

Space-related activities of UNISON Italy Students

at S5Lab in 2019:

Lessons learned from the on-going
hands-on space activities



SAPIENZA
UNIVERSITÀ DI ROMA

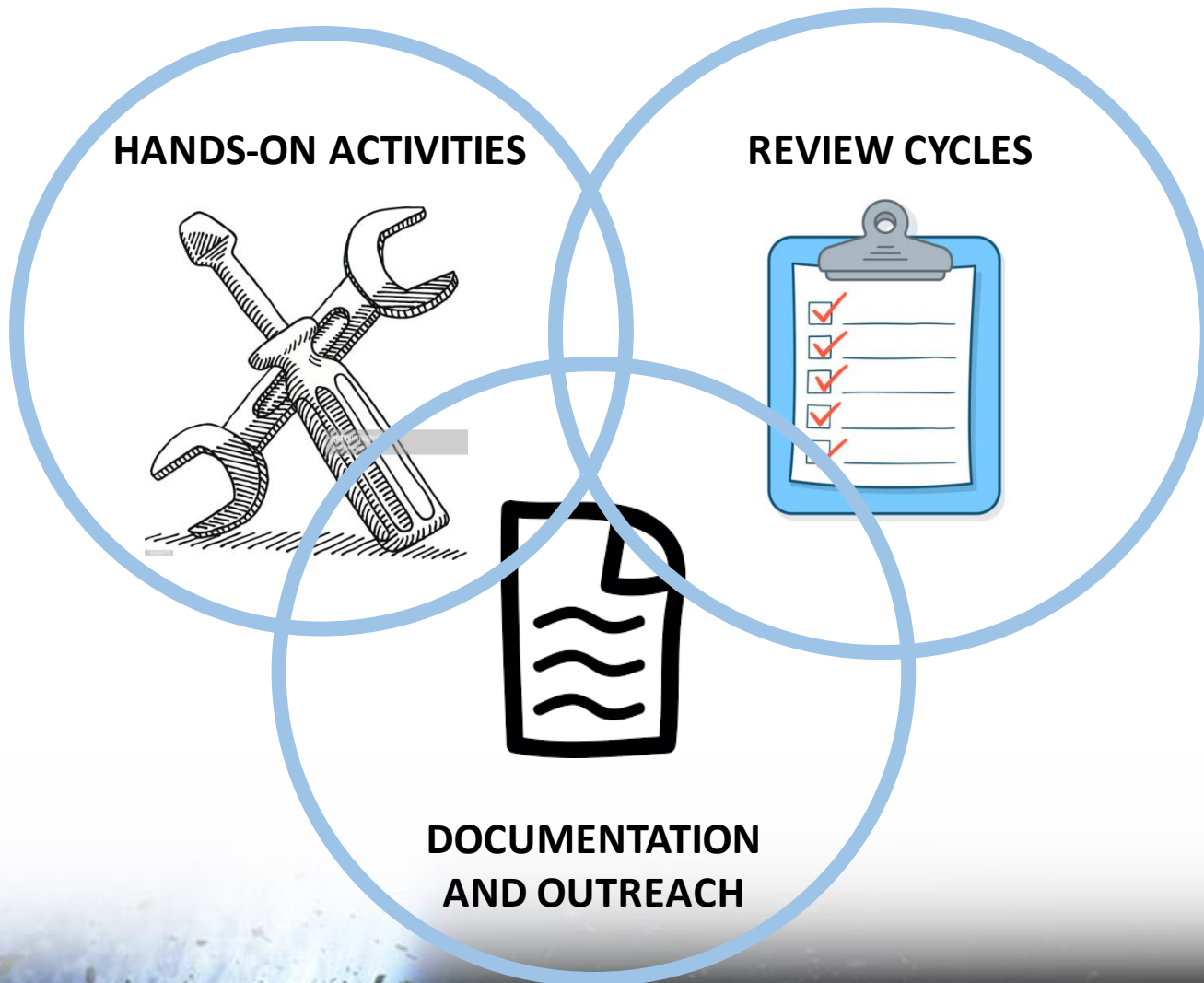


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Major Lessons Learned



Carried out international student projects



TARDIS Experiment

VOR aircraft radio-navigation system utilization for passive stratospheric positioning and attitude determination.



fly your
satellite!



