Risk management according to EN ISO 14971:2012 - a practical approach

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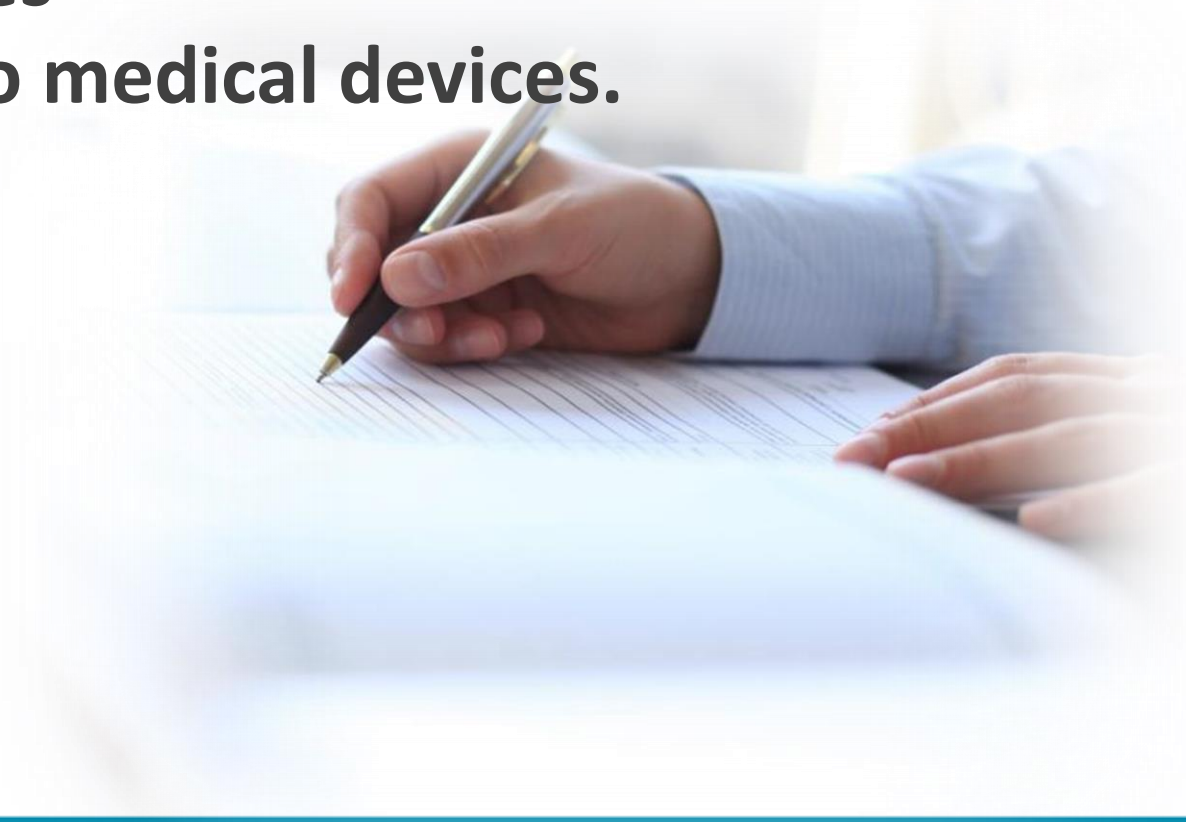
EMERGO

Harmonized Standard for Risk Management

Official Title:

EN ISO 14971:2012 Medical devices – Application of risk management to medical devices.



History:

- 1st edition: 2000
- 2nd edition: 2007
- 3rd edition: 2012

Status: Harmonized

Purchase at: www.iso.org

Risk management: understanding the process

Key definitions of EN ISO 14971

Safety: Freedom from unacceptable risks (Clause 2.24)

Risk: Combination of the probability of occurrence of harm and the severity of that harm (Clause 2.16), resulting in a Risk Priority Figure (RPF)

Hazard: A hazard is a potential source of harm (Clause 2.3)

Key definitions of EN ISO 14971

Acceptability of Risks: Risks are acceptable when there are much more and significant benefits as compared to the identified risks (i.e. positive risks vs. benefits ratio) (Clause 6.5)

Risk Management: Systematic application of management policies, procedures and practices to the task of analyzing, evaluating, and controlling risk (Clause 2.22)

Why perform risk management?

Risk Management is important and indispensable because:

- ✓ It is a regulatory requirement. No European CE mark without risk management process, biological & clinical evaluation!
- ✓ Risk management helps in the development phase to identify and resolve problems early.
- ✓ Costs per corrective action increase exponentially along the development phase. Changing a device shortly before or even after CE-marking is extremely expensive and time consuming. Therefore, early elimination of problems and non-conformities can save big money!

When perform risk management?

Risk Management must be performed during the entire product life Cycle as an ongoing and repetitive process!

- ✓ During design and development phase
- ✓ Before and after biocompatibility evaluation/testing
- ✓ Before and after clinical evaluation/testing
- ✓ During manufacturing phase
- ✓ During market phase
- ✓ Until market removal, respectively, disposal

Who should perform risk management?

Any medical device manufacturer must implement a risk management process in order to achieve and keep a positive risks versus benefits ratio for his products. Therefor the organization must:

- ✓ 1. Ensure that a device achieves the intended performances
- ✓ 2. Eliminate or reduce risks as far as possible
- ✓ 3. Apply preventive measures, if certain risks cannot be eliminated
- ✓ 4. Ensure that undesirable side-effects constitute an acceptable risk when weighed against the intended performances and patients' benefits
- ✓ 5. Inform users of the residual risks
- ✓ 6. Keep in place a permanent process to improve processes and products in order to further minimize potential risks

Applying EN ISO 14971 is a mandatory process for any medical device manufacturer, and the procedures and benefits must be understood and supported by all involved employees.

