INTERNATIONAL COMPETENCE CENTRE RAIL GmbH

Welcome to the „HIGH SCHOOL“

Risk and Opportunity Management

(in accordance with ISO/TS 22163-requirements)

Andreas Heinzmann

International Competence Centre Rail GmbH
Mitteldorfstrasse 17
CH – 6315 Oberaegeri
Switzerland

Mobil (D): +49 172 622 32 73
andreas.heinzmann@cc-rail.com
www.cc-rail.com

IRIS ACADEMY

Itellectual properties

This document and its contents are the property of INTERNATIONAL COMPETENCE CERTRE RAIL GmbH or its subsidiaries. This document contains confidential proprietary information. The reproduction, distribution, utilization or the communication of this document or any part thereof, without express authorization is strictly prohibited. Offenders will be held liable for the payment of damages.

© 2018 INTERNATIONAL COMPETENCE CERTRE RAIL GmbH or its subsidiaries. All rights reserved

本文件及其内容属于国际铁路能力中心有限公司（CC-Rail）或其子公司。本文件包含机密的专有信息。严禁未经明示授权的复制、分发、使用或传递本文件或其任何部分。违者将承担赔偿责任。

© 2018 INTERNATIONAL COMPETENCE CERTRE RAIL GmbH or its subsidiaries. All rights reserved

Andreas Heinzmann

Special strength / knowledge in the area of quality, certification, IRIS etc.

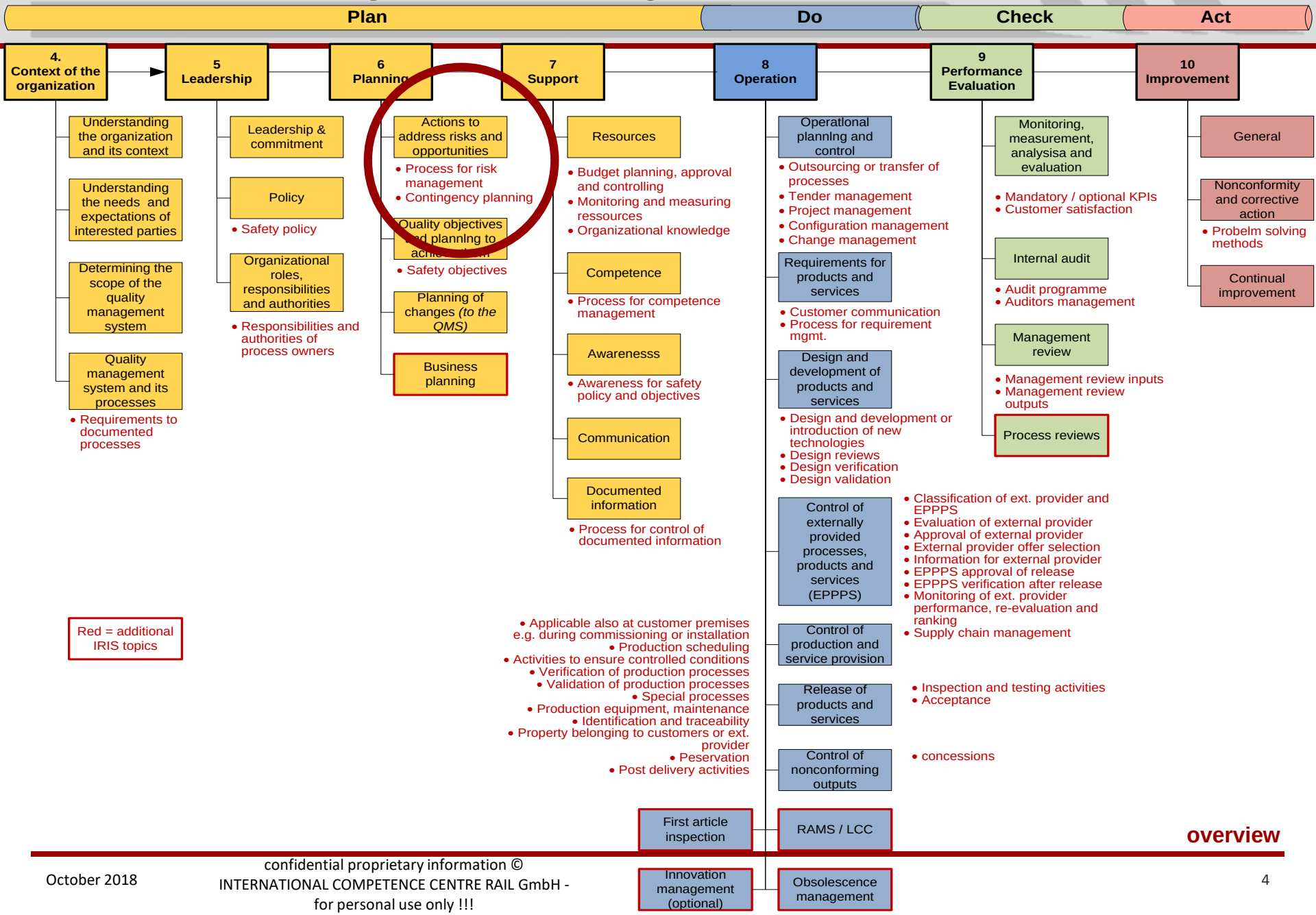
- One of three initiators of the IRIS standard and 1st President of the IRIS Group,
- responsible for the content and the successful launch of the IRIS certification (2006)
- from the beginning until today consistently involved in all IRIS revisions;
- one of the 5 member core team, which was commissioned to draft the ISO/TS 22163- standard,
- more than 1350 Manager trained and >40 companies (>60'000 employees) were successfully prepared for IRIS certification.

Professional career

- 1976 Masters degree (Dipl.-Ing.) in Electrical Engineering at TU Ilmenau,
- 1981 Institut für Regelungstechnik (development of sender & receiver for glas fiber optical systems).
- 1990 AEG-Westinghouse Berlin > AEG in Hennigsdorf, (Shanghai Metro, BR12X, VT 611/612).
- 1998 head of QHSE in Adtranz's "Light Rail Vehicles" Business Unit in Nuremberg.
- 2000 Bombardier (DWA) as General Manager for Quality & Customer Service.
- 2002 Senior Director Quality at Bombardier Transportation's headquarters
- > 37 years professional experience > network of suppliers, operators, approval authorities and registrars, also in the automotive, aerospace and food industries.
- 2009 foundation of iCC-Rail GmbH, the global market leader in IRIS training, coaching and mentoring.

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

IRIS elements integrated in ISO high level structure



confidential proprietary information ©
INTERNATIONAL COMPETENCE CENTRE RAIL GmbH -
for personal use only !!!

