Ariane 6 programme, Digitized Engineering & Production

CSD&M PARIS 2018 – 2018, Dec. 19th

H. GILIBERT - ArianeGroup Chief Technical Officer

#spaceenablers

WORLD LEADER IN ACCESS TO SPACE

9 000 HC
in Fr and GE

3,4 B€ SALES

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CREATED FOR ARIANE 6 …

Ariane 6 stakes …

- Keep Ariane 5 heritage (reliability, …)
- Time & Money ÷ 2 (Rec & Nrec)
- Industrial ramp-up
- Versatility, Evolutivity

… Ariane 6 answers

- New programme governance
- Production Pulled Concurrent Engineering
- Factory 4.0
- Technical Innovation

Toward **Integrated Design to Production System**

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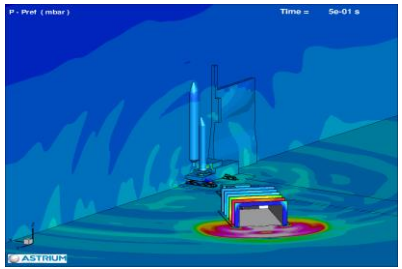
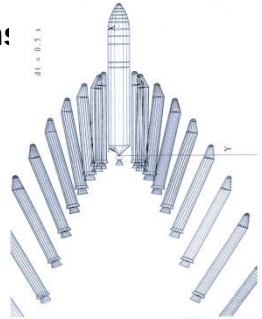
KEEPING ARIANE 5 HERITAGE …

- **Leading edge System Engineering : « No flight test and failure is not an option ! »**
  - **Multi-disciplinary optimisation (“Architect”)**
  - **Top-Down approach & concurrent engineering**
  - **Reliability & Safety**
- **Leading edge engineering**
  - **Physics modelling in all domains**





- **Today & tomorrow :**
  - **Model Based System Engineering (MBSE)**
  - **Functional Mock-Up (FMU)**
  - **Digital Mock-Up (DMU)**
  - **Functional Digital Mock-Up (FDMU)**

Leading edge engineering & technology …

… to be now fully devoted to industrial robustness

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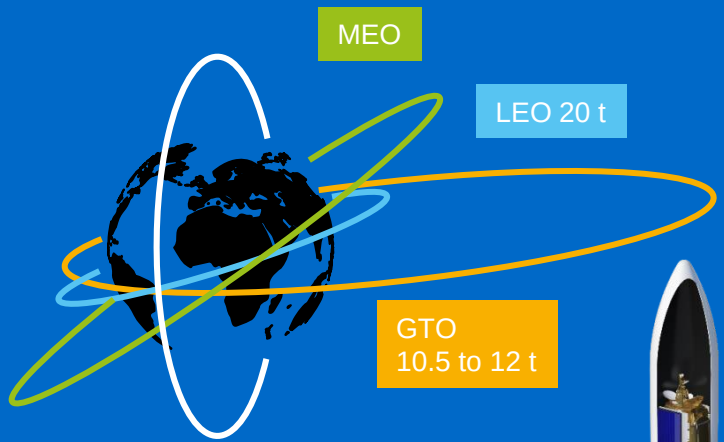
VERSATILITY, INNOVATION

Ariane 62 & 64
2020 maiden flight
FOC 2023

High performance and flexibility on trajectories

ARIANE 64 PERFORMANCE



(here on Ariane 6 APU)

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TIME & MONEY ÷ 2 & INDUSTRIAL RAMP-UP

A matter of …

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TIME & MONEY ÷ 2 & INDUSTRIAL RAMP-UP

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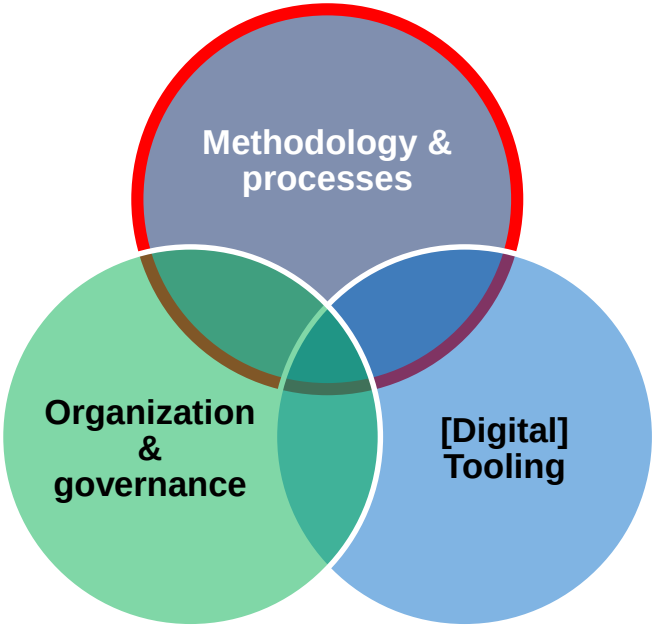