How to get started?

The following steps are necessary to initiate the risk management process:

- ✓ Read the current version of EN ISO 14971 (harmonized standard)
- ✓ Prepare a risk management plan following the requirements and describing the procedures as outlined in the standard
- ✓ Prepare a risk management table in order to document the risk analysis process (e.g. FMEA) and any corrective and preventive action to be taken

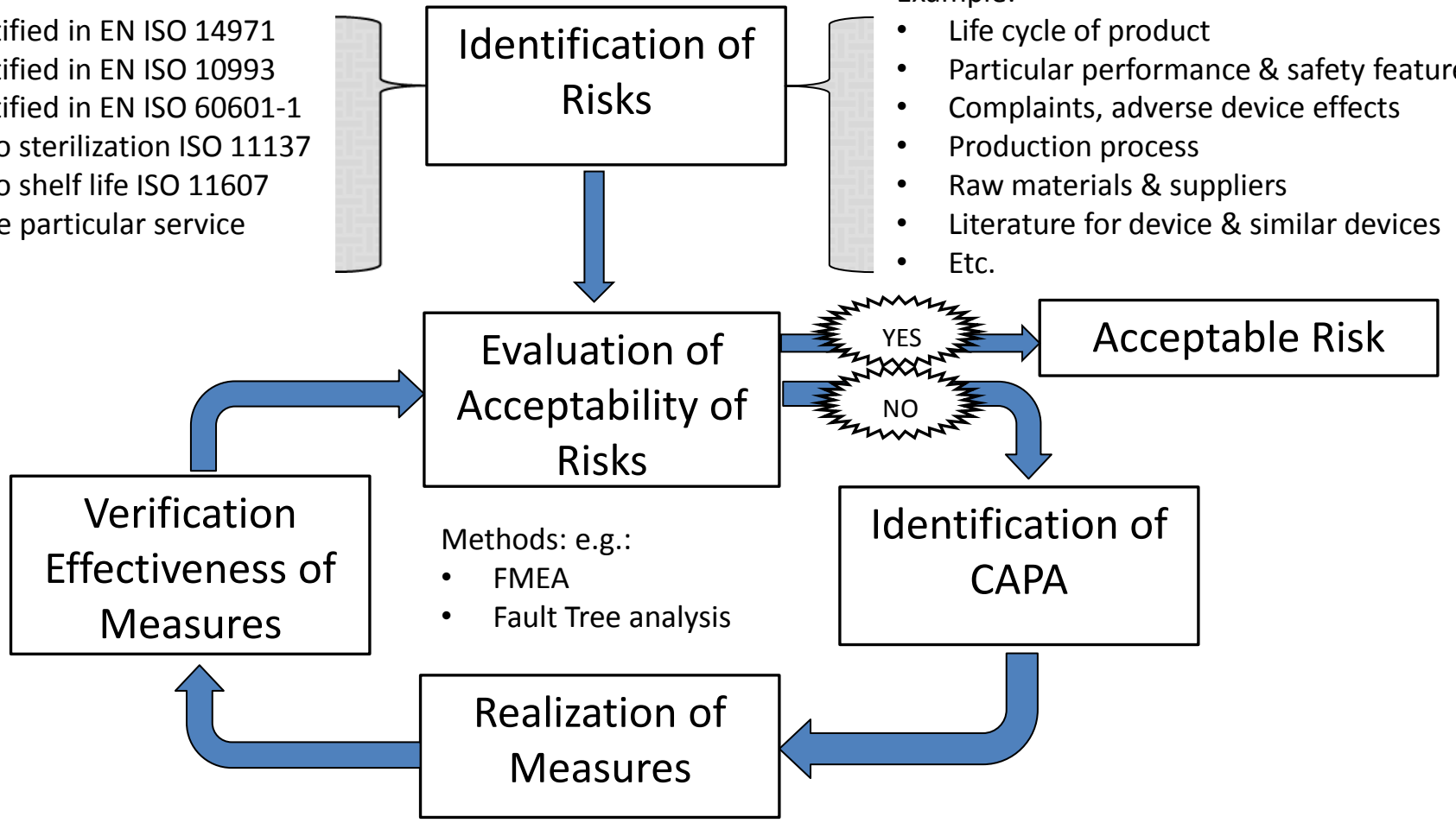
How to get started?

- ✓ Initiate and document a risk management meeting with persons covering at least the following:
  - Management representative
  - Safety officer („Sicherheitsbeauftragter“)
  - Responsible person R&D
  - Manufacturing responsible person
  - Marketing / Sales responsible person
  - Quality management representative
- ✓ Document the results of the meeting in a risk management report

Risk Management: Understanding the Process

Example:

- Risks identified in EN ISO 14971
- Risks identified in EN ISO 10993
- Risks identified in EN ISO 60601-1
- Risks rel. to sterilization ISO 11137
- Risks rel. to shelf life ISO 11607
- Risks of the particular service
- Etc.



Example:

- Life cycle of product
- Particular performance & safety features
- Complaints, adverse device effects
- Production process
- Raw materials & suppliers
- Literature for device & similar devices
- Etc.

