

Lessons Learnt in Space Harness Technologies: Our experience

DEFENCE AND SPACE
Alicia Garcia (ADS Toulouse, Materials and Processes)
Materials and Processes Expert in Harness
13th-16th Oct. 2026

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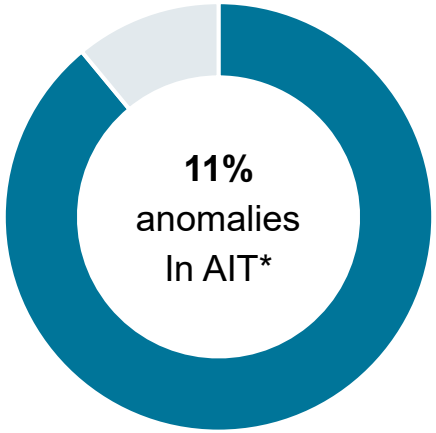
Our experience, and that of our operators

- Airbus Defence and Space designs, procure, inspect and install more than **100 000 – 150 000 connexions points per year for spacecraft programmes**

- **Telecommunication, Observation, Science, Navigation, Instruments, Constellations. From ECSS-quality level to COTS, Alpha missions to in-orbit demonstrators**

- **18 months on average from design kick-off to harness delivery → Critical path**

- 11% of the anomalies in the Assembly, Integration and Test phase are related to harness



* Telecommunication platforms. 2019-2023.

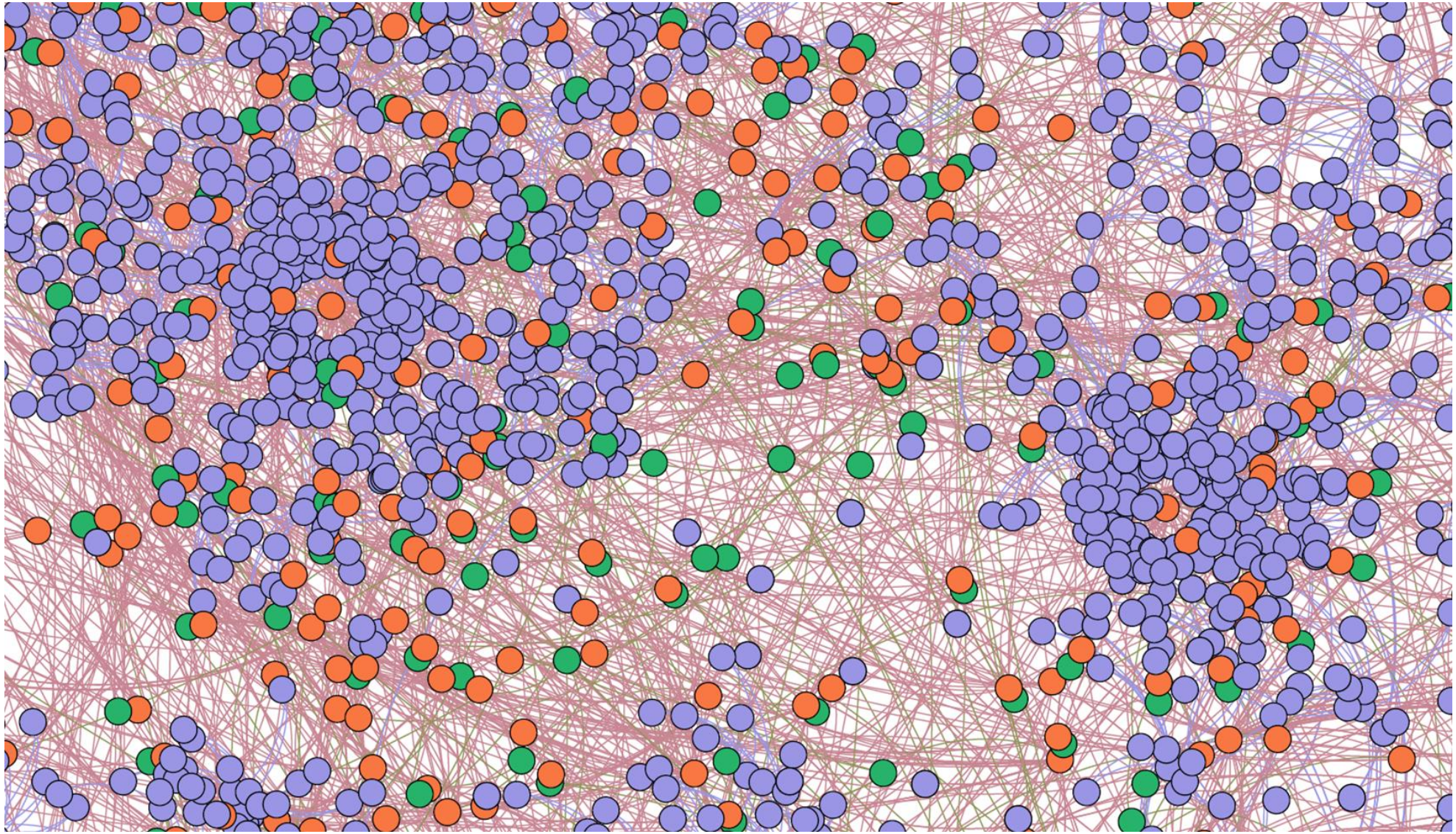
- **Oct. 2026 update:** 50% of Flash Quality Alerts in Sept. 2026 are related to harnesses and connectors*





