

CORHA

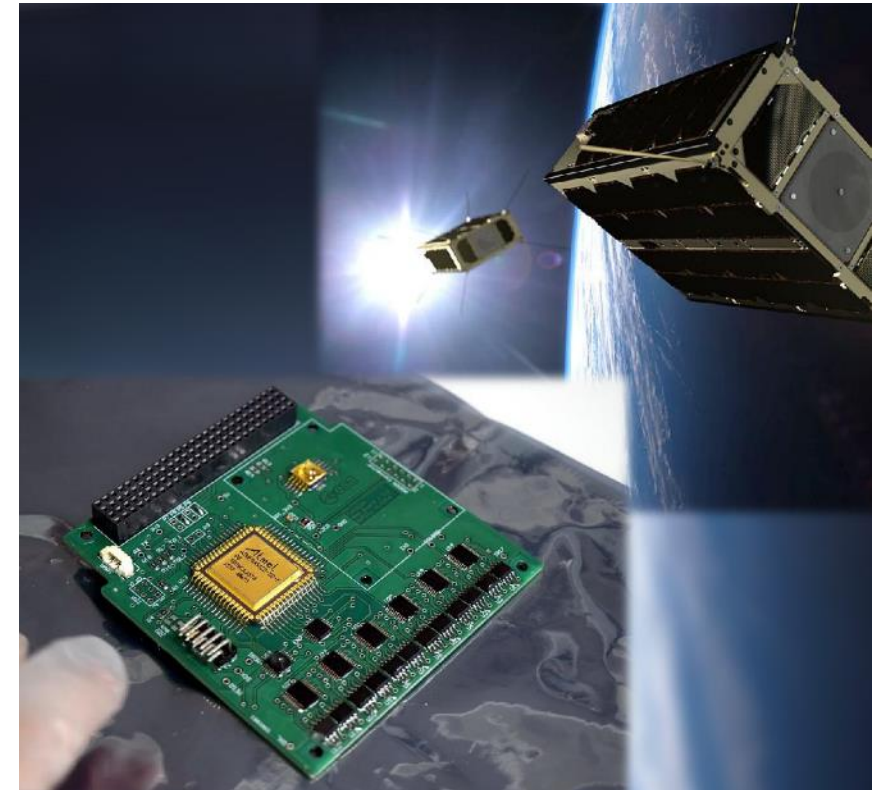
Radiation Screening of COTS Components and Verification of COTS RHA Approach

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ACCEDE COTS 2019

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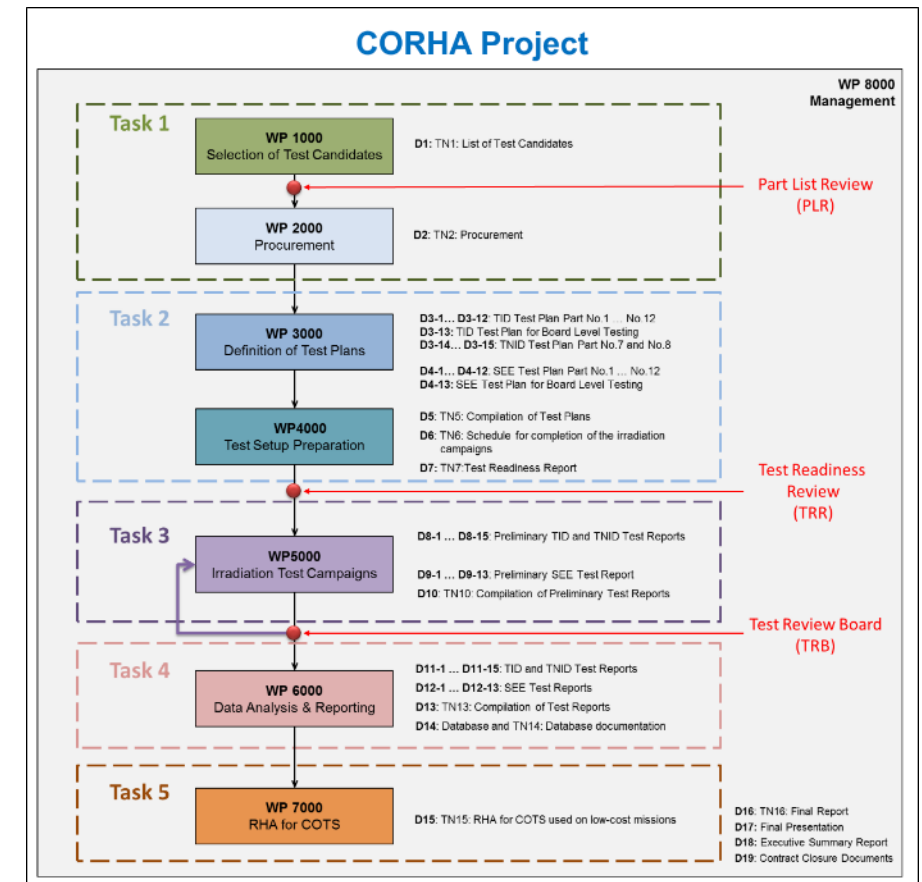
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- Radiation Hardness Assurance Procedure for COTS