Risk management plan

Compulsory elements of the risk management plan

1. Description of the medical device under consideration, intended use, performance properties, safety features, contraindications and warnings (EN ISO 14971 Appendix C)
2. Designation of personnel and responsibilities / competences within the risk management process (EN ISO 14971 Appendix F.3)
3. Definition of evaluation criteria for „severity of harm“, „probability of occurrence“ and „risks related to non-detection“(EN ISO 14971 Appendix D.3)

Compulsory elements of the risk management plan

4. Definition of criteria for acceptability of risks (EN ISO 14971 Appendix F.5)
5. Evaluation of the risk management process through the management (EN ISO 14971 Appendix F.4)
6. Designation of the elements of the risk management file
7. Designation of the content of a risk management report

Risk Management Plan – Example for Table of Contents

1. Signatures of the Responsible Personnel for this Risk Management Plan
2. Document History
3. Introduction
4. Description of Medical Device and Designation of Performance Properties
   - Specific Properties, Intended Use, Contraindications, Warnings
   - Reasonably Foreseeable Misuse / Malfunctions
5. Personnel and Responsibilities in the Risk Management Process
6. Criteria to Analyze and Evaluate the Acceptability of Risks
   - Severity of Harm
   - Probability of Occurrence
   - Risk Related to Non Detection

Risk Management Plan – Example for Table of Contents

7. Controlling of the Risk Management Process by the Management
8. Flow Chart of the Risk Management Process
9. Explanations to the Column Legend of the Risk Management Table
10. Designation of Elements of the Risk Management File
11. Designation of Elements of the Risk Management Report
12. Appendices: EN ISO 14971 Annex E.1; Annex E.2; Annex E.3

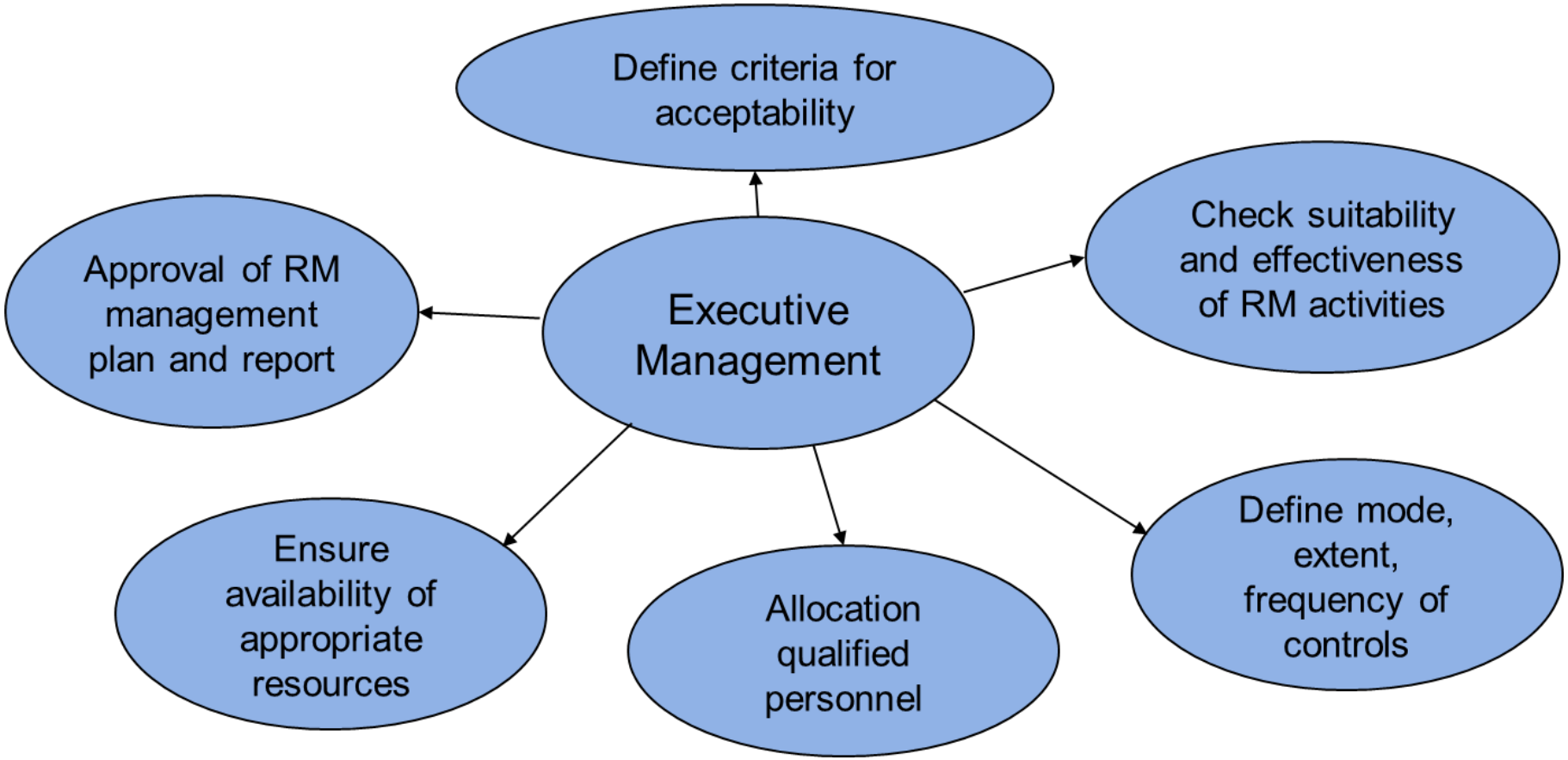
Process Description in the Risk Management Plan

1. Describe intended use as specified in the Instructions for Use (IFU).
2. Describe any contraindications and warnings as specified in the IFU.
3. Define very specific product-related performance and safety characteristics. These will later be evaluated in the FMEA:
   - What would be the technical reason for this characteristics to be missing?
   - What health hazards would occur to patients under such circumstances?
4. Define very specific “reasonably foreseeable” misuse and malfunction criteria. These will later be evaluated in the FMEA (see above bullet points).
   - What would happen technically in case of misusing the product?
   - What health hazards would occur to patients under such circumstances?