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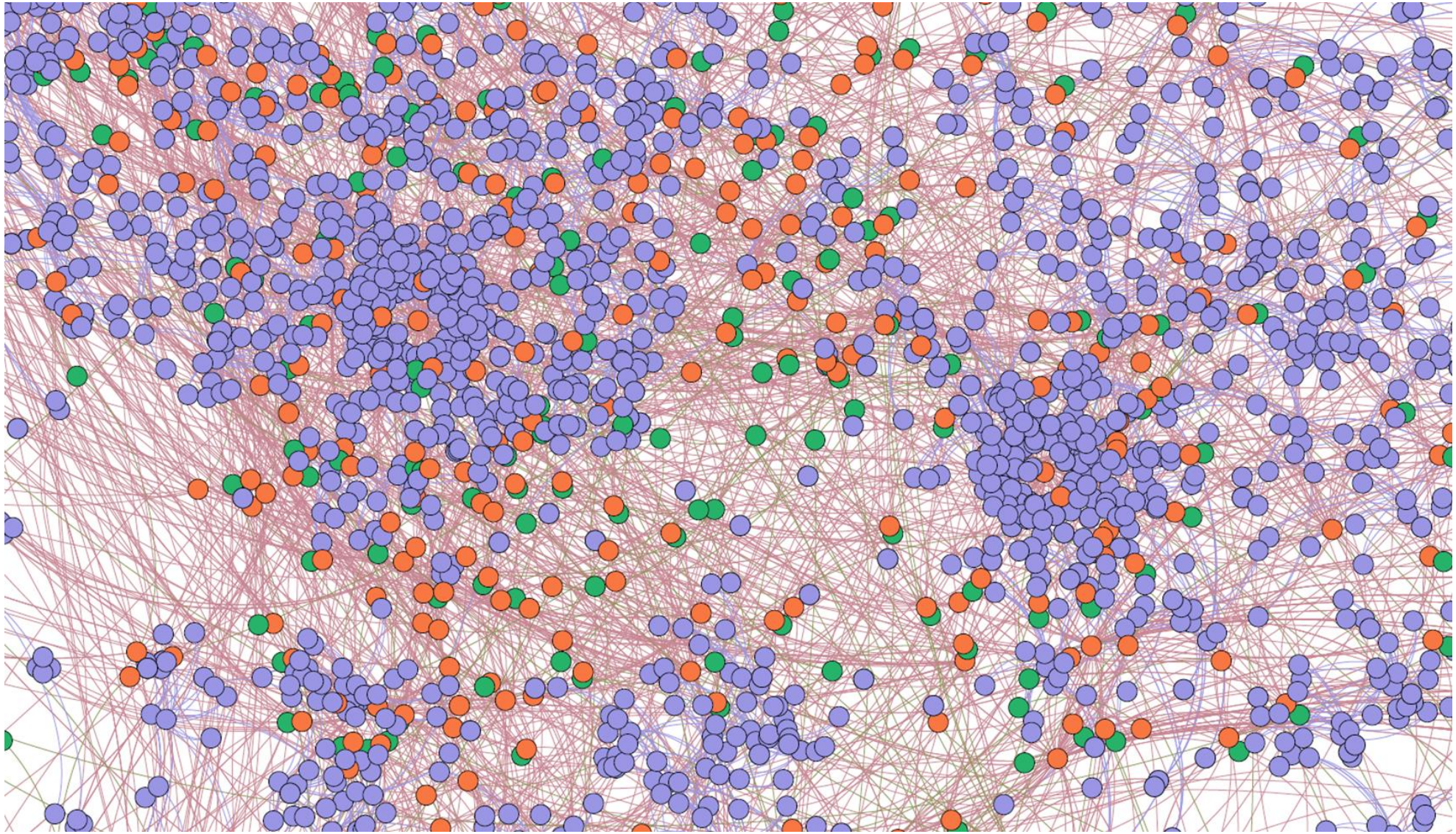
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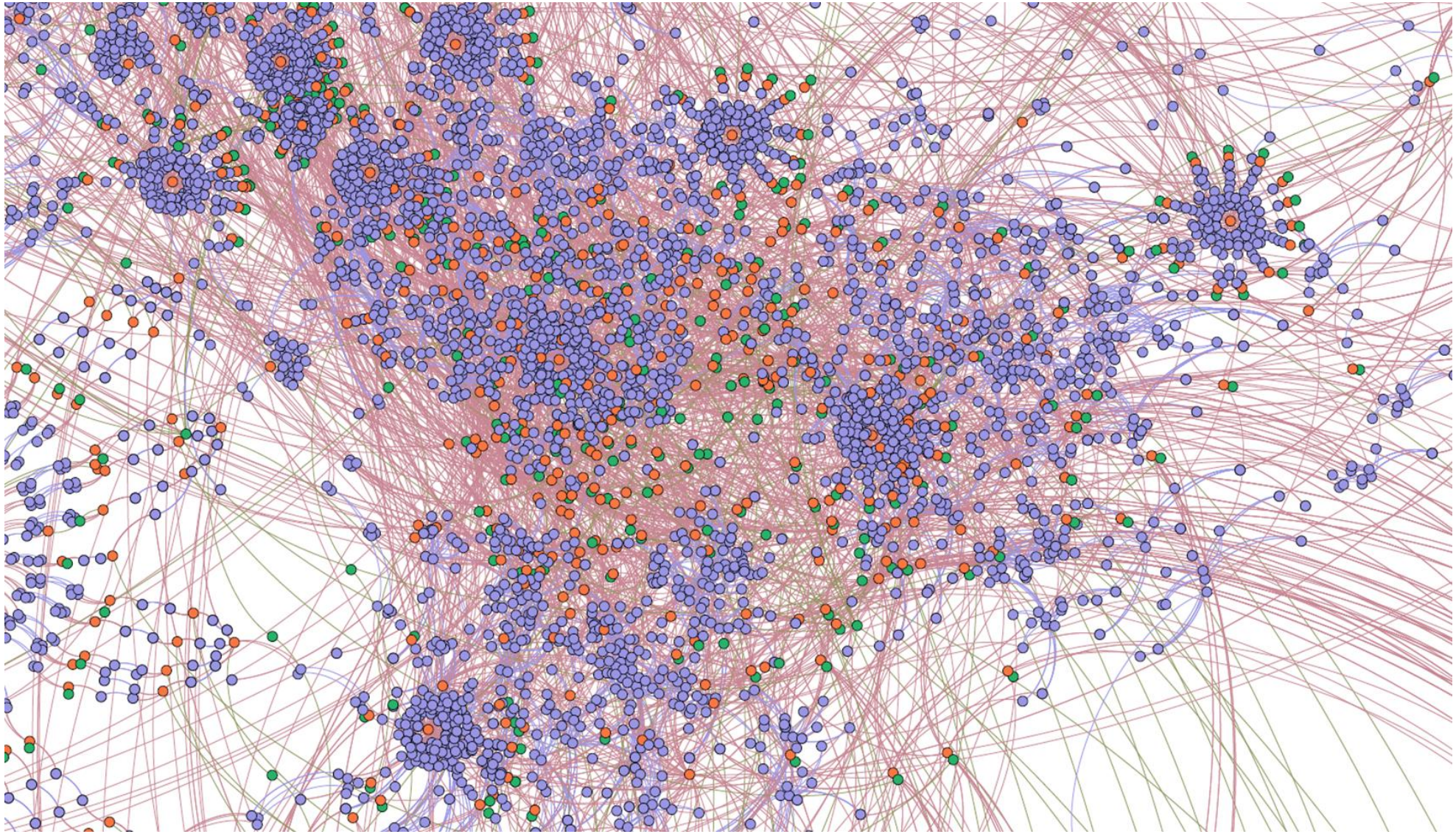
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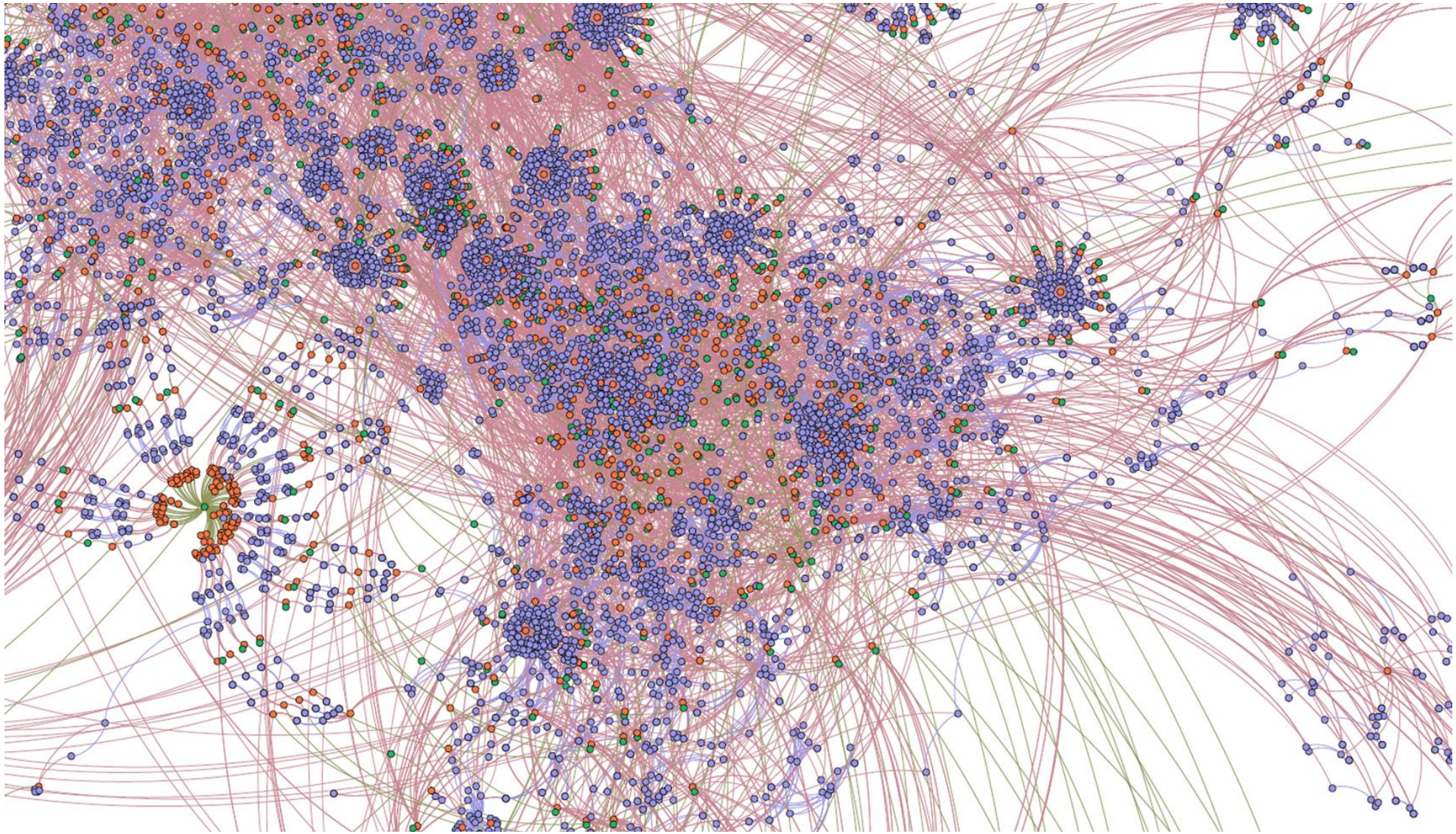