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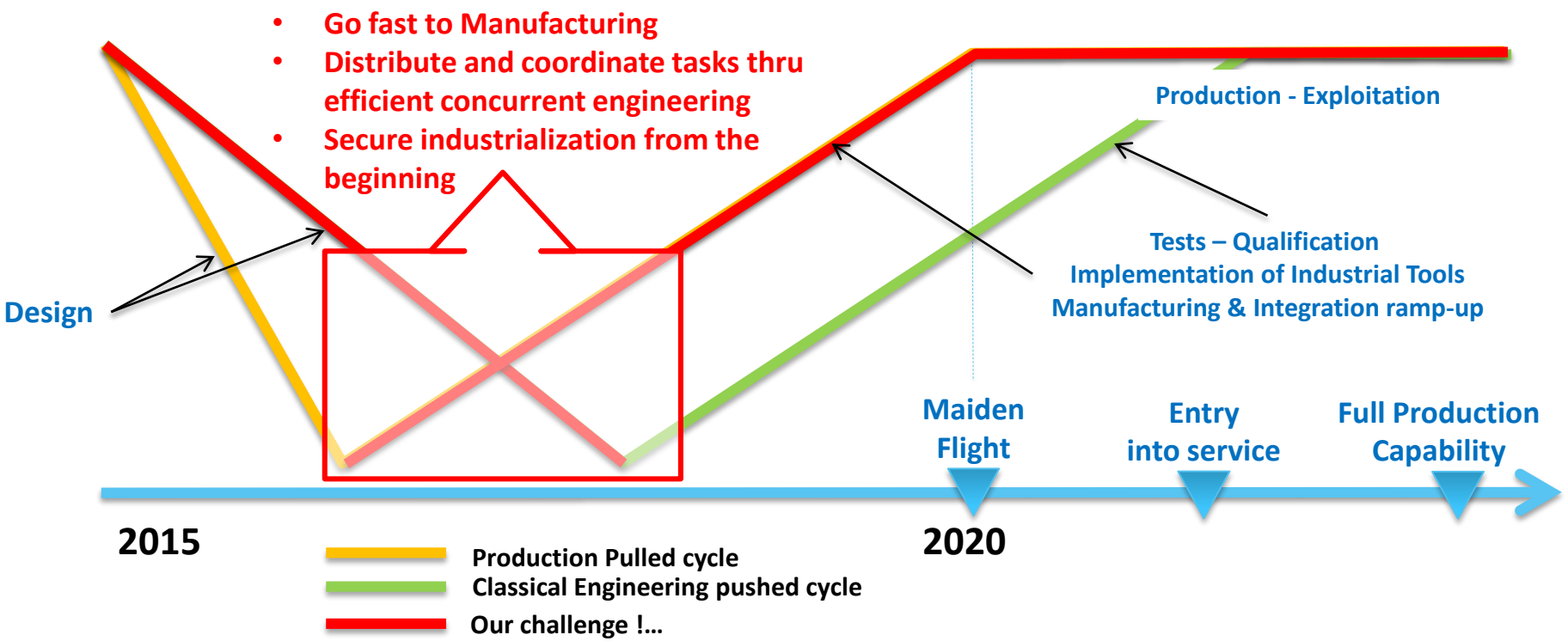
METHODOLOGY: THE ARIANE 6 PRODUCTION PULL APPROACH

Gain a factor 2 to 3 on NRC, RC and time to exploitation …



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TIME & MONEY ÷ 2 & INDUSTRIAL RAMP-UP