CORHA Objectives

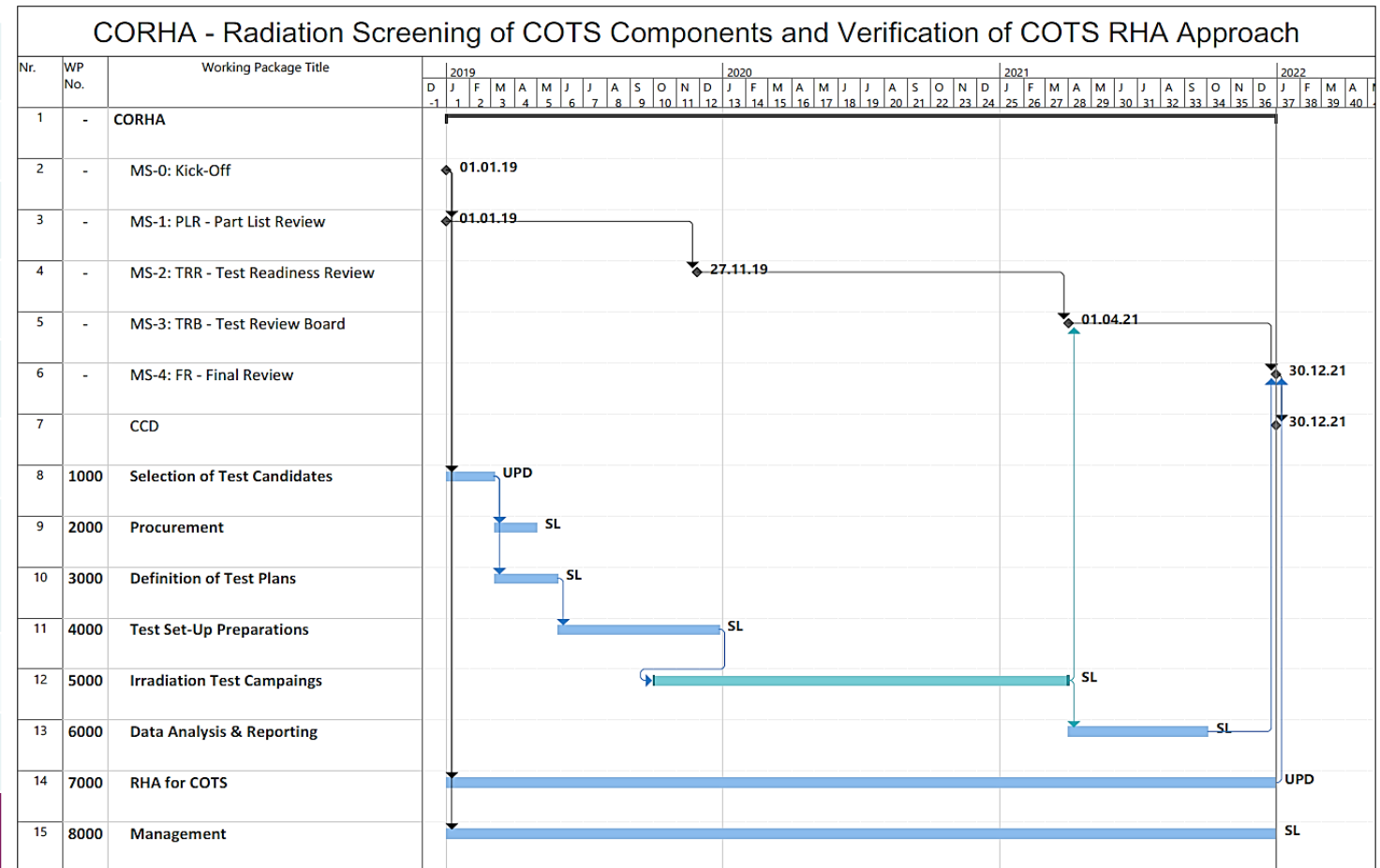
- **Radiation screen Commercial Off-The-Shelf (COTS)**
 - Novel semiconductor technologies of interest to
 - European Space Agency, ESA
 - European Space Industry, and
 - SmallSat applications