0.3.3 Risk based thinking

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Implementation of risk based thinking (1)

- Question:

Is it really necessary to manage all external provided products or services and all external provider with the same care?

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Implementation of risk based thinking
(best practices part 1: material classification)

classification of external provided products

RISK		functional requirements		degree of innovation		manufacturing technology		Availability at the market (Obsolescence)		Supplier region		Score
Rank	Points	30%		25%		25%		15%		5%		7,50
HIGH	10	Increased functional requirements / features Safety-related material or material with serial numbers Specification / tender documents and / or 3.1 certificate required	10	New product development (significant changes in technology are required; supplier has no experiences with the new technology)	10	Complicated production technology with many special processes, Manufacturing processes with an increased failure rate		Less than 5 years on the market		outside of Europe		> 6.7 - 10
MEDIUM	5	Average number of functional features, no specification / specification required, e.g. Order by drawing		Product development is given, but modifications are necessary		Manufacturing process with adjustments Manufacturing processes with medium failure	5	5-7 years yet available	5	Europe		> 4.2 - 6.7
LOW	0	Standard Material		proven product, no modifications necessary		known process without significant adjustments No Q-problems in the past		Material is fully available		your country	0	0 - 4.2

Only 2 obvious implications of such material classification:

- impact on parts approval process → e.g. A-Parts may require FAI, while C-Parts can be handled as Kanban
- impact on specifications → e.g. A-Parts may require GRD&TRD , while C-Parts can be ordered with catalog number

Risk based thinking

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Implementation of risk based thinking
(best practices part 2: supplier classification)

classification of external provider

logical OR operation					Supplier Class
Material-class	Order Volume/year	Scope of supplier	approvals & certificates	Dependence on Supplier	
A	> 100.000	Development and production by the supplier	Special approvals required for manufacturing, eg Welding (EN 15085), adhesion (DIN 6701), soldering, casting, etc.	Single Source to establish a second supplier it needs high invest	A
B or C	50.000 - 100.000	only production by the supplier	no Q-history, a new supplier	Change of supplier with cost / expenses	B
B or C	< 50.000	Purchasing via dealer / trader	no approvals & certificates	2nd or 3rd backup supplier is available, it's simple to change the supplier	C

Implications of supplier classification:

- impact on supplier approval → e.g. approval of new A-Supplier requires full SEAP, while new C-Vendors can be approved based on a filled supplier data sheet only
- impact on supplier evaluation → e.g. A-Supplier get performance objectives and regular feedback, while C-Supplier can be “ignored”

Risk based thinking

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Implementation of risk based thinking (2)

- Question:

Is it really necessary to manage all projects with the same care?

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Implementation of risk based thinking

(best practices part 3): Project Classification

	Complexity		Effort		Strategy		Degree of Novelty	
	Organizational Complexity	Technical Risk	Invest	Design hours	Customer	Product-Roadmap	Characteristics of Product	Production processes
Regular order handling process	only one site involved **0**	low **0**	< 100.000 € **0**	< 500 hours **0**	without customer requirements	low strategic importance **0**	Variant within a family or modification **0**	known processes, technologies, types of tools **0**
Orders with PM principles	development and / or production at several sites involved **1**	medium or high **2**	> 100.000 € **1**	> 500 hours **1**	Customer requires Project Management	medium or high strategic importance **1**	new Product or new Product family **2**	extented technological requirements and / or new manufacturing technology **1**
					mandatory requirement			

Project management principles must be applied when,

- the mandatory requirement is met, or
- the sum of scoring is more than 4

Remark: Due to business decisions the upgrade of an order to a project is possible at any time, even if the criteria are not met. But not visa versa!

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Further applications of risk based thinking (3)

Is it really necessary to treat all customer with the same care to make them happy?

Is it really necessary to manage all tender with the same care to win orders?

Is it really necessary to verify all incoming goods with the same care to ensure availability of materials in production?

Is it really necessary to test & inspect all work in progress with the same care to ensure defect free products?

Is it really necessary to order 3.1 Certificates (EN10204) for all external provided products?

Is it really necessary to verify all 3.1 Certificates (EN10204) of raw materials by own lab-tests on a quarterly basis?

…..

Risk based thinking

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Risk management at four fields
(mentioned 99 x @ the IRIS assessment sheet

Product design FMEA make sense:

- when significant new development (e.g. new platform product)
- when design with significant changes / modifications
- when new or significantly modified production requirements
- when problems with similar parts in the past
- when new materials or parts
- when particular safety aspects
- when high complexity regarding functional or integration requirements
- when FMEA is required by customer or standards

monetary weighted Project FMEA

- starting in tender phase (baseline FMEA) to determine the risk provisions and the budget for the preventive/mitigation actions
- regular updates, e.g. monthly or once per project phase,
- to be continued till end of project life

Production process FMEA make sense:

- when significant new technologies in production
- when production process with significant changes / modifications
- when problems with similar production processes in the past
- when production of new products or new parts assembly
- when processes with particular safety aspects
- when special processes (gluing, crimping, soldering, plating, etc.)
- when automatic or semi-automatic processes with high complexity
- when outsourced processes with high impact on product quality or safety
- when FMEA is required by customer or standards

Business risk assessment and contingency plan

- regular update at least once a year @ defined month in acc. with strategic business cycle

Risk based thinking

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Actions to address risks and opportunities

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Definitions

country road

t +1 containment action
= *immediate action to correct*

t +2 corrective action
= *action to eliminate the root cause in order it doesn‘t happen again*

