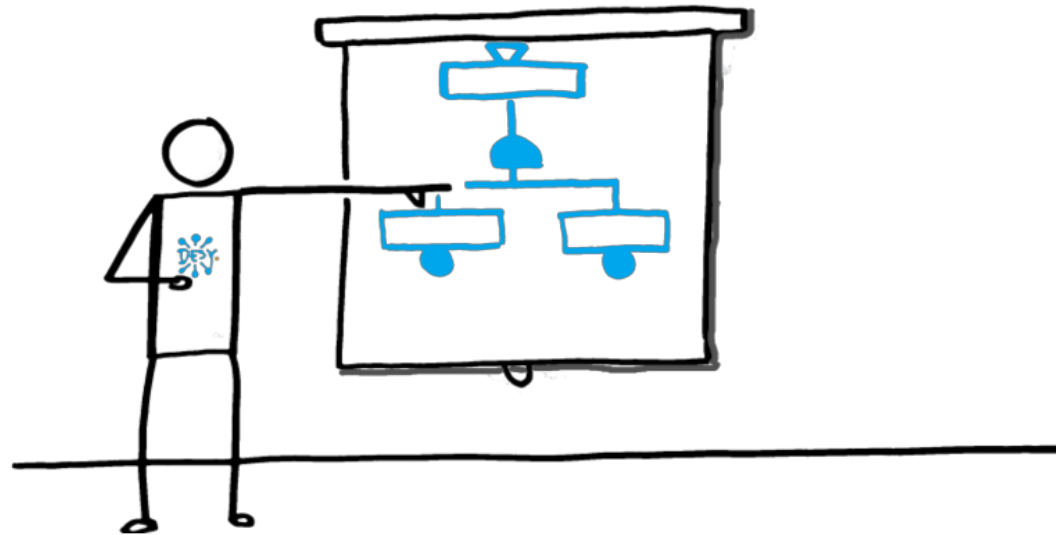


# The Trip Event Logger for Online Fault Diagnosis at the European XFEL

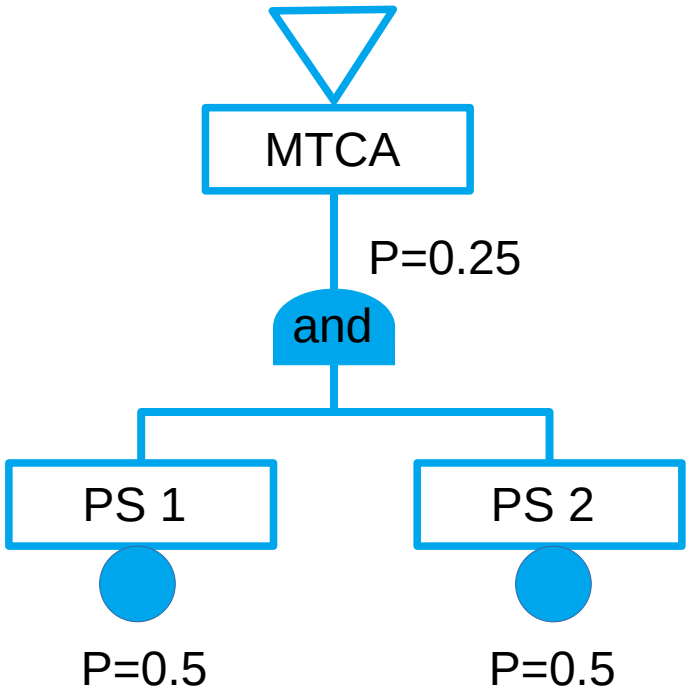
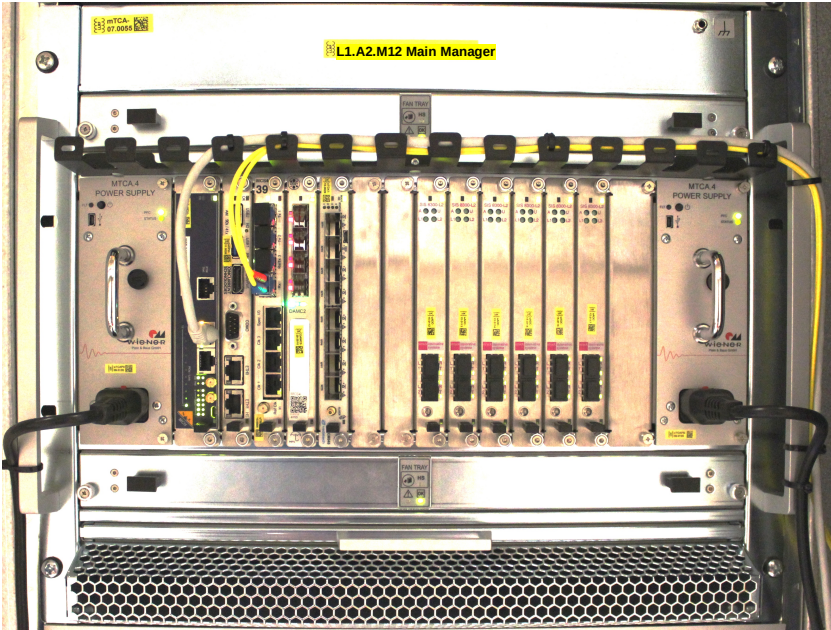
Overview and Current Status

