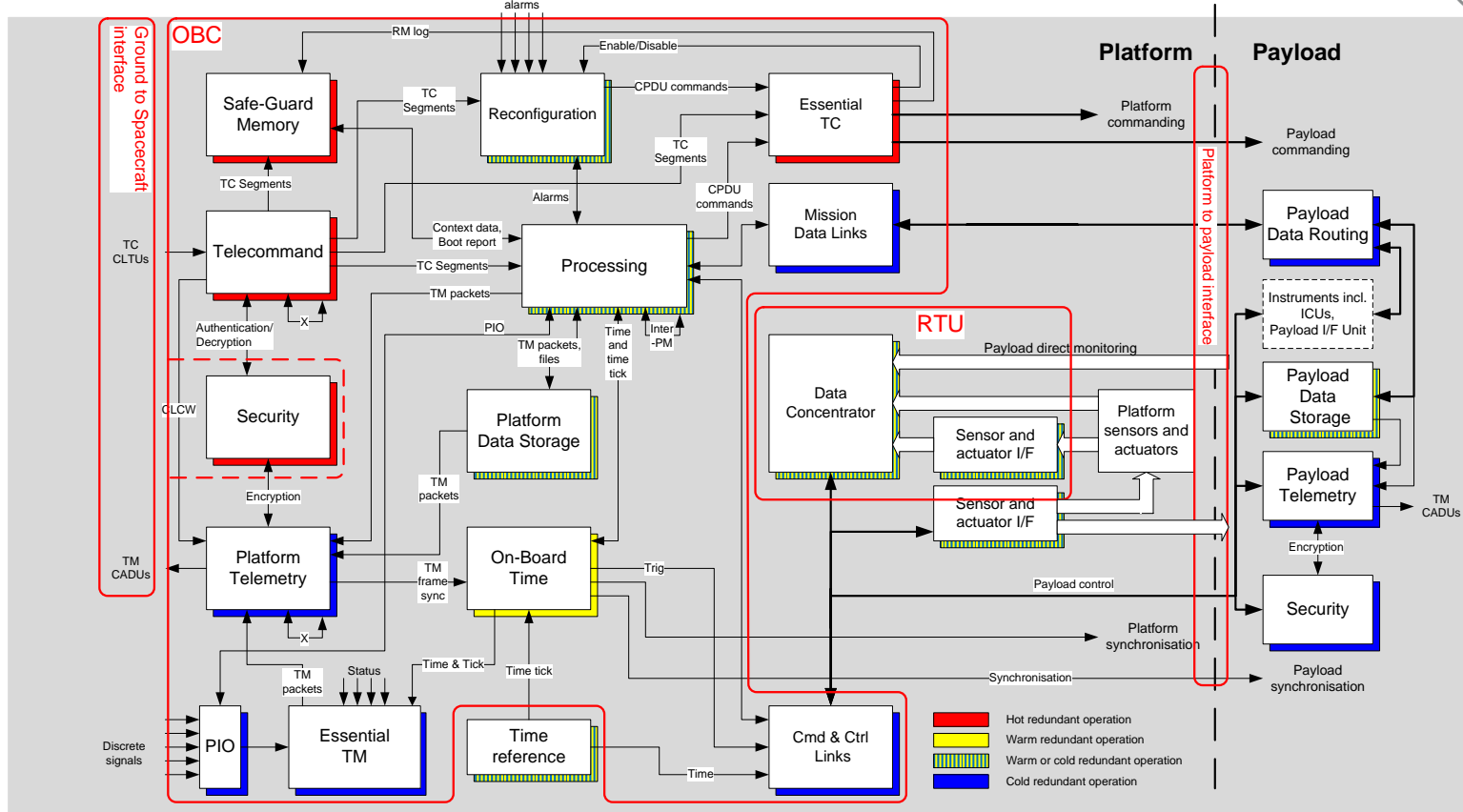


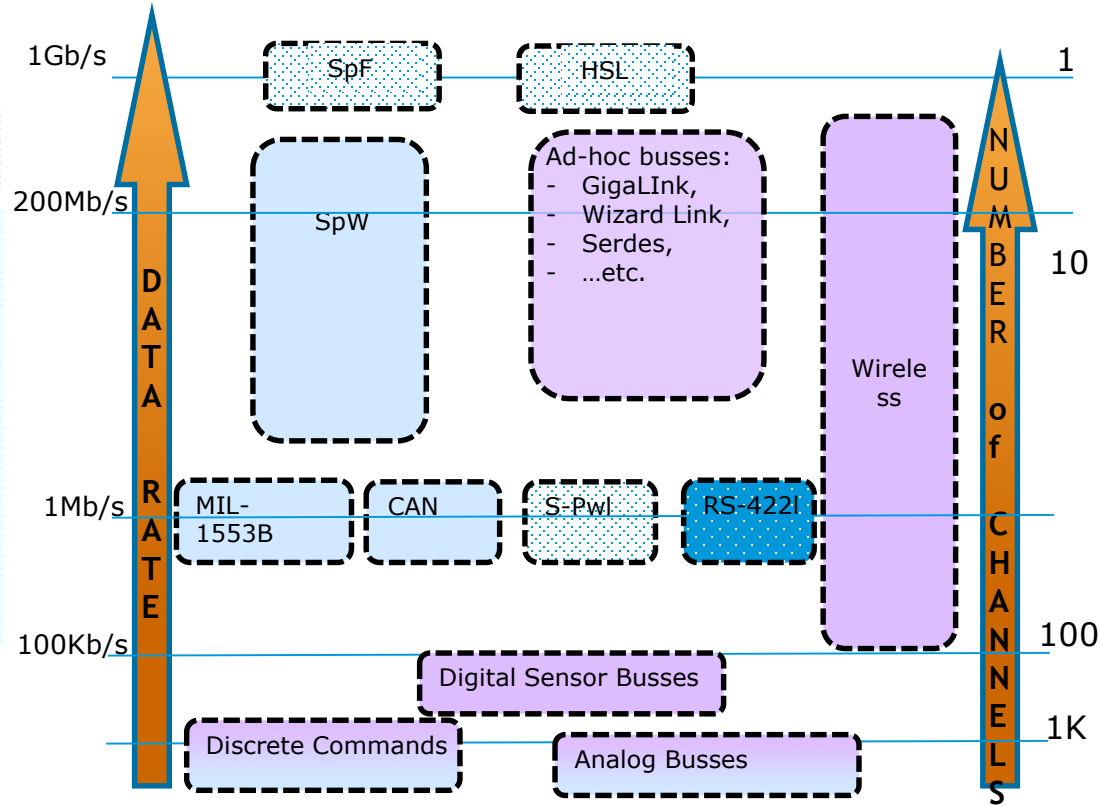
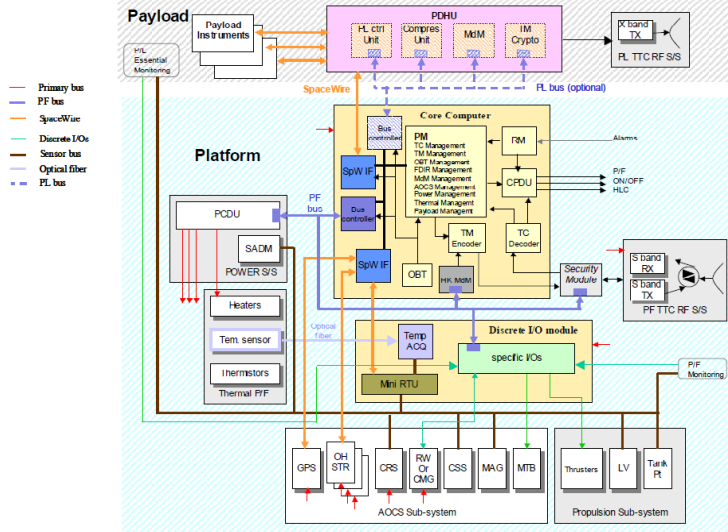
HARNESS REDUCTION INTRODUCTION ADCSS – 2017

Presented by : Dr W. Gasti
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TEC-EDD: On-Board Computer & Data Handling
18-Oct-2017

Satellite Avionics Functions & Interfaces



Example of Physical Architecture for a Satellite



RTU Existing Solutions

- Existing solutions for sensor acquisition and control use a centralised architecture
- A Remote Interface Unit connects to sensors distributed over the whole spacecraft.
- The large number of connections (300+) leads to a high harness mass and local congestion at the centralised unit.

