



Two examples of LHC

Risk assessment and reliability analysis activities

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Activities: A Failure Catalogue for the LHC

Goal:

- Collect knowledge on possible failures of LHC equipment, and related machine protection functions implemented in MPS, in a common failure catalogue.

Status:

- Approach for the deduction of hazard chains
- Identification of the required information/data

Ongoing:

- Collect the 'pieces of the puzzle' on a website

Figure 2: Failure catalogue data sheet (under development)

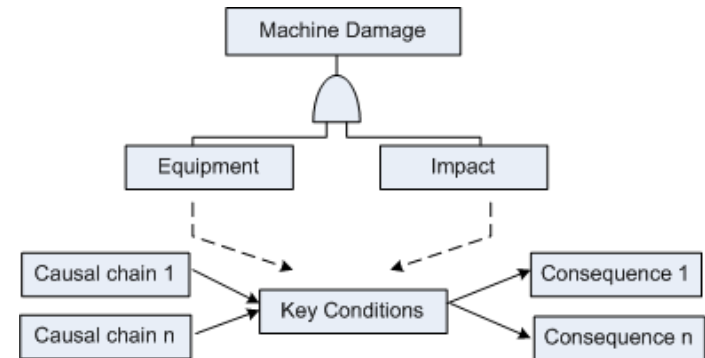


Figure 1: Top-down approach for failure analysis

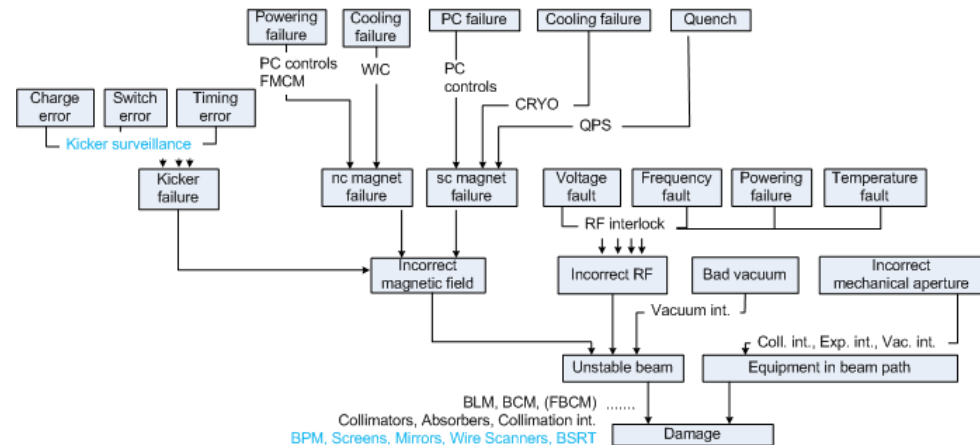


Figure 4: General hazard chain for beam-induced damage

Activities: Quantitative Reliability Studies

Goal: Comparison of different subsystem architectures in terms of machine safety and availability

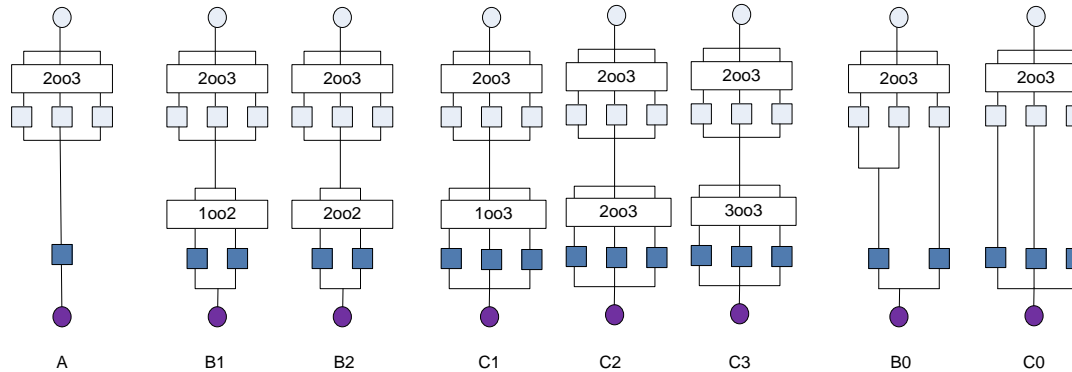


Table 3: Scenario probabilities for the different interface architectures

THEOR	A	B1	B2	C1	C2	C3	B0	C0
Mission completed	0.794900509	0.739878188	0.849922829	0.688664561	0.842305442	0.853731523	0.739872761	0.823763666
False trigger	0.076157726	0.135531124	0.016784327	0.19089764	0.024798093	0.012777444	0.07683858	0.04435782
Demand success	0.128479697	0.124582722	0.132376671	0.120432112	0.132883942	0.132123036	0.124181566	0.131855425
Demand missed	0.000462069	7.96489E-06	0.000916173	5.68622E-06	1.25222E-05	0.001367998	0.000408912	2.30891E-05
False missed								0.058698

Type of result: Probabilities for scenarios related to machine safety (*Demand missed*) and availability (*Mission completed*)

Conclusion: Potential Contribution

Potential contribution to CLIC WP *Machine Protection & Operational Scenarios, Task Reliability, Availability*:

- *2012, 1 CERN post-doc fellow (% tbd)*
 - Guidance in setting up a failure catalogue
 - Method(s) for analyses in terms of machine safety and availability
 - Support in risk assessment and management tasks