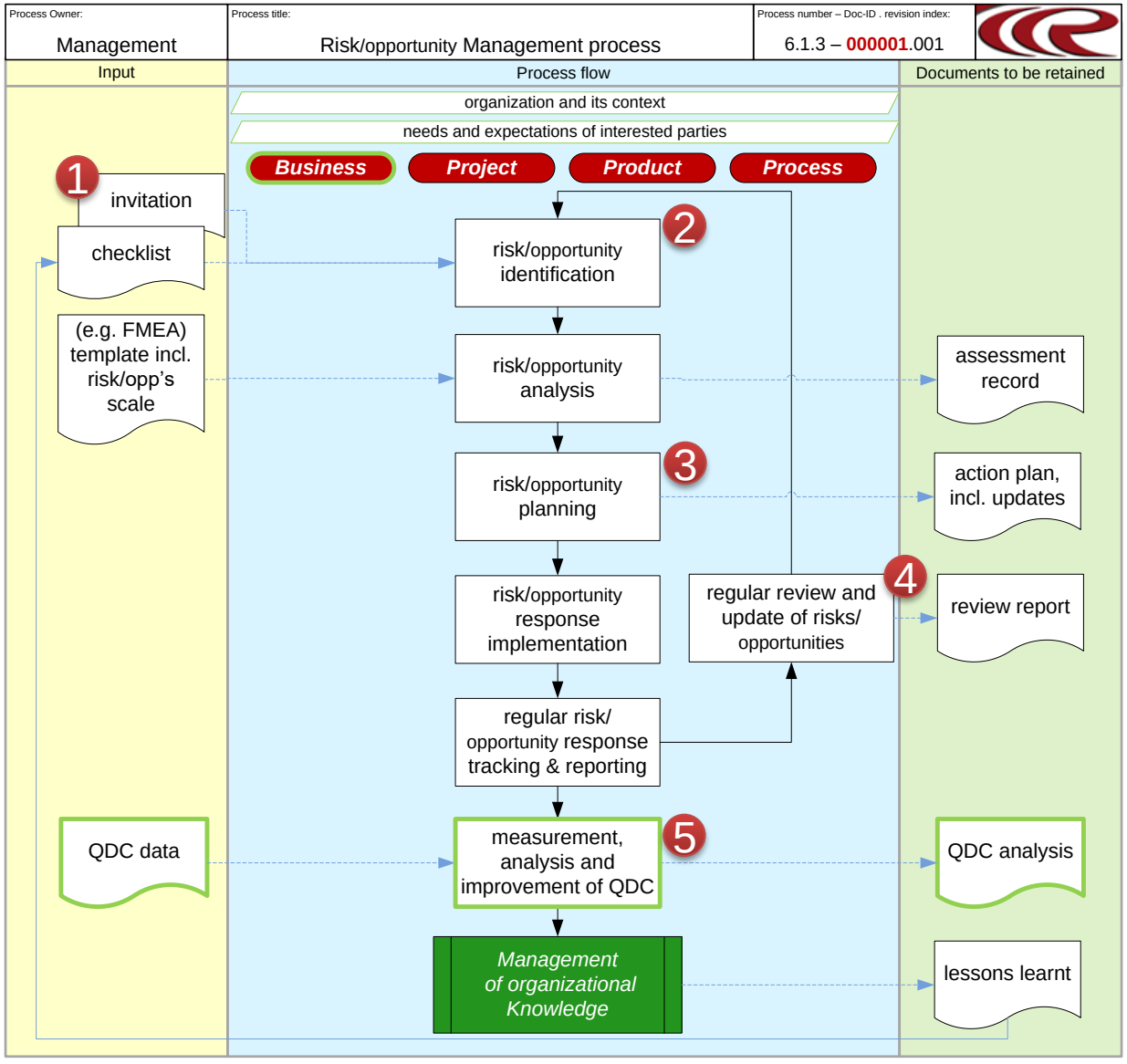
t -1 preventive action
= *action to eliminate the root cause of a potential issue in order it doesn‘t happen*

t -1 mitigation action
= *action to reduce the impact/damage when the risk occurs*

Chapter 6.1.3

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Risk & Opportunity Management



1 *involve customer and external providers in joint work on risk assessment and response.*

2 Determine the risks and opportunities that need to be addressed to:
- give assurance that the business management system can achieve its intended result(s);
- enhance desirable effects;
- prevent, or reduce, undesired effects;
- achieve improvement.

3 Actions taken to address risks and opportunities shall be proportionate to the potential impact on the conformity of products and services.
The organization shall plan:
- actions to address these risks and opportunities;
- how to:
  1) integrate and implement the actions into its quality management system processes,
  2) evaluate the effectiveness of these actions.
- define criteria to determine the type and extent of controls in its processes

4 *multidisciplinary approach for risk reviews*

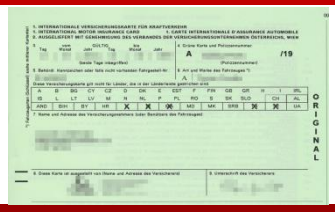
5 evaluate the effectiveness of risk management *based on QDCs*

Chapter 6.1.3

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Planning of risk responses

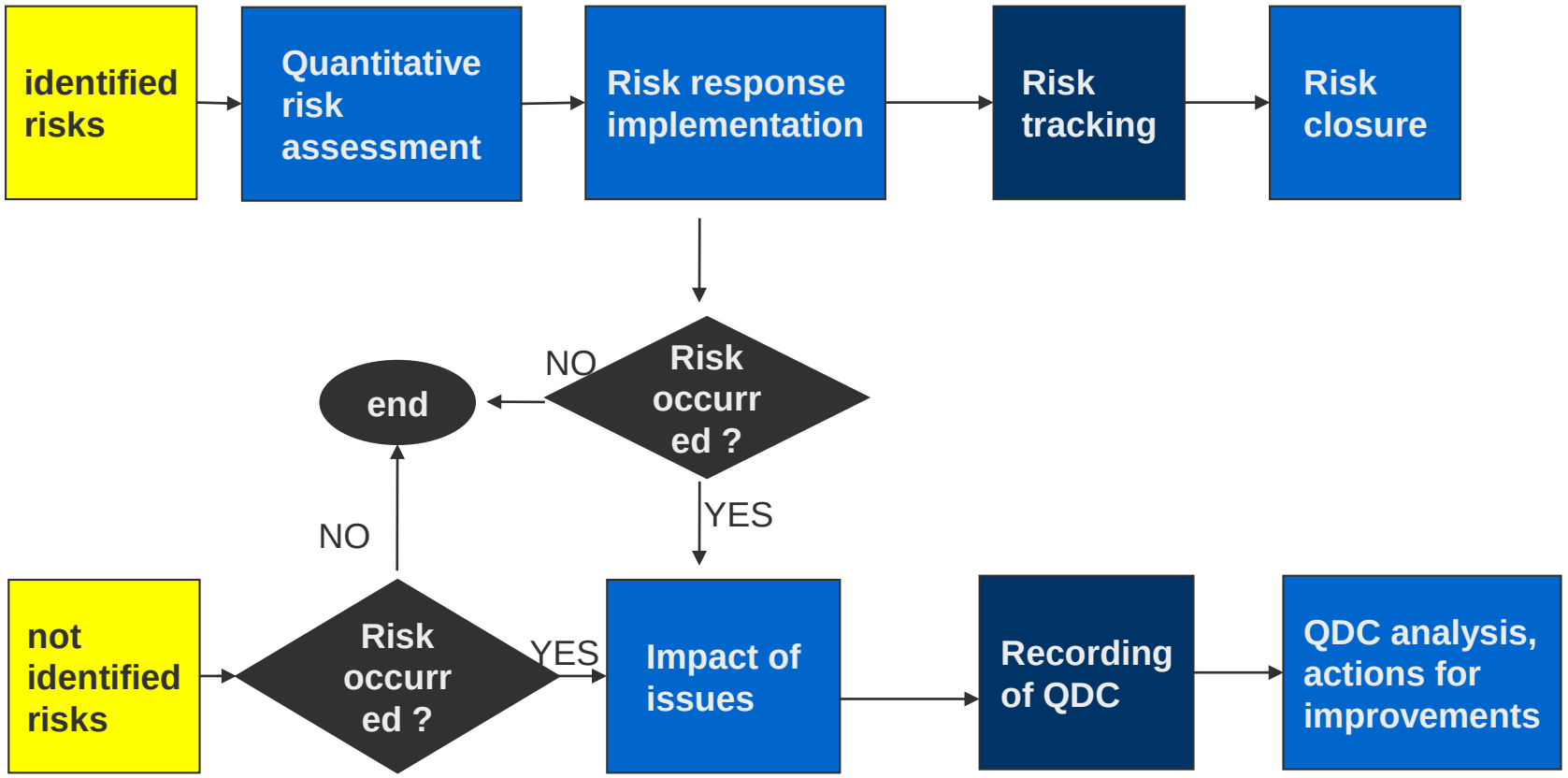
	risk avoidance	risk prevention	risk mitigation	accepted risks: risk transfer	accepted risks: acceptance of risk
	TOTAL RISK	action directed against the probability of occurrence or detection	actions to minmize the potential impact	transfer of risks, e.g. by insurance contracts	**REMAINING RISK**
	identified risks				
target:	exclude risk	prevention of the causes of occurrence or improve the possibility for detection	reduction or limitation of the demage	minimizing the consequences of the demage	hope for the best and prepare for the worst constitute risk provisions
	PREVENTIVE		**REACTIVE**		



