2019
CAN
IN
SPACE
WORKSHOP

2019 CAN IN SPACE WORKSHOP

Gianluca Furano

European Space Agency

WELCOME TO CAN IN SPACE!

Wednesday

Workshop Opening

W13

Why a CAN in Space Workshop?

- It captures the trends in avionic systems
- It showcases new building blocks and use cases
- It brings together like minded people
- “CAN is democratic”

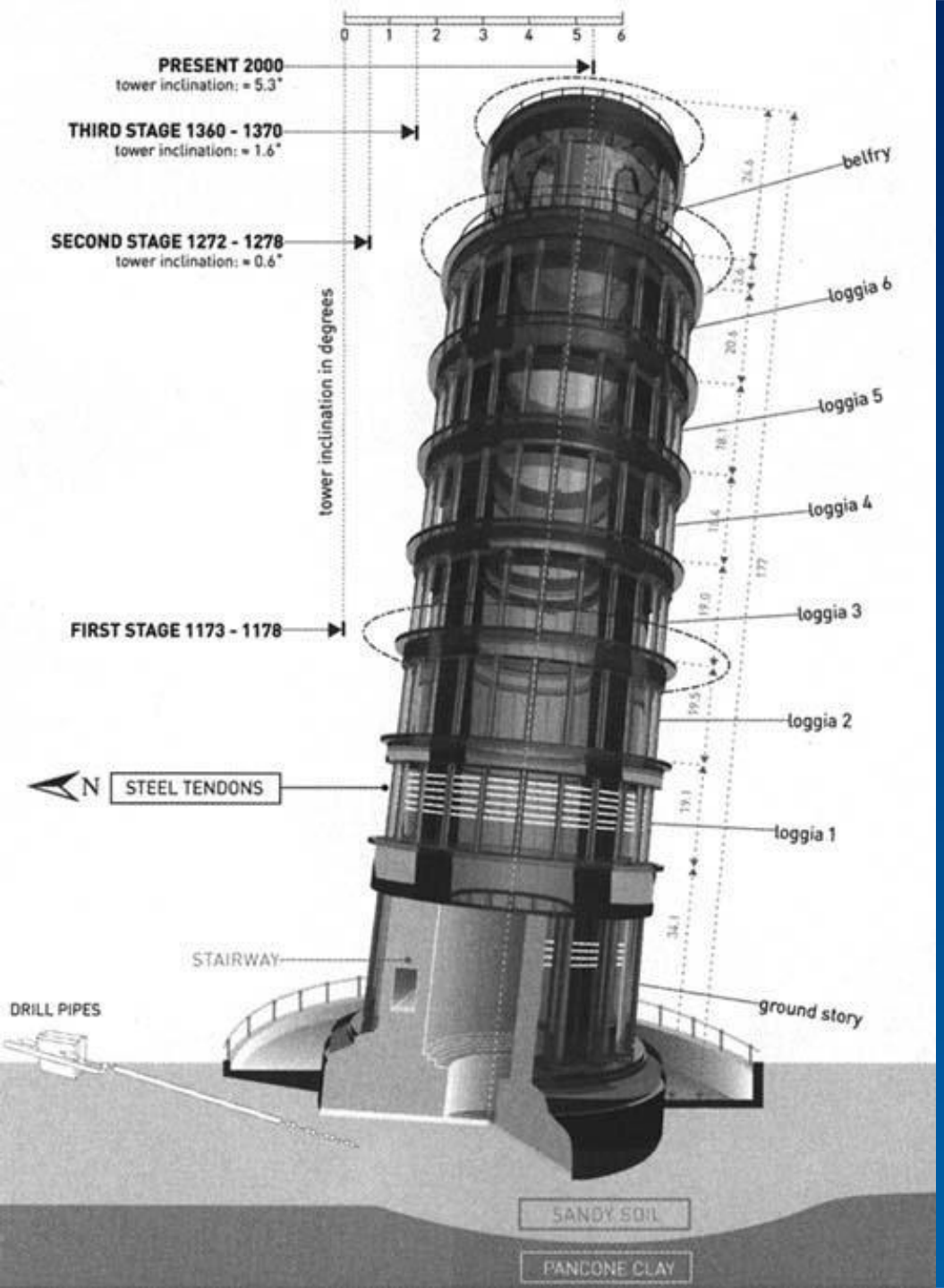
What's new at ESA

New challenges brought by constellations and Cost reduction

- Introduction of new technologies and architecture
- Use of COTS and change of qualification process

- Manufacturing and testing for high volume production
- Automated manufacturing
- New control process for manufacturing and testing

- End of life disposal



Building on sand

The Open Systems Interconnection (OSI) model (ISO/IEC 7498-1) provides the best conceptual model to understand the internal functions of a communication system.

