandatory processes defined in the ISO/TS 22163 and which KPIs measure the five (5) mandatory processes for performance evaluation.

The following Table 1 shows recommendations on how to structure mandatory KPIs for performance evaluation and have simple and effective communication on key requirements.

ISO/TS 22163 Clause	Process Name	Process Owner/ Function in charge	Process Overview	KPI Name(s)	KPI definition sheet(s)
8.1.3	Project Management	List here the process owner/organizational unit in charge of the process <i>EXAMPLE</i> Head of Project Management Office	List here the process overview reference to be used <i>EXAMPLE</i> PMO-PRO-001	List here the different KPIs to be used to assess performance of the process <i>EXAMPLE</i> On-Time Delivery %	List here the associated KPI definition sheet reference <i>EXAMPLE</i> PMO-KPI-001
8.2	Requirements for products and services				
8.3	Design and development of product and services				
8.4	Control of externally provided processes, products and services				
8.5	Production and service provision				

**Table 1 – Key information of the mandatory processes for performance evaluation**

Also, the ten (10) mandatory KPIs defined in ISO/TS 22163 clause 9.1.1.1 g) to p) should be mapped to the twenty-two (22) mandatory processes respectively.

This also applies to the eight (8) recommended KPIs according ISO/TS 22163 clause 9.1.1.1 i. to vii., if used by organization.

It is recommended that the organization formalizes its KPI definition sheets using the items provided in Table 2 below.





Note: Items with (\*) are mandatory according to ISO/TS 22163 chapter 9.1.1.1

9.1.1.1	Item	Explanation	Example
	KPI title	What is the proper designation of the KPI?	defective purchased parts ratio
	Purpose / Improvement goal	What is to be achieved by this KPI?	reduction of the number of defective purchased parts
a)	Process *	To which processes does this KPI measure the performance?	process for purchased parts
	KPI owner	Function/position/role responsible for the definition and the implementation?	Head of Procurement
b)	KPI definition and calculation *	How is the data calculated and what unit is used for measurement? What is the applicable scope of items to be measured?	number of defective purchased parts in relation to all purchased parts (e.g. all purchased signals)
	Data source & tools used for consolidation and reporting	What is to be used as a basis for measurement/consolidation and reporting?	stock inventory module of SAP
c)	Desired target values and defined period *	Define what is the applicable target (and the target range), what period of time is used for the analysis, and where it can be found.	desired target value and period: < 2% of defective purchased signals per month) (e.g. target range: green = < 2%; yellow = 2% to 4%; red = >4%) (e.g. where described: budget review)
d)	Responsible for report and reporting frequency *	function/position/role responsible for data consolidation and reporting and frequency of KPI publication	responsible: supplier performance analyst reporting frequency: monthly
e)	a) Reporting path * b) Reporting level	a) What is the reporting path? b) At which level (reporting level)?	a) goods receiving dept. → purchasing dept. → management (e.g. local level → function) b) leaders/process owners → division heads or head of operations → CEO/ executive committee
f)	Responsible for defining related actions *	function/position/role responsible for defining related actions in case desired target value is not met	commodity manager or supplier development team

Table 2: KPI definition sheet – mandatory and recommended standard items

## 6 Use of the core IRIS-KPIs

The following table 3 illustrates the different categories of the core KPI; some KPI are mandatory according to the standard ISO/TS 22163 and the IRIS certification conformity assessment. In addition, the organization is free to choose the appropriate KPIs for the performance evaluation of the 5 mandatory processes (not necessarily new ones).

These are mandatory KPIs		The organization is free to define appropriate KPIs
<b>Requested by ISO/TS 22163 chapter 9.1.1.1 g) → p)</b>	<b>Requested by IRIS CERTIFICATION® Conformity Assessment:2020 appendix 4</b>	<b>Requested by IRIS CERTIFICATION® Conformity Assessment:2020 appendix 6</b>
<b>10 mandatory KPIs</b>	<b>3 mandatory KPIs related to customer perception</b>	<b>5 mandatory PROCESSES for performance evaluation</b>
Customer Satisfaction (9.1.2)	Customer Satisfaction (9.1.2)	<ul style="list-style-type: none"> <li>• project management (8.1.3)</li> <li>• requirements for products and services (8.2)</li> <li>• control of externally provided processes, products and services (8.4)</li> <li>• design and development of products and services (8.3)</li> <li>• production and service provision (8.5)</li> </ul>
Customer on time delivery	Customer on time delivery	
Nonconformities raised by the customer (8.7)	Nonconformities raised by the customer (8.7)	
Internal nonconformities (8.7)		
External providers' nonconformities (8.7)		
External providers' on time delivery		
Quality deficiency costs		
Project costs (8.1.3.8)		
Requirements management process (8.2.5)		
Design and Development process (8.3)		

**Table 3: Core IRIS KPIs**

It is recommended to have the KPIs in the above table as part of the KPIs illustrating the twenty-two (22) mandatory processes, in order to avoid a duplication of KPIs for the same topic. The selection of the KPIs for the five (5) mandatory processes for performance evaluation can include, as much as possible, KPIs from the ten (10) mandatory KPI-list, but additional KPIs can be used to illustrate the performance of those 5 processes.