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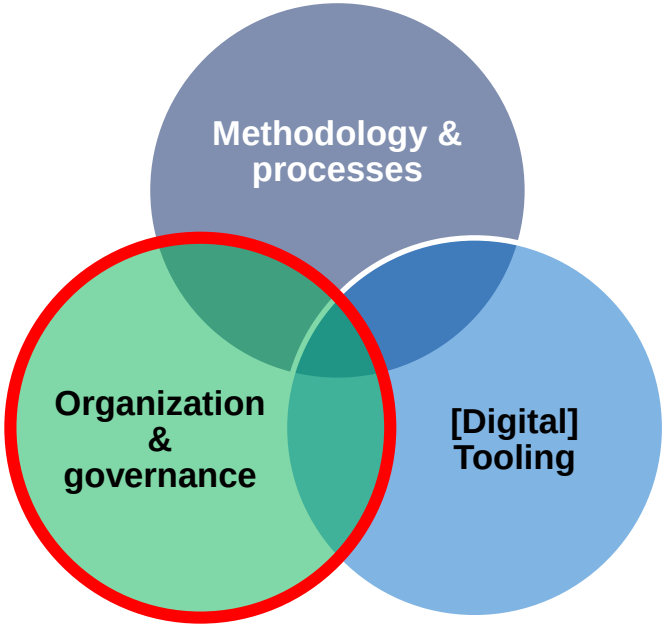

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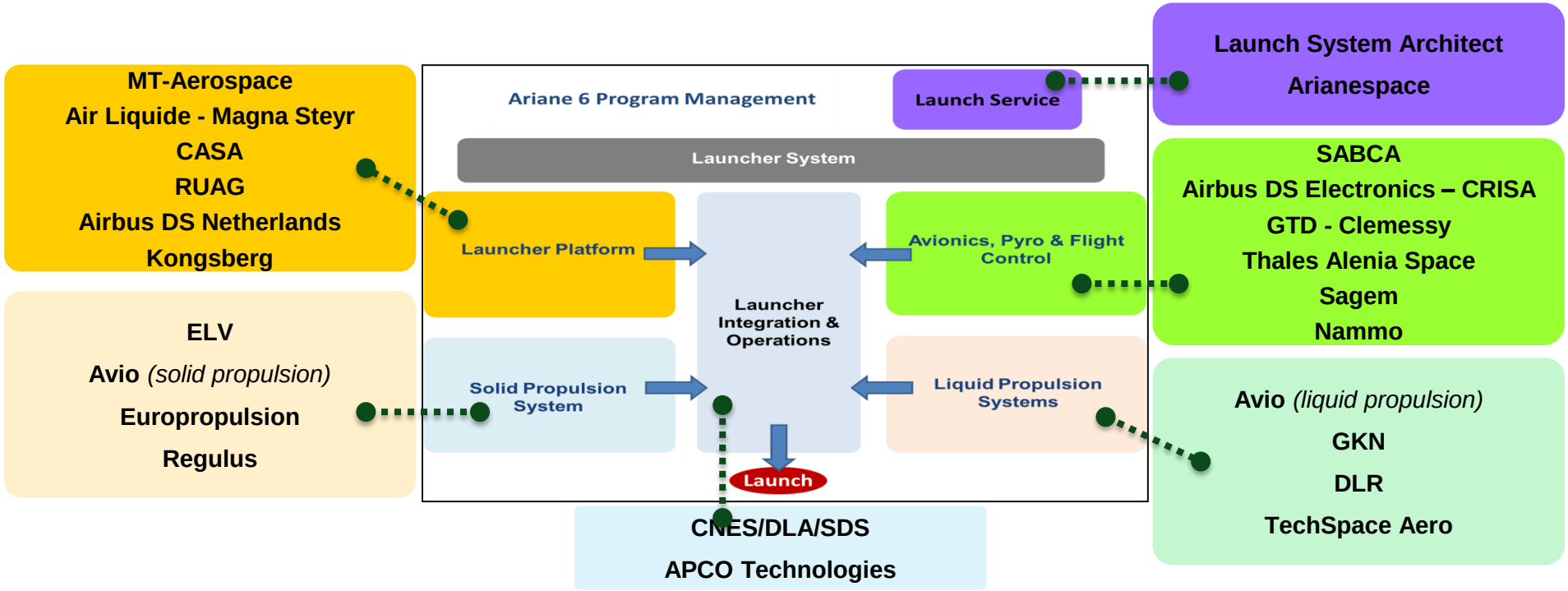
ORGANIZATION & GOVERNANCE



