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Instrument Hazard Analysis

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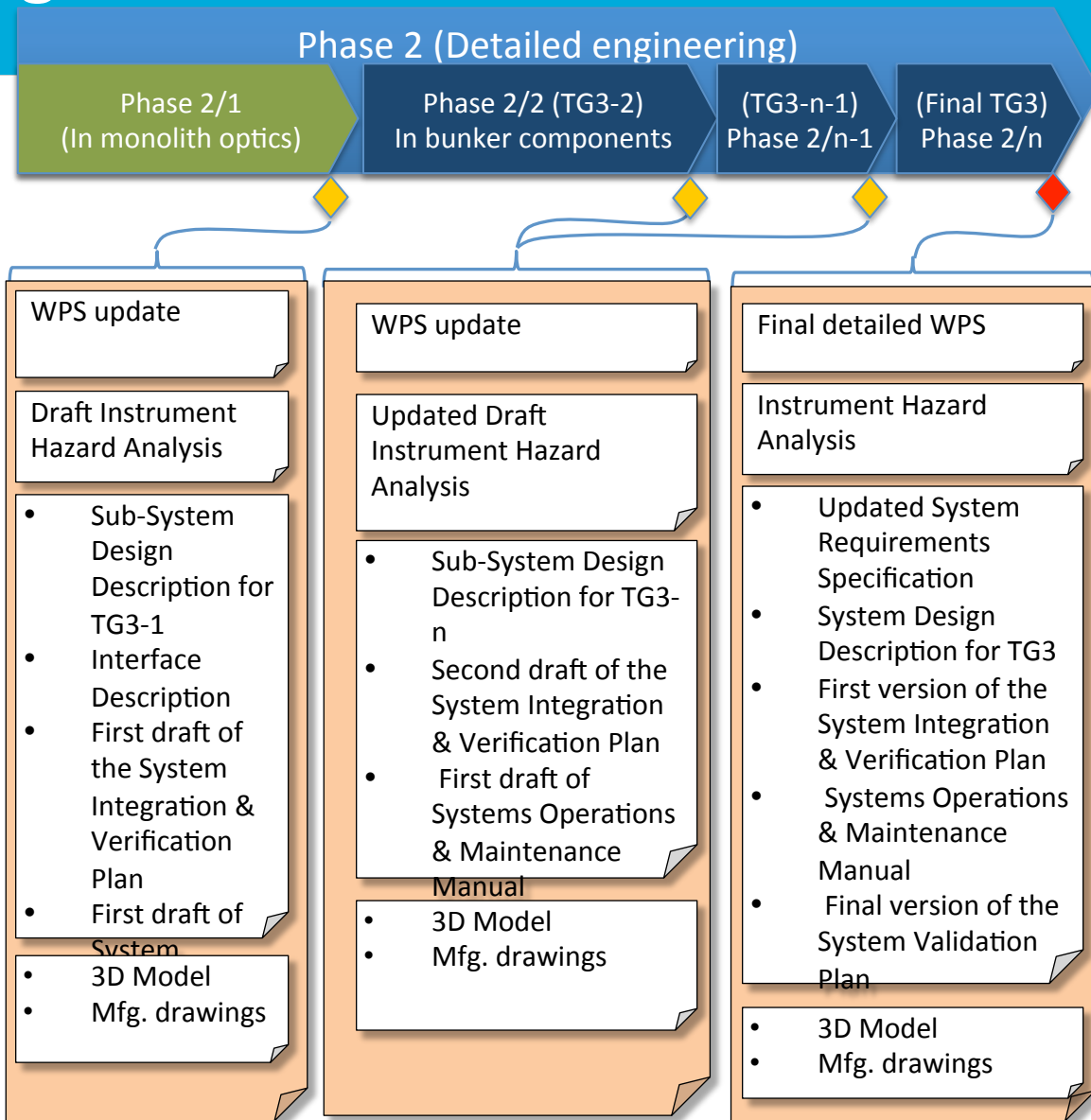
15th February , 2018

Content

- The IHA within the TG3 data package
- ESS processes and criteria
- ESS-0047810 Guideline for IHA
- ESS-0100583 Template for IHA

Example movies and example spreadsheet are available upon request,
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Phase 2 data package



ESS-0099059 Neutron instrument design and construction – Phase 2 data package Specification

Safety Documentation

Instrument Hazard Analysis

[ESS-0047810](#), ESS Guideline for IHA

[ESS-0100583](#), ESS Template for IHA

[ESS-0016468](#), ESS rule for identification and classification of safety important components

Radiation Safety Analysis

[ESS-0052625](#) NOSG phase 2 guidelines for designing instrument shielding for radiation safety