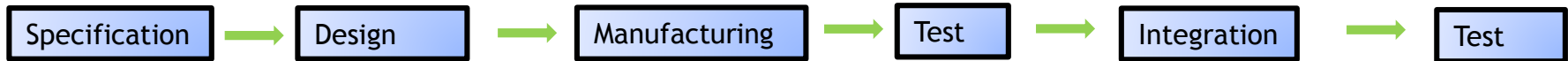


Courtesy to TAS-UK

Harness Work Flow



ESA Harness work flow/Test Review

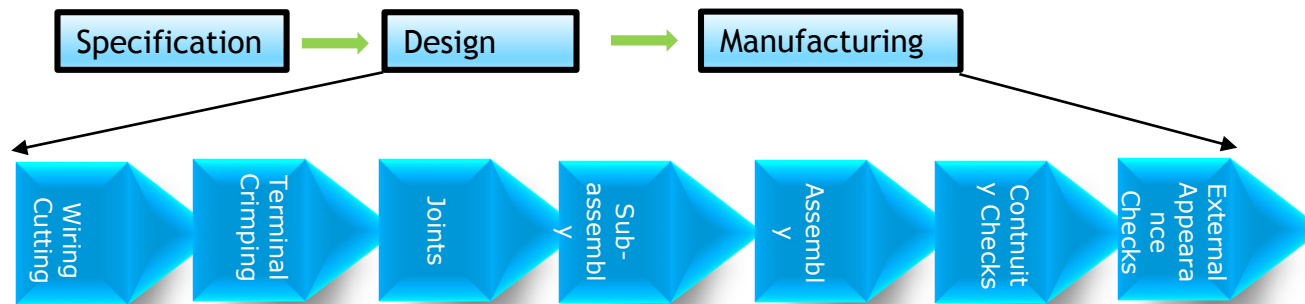


Specification

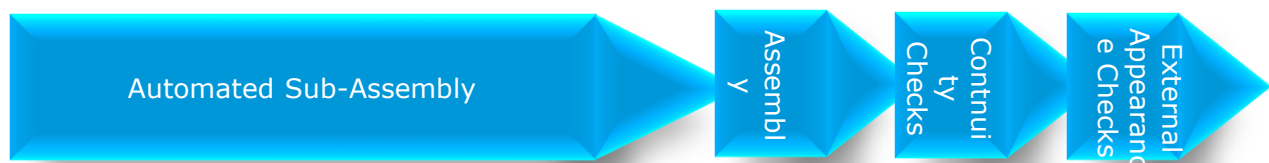
Cable harnesses are usually designed according to geometric and electrical requirements.

- A CAD Model is then provided to the sub-contractor for the assembly preparation and assembly.





- The wires are first cut to the desired length (using a special wire-cutting machine)
- The ends of the wires are stripped to expose the metal (or core) of the wires to be fitted with required terminals or connector housings.



Manufacturing by hand in spite of increasing automation (due to the many different processes involved), such as:

- routing wires through sleeves,
- taping with fabric tape, in particular on branch outs from wire strands,
- crimping terminals onto wires, *multiple crimps* (multiple wires into one terminal),
- inserting one sleeve into another,
- fastening strands with tape, clamps or cable ties.

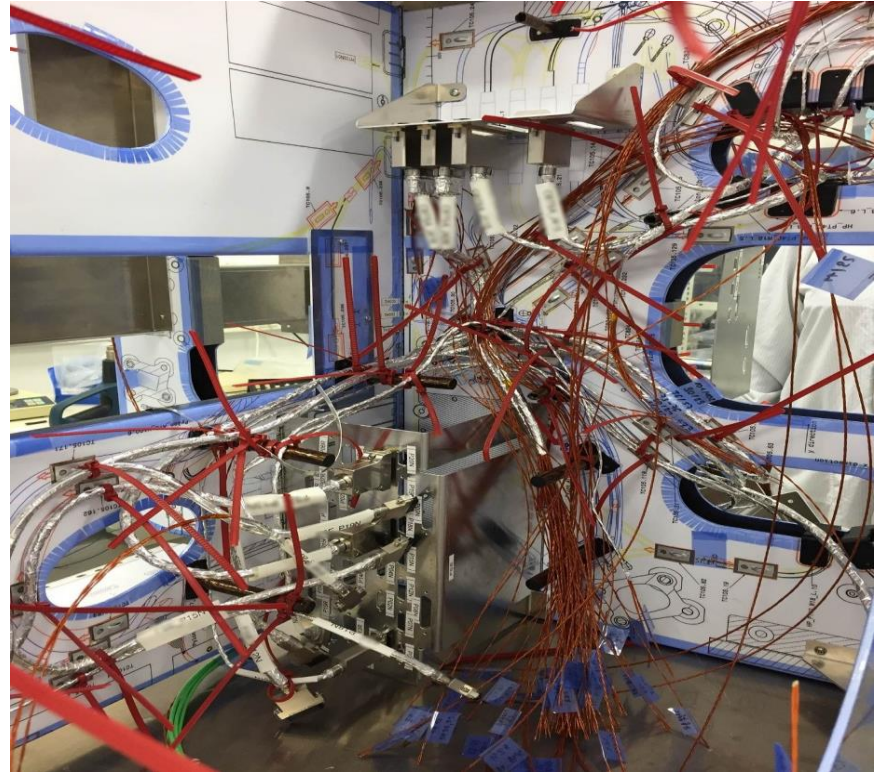
Difficult to automate this process



Facts Today 4/6

For wires, for which the length is not known:

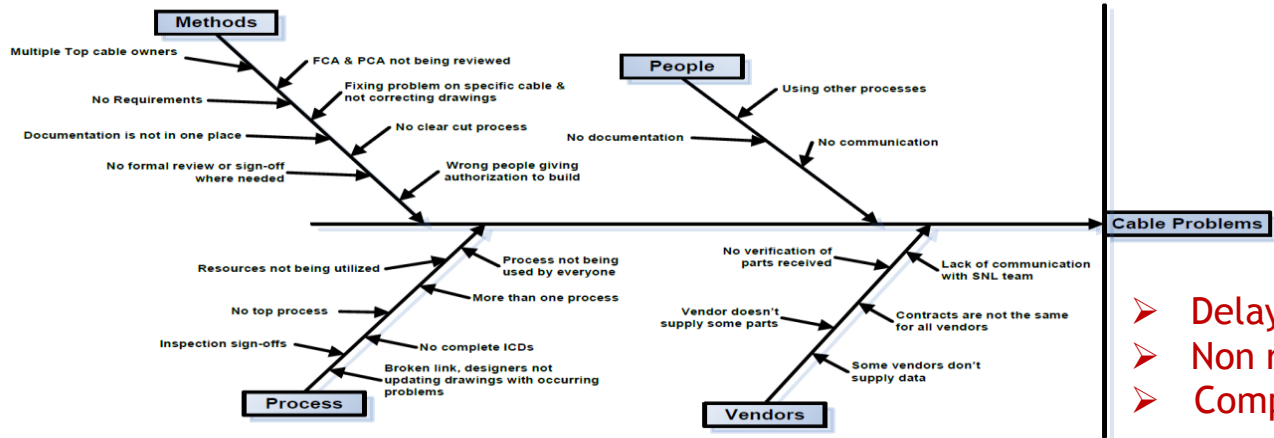
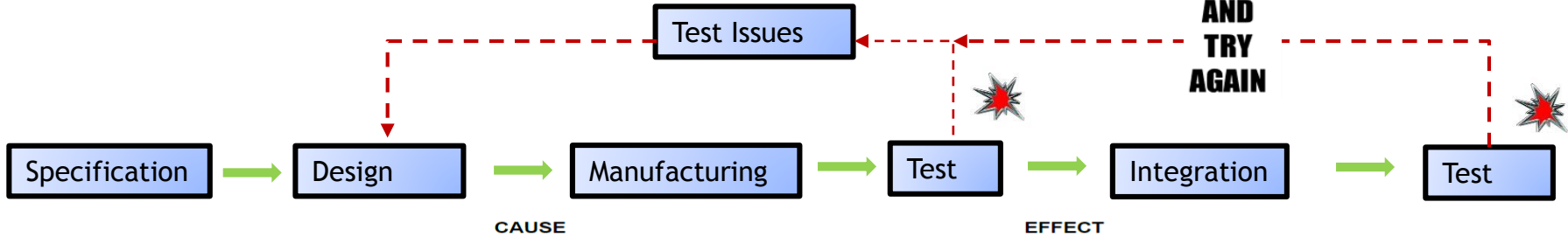
- A Frame is built to mimic the structure on which the cables need to be mounted
- Then the harness is dressed on the structure



Facts Today 5/6



**KEEP
CALM
AND
TRY
AGAIN**



- Delayed start of harness procurement
- Non recurrent harness production
- Complex harness testing



Future Trends 1/2: Growing Complexity

- Different type of avionics communication busses ↗
- Different type of cables ↗
- Different type of connectors ↗
- Compliance: Number of Standard (ECSS-E-ST-50-12C,13,14,15...etc)