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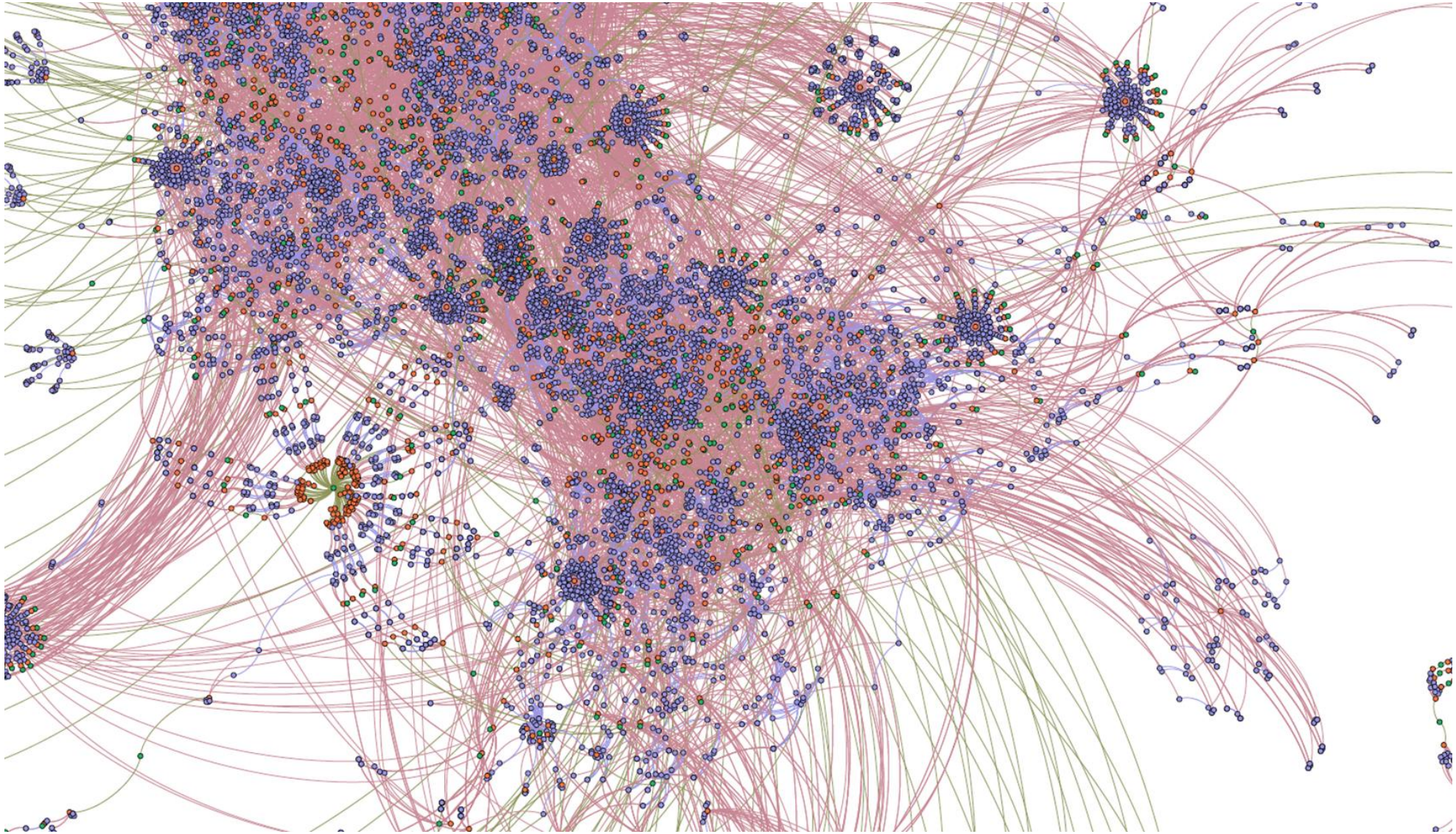