LEDSAT 1 U CubeSat

LED usage for ground-based optical orbit determination and early recognition after deployment.

2019: Year in review

6th UNISEC Global Meeting – Nov 2018

TARDIS is selected for BEXUS

- Design
- Development
- Verification
- Qualification



TARDIS launch

LEDSAT assembly / Kick-off of D1 phase



- Pre-assembly
- Minor design revision
- Payload ambient verification
- Payload env. Testing Prep.
- Planning for AIV

Environmental tests for payload at ESEC-Galaxia (Belgium)

7th UNISEC Global Meeting – Nov/Dec 2019

TARDIS – BEXUS 28/29 (CYCLE 12)

- *“Tracking and Attitude Radio-based Determination In Stratosphere”*
- Exploitation of VOR signal for back-up attitude and position determination – for HAPS and weather balloons



Team Composition

Aerospace Engineering (9/10, different levels) + Electric Engineering (1/10)

All from Sapienza University of Rome

7 BSc Students (Aerospace Engineering / Electric Engineering)

**2 MSc Students (Space and Astronautical Engineering, first year –
graduated shortly after selection)**

1 PhD Student (Aeronautical and Space Engineering)

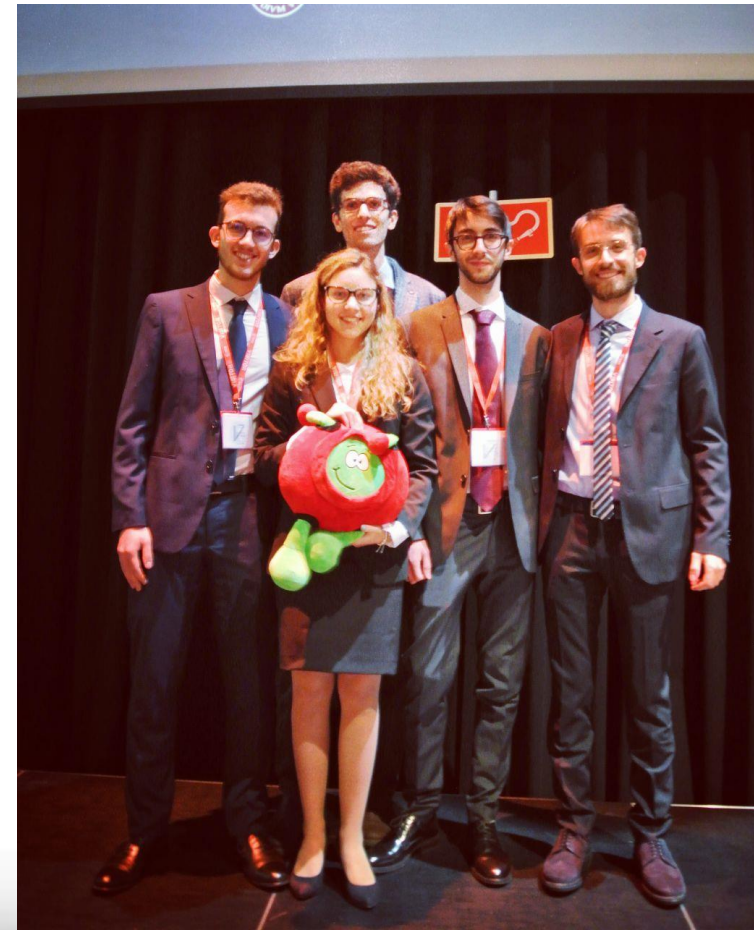
**1 Former member of STRATONAV –
all former members of STRATONAV core team as supporters**

