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**Integrated, Intelligent Modular Power Electronic Converter**  
**Horizon 2020 – Mobility for Growth, call H2020--MG--2014\_TwoStages: 636170-- I2MPECT**

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► **To cite this version:**

Bruno Allard. Integrated, Intelligent Modular Power Electronic Converter Horizon 2020 – Mobility for Growth, call H2020--MG--2014\_TwoStages: 636170-- I2MPECT. 9th CIPS, Mar 2016, Nuremberg, Germany. hal-01755108

**HAL Id: hal-01755108**

**<https://hal.science/hal-01755108v1>**

Submitted on 27 Apr 2018

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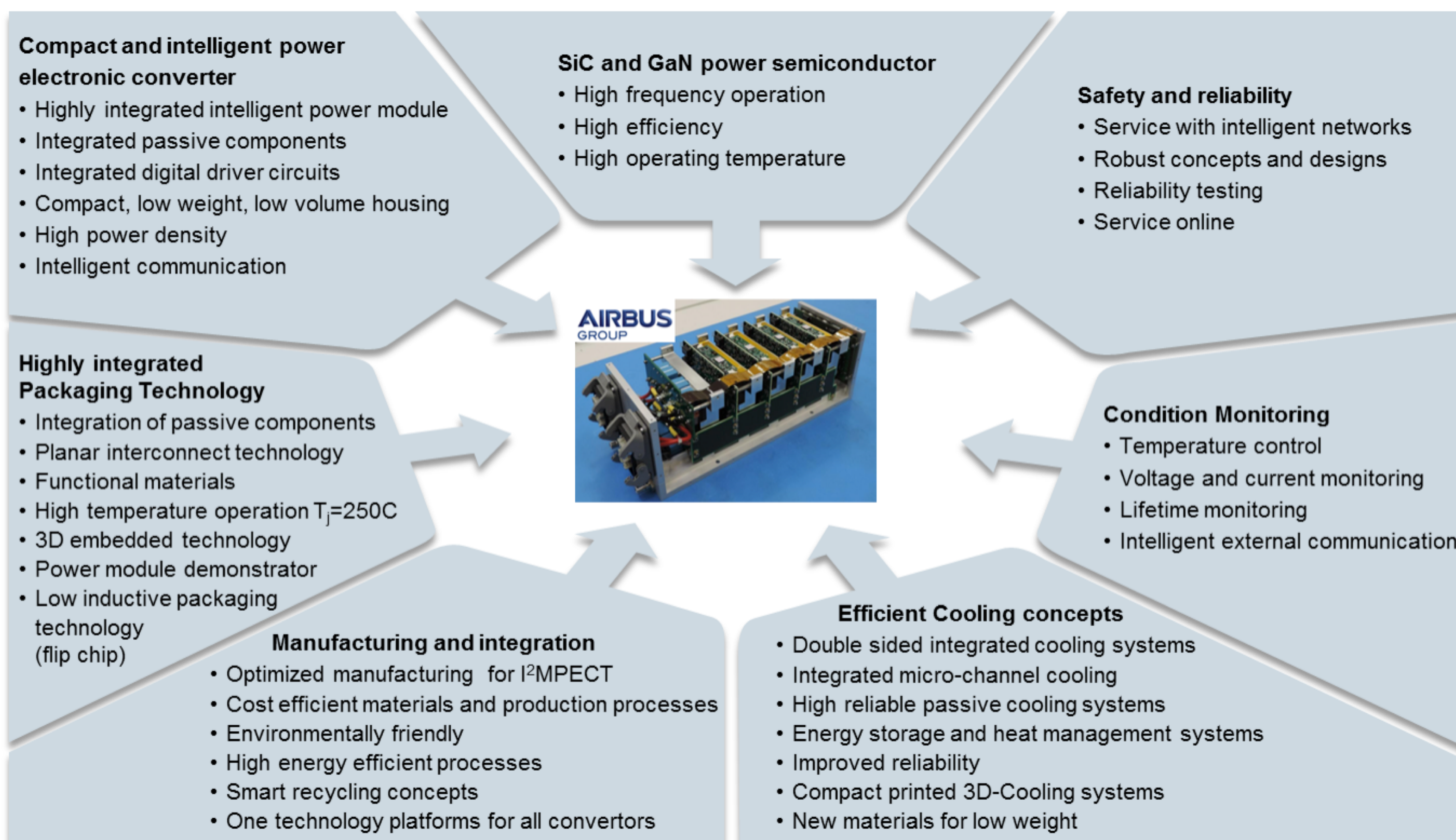
# Integrated, Intelligent Modular Power Electronic Converter