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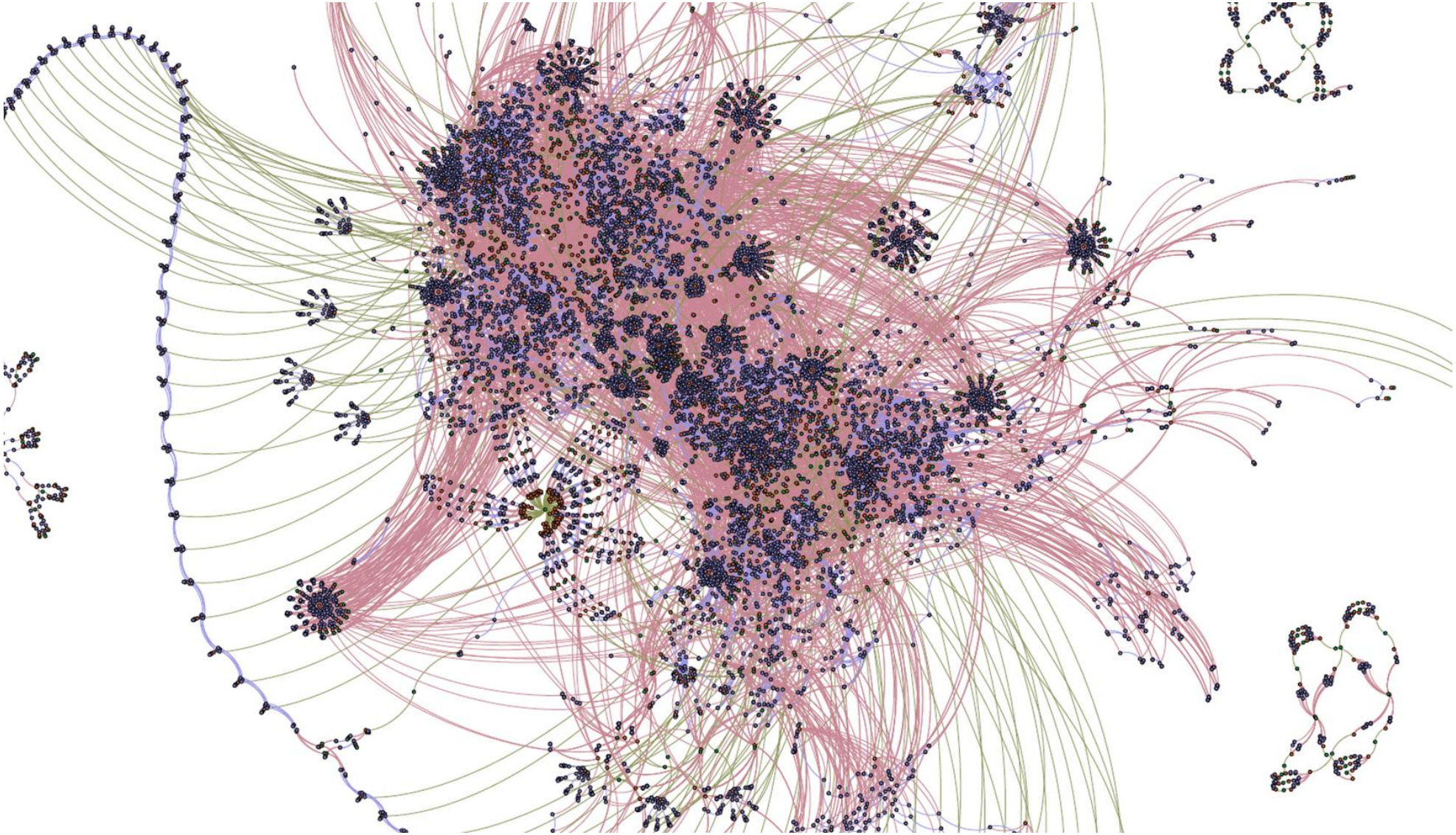
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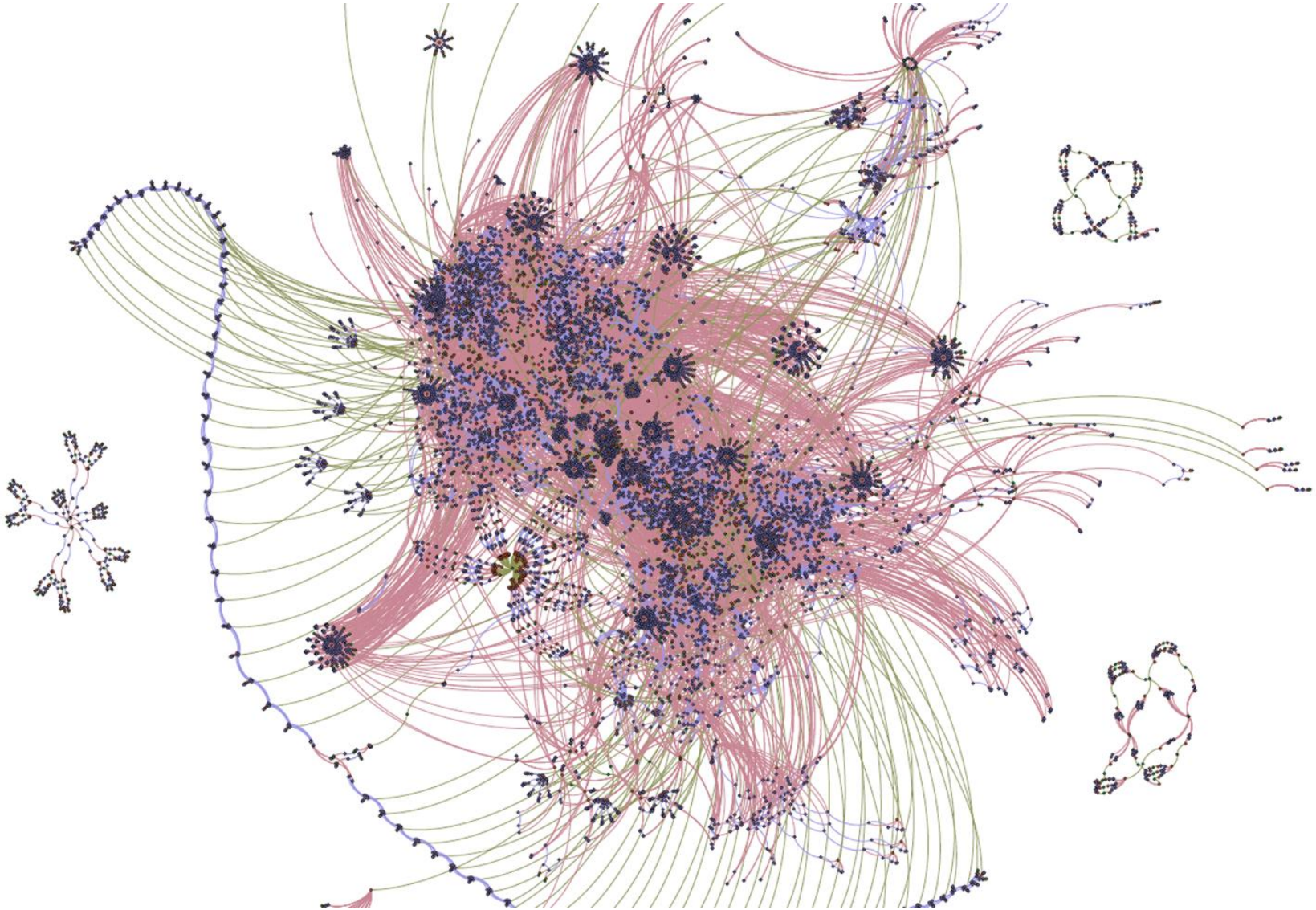
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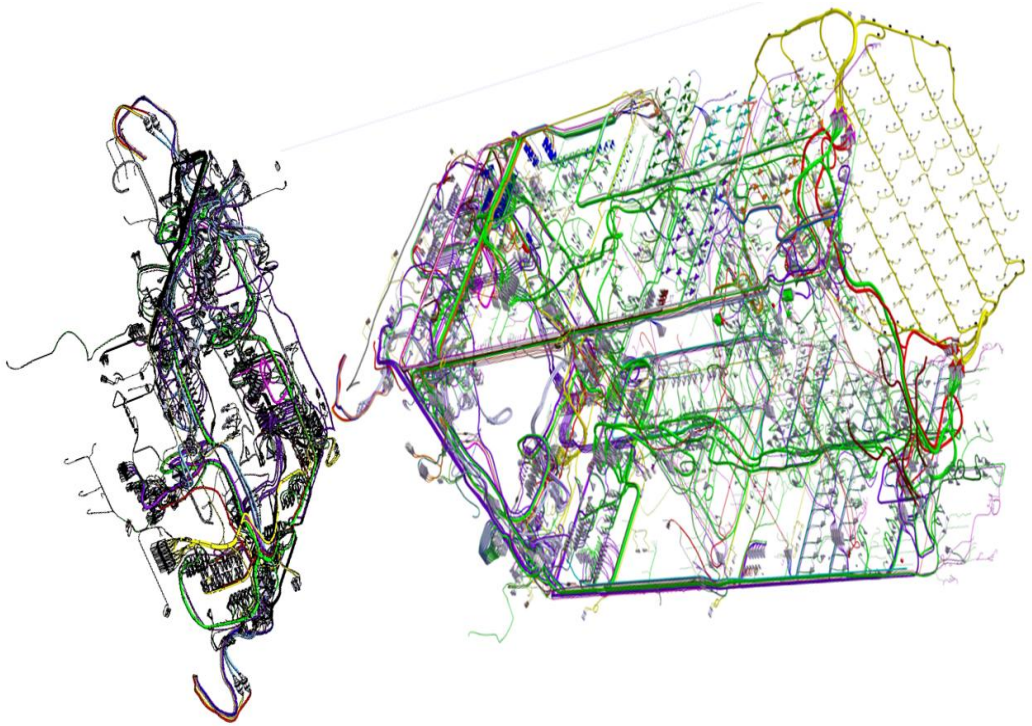
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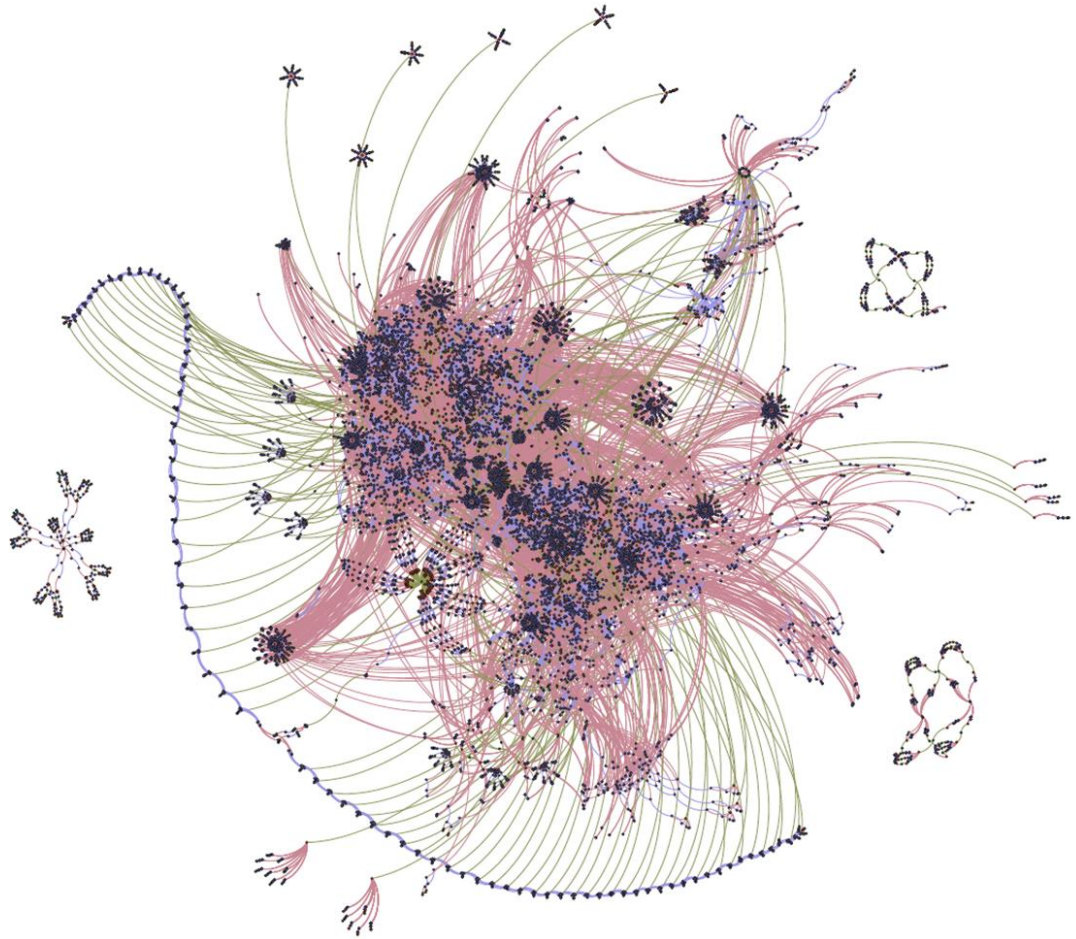
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An idea of the harness complexity