Jan Timm  
PCaPAC 2022 Prague

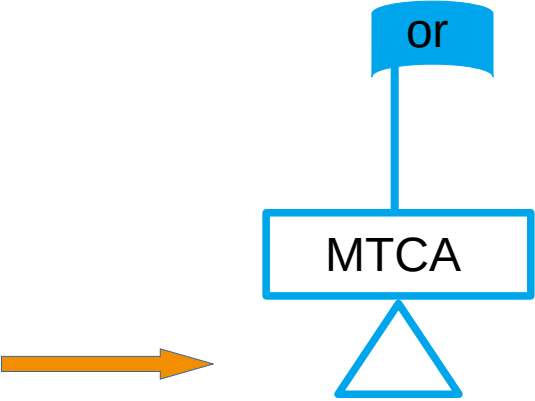


# Fault Tree Example

## MTCA Crate with two power supply



The fault tree follows a simple logic:  
 $P(A \text{ and } B) = P(A) * P(B)$   
 $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

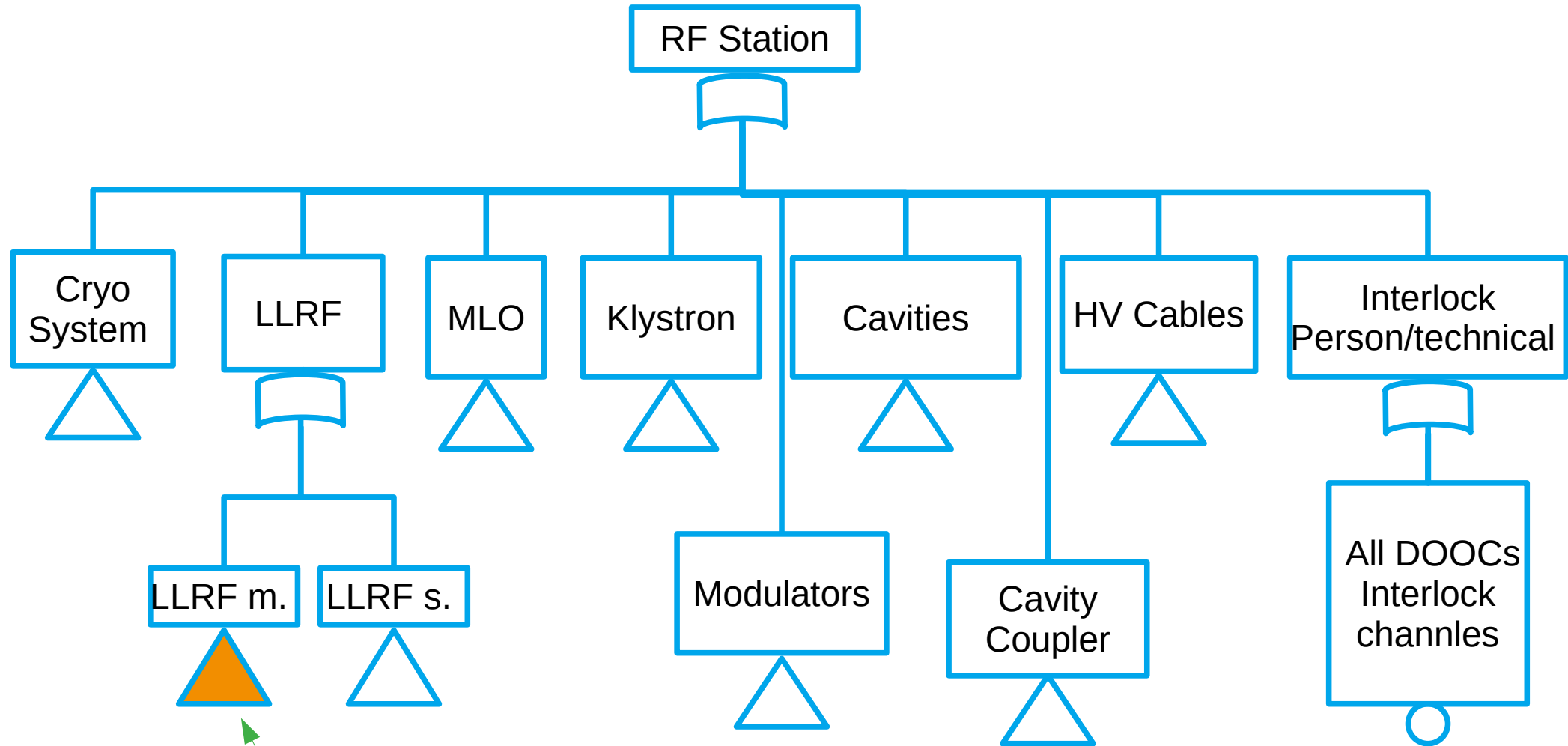


The events can follow different models, e.g. „law of decay“:  
 $P = 1 - e^{(-\lambda t)}$

If you have **sensors** that tell you what **state** the component/**event** is in and which are connected to a **P**, then you can automatically calculate a certain probability of failure.

