

RAWG Organisational Changes and Update on Activities

Lukas Felsberger, Bettina Mikulec and Jan Uythoven
RAWG of 14th August 2024



Mandate of the Reliability and Availability Working Group (RAWG)

Organisational changes as of July 1st:

Chair:

Jan Uythoven (TE-MPE)
→ **Lukas Felsberger** (TE-MPE)

Co-chair:

Bettina Mikulec (BE-OP)

Scientific Secretaries:

Lukas Felsberger (TE-MPE) → **Felix Waldhauser** (HSE-PP)

Xaver Fink (BE-ICS)

Mandate
unchanged!

The RAWG is an advisory body in the field of

Designing Dependable Systems

- Define reliability workflows & guidelines for dependable design
- Promote and support the use of standard methods and practices
- Coordinate additional developments concerning tools and methods
- Apply formal methods to safety critical and protection systems
- Provide an expert forum to assist others where needed

Tracking Availability and Availability Optimisation of the Operational Accelerator Complex

- Coordinate weekly fault reviews in the accelerator complex.
- Produce periodic availability reports for management.
- Provide recommendations & priorities to further increase the benefits of AFT for the sector

Reliability Analysis & Assessment for Future Accelerators

- Ensure a coherent approach for reliability/availability activities and studies for future accelerators such as the HL-LHC and the FCC.
- Promote standard tools and methods in terms of requirements and risk assessment to HL-LHC and future accelerators.

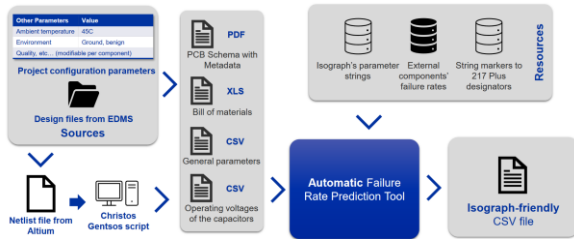
Building Collaborations, Internally and Externally

- Foster collaborations in the field of reliability and availability with universities, institutes and companies
- Organise where needed internal and external workshops and conferences in the field of reliability and availability.

The RAWG reports to the CTTB.

Designing Dependable Systems

Automated Component Reliability Prediction and FMECA Template generation for Electronics Assemblies

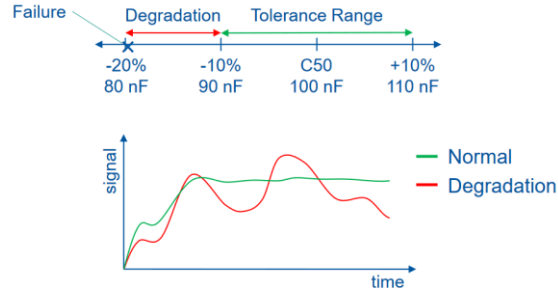


M. Blaszkiewicz

<https://gitlab.cern.ch/mblaszki/failure-rate-prediction-automation>

Speed-up and simplification of bottom-up reliability assessment.

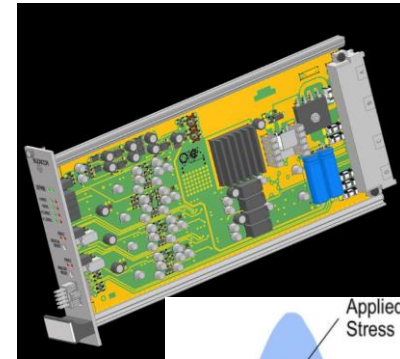
Hybrid Failure Prediction with simulated failure data



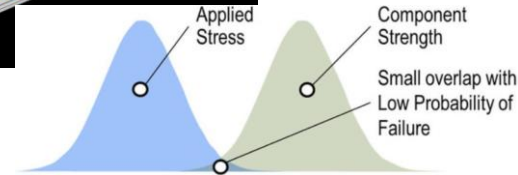
F. Waldhauser

Automated failure simulations using SPICE

High Reliability Electronics Design and Single Fault Tolerant circuitry applied on the BLM Tunnel Crate for SPS



W. Viganó



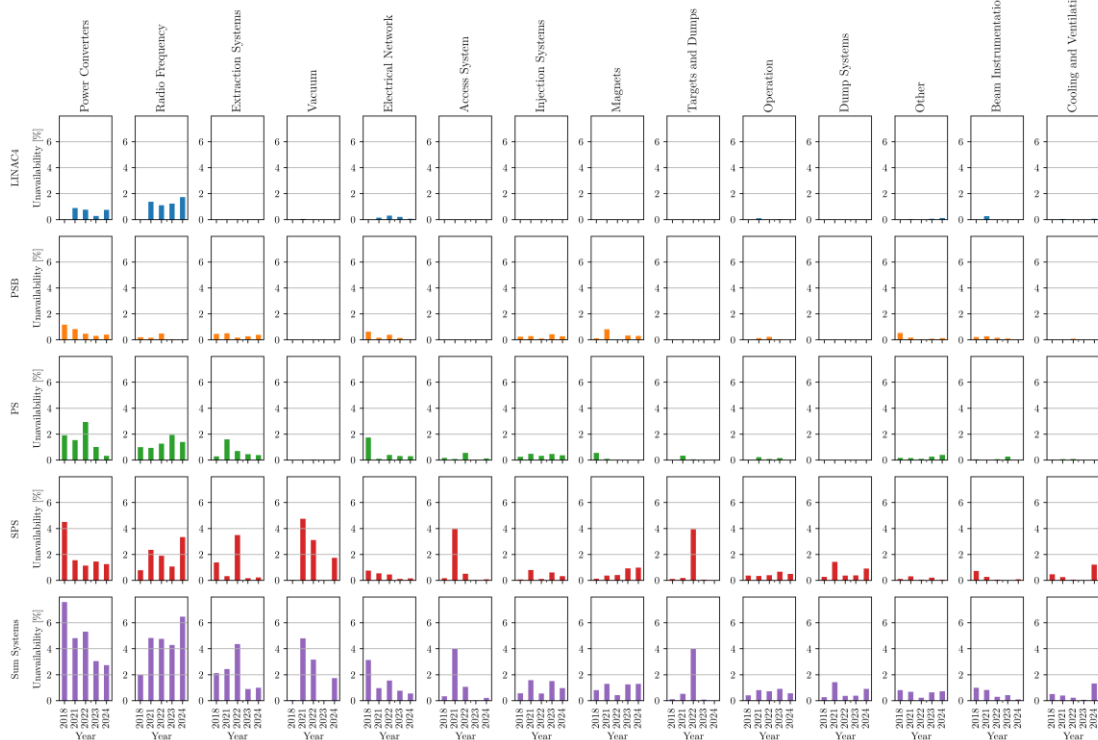
Summarizing design strategies for highly reliable electronics.