**3 former members of MIC5 team «HEMERA» + 1 former member of PreMic5
«MicroTom»**

TARDIS – 2018/9 – BEXUS 29



- *Selection Workshop at ESA/ESTEC – Nov/Dec 2018*



TARDIS – 2018/9 – BEXUS 28



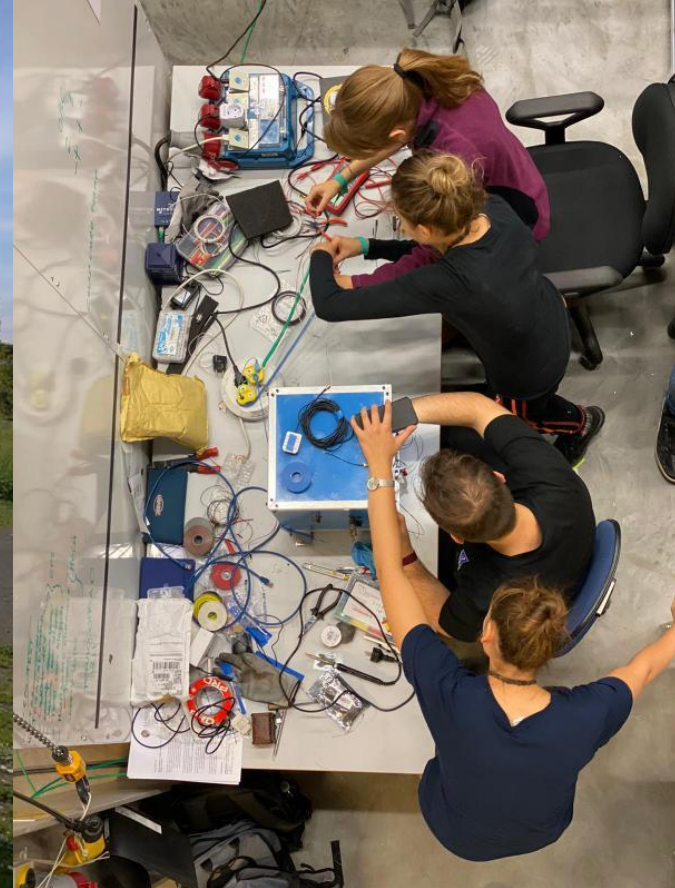
- *PDR and Training week in Oberpfaffenhofen, Germany*



TARDIS – 2018/9 – BEXUS 28



- *Testing phase – Spring / summer 2019*



TARDIS – 2018/9 – BEXUS 28



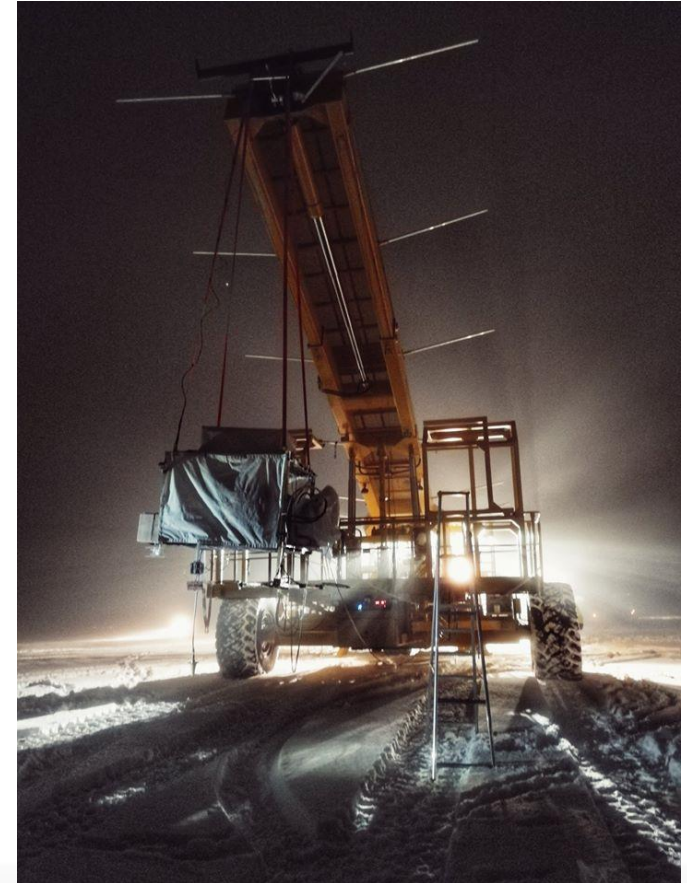
- *Laser tag testing campaign and spectrum-SPECTER analysis*