Current framework at ESS

ESS-0000263 ESS Process for Risk Management

ESS-0020044 ESS Procedure for Risk Management

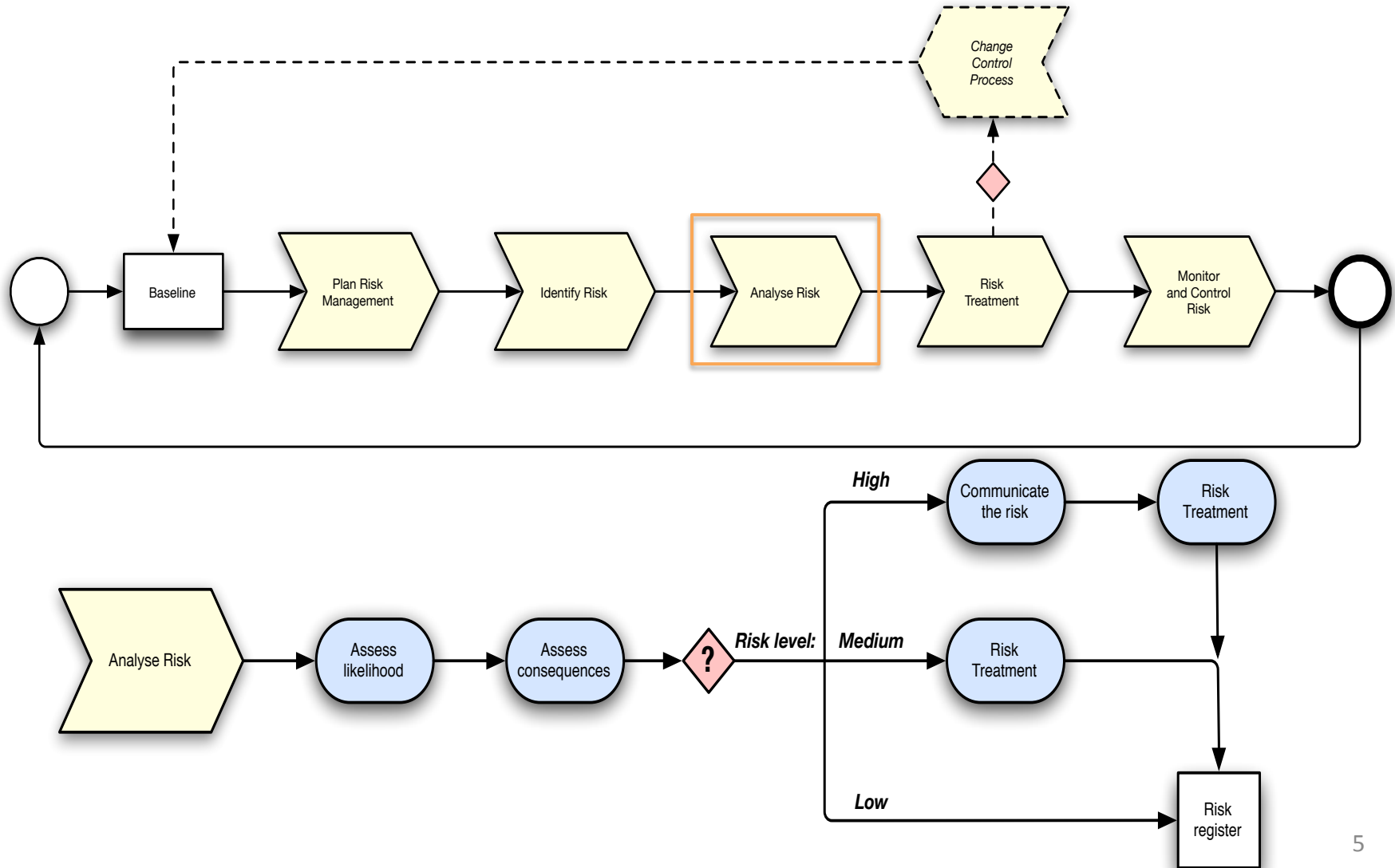
“Risks”

ESS-0047810 ESS Guideline for Instrument Hazard Analysis

“Hazard”

ESS-0100583 Template for IHA

ESS-0020044 ESS Procedure for Risk Management (J. Wollberg)



ESS-0020044 ESS Procedure for Risk Management (J. Wollberg)