Designing Dependable Systems

- **Sharing & improving established tools & methods for reliability assessment**
- **Identified need to expand methods for programmable devices (FPGA, ASIC, ...)**
 - Pioneering efforts in **Formal Verification Interest Group** (B. Fernandez Adiego BE-ICS, H. Boukabache HSE-RP et al.)
 - Approached Electronics Forum to have joint regular meetings on this topic and involve HSE-RP, EP-ESE
- Following the success of the **reliability training** in Sept 2023 from our colleagues of the University of Stuttgart, it will be repeated in Sept 2024
 - **Subscription is open** on [LMS link](#) (3 Seats left)

Availability Optimization of the Accelerator Complex

2024-08-05_09-00-00



- **Injector Availability Report 2023 published on CDS ([Link](#))**
 - Summarizing findings presented in past Montreux and Chamonix meetings
- **AFT survey being finalized to explore improvements**
 - Collected feedback from all major equipment groups
 - Presentation of outcome foreseen for 24th Oct.
- **Systematic scoring of CONS requests done for 2023**
 - Derived improvements for 2024 CONS template



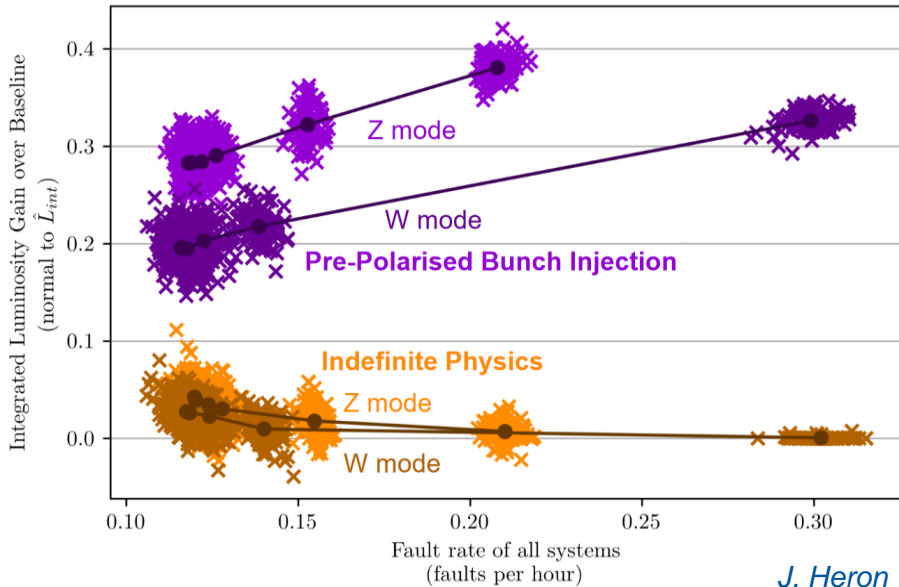
CERN Accelerator Complex: Unavailability by System and Year

RAWG, 14/8/2024

L. Felsberger

Future Accelerators

FCCEe Availability Study



J. Heron

Availability assessment of global machine as well as by equipment.

FCCEe Operational Model

The (obvious) new equipment paradigm

The figure consists of three panels. The first panel shows a person holding a smartphone, with text: 'Think banking apps, heating systems,.... All digital, all remote controllable/analysable. Simulations will be key. Fast-executing, differentiable. Digital twins...'. The second panel shows a car interior with a steering wheel and a large screen, with text: 'Exploit automation at every level. Automation across systems. Automation within given system. → different players to implement automation. All equipment designed with automation in mind: auto-configure, auto-stabilize, auto-analyse, auto-recover,...'. The third panel shows a space station with a large hole in the hull, with text: 'You cannot go there to fix it... Redundancy, robotics,...'. Arrows connect the text in the second panel to the text in the third panel.

An operational model for the FCC, RAWG, V. Kain, 18-June-2024

V. Kain

Sub-working group to discuss operational model for FCCEe.



Summary & Next Meetings

RAWG Mandate is well covered by important ongoing projects (Dependable Systems, AFT, CONS, FCC,...).

We are looking forward to continue working on them and further improve in relevant emerging topics (firmware reliability, automatic fault recording, diagnostics, prognostics,...) together with you!

Next planned meetings:

- Sept 12th : Reports from 2024 Reliability Conferences
- Oct. 24th : Outcome & Recommendations of AFT Survey
- Date tbd.: Joint Meeting with Electronics Forum on Programmable Device Reliability

[RAWG Indico Page](#)

Please email Felix or Xaver if you want to be added to the mailing list and/or would want to present/discuss topics in the RAWG!





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