TARDIS – 2018/9 – BEXUS 28



- *Launch campaign – Esrange Space Center, October 2019*



TARDIS – 2018/9 – BEXUS 28



- **Launched on 26 October 2019**
- **Recovered after two weeks in Finnish taiga**
- **Delivered to Rome and now in post-processing phase...**

Major Lessons Learned



Major Lessons Learned

Team definition and management

How many students in the core team? How many responsible for a subsystem?

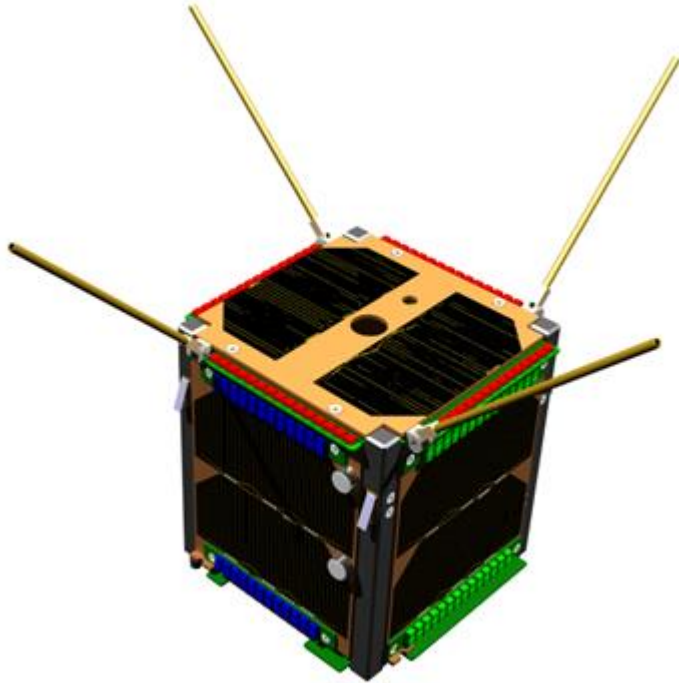
Efficient Communication

How to improve the information flow during contingency and rush?

Getting used to deadlines

How to prepare for a documentation delivery? How to process inputs in parallel?