KPIs should be reviewed periodically in order to ensure they fit into the business needs and should also be in line with the ISO/TS 22163 requirements.

The periodical reviews should be done on all relevant levels of the organization to ensure constant follow up and implementation of corrective actions on underperforming KPIs.

The IRIS certification system supports these reviews as specified in the ISO/TS 22163 as well as in the IRIS certification conformity assessment (assessment methodology).

Based on the requirements of the ISO/TS 22163, these reviews are considered in:

- Management reviews (clause 9.3), at least the ten (10) mandatory KPIs, and
- Process reviews (clause 9.4) of the twenty-two (22) mandatory processes and related KPIs.



Following IRIS certification conformity assessment, core KPIs are needed in the data package for the lead auditor, to be made available at least sixty (60) days in advance (refer to Table 3), to:

- assess the five (5) mandatory processes for performance evaluation (IRISCERTIFICATION® Conformity Assessment:2020, appendix 6)
- assess the three (3) mandatory KPIs related to customer perception (IRISCERTIFICATION® Conformity Assessment:2020, appendix 4)

## Bibliography

- [1] IRQB Guideline 2: First Article Inspection
- [2] IRQB Guideline 4: RAMS/LCC
- [3] IRQB Guideline 5: Obsolescence
- [4] IRQB Guideline 6: Special processes
- [5] IRQB Guideline 7: Problem solving
- [6] IRQB Guideline 8: Configuration and change management



## ANNEX 1: IRIS mandatory KPIs (ref. to clause 9.1.1.1)

The following table provides examples for the mandatory KPIs.

There is no obligation to apply all examples! Each organization is free to define their own KPIs.

KPI or Process name	IRIS clause	Definition / Examples
Customer satisfaction*	9.1.2	<p>Example 1: <b>Parts returned by the customer</b> ratio of parts returned from the customer over number of total parts delivered per period</p> <p>Example 2: <b>Average score</b> average of score on questions in a customer satisfaction survey related to key functions of a company (e.g. design, delivery, warranty etc.)</p> <p>Example 3: <b>Timely feedbacks to customers after surveys</b> average time (months) to provide full feedback to the customer after survey performed (measured over x rolling months)</p> <p>Example 4: <b>Net promotor score</b> Evaluation of customer rating for the answer of the question: "How likely is it that you would recommend our company to a business partner?" e.g. customer rating on a scale from 1 to 10: 1 to 6 (detractors), 7 to 8 (passives), 9 to 10 (promoters)</p>
Customer on time delivery*		<p>Example 1: <b>On time delivery of parts</b> number of parts delivered to the customer on time divided by number of parts delivered to the customer (per period)</p> <p>Example 2: <b>On time Delivery Index (OTD-percentage)</b> number of customer deliverables on time divided by total amount of customer deliverables planned</p> <p>Note 1: Customer deliverables can include physical products, software releases, documentation, designs and drawings Note 2: Customers can also be understood as internal customers within a company</p>
Nonconformities raised by the customer*	8.7	<p>Example 1: <b>Nonconformities customer</b> claimed parts divided by delivered parts (per period)</p> <p>Example 2: <b>Amount of incoming complaints</b> amount of incoming complaints per x rolling month divided by amount of incoming complaints of previous reporting period</p> <p>Example 3: <b>Nonconformity index at customer delivery</b> defects detected by customer during the final inspection but before delivery from the Site number of A-defect x 100 + number of B-defect x 25 + number of C-defect x 3 divided by (number of products delivered during the</p>