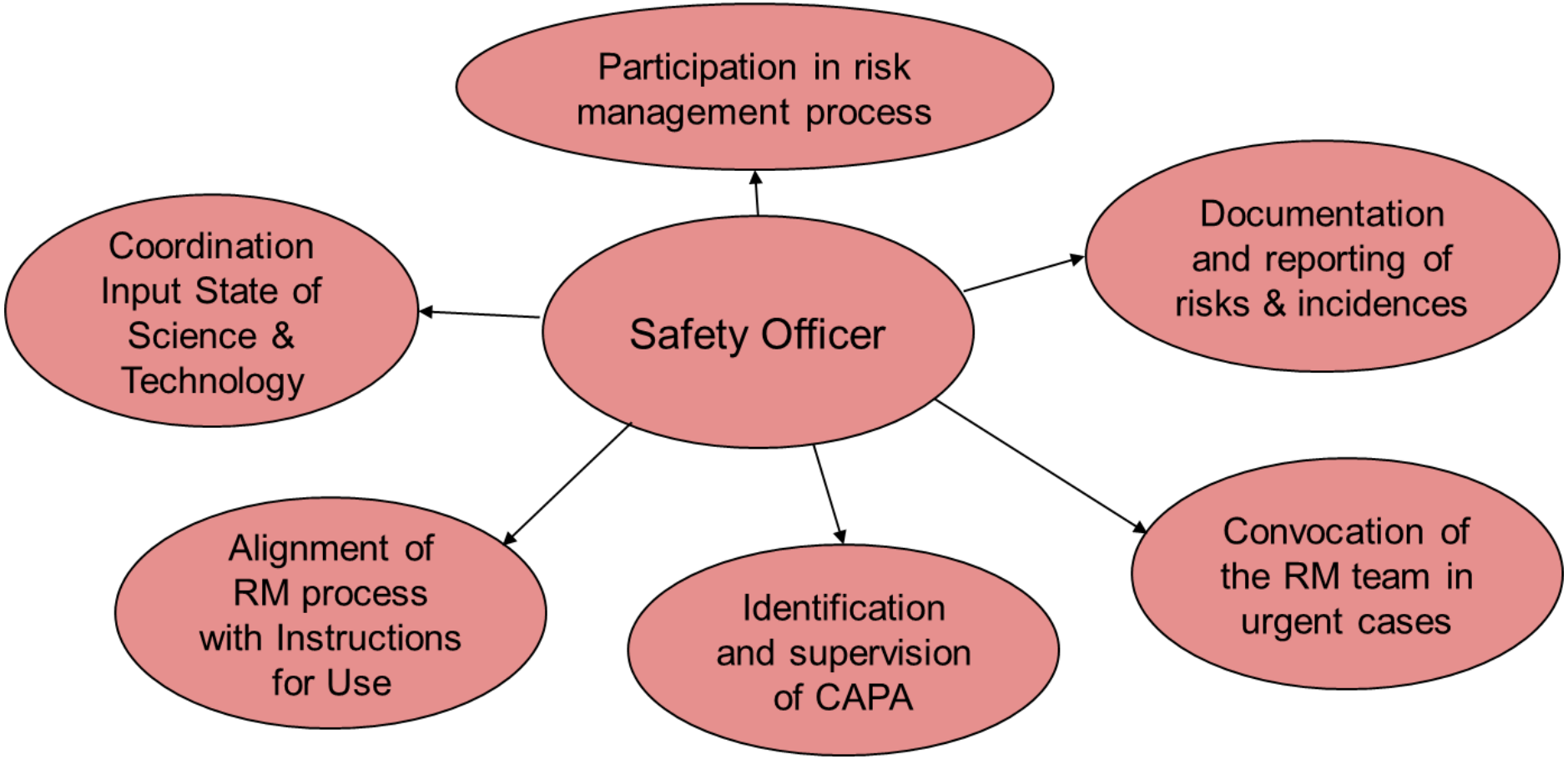
Process Description in the Risk Management Plan

5. In the later process, the Acceptability of Risks and specific Risk Priority Factors will be determined for all product specific performance criteria, foreseeable misuse situations and further risks as listed in EN ISO 14971 Annex E.1; Annex E.2; Annex E.3
6. All these hazardous situations will be analyzed before and after implementation of risk mitigating measures (e.g. validation tests, QM systems, Instructions for use, contracts with suppliers etc.)