# Fault Tree Display

## JDDD Event display

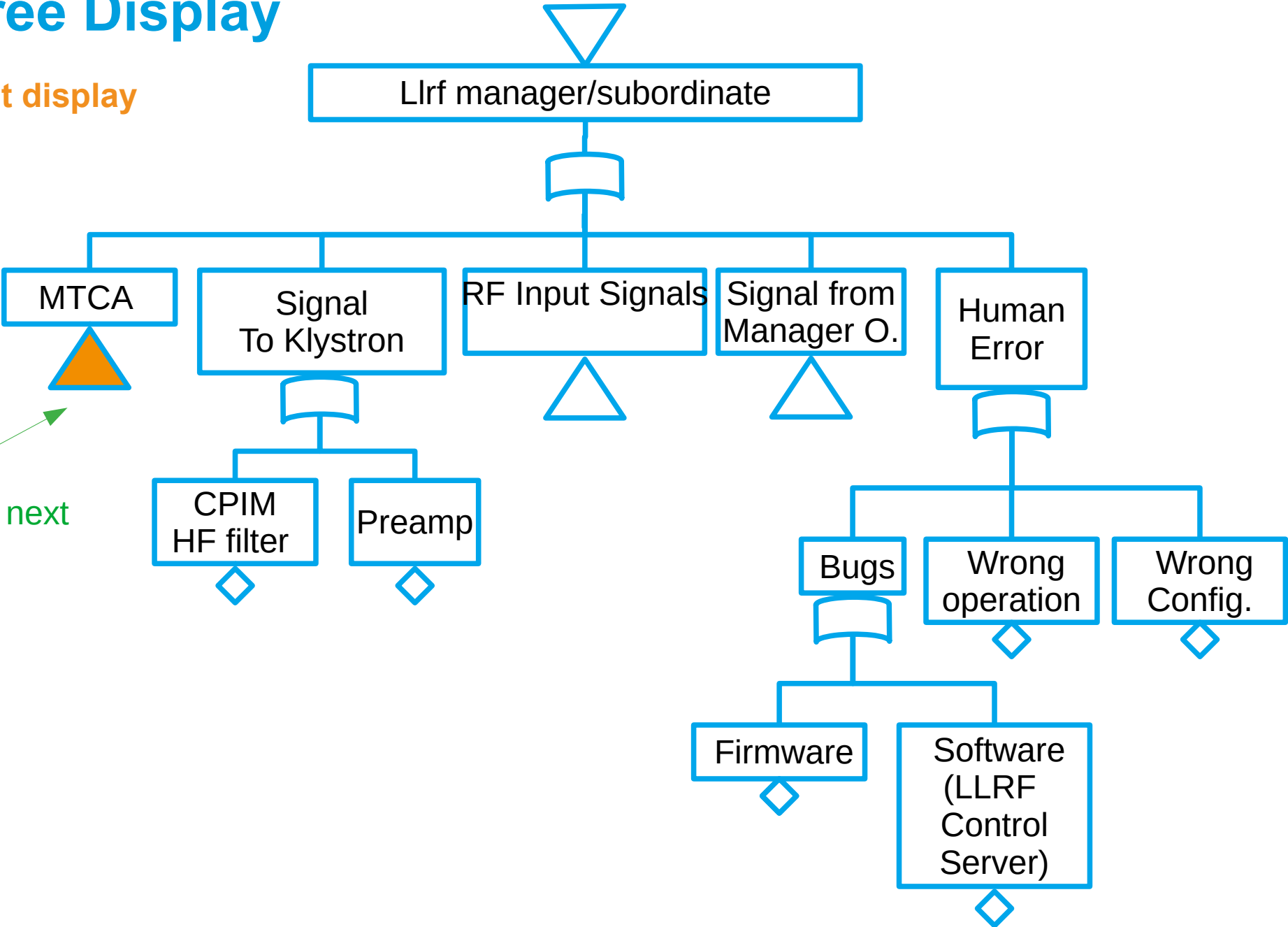


Click on it for next detailed view

# Fault Tree Display

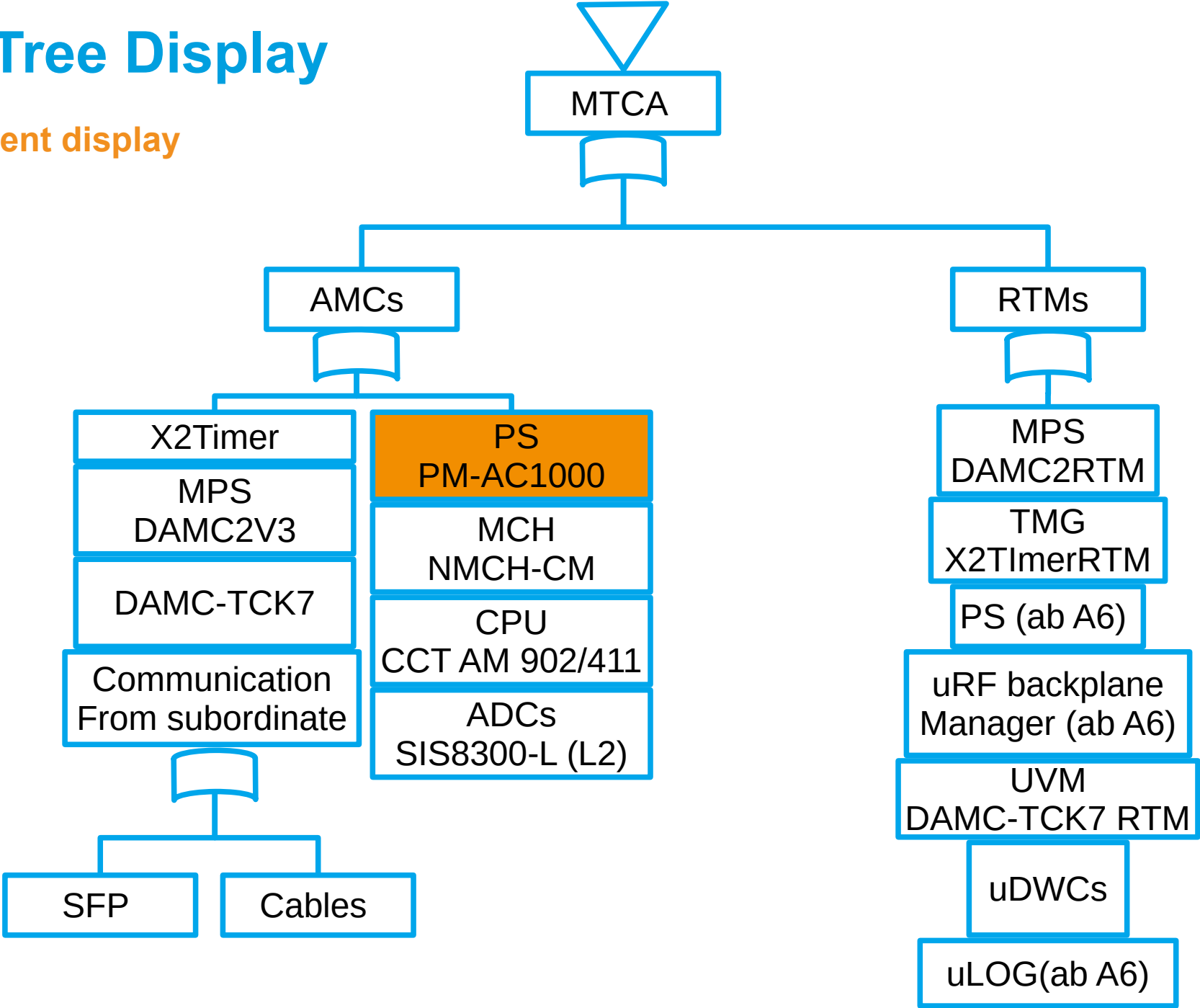
JDDD Event display

Click on it for next detailed view