Presented by Bruno ALLARD (INSA, Fr) on behalf of the project consortium

## Horizon 2020 – Mobility for Growth, call H2020-MG-2014\_TwoStages: 636170- I2MPECT

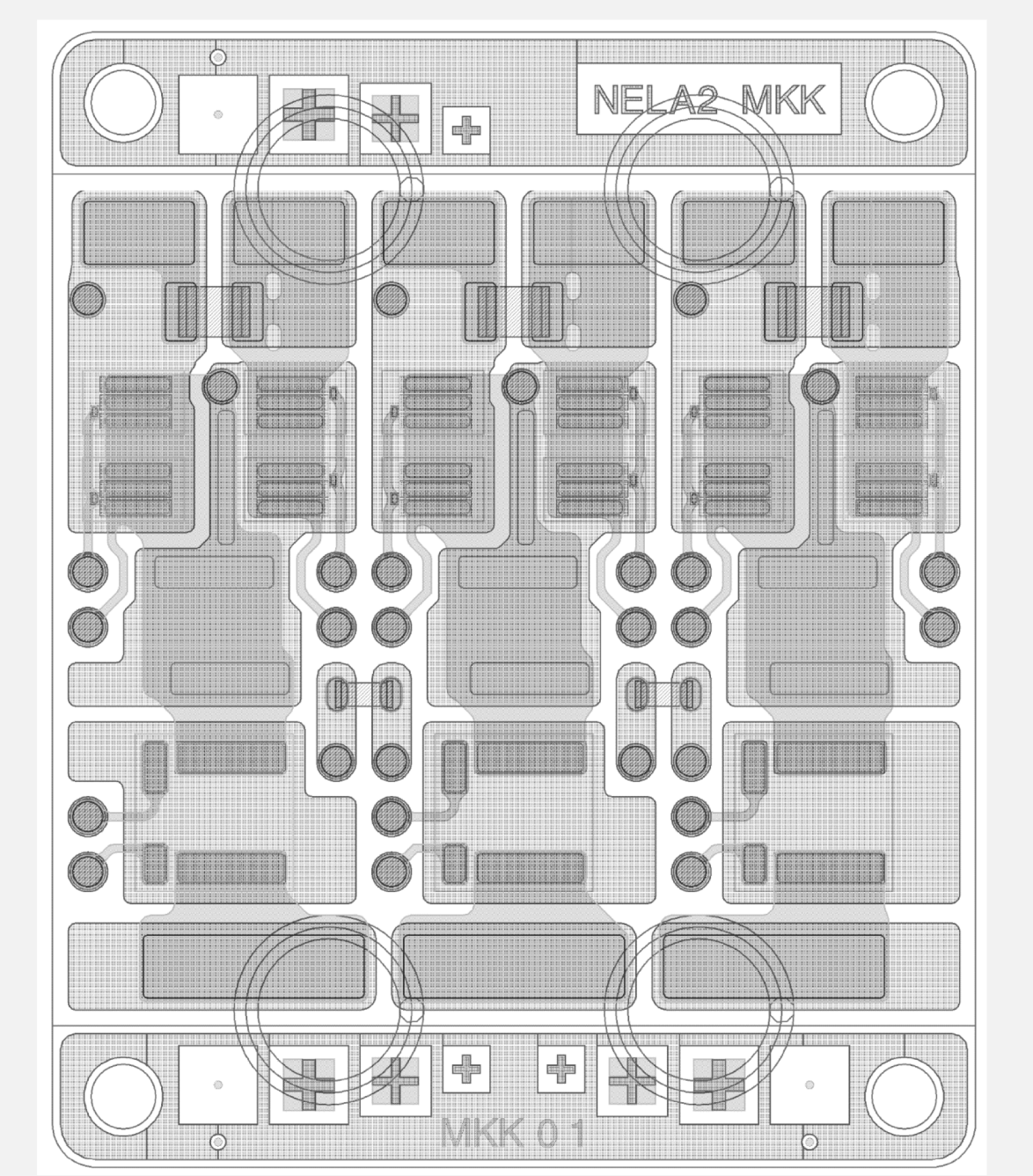
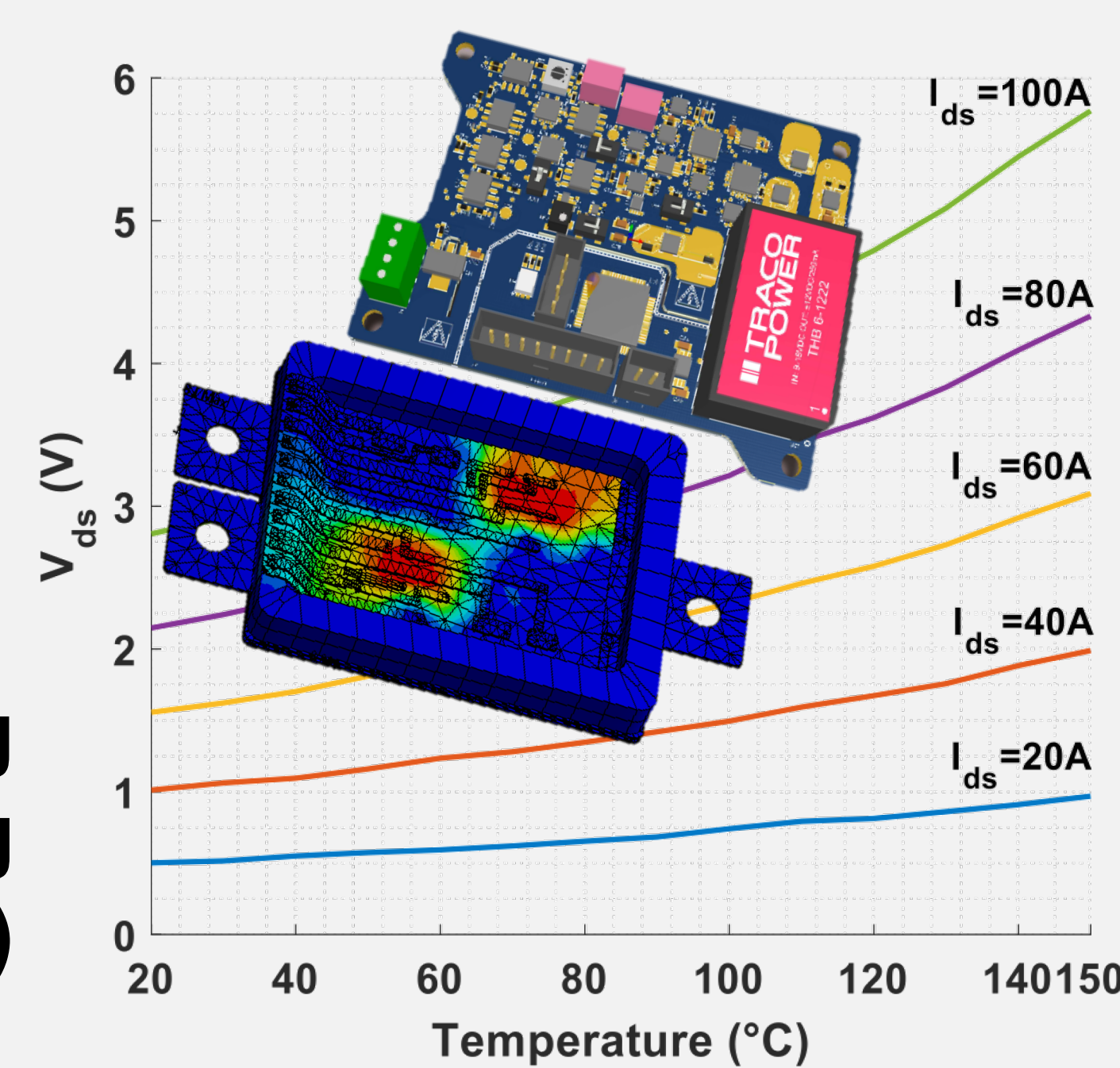
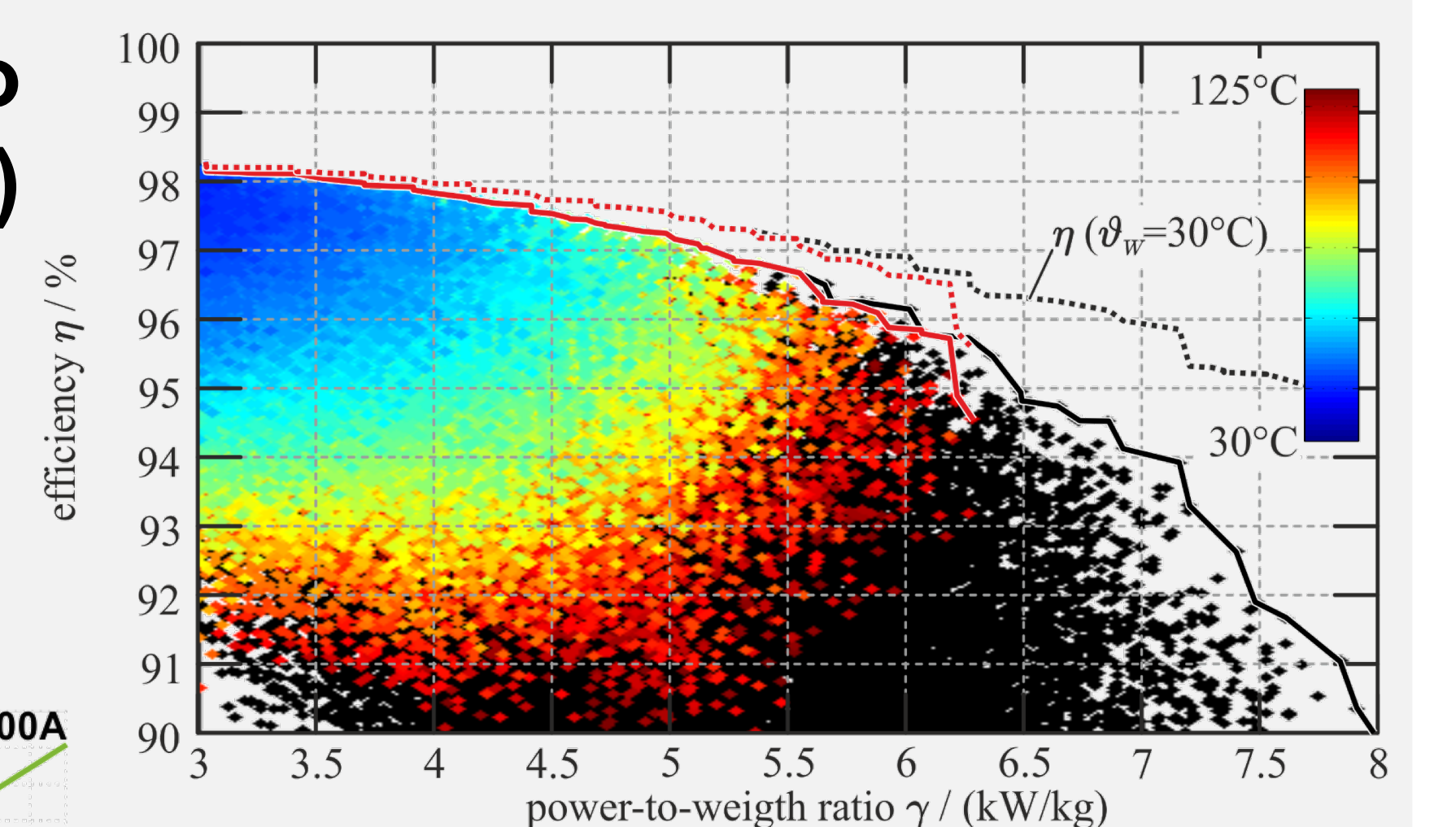
Develop and demonstrate an innovative, ultra-compact, highly reliable and efficient power electronic converter with extended functionalities for aerospace applications.