Approx. Size: 2,5m x 2,5m x 5,5m



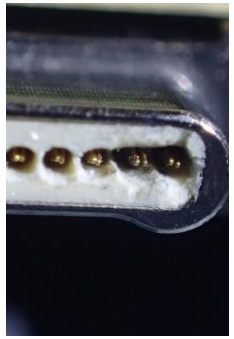
Electrical Wiring Interconnexion System

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The limits of the minituarisation trend

- **Micro-Ds are at the limits of what can be reliably handled by** harness operators

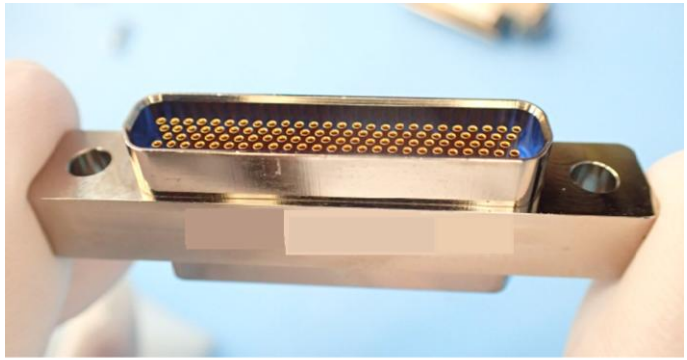
- **Nano-D technology** is **no longer** accepted for harnesses (*in general*)



- 51-ways Micro-D connectors and above are severely restrictive

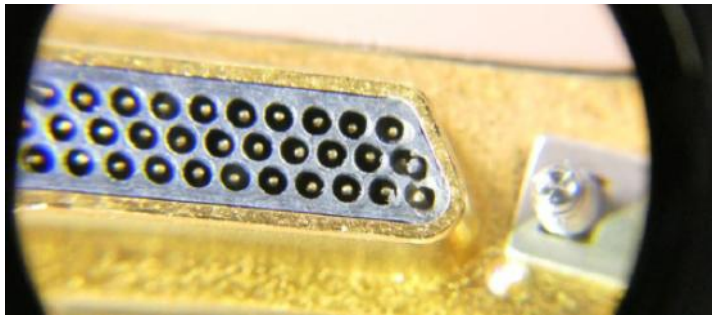
  → High insertion forces on a reduced imprint

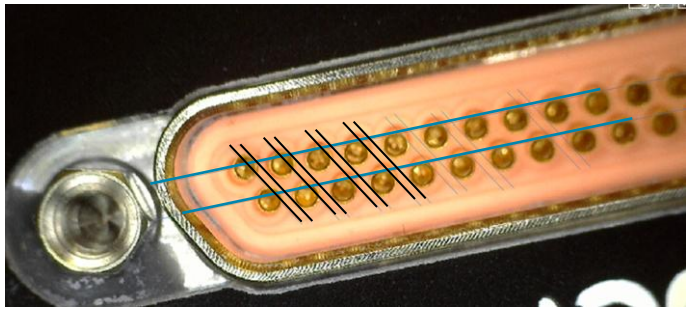
  → Massive design constrains if shielded lines are used



100-ways MDM connector saver. Estimated mating force: ~ 100-140N
278N max acc. to ESCC







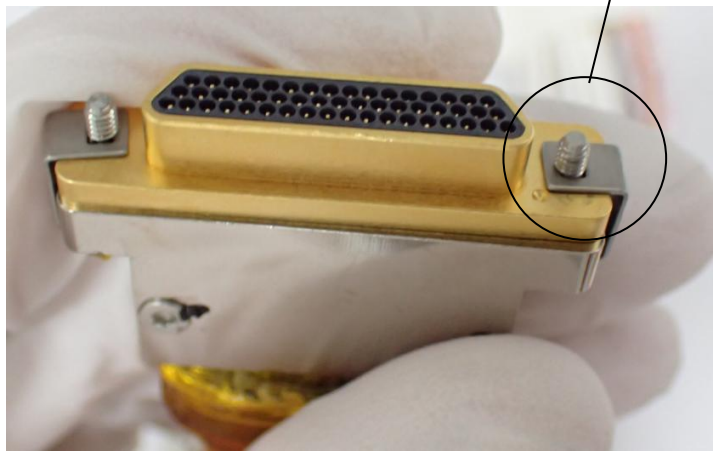


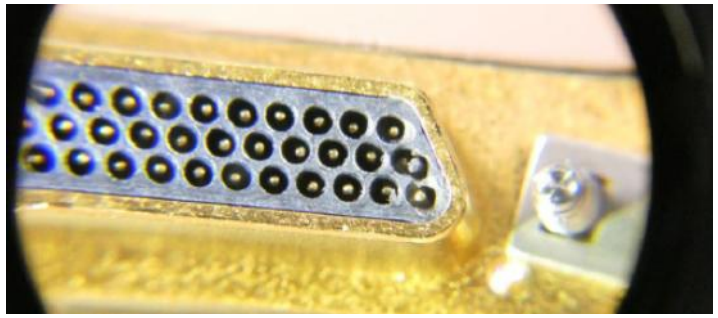
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The limits of the minituarisation trend



Non-retractable screws may be a source of issues





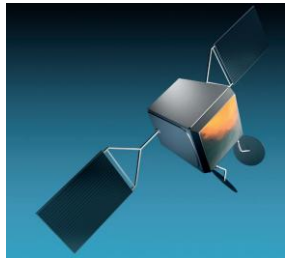
Screwlock assemblies for D-sub connectors allow full mating of connectors before clashing

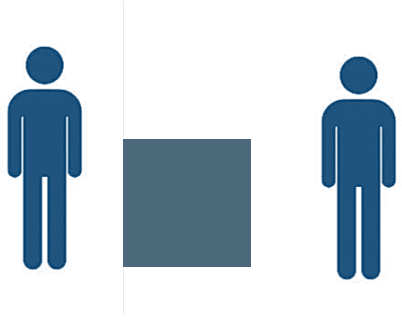


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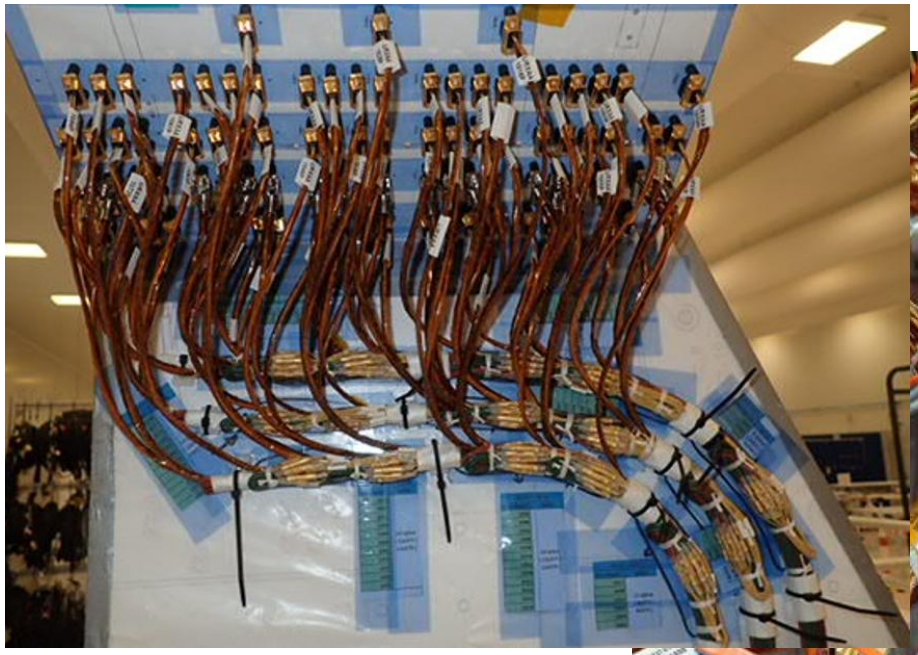
Voltage drop and minituarisation