Each actor of the extended enterprise is involved in one and only one segment

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TIME & MONEY ÷ 2 & INDUSTRIAL RAMP-UP

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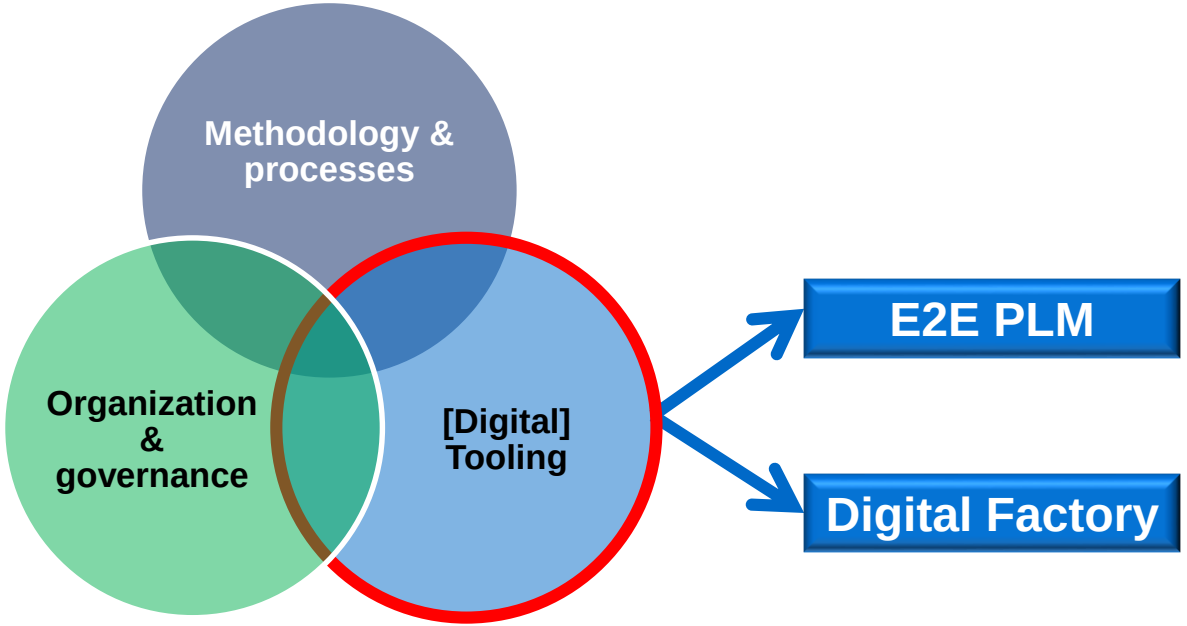

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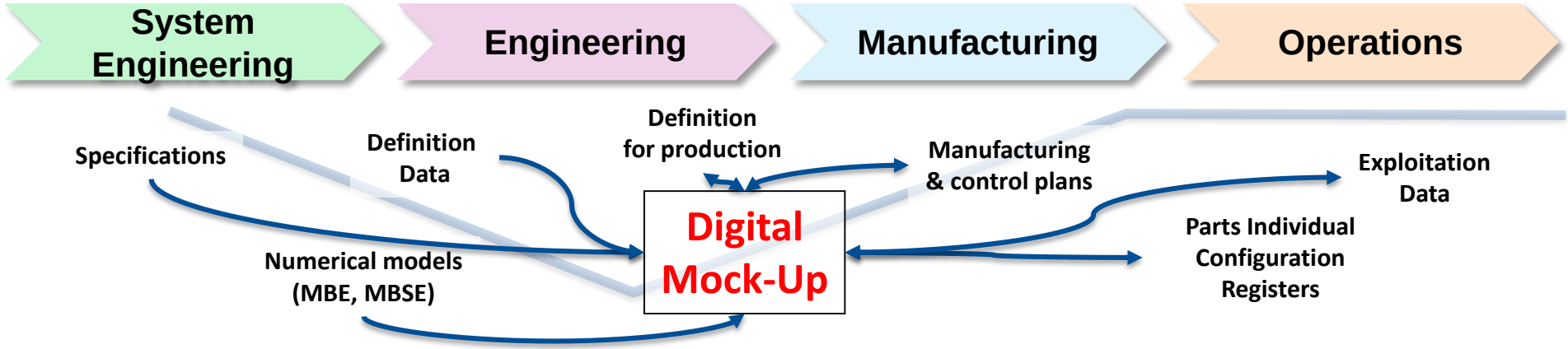
END-TO-END PRODUCT LIFE CYCLE MANAGEMENT (E2E PLM)