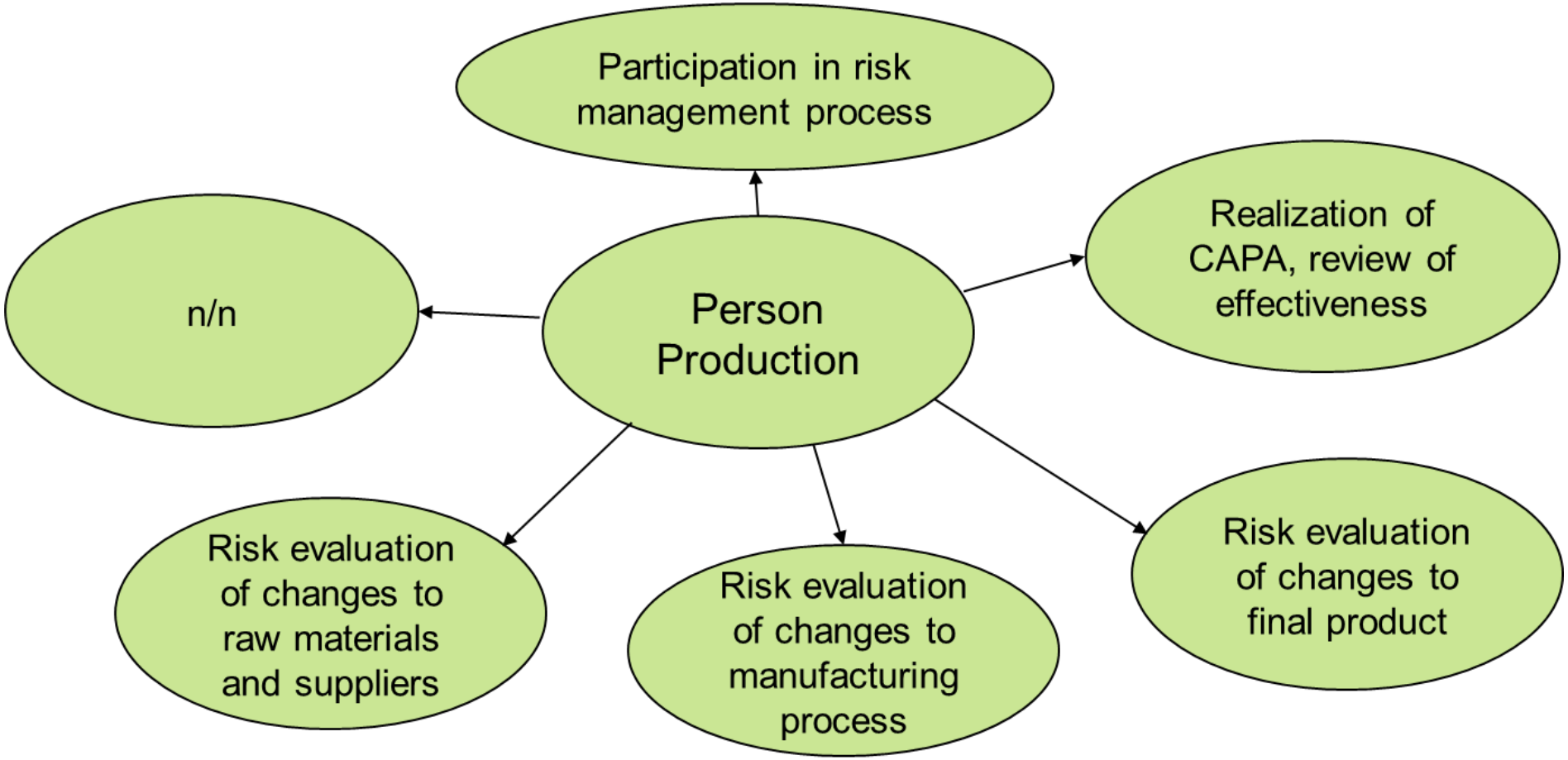
Personnel and Responsibilities in the Risk Management Process (Executive Management)



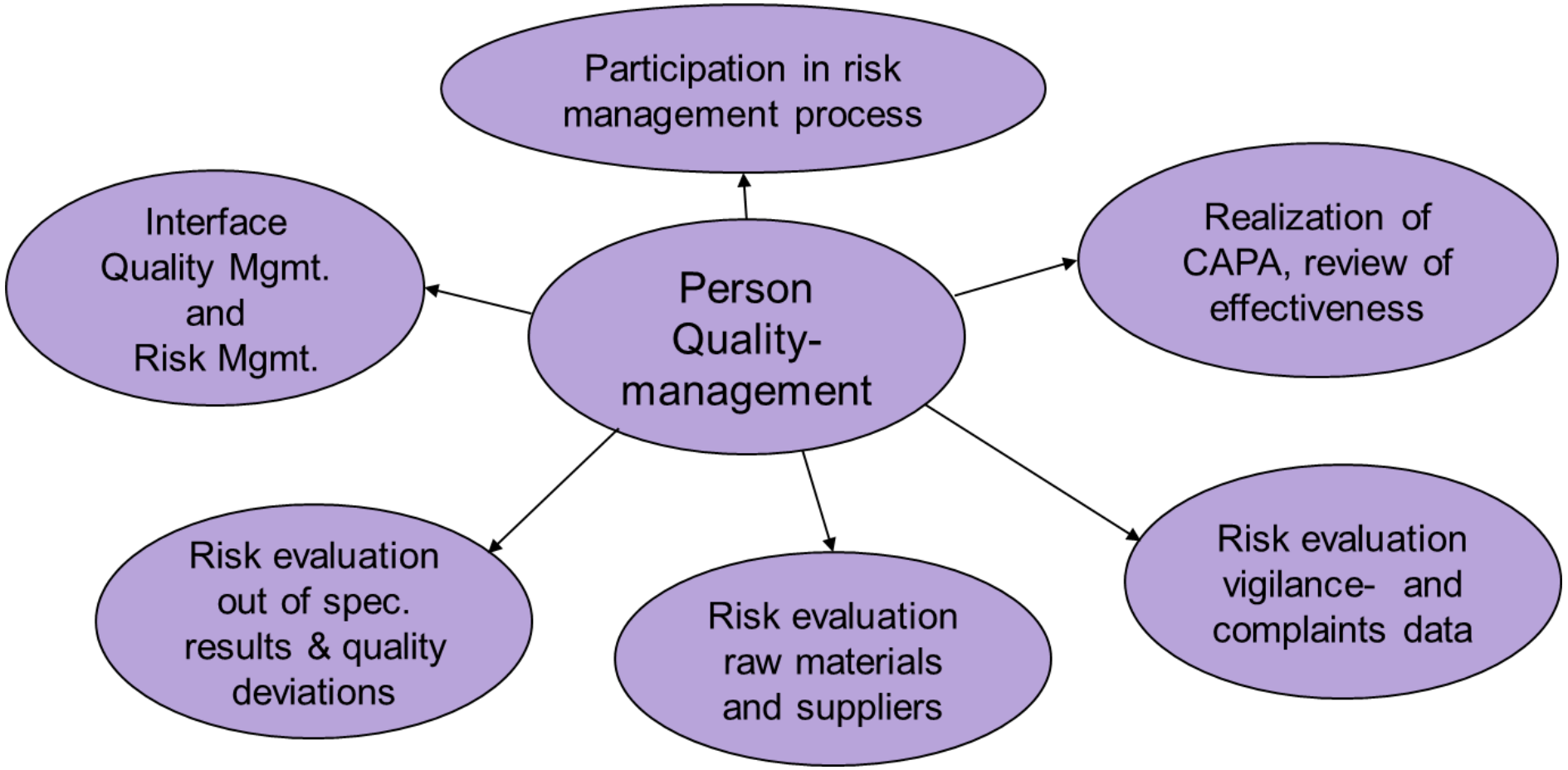
Personnel and Responsibilities in the Risk Management Process (Safety Officer)



