How to do an 8D
Problem solving in 8 Disciplines

Dipl.-Ing. (FH) Siegfried Köpke

MXL

Quality Assurance

Hamburg Bahrenfeld, 19.11.2019

Agenda

■ Preparation for 8D and Overview

■ D1 – Form the Team (responsibility: Team Leader)

■ D2 – Fault description, event chronology

■ D3 – Interim Containment Action(s) (ICA)

■ D4 – Root cause Analysis

■ D5 – Developing Permanent Corrective Actions (PCA)

■ D6 – Implementation plan for the Permanent Corrective Actions (PCA)

■ D7 – Preventive measures (or future directions)

■ D8 – Close out

■ Questions and answers

Preperation for 8D and overview

Preparation for 8D and overview

1 **What is an 8D-Report (@ DESY: XFEL Event Report)?**

A structured standard method in industrial areas

→ to solve (technical) problems,

→ document and distribute (e.g. into FMEA) learnings,

→ report them.

2 **Success keys are:**

→ Fact orientated: figures,data, facts, logbooks

→ Cause orientated: Understanding the root cause

→ Team orientated: moderated interdisciplinary approach

Where to get templates and support and more infos:

→ MXL

→ More general details can be found [here](#) at VDA!

XFEL Event Report 8D (4D)

Event Report No.:	Descriptive title		Event date/time:
20yy-nn-MXL	**Title** **Short description**		dd.mm.yyyy hh:mm
Report Status:	Report Version:	Last modified:	Editor:
Open | Closed	1	dd.mm.yyyy	First Name Surname

Accelerator	Sub-System	Componente	Maschine state:
FLASH | XFEL | other	LLRF: L3 | CS4 | A9M	Crate 2	User Run

Event type	Recurring Fault:	If yes, please name parent of the fault | e.g. report no.	
	Critical Fault:	If yes, please specify in terms of (financial impact, safety, Laws & Regulation	

Please give the absolute numbers:	Time to System Repair:	4.5 h	Excessive Down Time? *Down Time > 4 h*	Yes | No
	Time to System Recovery:	1.5 h		
	Time to Beam recovery:	2 h		
	Tuning Time: (Time to recover)	6.5 h	Excessive Recover Time?	Yes | No
	Total facility down time:	14.5 h		

Team meeting history	
1st meeting	dd.mm.20yy
2nd meeting	dd,mm.20yy

D1: Form the Team (responsibility: Team Leader)
Leader of 8D-Report informs MQ about new failure.
Who are your team members and who is going to be the team leader? What are the roles and responsibilities?

Role	Name	Acronym	Department
8D Lead	Max Mustermann	MM	XYZ
Run Coordinator (RC)	Britta Beispiel	BB	UVW
...			

HELMHOLTZ | GEMEINSCHAFT

European XFEL

Preparation for 8D and overview

When do I need an 8D?

Simple problems that can be solved by an individual

Typical solutions
- Simple rework
- Replacement with on-stock items

Recommended Methods:
Rework Report (Pictures and Text) → No 8D
Note in Process inspection card
Note in delivery documentation

Simple problems were we know the answer to

Typical solutions
Small Teams & Difficult rework (time and resource heavy)
Re-ordering of parts and/or Replacement of sub-components
Possible involvement of other departments
Recommended Methods:
Individual Report sheme (Pictures and Text) → 8D Optional
…

Difficult problems were we don't know the answer to

Typical solutions
Interdisciplinary teams
Involvement of suppliers, customers (e.g. XFEL GmbH)
Working on the problem with various methods

Recommended Methods:
At least an 8D-Report
5-Why
Ishikawa (Fishbone Analysis)
Pareto (80 / 20)
PDCA (Plan Do Check Act)
…

Recurring or existing problems, which couldn't be solved until now

Typical solutions
Interdisciplinary Project team with Management support
Involvement of 2nd / 3rd Parties, Suppliers, Customers
Working on the problem with various methods / tools

Recommended Methods:
At least an 8D-Report
DMAIC (Six Sigma)
Ishikawa (Fishbone Analysis)
Pareto (80 / 20)
DoE (Design of Experiments)
…

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY

D1 – Form the Team (responsibility: Team Leader)

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY

D1 – Form theTeam (responsibility: Team Leader)

Having the right experts on board is essential. But beware of a high number of participants. It's not easy to moderate more than 8 to 12 participants, writing the report, asking questions, guiding, playing the time keeper. Ask your colleagues to take over some of these roles and responsibilities.