LEDSAT 1-U CUBESAT



Conceived with the University of Michigan – supported by the University of Bern



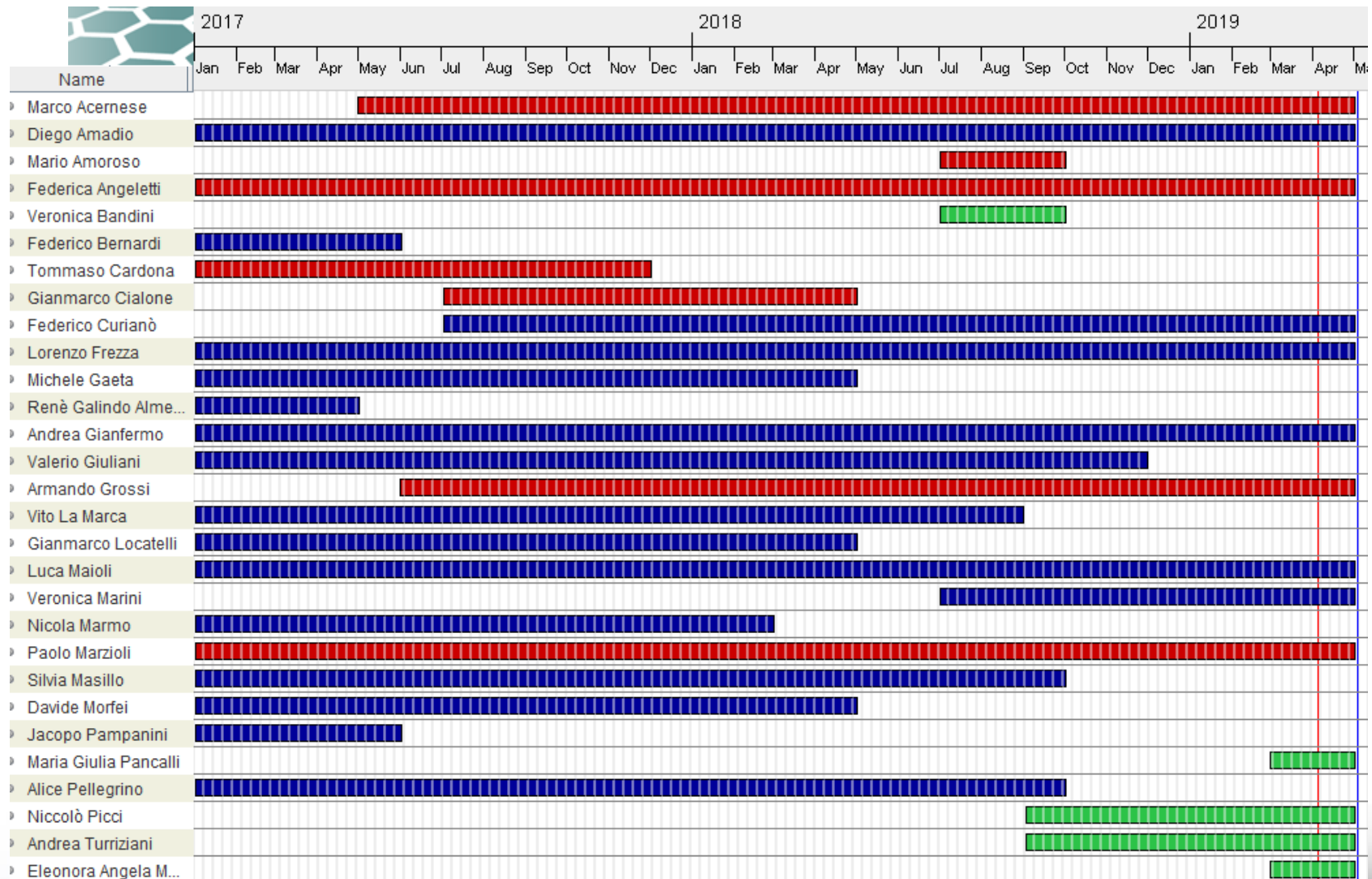
Selected for the II Edition of the ESA Fly Your Satellite! Educational Programme