- **Define and justify RHA processes for COTS**
 - Related to irradiation characterization of COTS components
 - Consider simulation codes for SEU prediction



Project Overview and Schedule

Customer	ESA
Coordinator	Seibersdorf Labor GmbH
Partner	University Padova
Kick-Off	January 2019
Duration	36 months
Components	12
Part Types	Memories, OpAmps, MCU, MUX, Converters, ADC
Testing	TID, SEE
Campaigns	7
Innovation	RHA procedures for COTS



COTS Test Candidates

#	Component	Type	Description	Manufacturer
1	MT28EW128ABA	Memory – Flash	128Mb Embedded NOR Flash Memory, single bit per cell	Micron
2	CY14V101PS	nv-SRAM	1-Mbit (128k x 8) Quad SPI nvSRAM with Real Time Clock (NVM is SONOS)	Cypress
3	MB85RS256TY	Ferroelectric RAM	256K (32 K x 8) Bit SPI FRAM	Fujitsu
4	CY15B102QN	Ferroelectric RAM	Excelon™- 2-Mbit (256K x 8) Serial (SPI) F-RAM	Cypress
5	STM32F103	Microcontroller	Microcontroller	STM
6	STM32L152	Microcontroller	Microcontroller	STM
7	LT1499HS	Operational Amplifier	10MHz, 6V/μs, Dual/Quad Rail-to-Rail Input and Output Precision C-Load Operational Amplifier	Linear Technology
8	LTC6240	Operational Amplifier	CMOS Operational Amplifier	Linear Technology
9	CD74HC4051	Multiplexer	Hi-Speed CMOS 8-Ch MUX	TI
10	ADG5408TCPZ-EP	Multiplexer	HV Latch-up proof 8 Channel MUX	Analog Devices
11	LTC3895	DC / DC	Synchronous Step-Down DC/DC Controller	Linear Technology
12	ADC128S102	AD Converter	500 kps to 1Msps, 12-Bit A/D Converter	TI