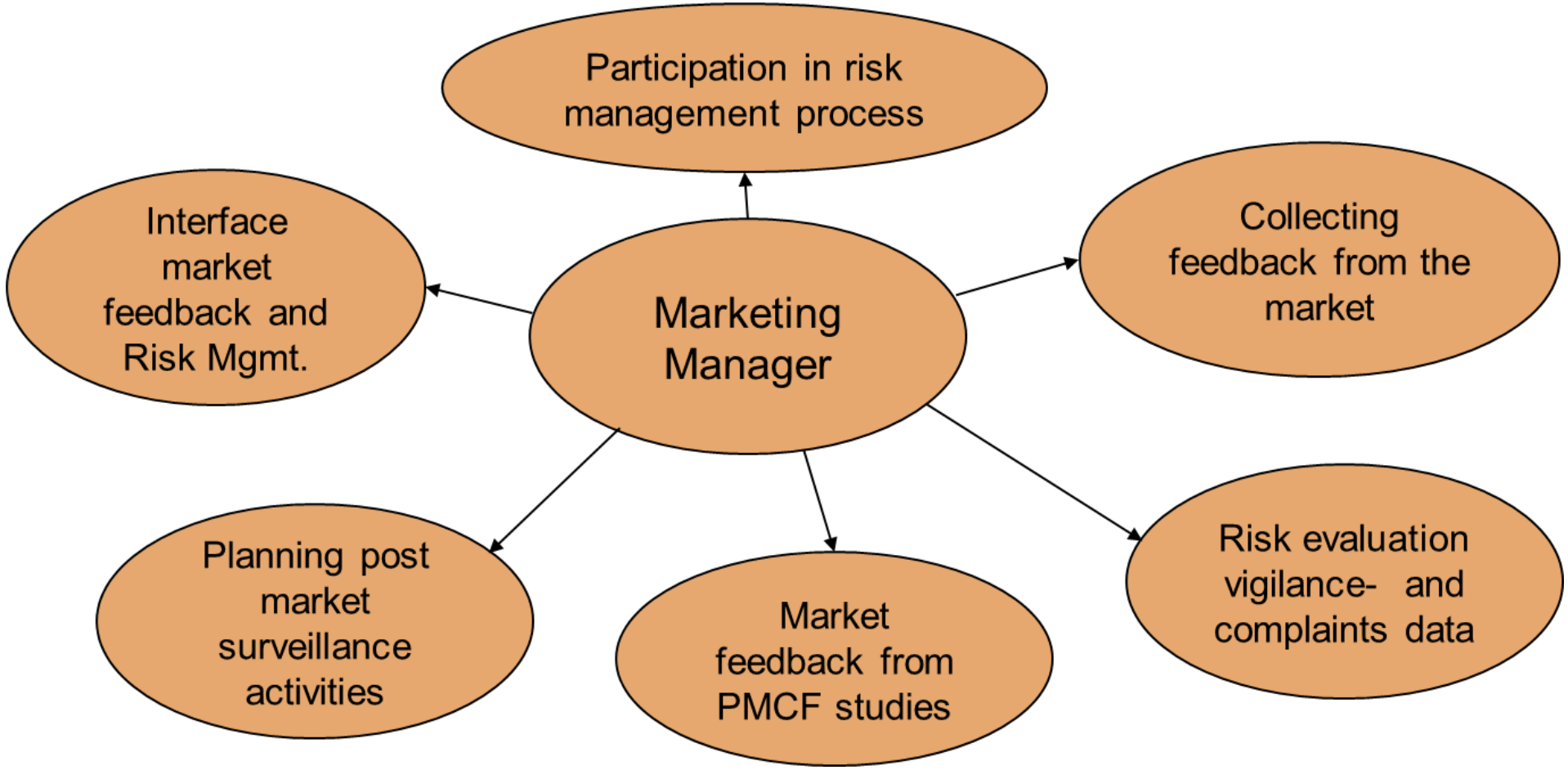
Personnel and Responsibilities in the Risk Management Process (Responsible Person Manufacturing)