In critical application, robustness shall be tackled at each layer to avoid “ad hoc” corrections.

We have a long list of lessons learned where bad foundations resulted in “leaning” design.

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Challenges - FPGA vs SW cost

In many companies there are FPGA development teams with 100s of years of combined experience: very efficient & reliable development methods.

For uC ‘firmware’, needs to be booted up.

Documentation volume is about 2.5 times heavier for software and does not take into account reuse in an efficient way.

Some process improvement efforts focused on automating regression tests & automatic document generation are needed to get back to equal development efforts vs VHDL in FPGA.

Are we ready for distributed intelligence?

There is a necessity to find some metrics to compare complexity of use of uC with respect to FPGAs in avionic systems.

Nowadays it is cheaper (in terms of total cost of ownership) to write 20k lines of VHDL than 1k lines of bare-metal C code for a uC!

I believe that this is not reflecting the reality and needs to change. A proper evaluation of the different design methods needs a coordinated effort to review PA/QA processes to pave the way towards a greater decentralisation of avionic systems.

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Three days in Gothenburg - Why?

CAN-related avionics went from niche systems to dominating flying recurring product in few years (one of the fastest adopted general purpose tech) CAN in space is now supported by a full range of building blocks, covering from physical layer to SW and testing tools

Experience in design of CAN system is trickling ‘top-down’ from primes to equipment manufacturers but also ‘bottom-up’ from solution providers with large experience in industrial and automotive markets

- As an agency we have to work on future needs: CAN-FD / CAN-XL?
- Will microcontrollers pave the way toward more decentralized systems?

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Summary

- 27 Oral Presentations including Invited Talks
- 3 Special Invited Talks
- 3 Opening Talks
- 8 Exhibitors

2019 CAN IN SPACE WORKSHOP

Wednesday Technical Programme

- Workshop Opening
- Invited Talk - **Mathieu Patte**
- CAN applications in space industry
  Chair: **Torbjörn Hult - Ruag**
- Invited Talk - **Holger Zeltwanger**
- CAN higher-layer protocols
  Chair: **Oscar Mansilla – Renesas**
  Chair: **Fredrik Johansson - Cobham Gaisler**

2019 CAN IN SPACE WORKSHOP

INVITED TALK
WEDNESDAY
09:15

Mathieu Patte

Airbus Oneweb Satellites

THE SIMPLE ONEWEB CONTROLLER AREA NETWORK (SOCAN) BUS

2019 CAN IN SPACE WORKSHOP

INVITED TALK
WEDNESDAY
13:30

Holger Zeltwanger

CAN in Automation

NEXT CAN GENERATION PROTOCOLS INCLUDING HIGHER-LAYER PROTOCOLS SUCH AS CANOPEN FD

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Thursday Technical Programme

- **CAN applications in space industry**
  - Chair: **Sandi Habinc - Cobham Gaisler**
  - Chair: **Jean Dalenq - Airbus**
- **Invited Talk – Elsa Modin**
- **CAN implementations**
  - Chair: **Alessandro Avanzi – Sitael**
- **Microcontrollers with embedded CAN support**
  - Chair: **Dejan Gačnik, Skylabs**

2019 CAN IN SPACE WORKSHOP

INVITED TALK
THURSDAY
10:30

Elsa Modin

Hasselblad Foundation

THE BIRD CAMERA THAT FLEW TO THE MOON

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Friday Technical Programme

- **CAN device design**
  Chair: **Gianluca Furano - ESA**
- **CAN system design**
  Chair: **Armand Dilworth – Cobham**
- **Workshop Closing**

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Final Comments

- More details available in brochure on-line
  www.CANinSpace2019.org

- The Committee would like to thank
  - ✓ Presenters
  - ✓ Attendees
  - ✓ Exhibitors
  - ✓ Sponsors

THANK YOU

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