Motivation for Test Candidates

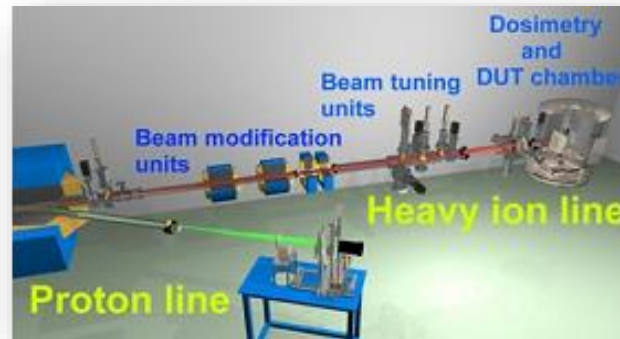
- COTS components
 - State-of-the-art technologies
 - Special interest to ESA and the space industry
 - Focus on SmallSat applications
- ✓ Innovative Memories
 - ✓ European Microcontrollers
 - ✓ Operational Amplifiers
 - ✓ Multiplexer
 - ✓ DC/DC converter
 - ✓ A/D converter

Several SEE Test Campaigns



Proton Testing
Proton Irradiation Facility (PIF)
PSI, Switzerland

<http://pif.web.psi.ch>



Heavy Ion Testing
RADEF
Jyväskylä, Finland

<https://www.jyu.fi/fysiikka/en/research/accelerator/radef/facility>



Heavy Ion Testing
Heavy Ion Facility (HIF)
UCL, Belgium

<http://www.cyc.ucl.ac.be/HIF/HIF.php>

TID Test Campaigns - TEC-Laboratory, Seibersdorf (A)

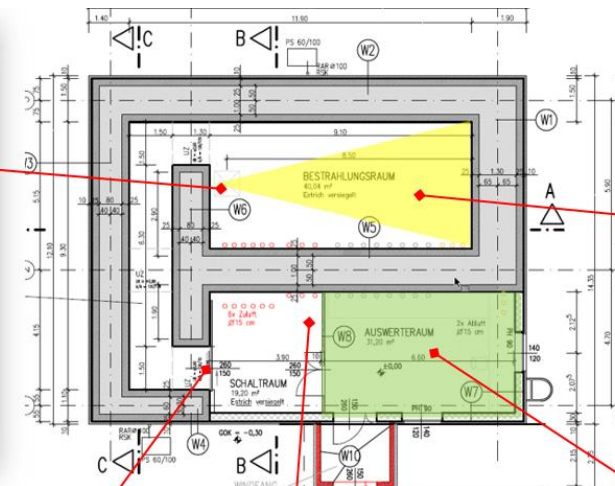


TID Test Campaigns - TEC-Laboratory, Seibersdorf (A)