- Gauge limitations, voltage drop and equipment limitations heavily impact harness manufacturing and accommodation









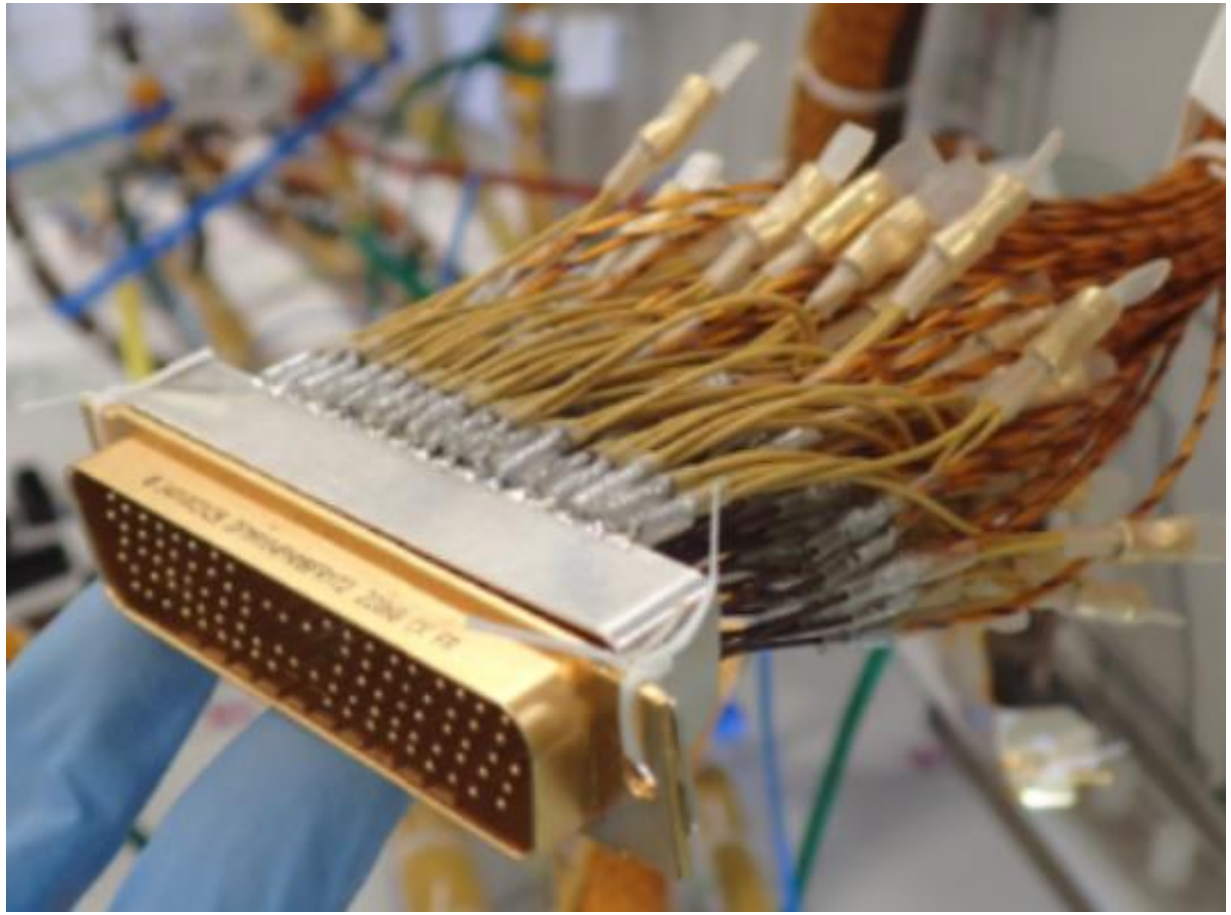


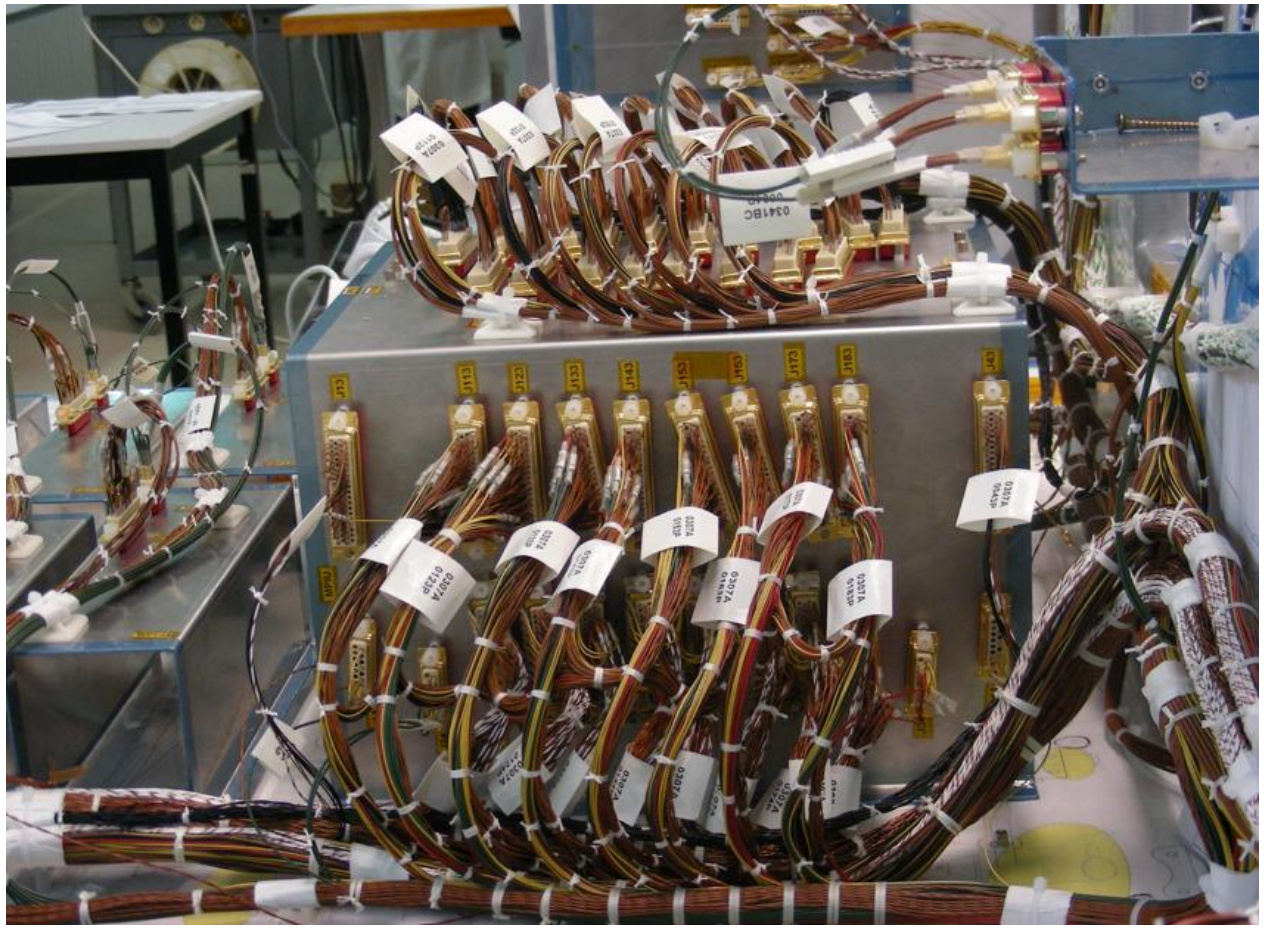
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Design issues