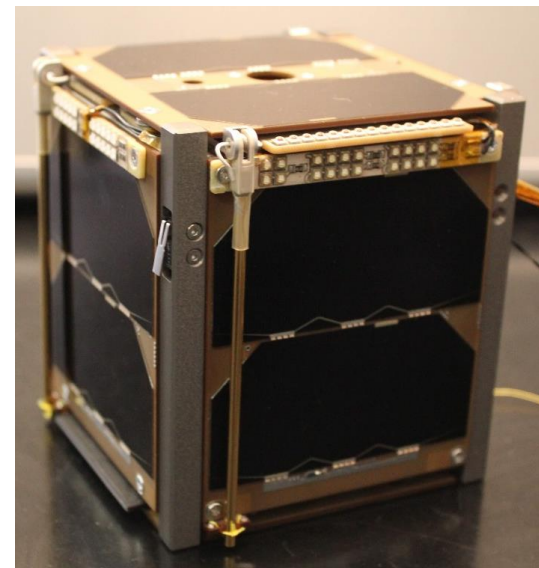
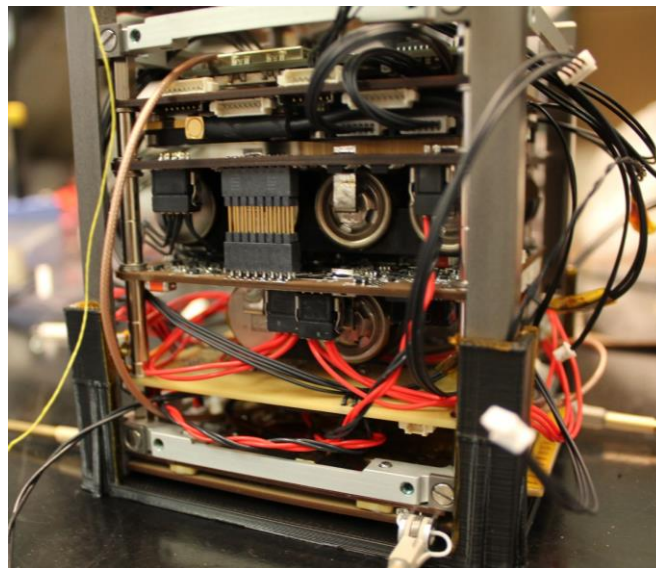
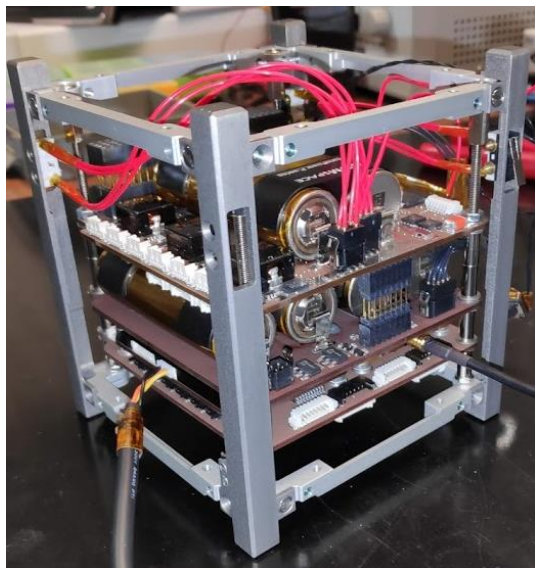
Part of the Italian Space Agency IKUNS Programme – collaborating with Kenyan Students



LEDSAT involved students



Assembly – and first mass and volume verification



Completed in April 2019, mechanical rework of interfaces with payload completed in late July 2019



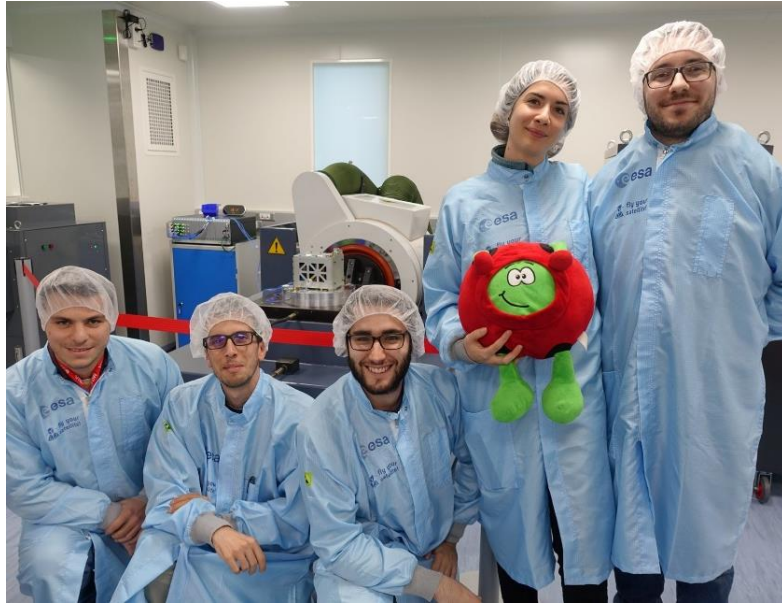
ESA FYS! Kick-off of phase D1



April 2019, ESA/ESEC-Galaxia, Transinne (Belgium)