Chapter 6.1.3

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Risk management - measurements of effectiveness



AH: "I'm convinced that Quality Management is profoundly logical. It's basically all about getting the risks under control."

Chapter 6.1.3

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Business Risk and Contingency Planning
(Chapter 6.1.4)

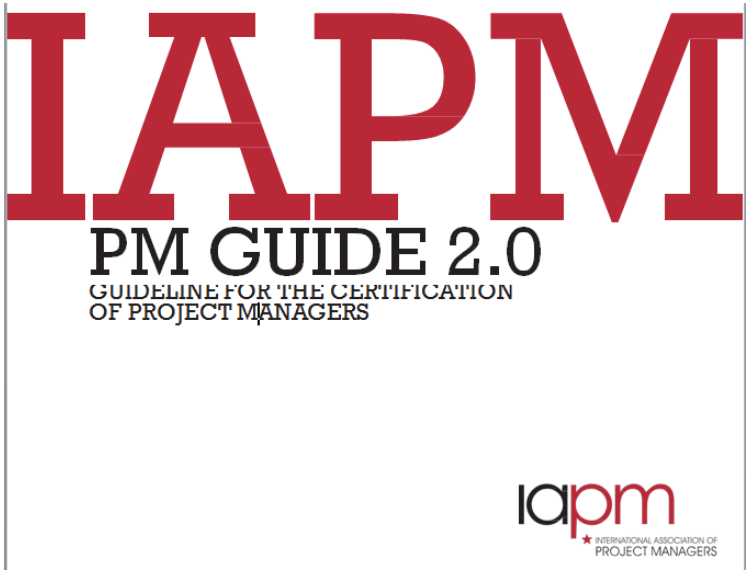
Sorry,
this topic is omitted in this reading sample.

Establish, validate, where applicable, and regularly review a contingency plan based on an evaluation of business risks, such as utility interruptions, interruptions in the supply chain, labor shortages, critical technologies, key production equipment failure, field returns, succession plan, information and communication technology and much more…

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Project Risk

recommended lecture:

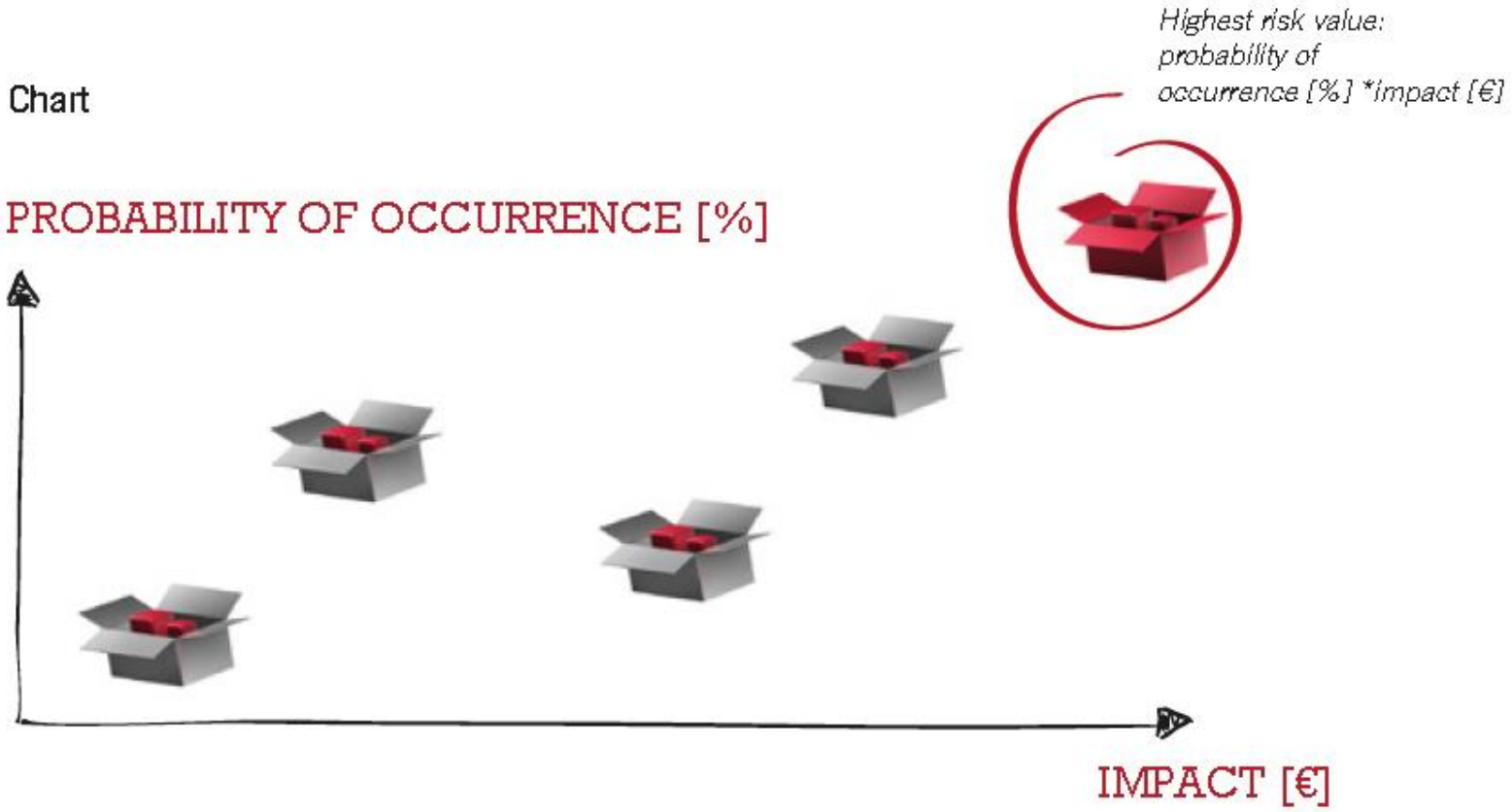


http://www.cc-rail.info/wp-content/uploads/2016/10/iapm_pm-guide2_en.pdf

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Monetary weighted RISK ANALYSIS

monetary evaluation of risks:



confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Risk - causes

fields of risks:

One risk may have an impact / influence on other risks.

1) Risks due to stakeholders (resource):
   - There is a risk of external influences due to non-project relevant reasons (political, personal, power-related ...)
   - There is a risk that there are problems with internal or external staff (expertise, availability, motivation ...).

2) Risk of confusion, changes in goals or inadequate conditions :
   - There is a risk that unwanted / not accepted results are achieved.
   - There is a risk a project fails due to a lack of resources or support.

3) Risk through lack of information:
   - There is a risk that things are not considered due to a poorly managed project file or that they will be processed in parallel or re-invented.

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Example: Define and Mitigate

example: define and mitigate

Define clearly and concisely

There is a risk that your warehouse will catch fire, the risk is caused by very old gas works and electrical works in the house. Also you smoke 60 cigarettes a day! The direct impact of the risk occurring will be the house burning down.

"3Cs" = Condition,
Cause and
Consequence

Mitigate practically and cost effectively:

replace gas & electrical works and ban smoking in warehouse!

Does the action target:

Transfer the Risk?

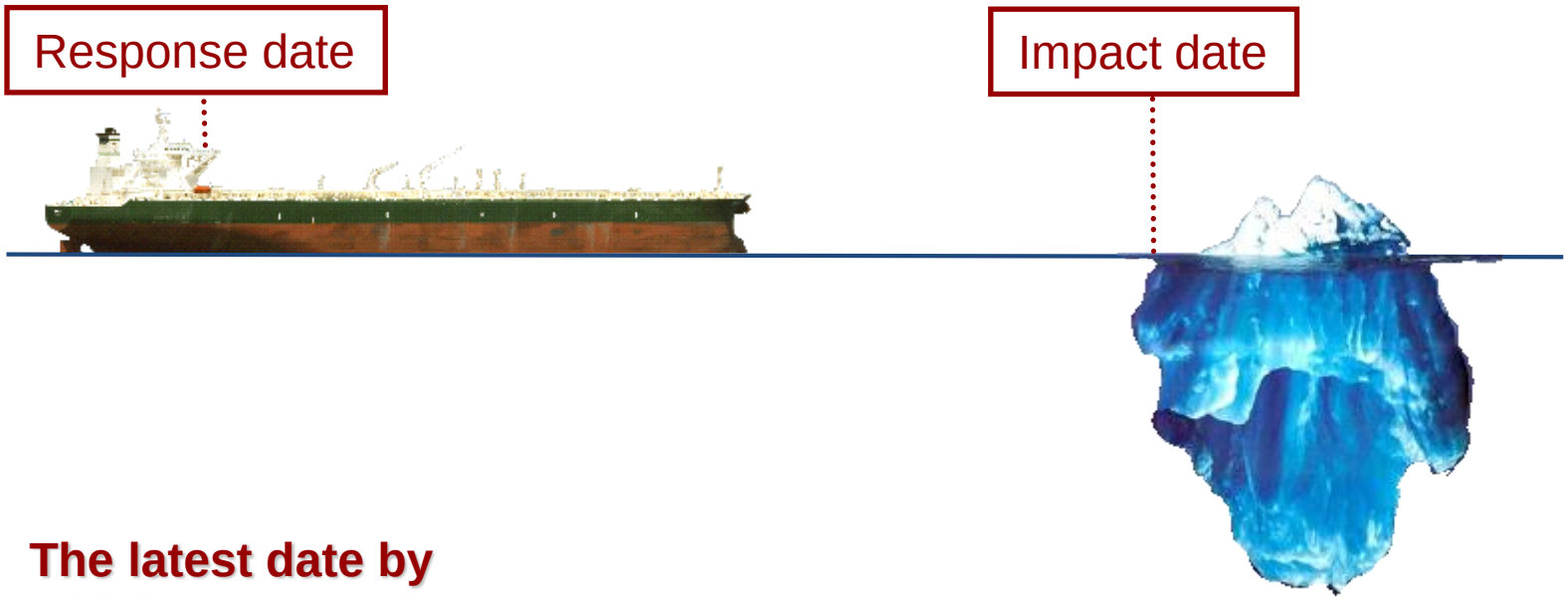
Target the Risk Cause?

Reduce the Risk Impact?

Accept the Risk?

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Consider the response date!



The latest date by which we must do something.

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Exercise 6: case study - Project FMEA

- Please split into groups.

- You now have time to complete a project-based risk assessment (FMEA methodology) in accordance with a case study on page **190**
  Please use your laptop and this **Excel Tool**

- Your goal is to support the decision-making process of your company prior to the first gate, i.e. before the offer will be launched.

What do you suggest? Offering or not?
I'm looking forward to your answers!