Team members:
→ technical experts in their discipline
→ Run Coordinator (RC)
→ empored in regards to time and authorithy
→ team can be expanded or downsized (e.g. new facts and data) by the ...

8D team leader:
→ ensures communication (intern / extern)
→ 8D competence and experience
→ access to further supportive methodes (e.g. 5Why, Ishikawa, ...)

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY

D2 – Fault description, Event chronology

D2 – Fault description, Event chronology

Some times it could be helpful to document first the timeline and the chronology of the fault, instead of discusing what was the cause and what was the failure pattern.

■ Sucess key for D2:

→ be precise in your statements

→ speak with facts and data

→ use the log book, collect picture, screen shoot from the panels, ...

■ Major risks in D2:

→ Assumption and conclusions without evidence

→ Mixing up descriptive things and interpretations, starting discussions

The fault description is a precise fact based statement about the problem whose cause is not known!

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY

D3 – Interim Containment Actions(s) (ICA)

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY

D3 – Interim Containment Action(s) (ICA)

The interim containment actions should be simple and impactful. The influenced area | facility should always be informed e.g. by email or blackboard. After finalizing the report and implementing the permanent corrective actions all cointainmend actions should be withdrawn.

- Sucess key for D3:
  - → fast implementation of actions
  - → giving information to the employees

- Major risks in D3:
  - → worthless actions, failure pattern still there
  - → containmant actions have unexpected effects, not u nder control

Purpose of D3 is to implement immediate actions to keep users free from the problem until permanent corrective actions are introduced in D6.

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY

D4 – Root Cause Analysis

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY

D4 – Root Cause Analysis

Main task of 8D. Be precise – don't hurry! Prevent discussions, collect facts only!

■ Definition of Root Cause:
"The lowest level event that can be verified, which cause the problem to occur."

■ Root Cause undetectable! Then:
"The place in the failure process, where the root cause of the problem went undetected alloing the problem to occur."

■ Appliceable methods (supported by 8D lead):
→ 5Why, Ishikawa (Fishbone), Pareto (80/20)
→ PDCA
→ DMAIC | DMADV
→ DoE
→ Statistics
→ ...

The Root cause has to be determined and verified based on D2 and the interim containment actions in D3.

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY

D5 – Developing Permanent Corrective Actions (PCA)

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY

D5 – Developing Permanent Corrective Actions (PCA)

(Potential) corrective actions are developed within the team.

- Each identified potential root cause should have an corrective action

- Review similar Failure events, learn from them, consider their measures

- Record the potential risks and side effects of your developed actions

- Setup implementation plan

- Communicate the implementation plan to the effected parties

Consider the each actions should have unintended effects to other processes!

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY

D6 – Implementation plan for the Permanent Corrective Actions (PCA)

HELMHOLTZ | GEMEINSCHAFT

DESY

D6 – Implementation plan for the Permanent Corrective Actions (PCA)

Test or simulate your choosen actions before implementing in given systems.

- 8D team lead coordinates and follows up the implementation

- Adaptions may be necessary

- If aggreed actions are switched to „on hold" or „canceld" team lead should be informed by action owner

- After implementation, dont forget to
  - → change documentation (e.g. schematics, descriptions, manuals, ...)
  - → Inform user, experts, groups about new situation

Look across: Could these failure pattern and corrective action also helpful for similar processes?

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY

D7 – Preventive measures (or other future directions)

D7 – Preventive measures (or other future directions)

In some cases it could be that there are actions which cannot organized by the 8D Team:

🟧 Reorganizing or change Roles and Responsibility

🟧 Create Job advertisement

🟧 Change company standards

Make sure that this actions can be adressed to the next organisation level or the the leading management in the organisation.

Add-On: General „catch all" for ideas/concepts that have arisen from the analysis.

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY

D8 – Closeout

D8 – Closeout

Bear in mind the you have to clean up:

- Documents like, process maps, processdescriptions, work instructions should be reworked. Colleagues should be informed | trained.

- FMEAs should be updated,failure reports may stored in databases.

- Report to the management must be prepared

- Interim containment actions must be withdrawn

Less concrete actions (long-duration studies, organisational issues, …) should not keep the report open. These kind of ongoing themes should address to a higher oranisational level.

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY

Questions and answers

European XFEL

HELMHOLTZ | GEMEINSCHAFT

DESY