Shorten duration and reduce cost of development & evolutions



Reinforce digitalization along whole Life-Cycle
with tools integrated into a coherent data management system:
Digital E2E-PLM

Digital mock-up & traceability / versioning management as key success factors

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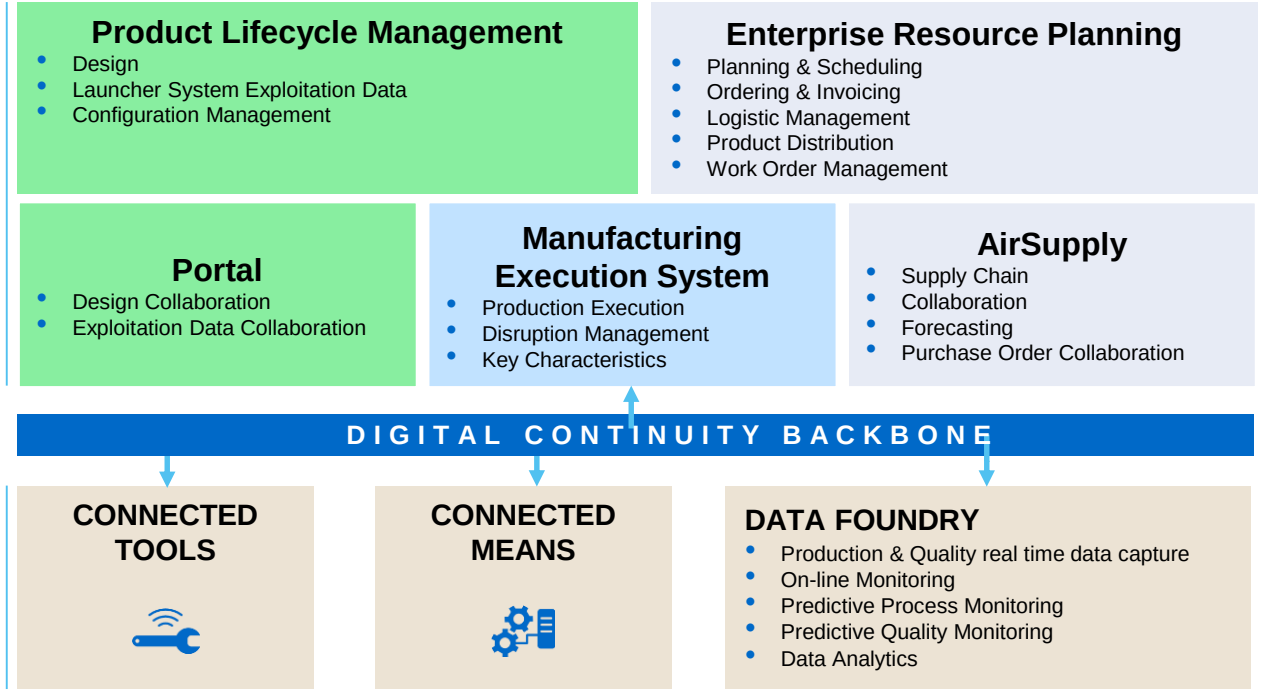
ARIANEGROUP DIGITAL SET-UP FOR ARIANE 6 ENGINEERING & PRODUCTION