Personnel and Responsibilities in the Risk Management Process (Quality management Representative)



Personnel and Responsibilities in the Risk Management Process (Marketing Manager)



Personnel and Responsibilities in the Risk Management Process (Documentation in the RM Plan)

Position in the Company	Full Name	Initials	Responsibilities in the RM Process	Authorization to Act
Management representative	**Dr. Klaus Schulze**	**KS**	• Defining of acceptance criteria • Approval of RM plan • Financial resources • Defining mode, extent and frequency of controls • Checking effectiveness of measures • etc.	✓ Realization ✓ Review ✓ Evaluation ✓ Approval
Safety Manager	**Elke Müller**	**EM**	• Coordination of risk management meetings etc.	✓ Realization ✓ Review ✓ Evaluation
Marketing / Sales	**Michael Meyer**	**MM**	• Input feedback of product users, market needs etc.	✓ Realization ✓ Review ✓ Evaluation

Criteria for defining the "RISK" of a device

1a. Severity of harm (example for a low risk device, e.g. contact lens)

- Score 1: negligible physical damage (e.g. minor short-term reversible reaction of the human body to the MD)
- Score 2: minor physical damage (e.g. painful but still reversible reaction of the human body to the MD)
- Score 3: critical physical damage (e.g. painful injury requiring a medical intervention)
- Score 4: disastrous physical damage (e.g. non-reversible, disabling injury, death)

Criteria defining the "RISK" of a device (cont'd)

1b. Severity of harm (example for a high risk device, e.g. heart implant)

- Score 1: minor physical damage (e.g. reversible damage, which does not require medical intervention)
- Score 2: moderate physical damage (e.g. reversible physical damage, which requires medical intervention)
- Score 3: critical physical damage (e.g. serious, possibly irreversible consequences, despite of medical intervention)
- Score 4: disastrous physical damage (e.g. life-threatening condition, disabling injury, death)

Criteria defining the “RISK” of a device (cont’d)

2. Probability of occurrence

- Score 1: Very improbable (during intended use and/or reasonably foreseeable misuse hardly imaginable)
- Score 2: In single cases possible (during intended use and/or […] misuse in single cases possible)
- Score 3: Probable (during intended use and/or […] misuse […] in certain cases well possible)
- Score 4: Frequent (during intended use and/or […] misuse regularly but not always possible)

Criteria defining the "RISK" of a device (cont'd)

3. Risks related to non-detection

- Score 1: Will be discovered always, immediately and before occurrence of a possible harm. Therefore: no additional risk to be evaluated
- Score 2: A possible non-detection has none or acceptable negative consequences
- Score 3: A non-detection has critical physical consequences
- Score 4: A non-detection has disastrous physical consequences

Decision matrix for the acceptance of risks (example)

Potential Harm	Probability of Occurrence			
	1	2	3	4
4				
3				
2				
1				

Non-Detection			
Risk score values			
1	2	3	4

Light Green: Risks evaluated to be directly acceptable

Dark Green: Risks still acceptable with a clear risk vs. benefits ratio, possibly requiring some preventive action (e.g. warning note)

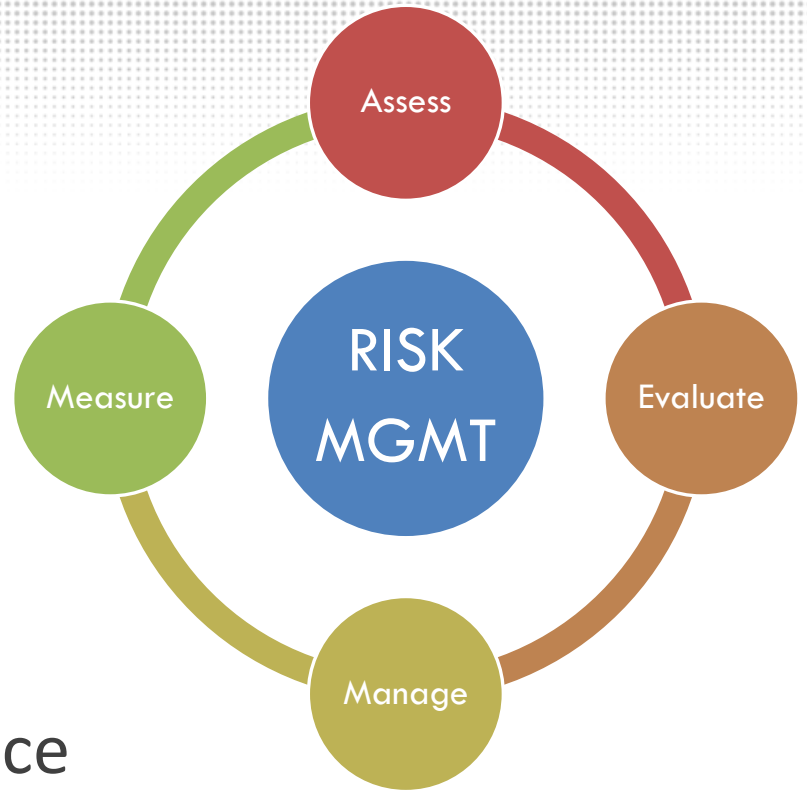
Red: Risks that cannot be accepted; negative risks vs. benefits ratio