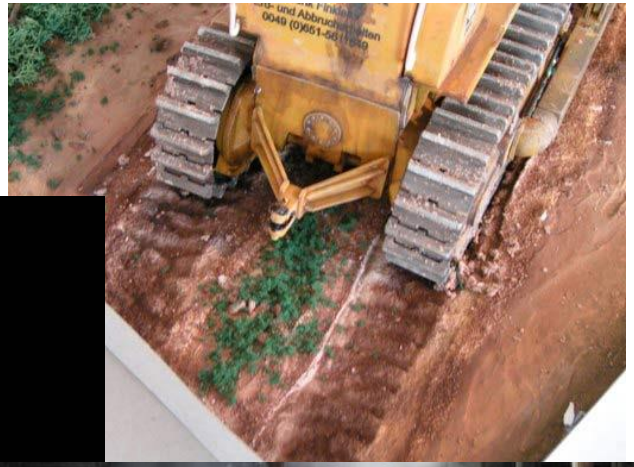
confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Process Risk

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Process FMEA

Example: foundry process of track pads for excavators



confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Process FMEA template & inputs

Failure Modes and Effects Analysis Form (FMEA)

Process or Product Name: _____

Process or Product Owner: _____ Project Leader: _____

Facilitator _____ Recorder: _____ Page ____ of ____

FMEA Date (Orig) _____ Last Team Meeting Date _____

Process Step/ Input/ Item	Function	Potential Failure Mode	Potential Failure Effects	SEVERITY	Class.	Potential Causes	OCCURRENCE	Current Controls Prevention	Current Controls Detection	DETECTION	RPN	Actions Recommended	Resp. & Target Date	Actions Taken	SEVERITY	OCCURRENCE	DETECTION	RPN
What is the process step, Input or design item under investiga-tion?	What is the Intended Function of the Step/ Input/ Item under investigation	In what ways does the Key Input go wrong?	What is the impact on the Key Output Variables (Customer Requirements)?			What causes the Key Input to go wrong?		What are the existing controls and procedures that prevent either the cause or the Failure Mode?	What are the existing controls and procedures (inspection and test) that detect either the cause or the Failure Mode?			What are the actions for reducing the occurrence of the cause, or improving detection?		What are the completed actions taken with the recalculated RPN?				
											0							0
											0							0
											0							0
											0							0
											0							0

Process flow chart

SIPOC

Fishbone

Inspection and test plan

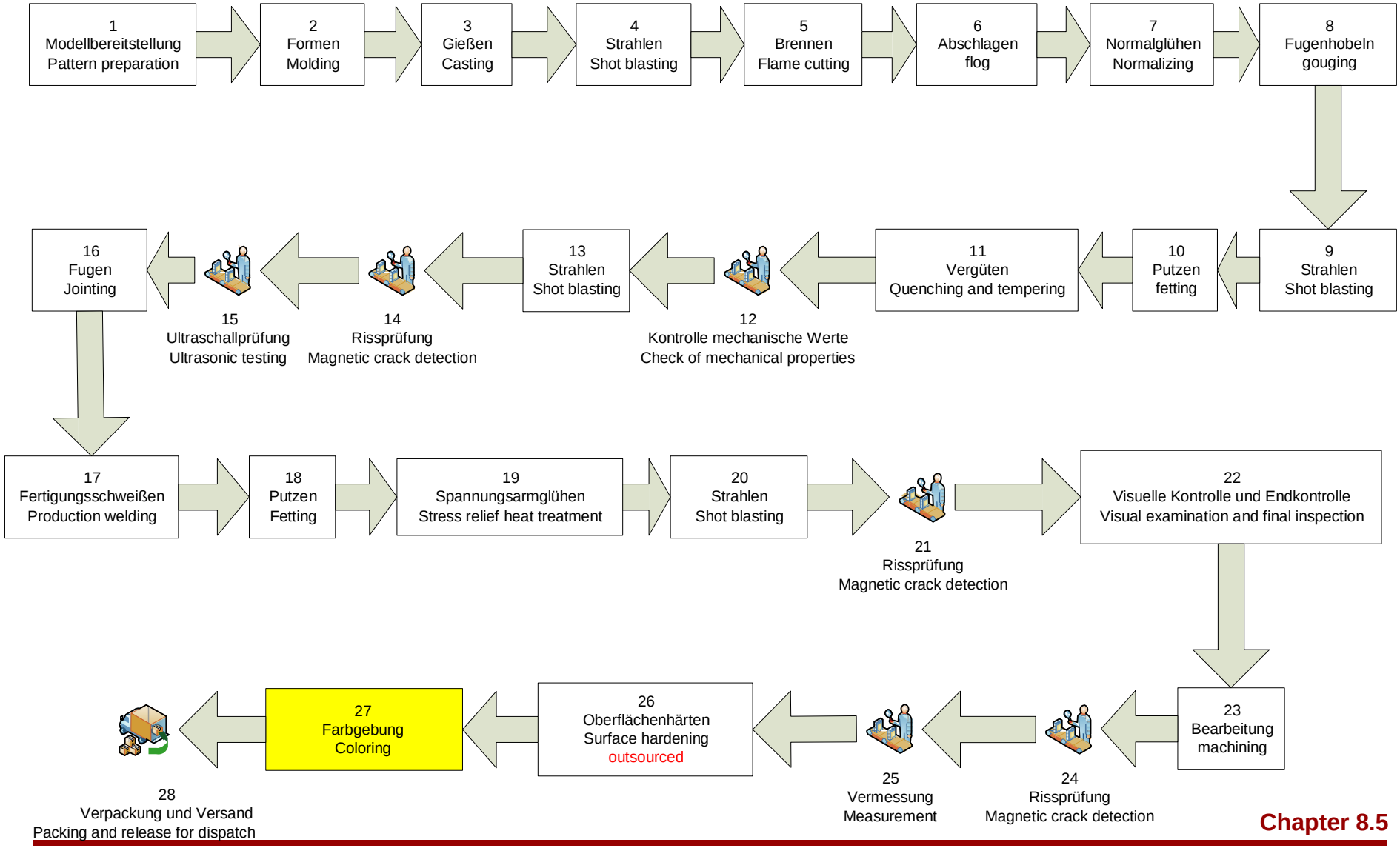
Risk evaluation and action plan

Re-evaluation

Chapter 8.5

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Manufacturing process of track pads - flow chart