Phase			Consequence					
			1	2	3	4	5	
	<i>Construction</i>	<i>Operation</i>	Minor	Substantial	Serious	Very serious	Catastrophic	
Frequency	5	Most likely to occur during construction	More frequent than once per 5 years of operation	5x1	5x2	5x3	5x4	5x5
	4	Likely to occur during construction	Less frequent than once per 5 years of operation	4x1	4x2	4x3	4x4	4x5
	3	May occur during construction	Less frequent than once per 10 years of operation	3x1	3x2	3x3	3x4	3x5
	2	Unlikely to occur during construction	Less frequent than once per 25 years of operation	2x1	2x2	2x3	2x4	2x5
	1	Most unlikely to occur during construction	Less frequent than once per 100 years of operation	1x1	1x2	1x3	1x4	1x5

ESS-0020044 ESS Procedure for Risk Management (J. Wollberg)

	<i>1= Minor</i>	<i>2 = Substantial</i>	<i>3 = Serious</i>	<i>4 =Very Serious</i>	<i>5=Catastrophic</i>
<i>Personal Injuries</i>	Minor injuries or discomfort	Injuries requiring professional treatment	Injuries leading to more than three days absence	Permanent injuries	Fatal outcome

Table 1 Risk levels, acceptance criteria, and descriptions.

RISK LEVEL	CRITERIA (LXC)	Description
High – Unacceptable	5x3, 5x4, 5x5 4x3, 4x4, 4x5, 3x4, 3x5 2x5	<i>Can never be accepted – treatments are required.</i>
Medium – Tolerable	5x1, 5x2 4x2 3x2, 3x3 2x3, 2x4 1x4, 1x5	<i>Treatments are required but risks can be accepted without treatment if the actions are not proportional to gained improvements.</i>
Low - Acceptable	4x1 3x1 2x1, 2x2 1x1, 1x2, 1x3	<i>Treatments are not necessary. Usual precautions taken and maintained. Should be monitored.</i>

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ESS-0047810 ESS Guideline for Instrument Hazard Analysis



The purpose of this document is to explain the use of the “Template for Instrument Hazards Analysis” [7], illustrate the scope of the analysis and the criteria used.

The guideline and the template are designed to assist in documenting, tracking and communicating hazards connected to the ESS neutron scattering instruments in accordance with the ESS Procedure for Risk Management [1].

This guideline and the template do not provide a hazard analysis but constitute an aid for performing it.

Different engineering disciplines provide specific methodologies of the evaluation of risks and different grading, note that these may as well be applicable (as example EN-ISO 13489 or IEC 61508).

ESS-0047810 ESS Guideline for Instrument Hazard Analysis

Scope:

The scope of the hazard analysis is the neutron instrument and its subsystems as identified in the ESS Generic Instrument PBS Number Designation [5]

Excluded hazard categories:

Radiological hazards: Identification and Mitigation of the radiological hazards are described in separate documents (see inside the document)

Fire and explosion hazards: These are addressed by Fire & Explosion Safety Program [ESS-0004722]. Not all fire and explosion hazards are identified, but most hazards are covered for in the program.

Hazards related to removable experimental setups (sample environment equipment) and samples, these are addressed by:

ESS-0024109 ESS Sample Management Procedure

ESS-0024107 ESS Experiment Safety Review Procedure

ESS-0024112 ESS Sample handling Procedure

ESS-0047810 ESS Guideline for Instrument Hazard Analysis

Modes of operation (NSS Sub modes: NSS zoning document - part I (safety) ESS-0051603)

Instrument Operation: Having excluded radiological hazards from the scope of this analysis, the distinction between **beam on** and **beam off** can be ignored since the same hazards are present.

Instrument Construction/Maintenance: All these modes are characterized by additional hazards and total or partial removal of the hazards treatments that are typically available in the “operation mode”.

Current framework at ESS

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Workflow

Input

Major and minor system designations of the instrument in agreement with the project breakdown structure.	Identify the system and subsystem that contain the hazard. The systems are identified in the Instrument breakdown.
Hazard category	Mechanical, Chemical, Biological, Human behaviour, Electromagnetic, Ergonomic, Temperature,
Source of hazard	Description of the source of hazard
Accident description	Description of accident, in terms of event, cause and impact
Accident likelihood and consequence assessment	Grade the likelihood and consequence according to the scale defined in [1] for each mode of operation

NON EXHAUSTIVE

Workflow

Output

L.O.R (Level of risk)	Is the combination of likelihood and consequence, the risk level is defined according to the ESS limits [1] three levels are possible: Acceptable(Green), Tolerable(Yellow), Unacceptable(Red)
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Hazard treatment

Hazard treatment category	Describe the nature of the mitigation within the possible options: Eliminate, Mitigate, Transfer, Observe.
Hazard treatment description	Description of the mitigation to be implemented
Hazard owner	Responsible for treatment and monitoring of the hazard

Questions?