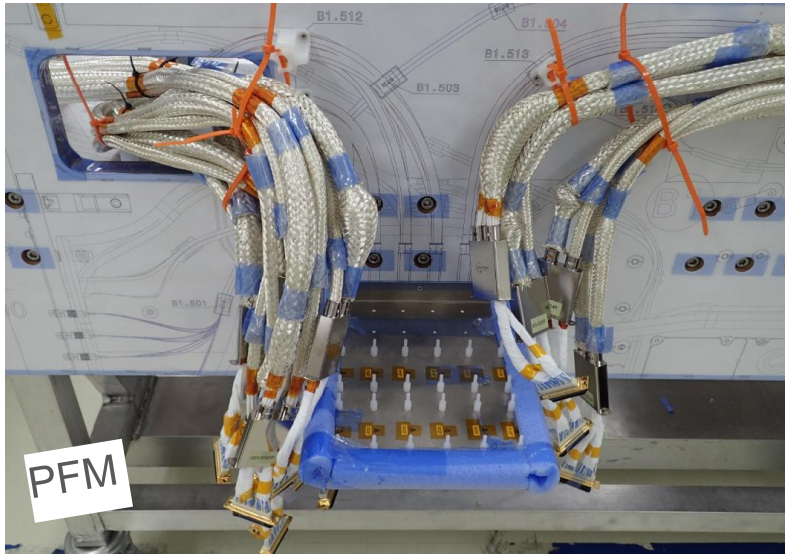


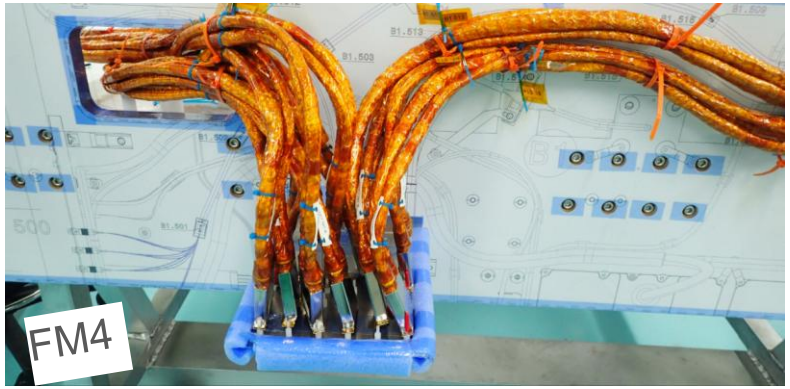
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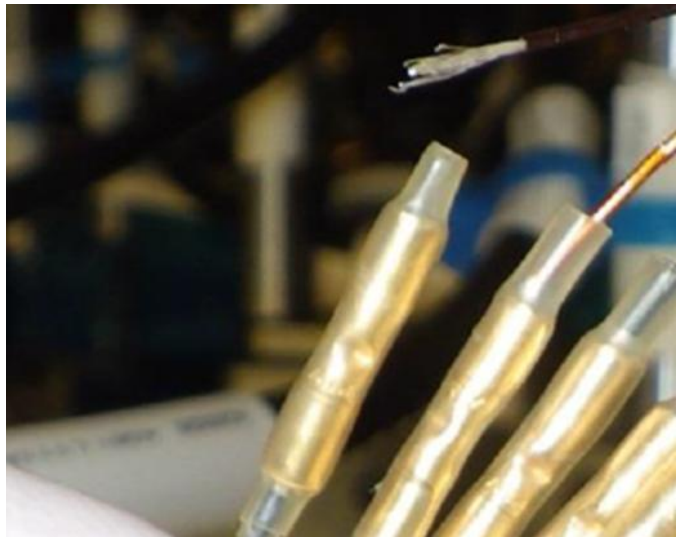
Fragile Technologies