COMPANY DIGITAL TOOLS

FACTORY 4.0



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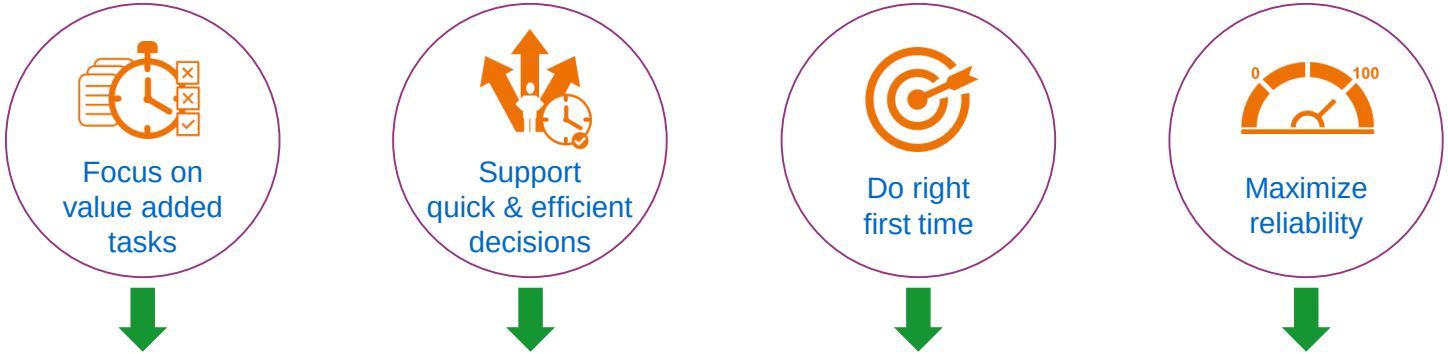
ARIANEGROUP FACTORY 4.0 OBJECTIVES

NEXT STEP
IN SPACE EXCELLENCE



To support our teams in their daily tasks and foster continuous improvement

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ARIANEGROUP FACTORY 4.0 SPECIFIC CHALLENGES

SECURITY & SAFETY
LONG PRODUCT LIFECYCLE
FULL TRACEABILITY

- Highly critical business from security, safety and confidentiality perspectives
- Low volume production of highly complex systems
- Failure of even a single unit of product is not an option
- Long lead time for design and manufacturing of products
- Long term lifecycle of products
- Full traceability required for every unit of product

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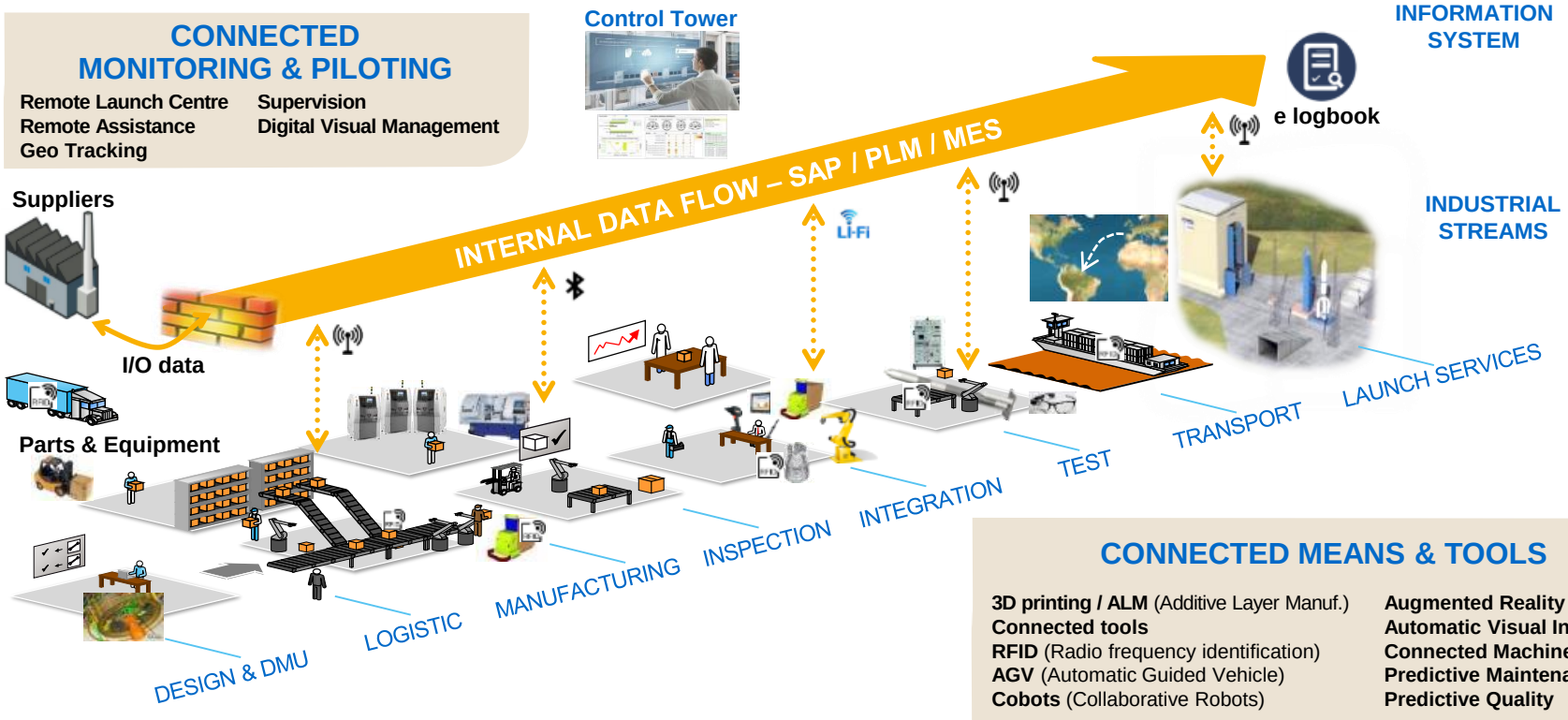
ARIANEGROUP FACTORY 4.0
END TO END DIGITAL CONTINUITY