**THE NUMBER AND THE LENGTH OF WIRES AND CABLES
ARE CONTINUOUSLY INCREASING !!!**

Future Trends 2/2: Miniaturisation

@ Unit level



Courtesy to RUAG

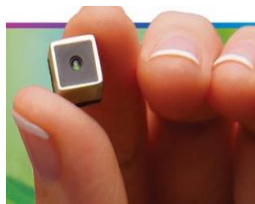
Herschel-Planck OBC: 260x260 x278 mm³



Courtesy to Airbus

OSCAR OBC: 230x160x200 mm³

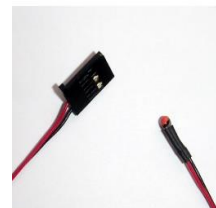
@ sensors, actuators



MEMS

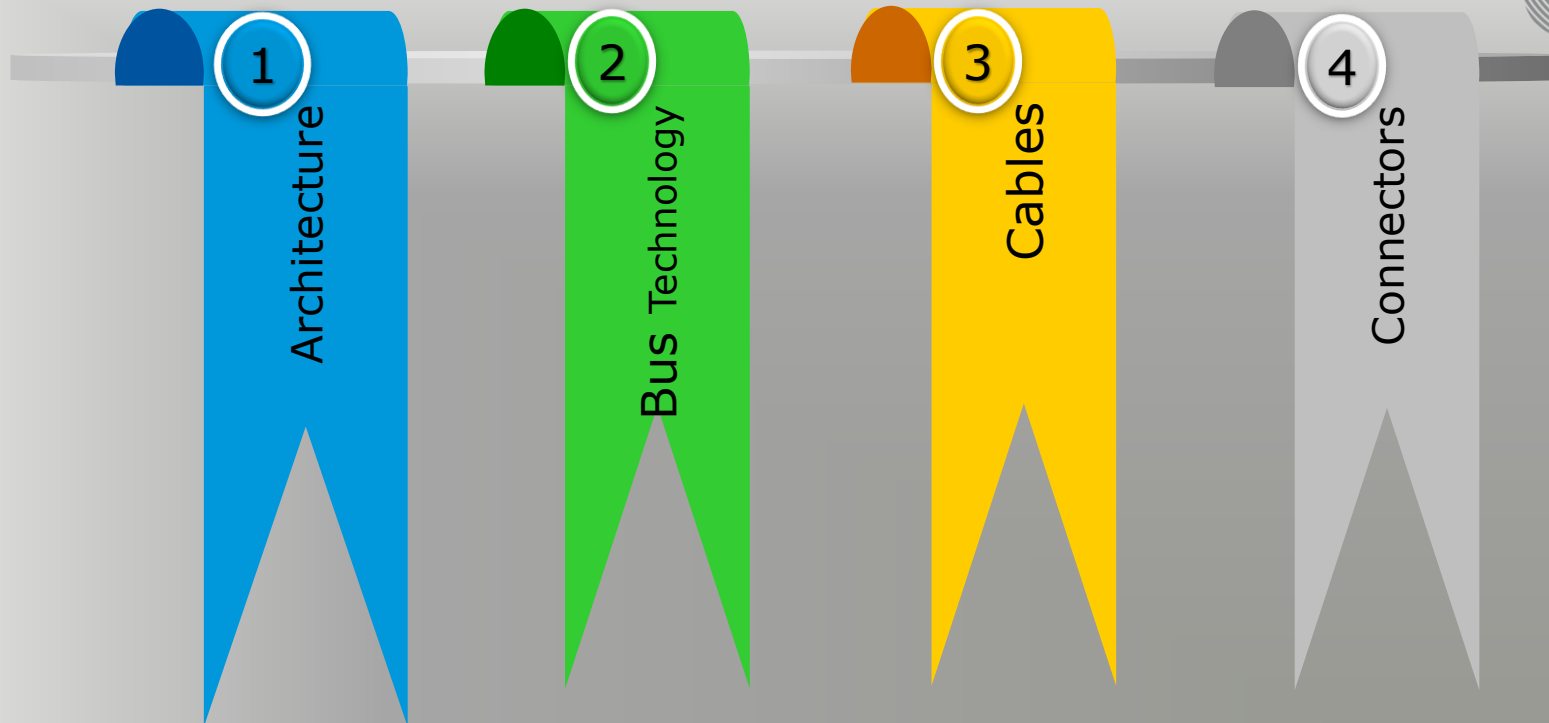


SUN SENSOR



TEMPERATURE SENSOR

STRATEGY HARNESS REDUCTION



☞ MicroNode Presentation

- ☞ S-PwL Presentation
- ☞ WiSAT Presentation
- ☞ One Bus Illusion Presentation

☞ Harness Reduction:
Future Trends and Prospects
Presentation

Questionnaire will be posted on ADCSS2017 web site
to collect the industry preferences
in terms of
Strategy and/or Priorities