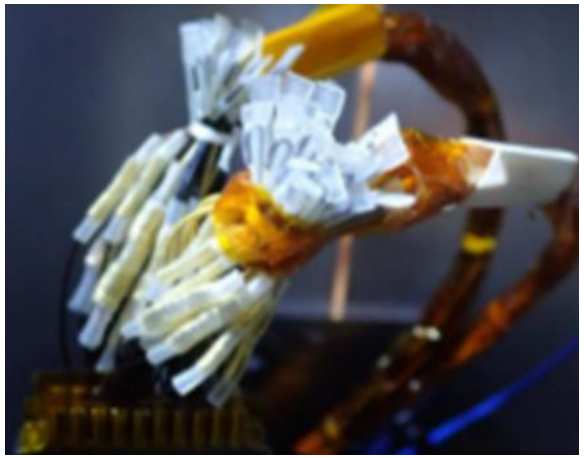










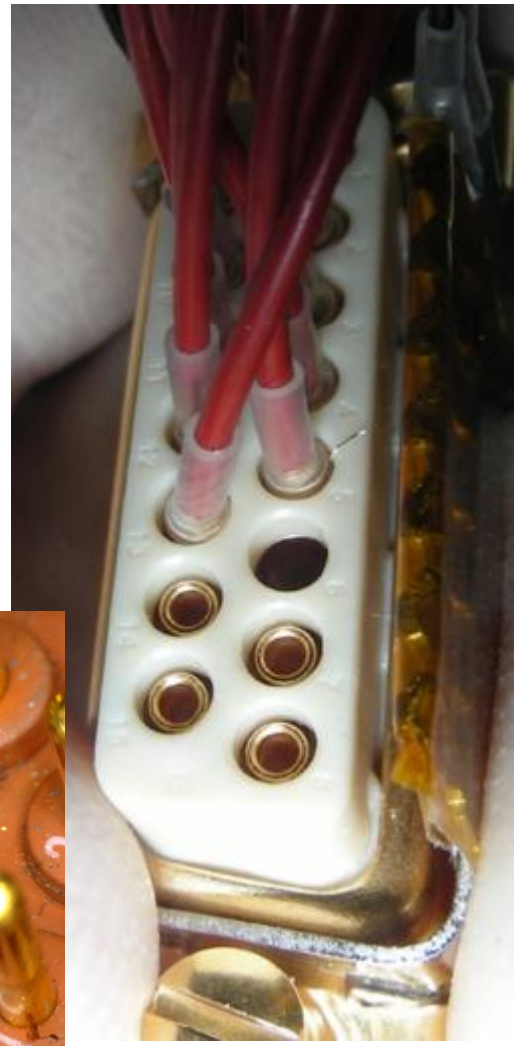


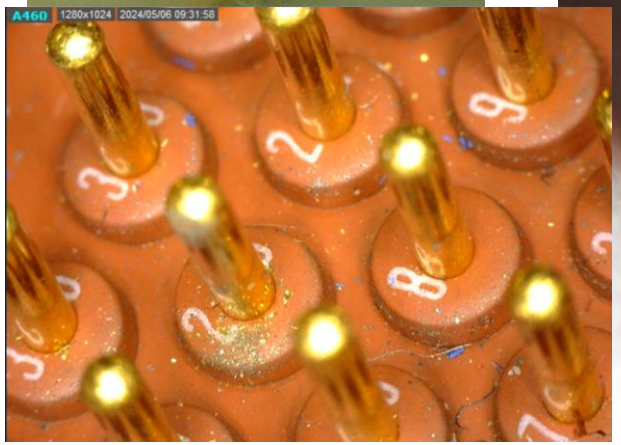


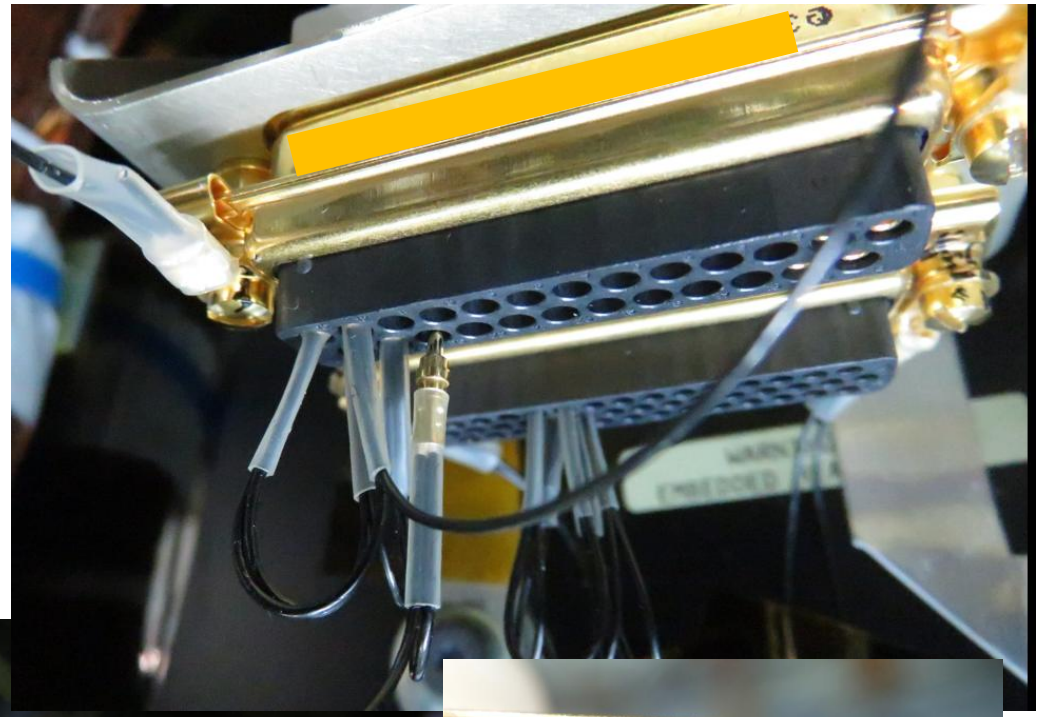
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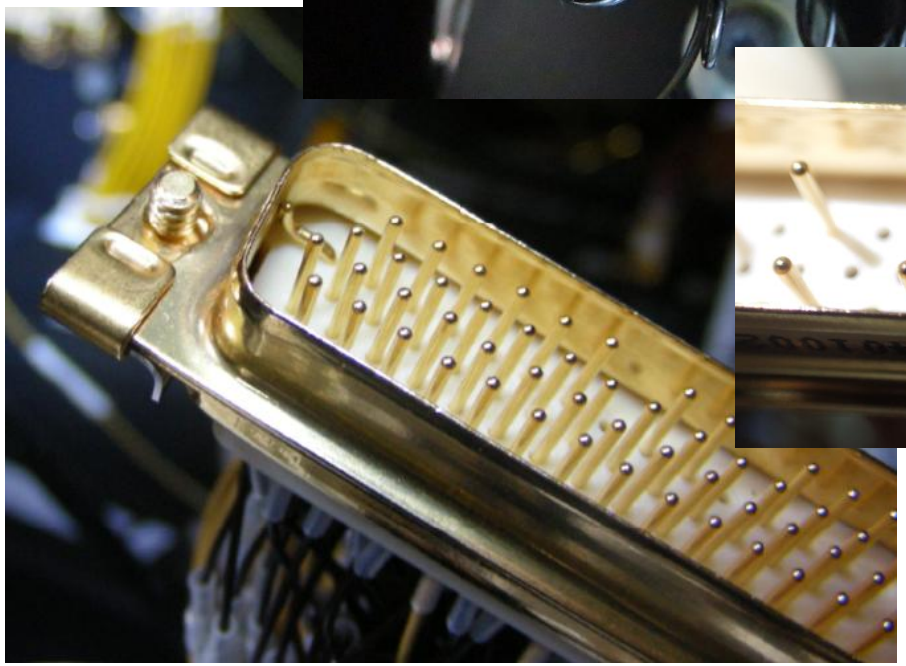
Not so fragile technologies











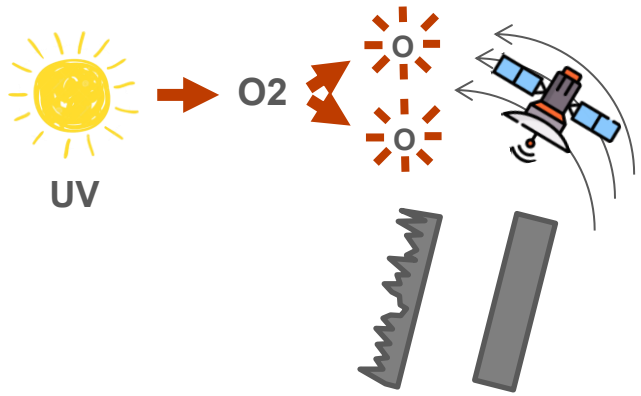


What we will need: Wires and Cables

- ATOX (Atomic Oxygen) resistance is leading the choice of cables in the external areas of satellites in LEO and VLEO.
- French Space Operations Act (LOS) in place

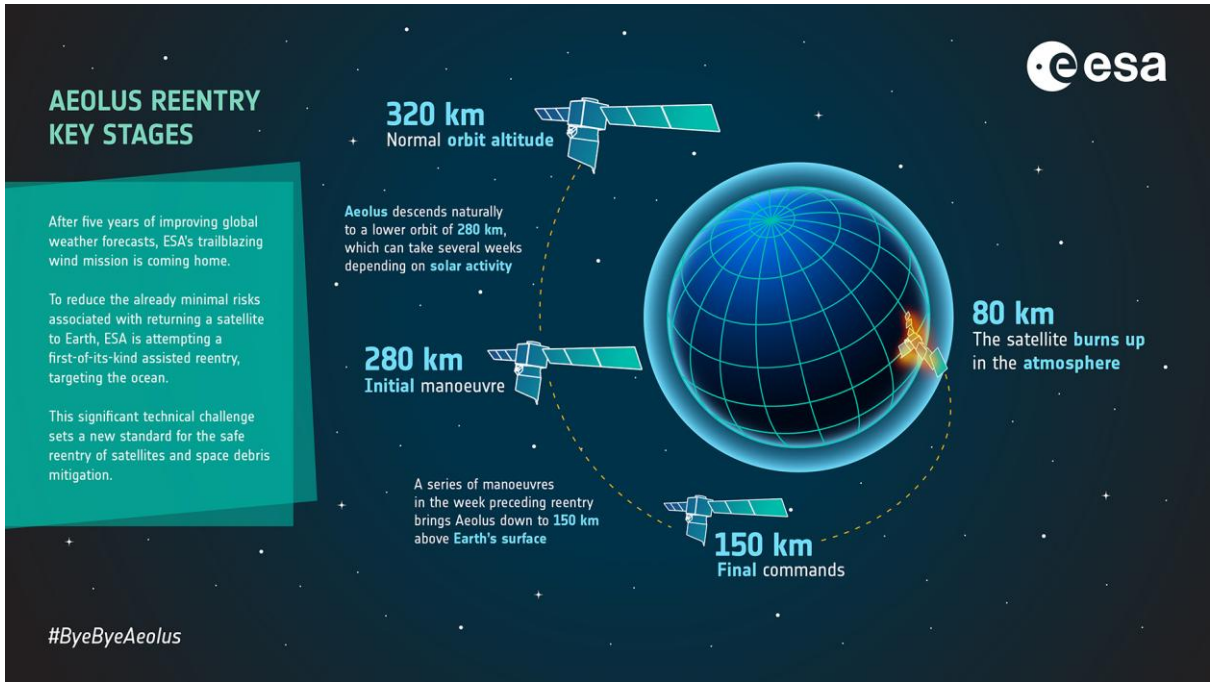
- Little test data on dynamic applications available on demand

- Robust to industrial and legislation obsolescences



- Cryogenic wires, small gauges (low volume)





New developments

Easy installation (blind conexión, with gloves)

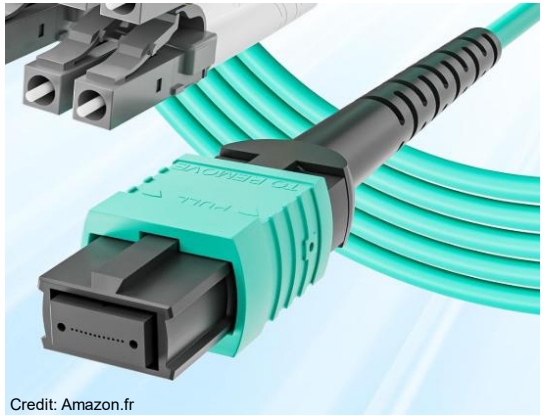
Robust to accidental demating

EMC/ EMI, metallic housings,
Anti-ESD jackets



Credit: Ubitech.fr

Visual clues for inspectors, is it correctly installed?
A “click” is not considered enough



Credit: Amazon.fr

MPO connector:
Visual clues added to the connector body

New developments



Fast locking technologies (but no monopoles)



Possibility of repairs in AIT



Cost effective components



Easy handling and wiring



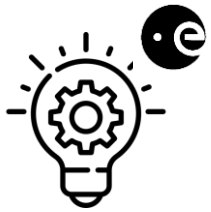
Robustness



No monopoles (standardization is key for new developments, e.g. MPO-MT ferrules for fibre optics)



Robust to obsolescences (PFAS, CRM)



Open barrel contacts compatible with D-sub, Micro-D, circular connectors → Automatization of crimping

Thank you

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