CONNECTED MEANS & TOOLS

3D printing / ALM (Additive Layer Manuf.)
Connected tools
RFID (Radio frequency identification)
AGV (Automatic Guided Vehicle)
Cobots (Collaborative Robots)
Augmented Reality
Automatic Visual Inspection
Connected Machines
Predictive Maintenance
Predictive Quality

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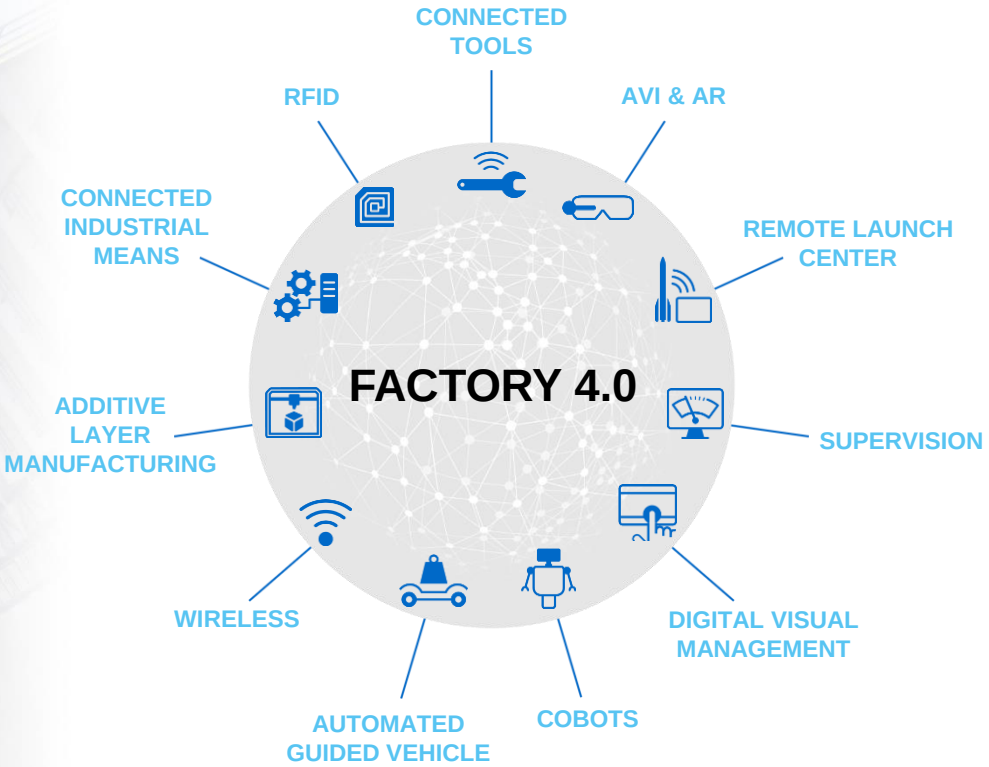

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FACTORY 4.0 VIDEO

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