Chapter 8.5

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

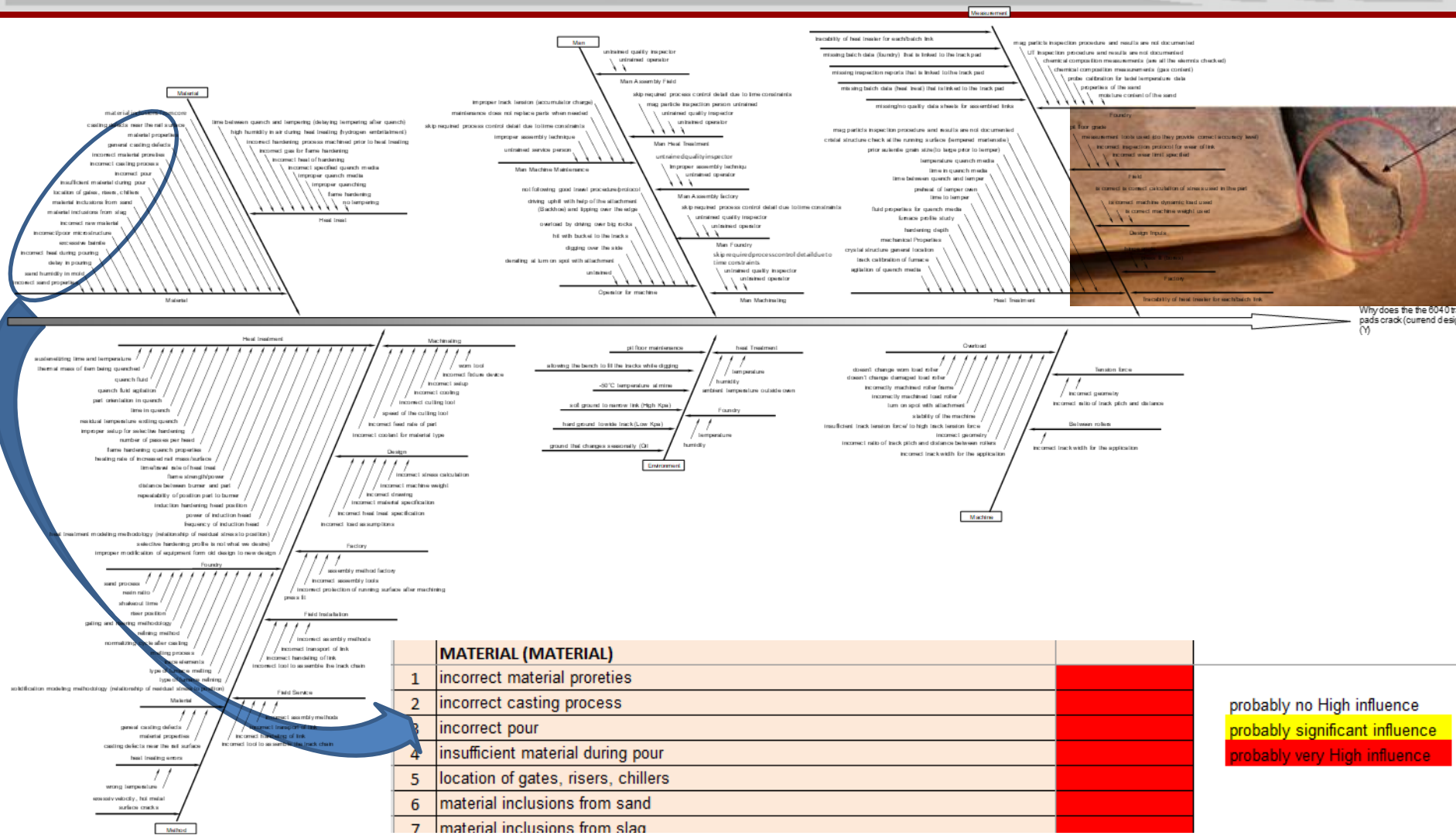
SIPOC

coloring (SIPOC) (Supplier, Input, Process, Output, Customer)

step	supplier	input	process	critical functions / parameters	output	customer
1	Surface hardening	traveller employee sample castings and samples	check identity / compare traveller with castings	eye function lighting accompanying documents component labeling training & qualifications suitability and condition of the slings environmental conditions	matching identification on castings and accompanying documents	
2		spray system cleaning material	system cleaning	cleanliness of spray system	clean spray system	
3		casting solvent	visual check and cleaning as necessary	cleanliness of casting	clean casting	
4		oven	predrying	temperature	dry casting	
5		color spray systems color mixer paint instruction color comb	1st primer	color material viscosity mixing ratio mixed technique layer thickness adhesiveness primer method Purity of color	primed part	
6		oven carousel	1. dry	time temperature	dry part	
7			more priming and dry	as in 1st primer		
8		dry film thickness gauge	inspection	dry film thickness	part with correct film thickness	
9		slings crane storage location	put on local storage	stacking sequence & technology state of storage	part painted / finished and ready for transport to next stage	
10		employee slings crane palette	prepare for transport	slings	prepared part	
11		traveller employee	entry in traveller	filling of template	dokumented information	
12		employee workstation time ticket	data entry in ERP system	data errors	confirmed part	packing and release for dispatch

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Cause / effect diagram (Fishbone / Ishikawa)

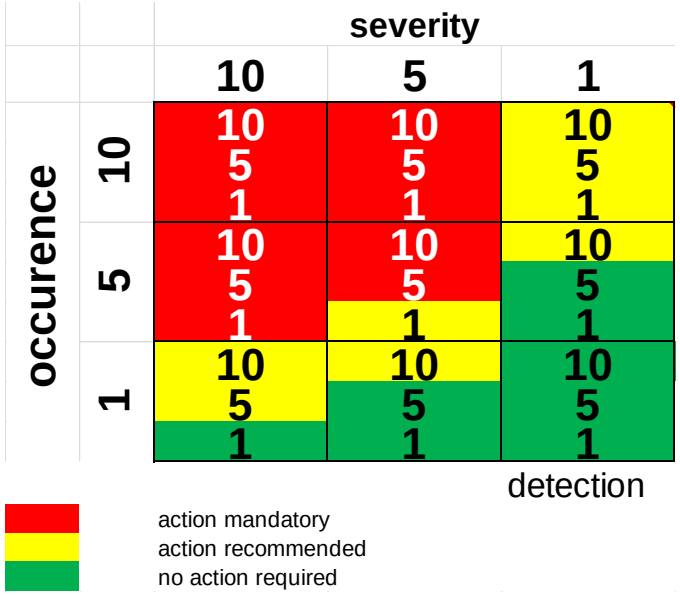


	MATERIAL (MATERIAL)	
1	incorrect material proreties	
2	incorrect casting process	
3	incorrect pour	
4	insufficient material during pour	
5	location of gates, risers, chillers	
6	material inclusions from sand	
7	material inclusions from slag	

probably no High influence
probably significant influence
probably very High influence

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Risk evaluation scheme



	severity	occurrence	detection
MEANING	*If damage or loss occurs, what is the effect on the internal and external customers or the next production step?*	*What is the probability that the cause occurs?*	*How is our confidence that we know the cause, or the cause of failure before it goes to the next step?*
10	irreparable part leads to scrap machinery failure leads to production downtime accident at work resulting in lost work time (sick leave) **"I do not know..."**	failure often occurs (min. 1x / month) **"I do not know..."**	**almost impossible** - no failure detection; can not be detected or is not checked.
5	component failure causes (unplanned) overtime equipment damage resulting in no loss of production injury leads to time loss (no sick leave)	failure occurs	**low** - inspection is not planned, it is checked indirectly or by sampling
1	no discernible effects	failure is very rare (max. 1x / year)	**high** - inspection or test reliably detects the error