KPI or Process name	IRIS clause	Definition / Examples
		<p>month)</p> <p>A-defect: Safety critical defect B-defect: Major non-functional issue C-defect: All other minor defects</p> <p>Example 4: <b>Complaint processing time</b> average time to close all related actions after the opening date (measured over x rolling months) Note: The KPI can apply to the whole complaint process or different steps within it.</p>
Internal nonconformities	8.7	<p>Example 1: <b>Right First Time (RFT)</b> number of parts meeting the requirements at final inspection divided by number of parts final inspected (per period)</p> <p>Example 2: <b>First pass yield</b> ratio of "passed" tests over the total number of tests in the last period</p> <p>Example 3: <b>Software defectiveness after release</b> hours spent to close the defects identified after the release in relation to total effort to develop the software-code</p> <p>Example 4: <b>Nonconformity index at final inspection</b> defects detected during internal final inspection number of A-defect x 100 + number of B-defect x 25 + number of C-defect x 3 divided by (number of products delivered during the month) A-defect: Safety critical defect B-defect: Major non-functional issue C-defect: All other minor defects</p> <p>Example 5: <b>Nonconformities processing time</b> average time to close all related actions after the opening date (measured over x rolling months)</p> <p>Example 6: <b>Technical Quality Index (TQI)</b> not accepted deliverables by the internal customer in relation to total transmitted deliverables.</p>
External providers' nonconformities	8.7	<p>Example 1: <b>Purchased parts failure rate</b> number of nonconforming parts in relation to total number of purchased parts (per period)</p> <p>Example 2: <b>Supplier related non-conformance-costs</b> non-conformance-costs caused by suppliers in relation to total procurement costs</p> <p>Example 3: <b>Number of nonconformity reports issued to supplier per</b></p>

KPI or Process name	IRIS clause	Definition / Examples
		<p><b>1000 own production hours</b> ratio between the number of supplier nonconformity reports issued to suppliers by the entity during a period in relation to number of production hours over the same period in the same entity x multiplied by 1000.</p>
External providers' on time delivery	8.4.2.3	<p>Example 1: <b>Supplier on-time delivery</b> number of parts received from supplier divided by number of parts confirmed to be delivered by the supplier (per period)</p> <p>Example 2: <b>Supplier delivery performance (OTIF)</b> sum of on time in full purchase order schedule lines in relation to the sum of expected schedule deliveries. Note: on time in full deliveries: lines totally delivered at planned date +/- x working days".</p>
Quality deficiency costs		<p>Example 1: <b>Rate of total cost of non-quality</b> sum of all costs related to scrap, rework and repair, modifications, penalties, extra warranty costs in relation to sales revenue</p> <p>Example 2: <b>Claim and warranty costs</b> total costs of claim and warranty in relation to sales revenue</p> <p>Example 3: <b>Internal non-conformity costs (scrap and rework)</b> sum of all costs of scrap and rework in a plant in relation to the value of the WIP (Work In Progress) of production</p> <p>Example 4: <b>Non-conformance-costs before delivery</b> non-Conformance-costs (e.g. all kind of unplanned costs) before delivery in relation to the revenue of the production</p>
Project costs	8.1.3.4	<p>Example 1: <b>Deviation on final result</b> actual gross margin minus initially planned gross margin</p> <p>Example 2: <b>Estimated At Completion (EAC) gross profit development</b> deviation of actual EAC gross profit to previous reporting period</p> <p>Example 3: <b>Cost management forecast accuracy</b> difference between actual cost measured in month M versus forecast of costs for month M seen in month M-1</p>
Requirements management process	8.2.5	<p>Example 1: <b>Requirements coverage index</b> number of processed (analyzed, validated) tender/order requirements (technical, contractual, financial, legal...) in relation to the total number of requirements in the request for quotation Note: The requirements coverage index can apply for the tender phase as well for project realization phase</p>
Design and	8.3.1	<p>Example 1: <b>Design Changes</b> no. of design changes not initiated by the customer divided by no.</p>

KPI or Process name	IRIS clause	Definition / Examples
development process		<p>of design changes (per period)</p> <p>Example 2: <b>Software defectiveness after release</b> average no. of defects found after a software release</p> <p>Example 3: <b>Design and development on time</b> no. of deliverables on time in relation to total planned deliverables Note: Design and development deliverables can apply to high level specifications, interface documents, 3D-models, software releases, architecture documents, test procedures, hazard analyses, FMEA-documents etc.</p> <p>Example 4: <b>Quality of deliverables</b> no. of deliverables with open issues in relation to the number of all deliverables Note: Open issues could be hardware or software defects, not approved documents etc. It might be helpful to rate the open issues according to their severity.</p>

*\*) According to IRIS certification conformity assessment appendix 4, these KPIs are evaluated for the customer perception analysis*

*NOTE: The definitions given in Annex 1 (IRIS KPIs) are for examples only. The organization may choose a different definition for the mentioned KPIs, if preferred.*