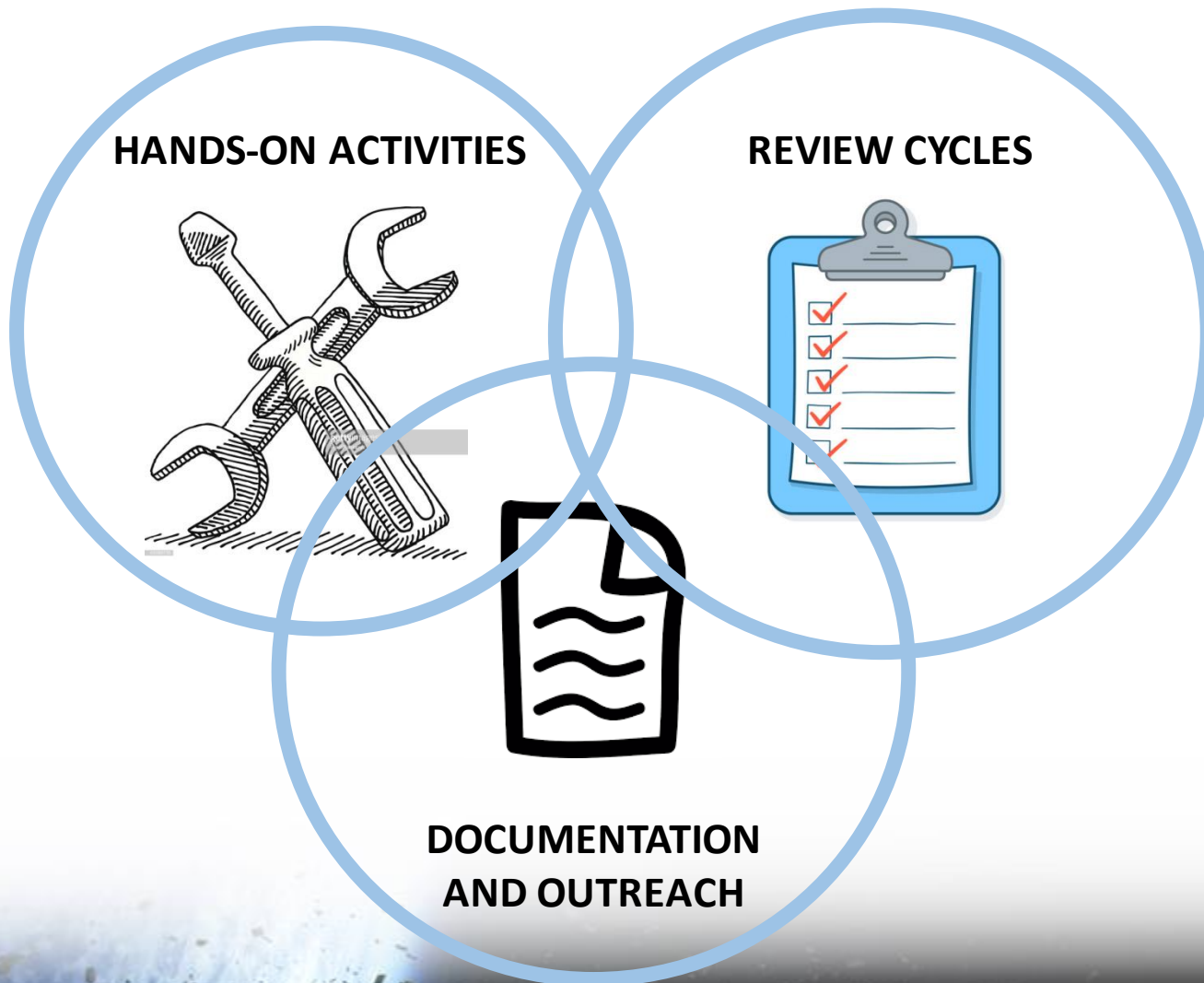
Environmental qualification for LEDSAT LED-based payload



**November 2019,
ESA/ESEC-Galaxia
Transinne (Belgium)**



Major Lessons Learned



Major Lessons Learned

Team management

How to manage handovers in long projects for University students?

Improved skills in documentation production

How to manage to perform PA analyses in a University project?

Large number of inputs in parallel

From custom-prepared comments lists to RIDs and autonomous reply strategy

**«With great power
comes great
responsibility»**

**aka the typical hands-on
experiences you might get as
S5Lab student**



**MIC (and design
competitions)**

Students' balloon projects

**Nano-satellite development and
operations**

Thanks for your attention...





**...and for the
great memories!**