- Explore:
  - innovative 3D packaging and cooling concepts, by integration of full SiC power electronics (switches and diodes)
  - ultra-compact passives and intelligent gate drive
  - novel control and health monitoring techniques with intelligent external communication.
  - reduction of certification cost by modularization and standardization
- The key objective:
  - 3% increase in efficiency
  - Use of SiC and GaN components being able to cut the losses in power module by about 60%.
  - Increased switching frequency: further loss reduction in electric machines due to lower harmonic distortion
  - Modular highly integrated power electronics building blocks
- Significant increase in power density:
  - 2kW/kg today to at least 10kW/kg in given conditions and potentially 15kW/kg in more long term future
  - highly compact and flexible 3D design, integrated 3D packaging technologies
  - innovative cooling technology
  - cost effective production by new technologies



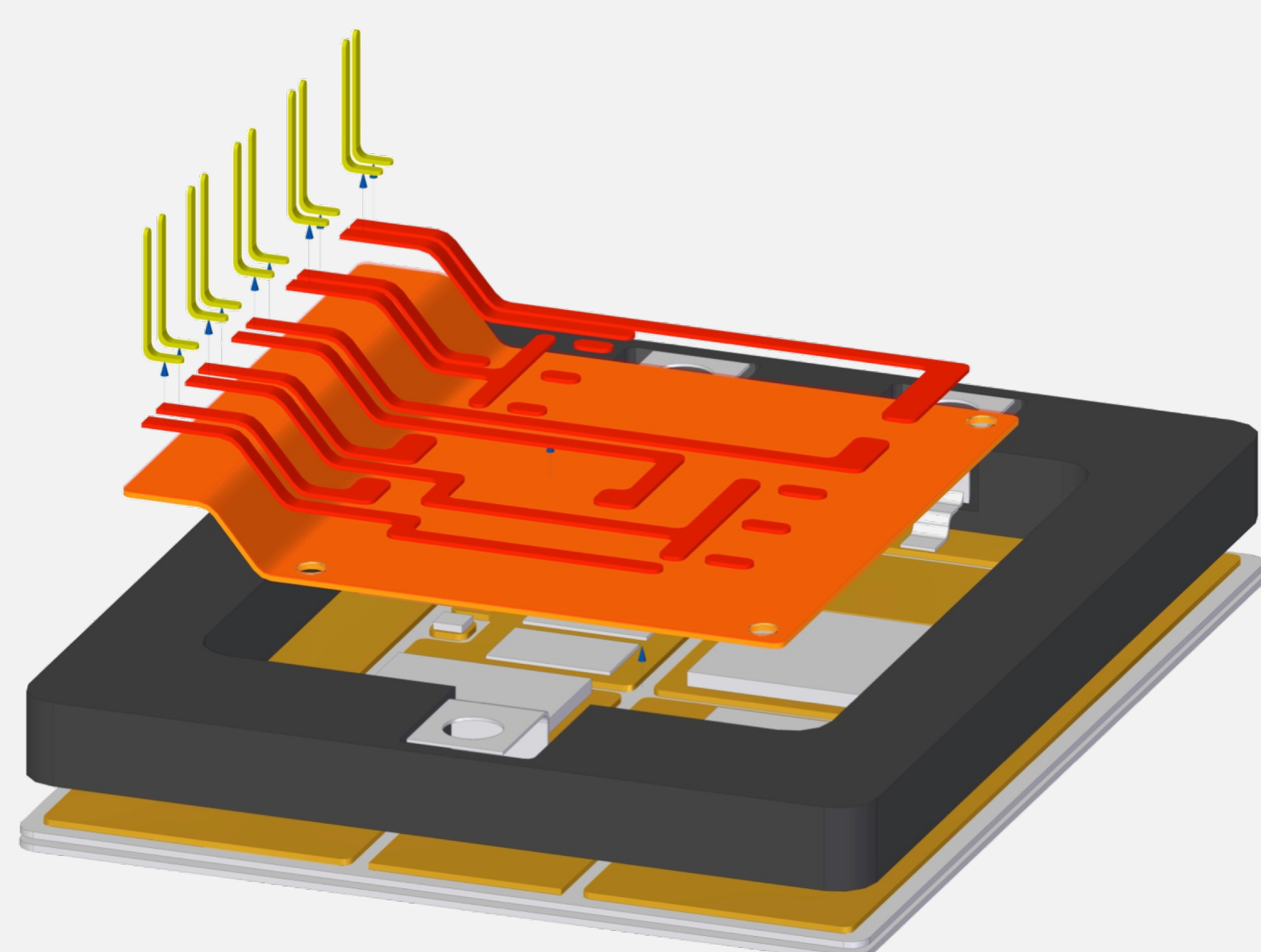
## Early proposals

### Weight/Efficiency Pareto optimization (ETH Zurich)

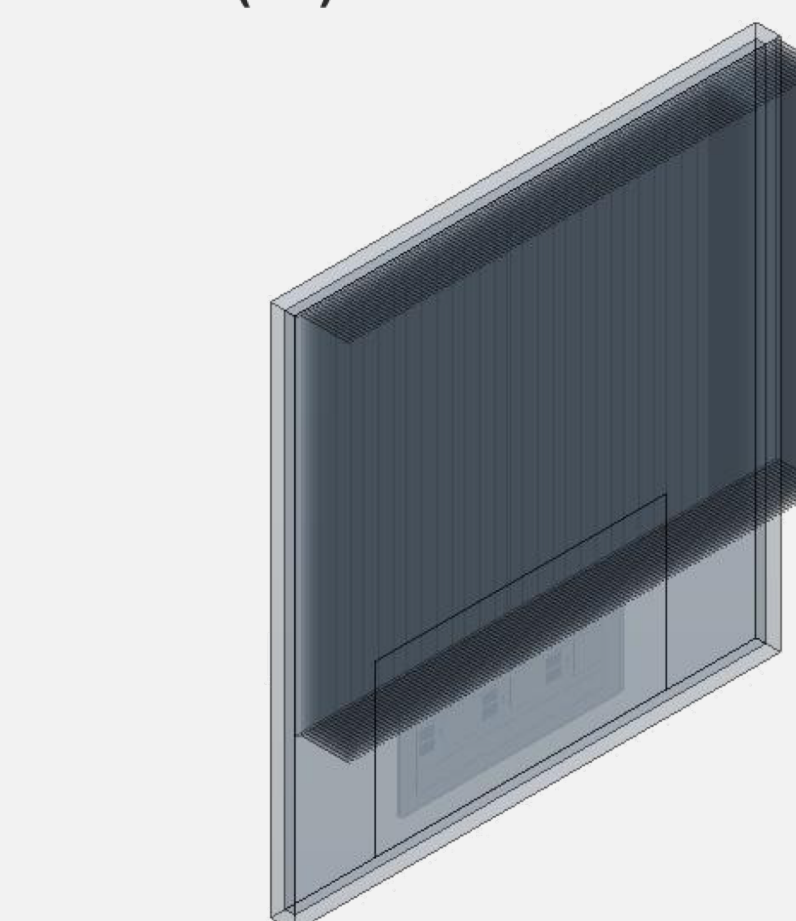
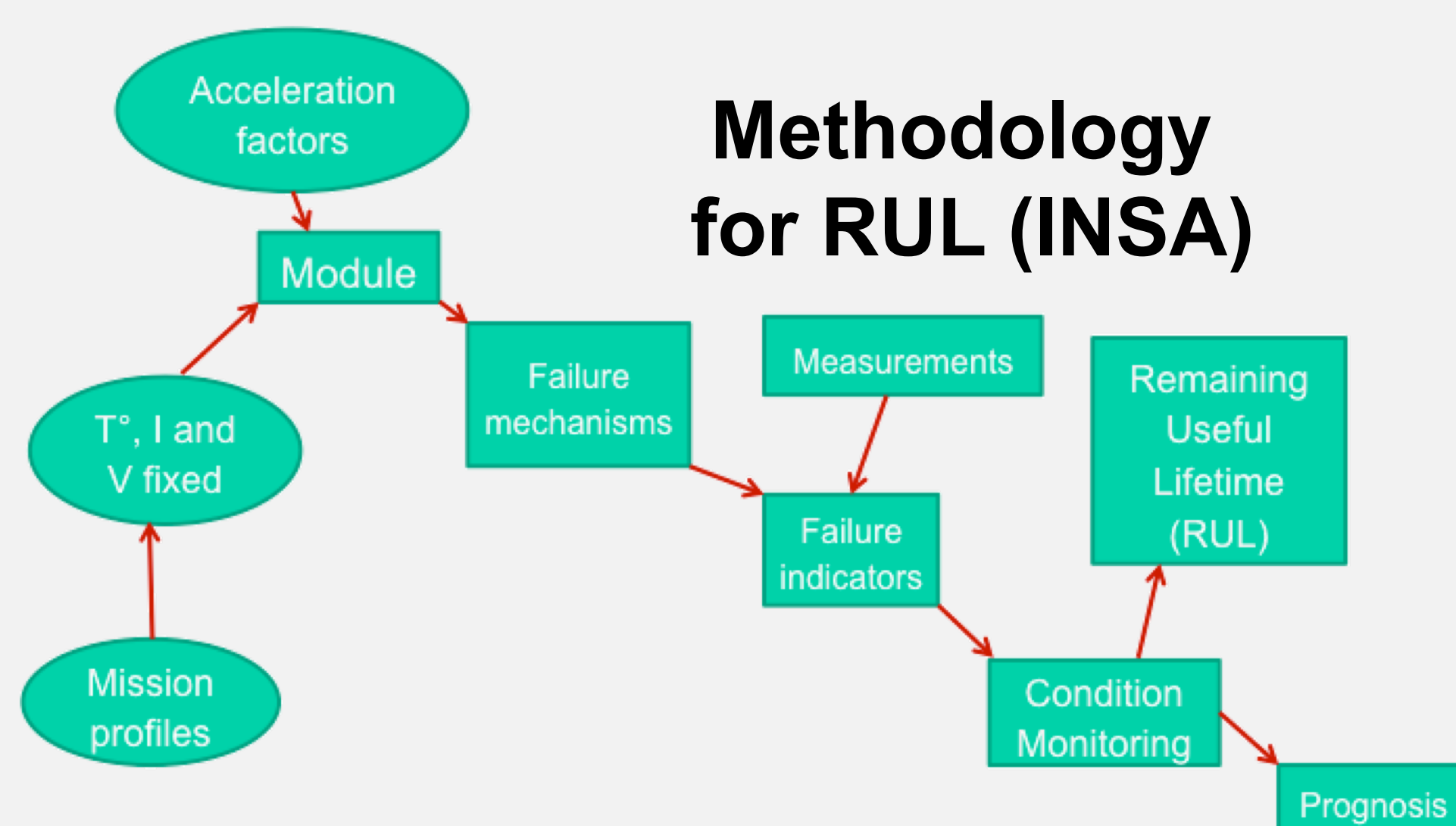


Microchannel heatsink technology (Siemens)

### Electro-thermal modelling and condition monitoring (Univ. Sheffield)



Flex-cover technology (Dynex)



Two-phase heat transfer device with integrated fins (INSA)