Risk Management FMEA Table

Risk Management FMEA Table I: Minimum Requirements

Table I: Analysis and Evaluation of Risks

- ✓ Sequential number
- ✓ Date of assessment
- ✓ Description of malfunction / hazard
- ✓ Technical description and foreseeable sequence of event
- ✓ Medical description of health hazards and harm to patients



Risk Management FMEA Table I: Minimum Requirements

- ✓ Assessment of severity / probability / non-detection scores **without** considering existing measures of risk mitigation
- ✓ Description of currently established measures of risk mitigation
- ✓ Assessment of severity / probability / non-detection scores **while** considering existing measures of risk mitigation
- ✓ Evaluation of risk acceptability (YES / NO)
- ✓ Identification of potentially necessary further measures
- ✓ Who is responsible for such measures

Risk Management FMEA Table II: Minimum Requirements

Management of Corrective & Preventive Action

Description of actions taken

- ✓ Sequential number (kept identical with sequential number of Table I)
- ✓ Date of initial assessment (kept identical with Table I)
- ✓ Description of planned corrective or preventive action (kept identical with Table I)
- ✓ Description actually performed corrective or preventive action
- ✓ Activity performed by whom (initials) and when (date)

Risk Management FMEA Table II: Minimum Requirements

Management of Corrective & Preventive Action

<u>Evaluation of effectiveness of actions taken:</u>

- ✓ Was activity effective (YES / NO)
- ✓ Evaluation by whom (initials)
- ✓ Evaluated when (date)
- ✓ Final assessment of severity / probability / non-detection scores **while** considering the newly implemented measures of risk mitigation
- ✓ Final evaluation of acceptability of (residual) risks (YES / NO)
- ✓ Further recommended action (what to do and when and who)

Risk Management Report &
Risk Management File

Risk Management Report – Example for Table of Contents

A Risk management report must be filed and regularly be updated (typically 1x per year)

Table of Contents

1. Signatures of the Responsible Personnel for this Risk Management Report
2. Document History
3. Introduction (with reference to the RM Plan; with or without repeating the methodology as described in the RM Plan)

Risk Management Report – Example for Table of Contents

4. Suitability and Effectiveness of the Risk Management Process
5. Adequacy of Criteria to Accept Risks
6. Reports about Damages, Complaints and Side Effects
7. Ongoing and Planned Further Measures for Risk Mitigation
8. Residual Risks Connected to the Product
9. Summary and Conclusion

Contents of the Risk Management File

A Risk Management File must be kept by the manufacturer containing the following elements:

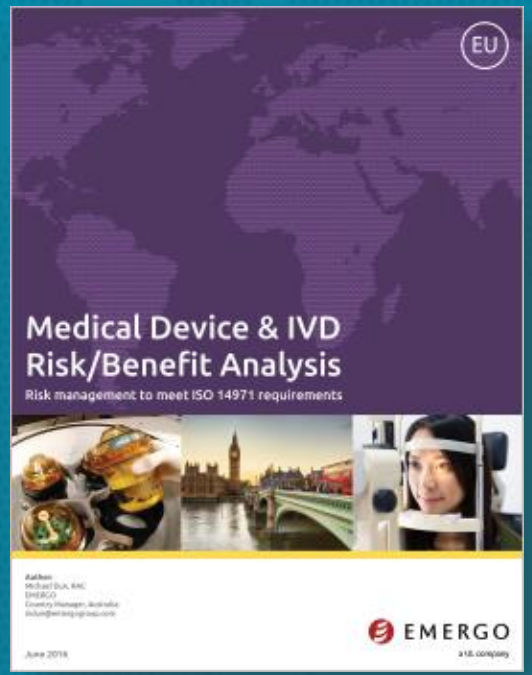
- ✓ Risk management plan
- ✓ Risk management tables
- ✓ Risk management report(s)
- ✓ Product sales records
- ✓ PMS data and record of complaints, clinically relevant incidents, adverse device effects and notifications to competent authorities for the device in question and for comparable (equivalent - “predicate”) products of other manufacturers

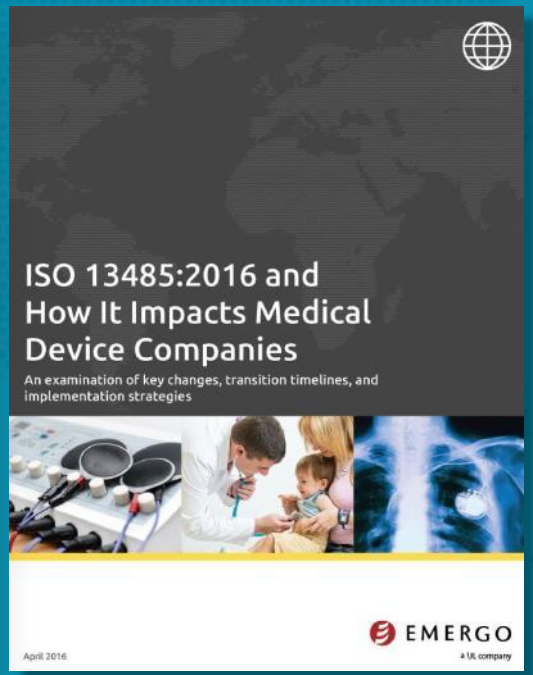
Questions?

Emergo can assist you in 23 medical device markets worldwide.

Our Areas of Expertise

- Classification & RA Strategy
- Device/IVD Registration
- In-Country Representation
- Internal/Supplier QMS Audits
- ISO 13485:2016 Transition
- EU MDR/IVDR Compliance





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