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Process-FMEA (1/2)

Process step	critical functions / parameters	failure	impact	severity	cause	occurence	actual preventive action	actual corrective action	detection	risk class	prevetive / mitigation action	budget	responsible	target date	severity	occurence	detection	risk class
identity check	eye function	wrong gathering of casting data from labeling	no traceability	5	poor eye function, no glasses	1	eye test every 2nd year		1									
	lighting	wrong gathering of casting data from labeling	no traceability	5	poor lighting	1	cleaning schedule		1									
	lighting	poor illumination (mind. 300lx)	wrong gathering of casting data	5	poor lighting	1	regular check by maintenance		1									
	component labeling	wrong gathering of casting data from labeling	no traceability	10	poor component labeling, mirrored reading	10	enlarge the font field	investigation by shift supervisor	10		a unique alignment of the title block, e.g. as underscore		Hr. Miller, N.	01.10.2014	5	1	10	
	accompanying documents	missing accompanying documents	non-acceptance	5	loss during transport no duty to bring docs to the next station	1		Information of the shift supervisor worker gets papers	1									
	accompanying documents	wrong accompanying documents	non-acceptance	5	lack of care	5	shift supervisor is responsible for care		1		training concept of stacking sequence & technology (countersign of transported castings on traveler)		head of department heat treatment	01.11.2014	5	1	1	
	training & qualifications	worker not trained	no traceability rework / repair	5	poor quality / capability of tutor / content of the training sickness / holidays	1	regular training 1 x /year traveler is also mentioned in other training		1									
	suitability and condition of the slings	casting fall down	accident at work	10	demaged sling	1	external review (annually); daily internal review by workers		1									
	environmental conditions	dirty work station	dirt particles in the paint; inclusions	5	missing cleannes	1			1									
	environmental conditions	too high humidity	blistering (small craters; porosity) poor binding ability of color	5	open hall system	1	predrying measurement of humidity		1									
	environmental conditions	too low temperature	too long drying time; Viscosity of the color is too high	5	open hall system	1	measuring the temperature Heaters in winter		1									
	training & qualifications	missing qualification pint instructuion not known/available	paint not to instruction	5	qualification deficiency lack of training	10	product-related training		10		training skill matrix							
system cleaning	cleanliness of spray system	paint residues in the intake and coloring system	inoperability	5	lack of care	10			1		Functional test before each shift and after each break							
visual check and cleaning as necessary	cleanliness of casting	contamination (dust, rust, test equipment residues)	Particle inclusions in the color layer	5	lack of order and cleanliness in production	5		blow with compressed air	1		improve stacking sequence & technology to avoid contact points and residual moisture							

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Process-FMEA (2/2)

predrying	temperature	too low temperature	residual moisture is too high	5	burner defect	1			1									
1st primer	color material	wrong shade of color	there are parts that can not be blasted => intensive washing process	5	wrong requirements working error	1		production is controlled by QC later	5									
	viscosity	too high	only limited processability	1	wrong requirements working error	10	Sample for target-performance comparison; for new parts measuring of viscosity		1		no further actions							
	viscosity	too low	extra work due to runners	1	wrong mixing ratio	10	Sample for target-performance comparison; for new parts measuring of viscosity		1		no further actions							
	mixing ratio	wrong mixing ratio	affects the curing	5	data sheet missing working error calculation error	1			10		duty to provide training							
	mixed technique	color wrong mixed (time too short)	affects the quality of paint	5	lack of care time pressure	1			1									
	layer thickness	too less	minimum dry film thickness is not reached	5	paint too thinn casting geometry	10			10		measurement of wet film thickness at defined measurement points							
	layer thickness	color runner	rework / repaint	1	paint too thick casting geometry	10	visual check		1									
	adhesiveness	no adhesiveness of color	color flakes	5	no clean underground incorrect mixture	1	visual check		10									
	primer method	wrong method	requirements (time, layer thicknesses, etc.) unachievable	5	no documented information	10			10		paint instruction							
	Purity of color	pollution	particle inclusions in the color layer	5	skinning through open paint container no order / cleanliness in the workplace	1			1									
	adhesiveness	shelf life of the opened color container exceeded	affects the quality of paint	5	shelf-life is not known	10			10		request shelf life data for opened container from supplier							
1st dry	time	too short	paint is not dry subsequent drying delay	5	temperature humidity	1			1									
	temperature	too low	paint is not dry subsequent drying delay	5	ambient temperature burner failure humidity	1			1									
more priming and dry	as in 1st primer																	
inspection	dry film thickness	too thinn	minimum dry film thickness is not reached claim	5	paint flaws / handling	5			1		Sampling inspection of wet film thickness (to be put in paint instruction)							
	dry film thickness	color runner	rework / repaint	5	casting geometry technology-related	10			1									
put on local storage	stacking sequence & technology state of storage	castings are stacked	damage to the paint	1	no interlayer (no customer demand)	10		repainting	1									
	state of storage	pollution	dirty surface	1	no top cover	10		blow off	1									
prepare for transport	traveller	missing accompanying documents	production stop	5	lack of care	1			1									
prepare for transport	filling of template	failure in data entry poor legibility	search effort	5	human error	1	annual training	supervisor / coordinator checks time ticket prior to data entry	10		improve ERP system regarding machine readable codes sample checks by shift supervisor							
entry in traveller	reading the time tickets	wrong data gathering on time ticket	no readiness of parts in system possible scrutiny needed	5	lack of care	10			1		omission by machine readable codes							
data entry in ERP system	entry	wrong data entry	no readiness of parts in system possible scrutiny needed	5	human error, lack of care	1			10		2nd check after data entry		shift supervisor	01.10.2014	5	1	1	
	entry	too late data entry	delayed process	5	wrong documented information	1			1									

Chapter 8.5

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Conclusions

conclusively 2 formulas to reflect:

Quality = fulfillment of requirements *(ability / skills)* **x mind-set** *(want / behavior)*

QM = process focus *(effective & efficient processes)* **x risk based thinking** *(prevention)* **x PDCA-approach** *(continuous improvement)*

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!

Your contact:

Andreas Heinzmann

International Competence Centre Rail GmbH
CH – 6315 Oberaegeri
Switzerland
www.cc-rail.com

andreas.heinzmann@cc-rail.com

Mobil (D): ***+49 172 622 32 73***
Phone (D): *+49 333 977 33 37*

I would be very happy to hear from you again.

If you leave me a message, I will aim to return within 24 hours.

confidential proprietary information © INTERNATIONAL COMPETENCE CENTRE RAIL GmbH - for personal use only !!!