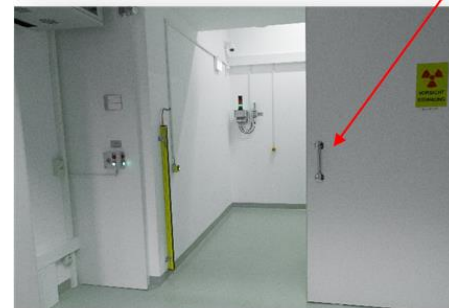
EN ISO/IEC 17025 Accredited



Irradiation system



Irradiation room



Labyrinth and radiation protection door



Control system



Electronics- and analysis room

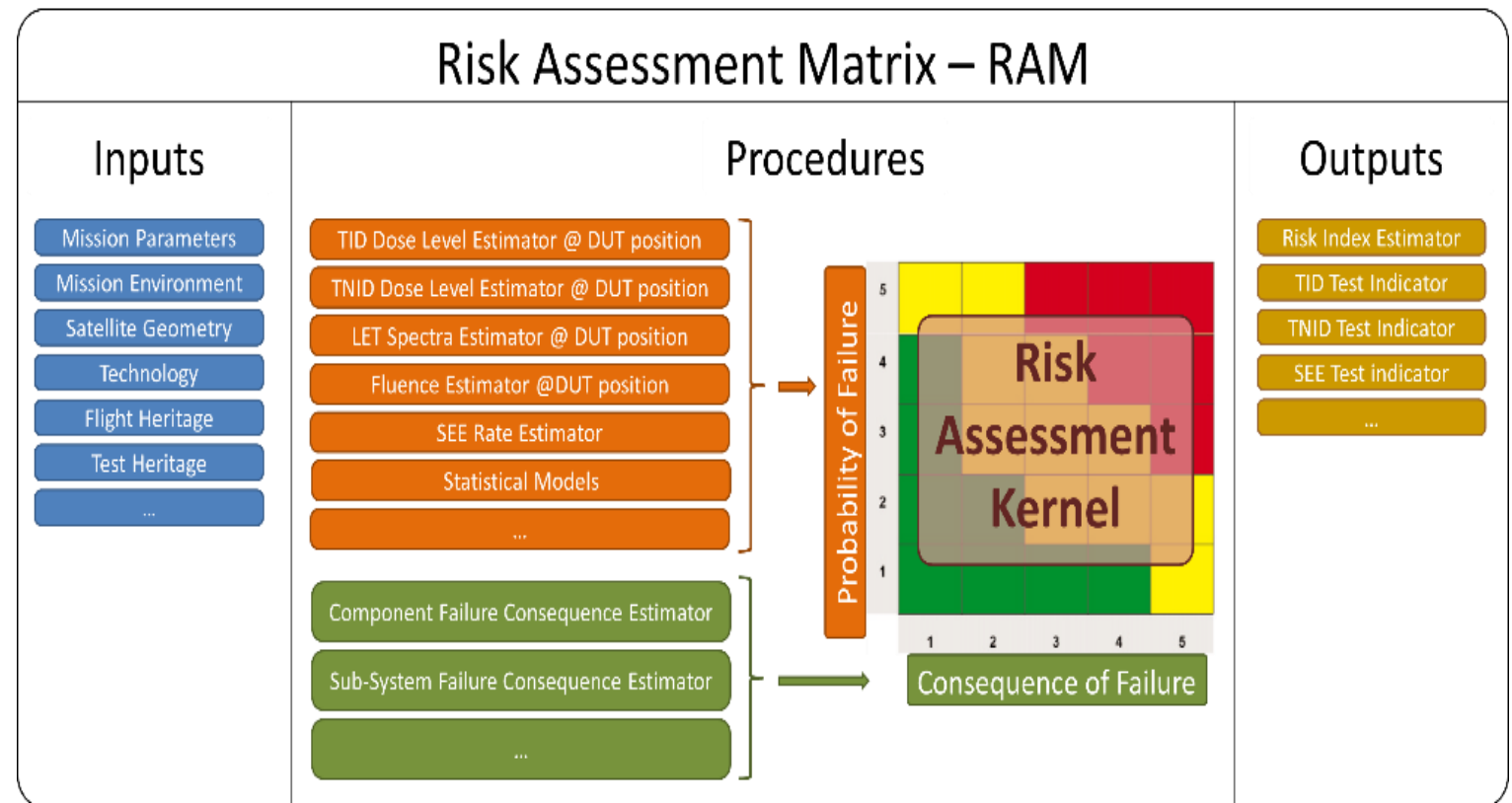
Innovation - Radiation Hardness Assurance for COTS

Objectives

- Propose RHA approach for COTS
- Investigate upset rate calculation tools

Content

- Literature review
- Ad-hoc RHA approach
 - appropriate risk assessment
 - calculation tools
e.g. PROFIT, SIMPA, FOM
 - statistical analysis
- Compare SEU rate measurements
- Cost saving aspects



Ref: CORHA – Technical Note TN15: RHA for COTS used on low-cost missions, 2019

Summary

- **CORHA** – ESA project on RHA for COTS was launched in January 2019
- Coordinator: **Seibersdorf Laboratories**, Partner: **University of Padova**
- Project duration is **36 months**
- Testing of **12** state-of-the art and innovative **COTS** components for **TID** and **SEE** effects
- Test candidates are selected and procured
- Test set-up preparations are ongoing, **TRR** on 27th November 2019
- An innovative **RHA approach for COTS** will conclude the study in 2021

Thank you for your attention!

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