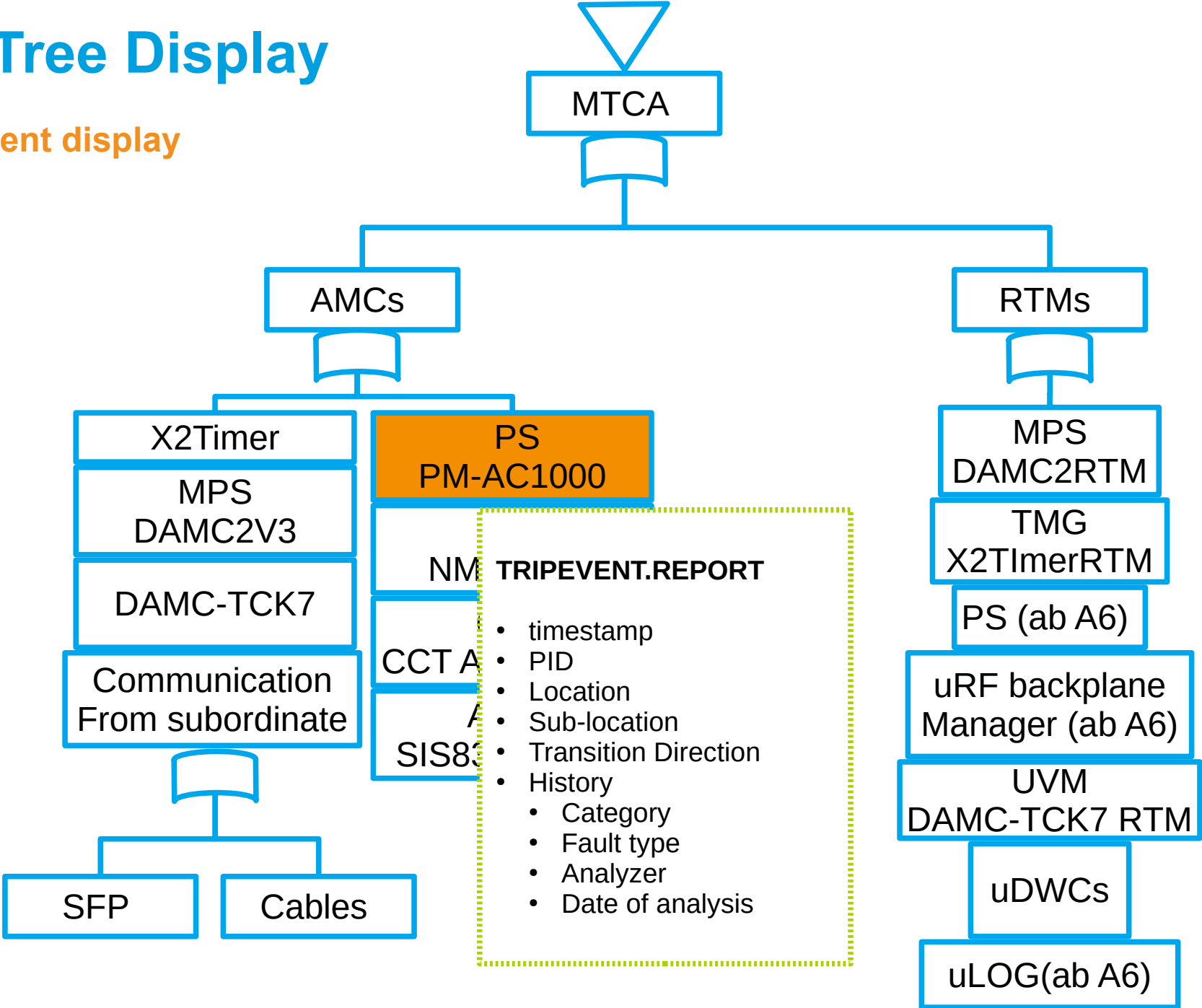
# Fault Tree Display

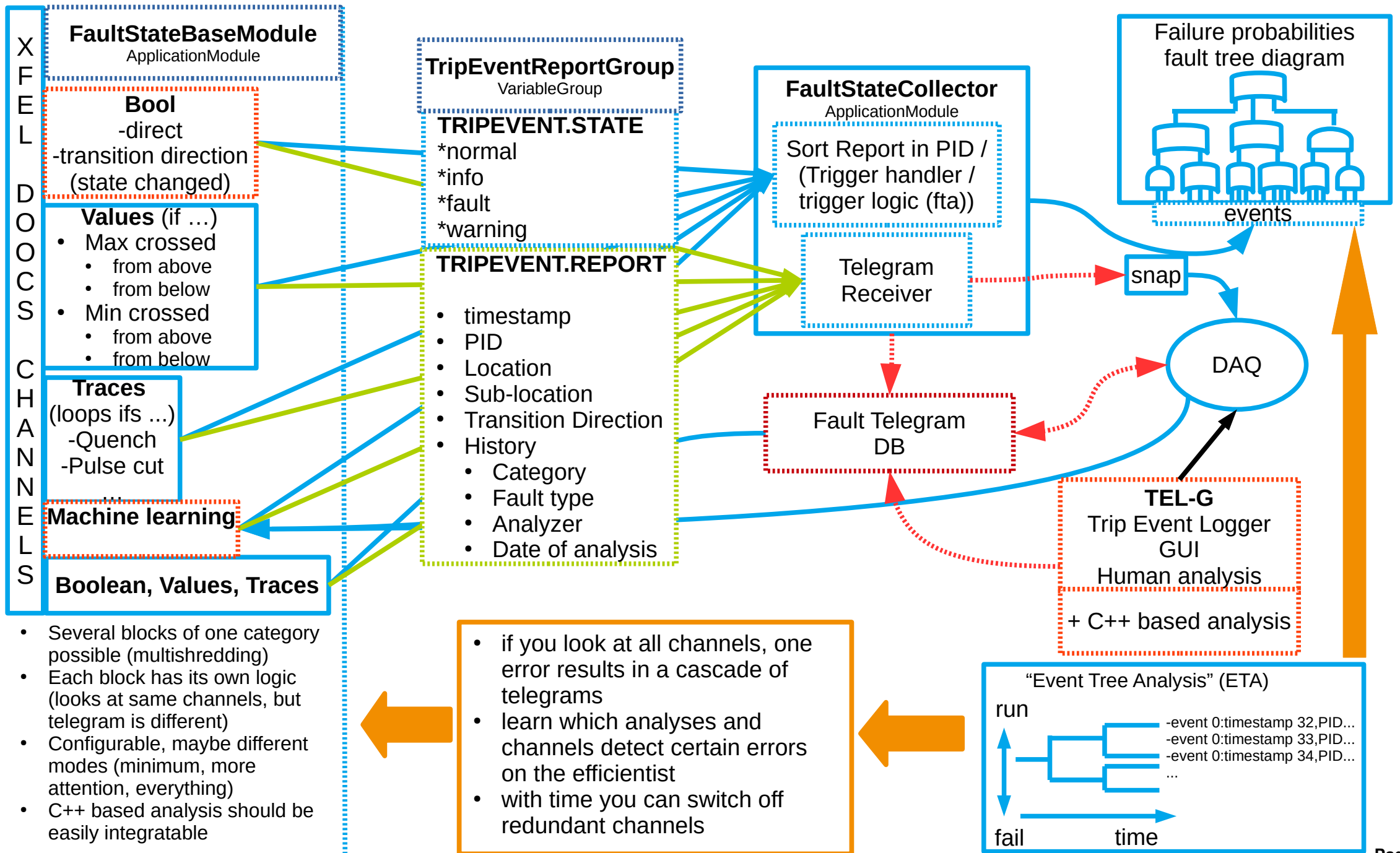
JDDD Event display



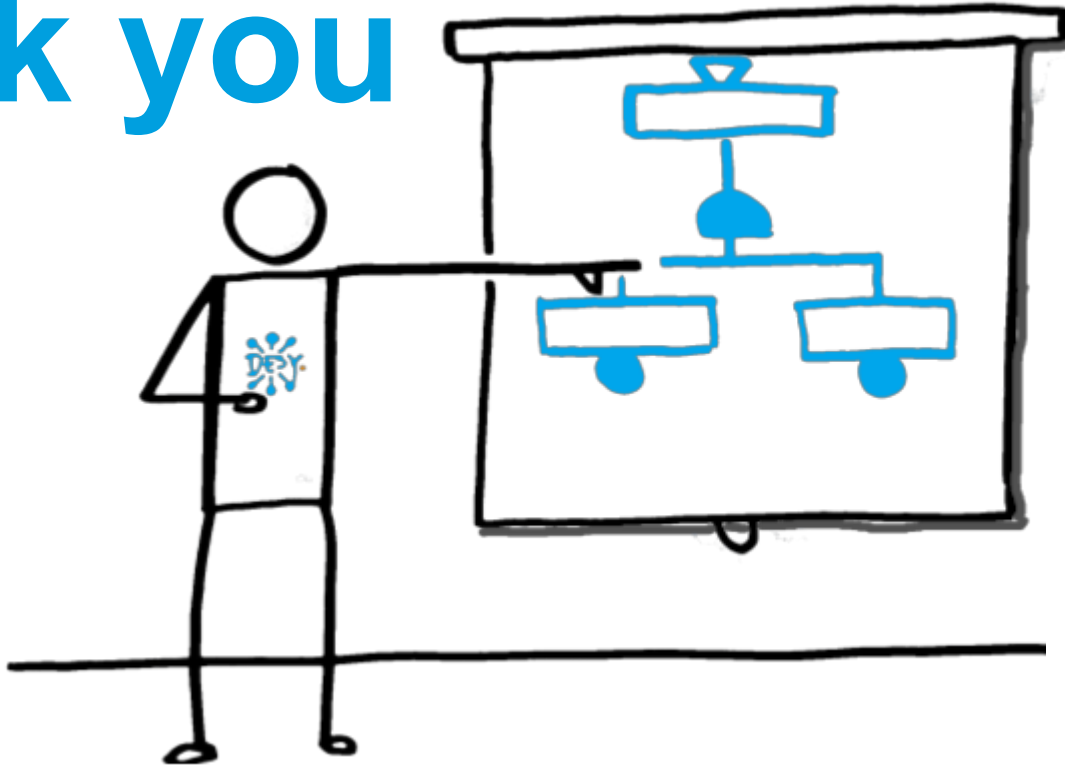
# Fault Tree Display

JDDD Event display





# Thank you



## Contact

**DESY.** Deutsches  
Elektronen-Synchrotron

[www.desy.de](http://www.desy.de)

Jan Timm  
DESY - MCS4  
[Jan.horst.karl.timm@desy.de](mailto:Jan.horst.karl.timm@desy.de)

**Feel free to contact us:**

Annika Eichler  
[annika.eichler@desy.de](mailto:annika.eichler@desy.de)

Julien Branlard  
[julien.branlard@desy.de](mailto:julien.branlard@desy.de)

# References

- [1] Varghese, G. et al. “ChimeraTK - A Software Tool Kit for Control Applications.” (2017).
- [2] ChimeraTK Repository, <https://github.com/ChimeraTK>
- [3] Nawaz, A. et al. “Anomaly Detection for the European XFEL using a Nonlinear Parity Space Method.” IFAC-PapersOnLine 51 (2018): 1379-1386.