

Access to Space

**H2020 Space WP 2018-2020
Stakeholder Consultation Workshop
Session 3**

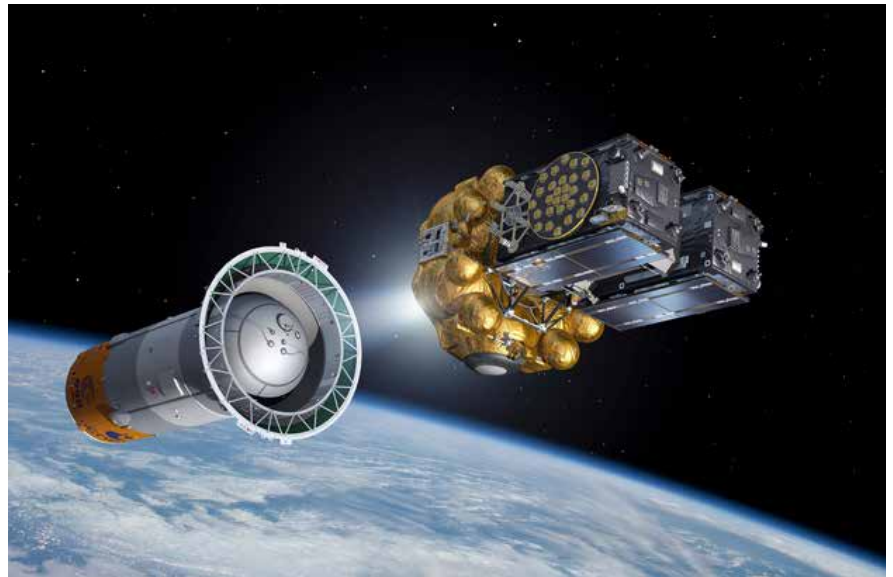
**T. Kranz, ESA LAU
27/09/2016**

Access to Space - Strategic Context

The space sector provides an important contribution to several European strategic priorities, and **2016 is a cornerstone year for discussing the European Space Strategy**

Access to Space is a crucial element in the European Space Strategy as it is:

- considered as an enabler in many downstream fields of application
- essential in a **globally competitive** European space sector
- ensuring European autonomy in accessing and using space in a safe and secure environment



Global competitiveness in Access to Space

Fast evolving global context - rising competitive pressure through agile, innovative, entrepreneurial actors supported by captive markets

European response to the latest evolutions in the global launch solutions environment is formulated in the CM/14 decisions:

Ariane 6 – *Designed for competitiveness*

- Half costs per kg as compared to Ariane 5 & competitive service
- Modularity to match institutional and commercial markets (and their evolutions)

Vega C – *Designed for Mission Capability*

- Reducing costs per kg as compared to Vega while widening the mission range
- Maximizing synergies with Ariane 6

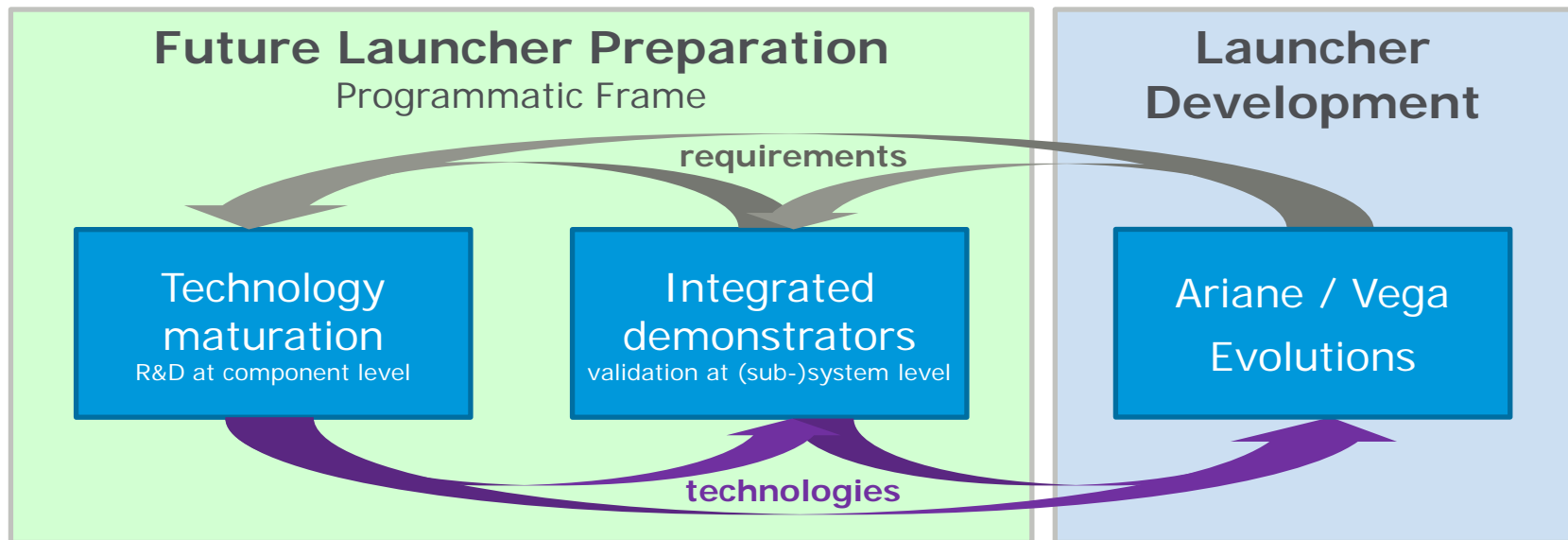


An assured institutional market in Europe is indispensable to secure worldwide competitiveness of European launch services

Access to Space technology development implementation in ESA

ESA, being responsible to ensure assured access to space for Europe, covers a very large scope of technology development in the field of Launchers/Space Transportation, through the following programmatic instruments:

- TRL 1 - 3 mainly through the “**Basic Technology Research Programme**”
- TRL 3 – 7 mainly through the “**Future Launcher Preparatory Programme**”
- TRL 6 – 9 through the launcher **development Programmes**



Technical innovation in Ariane 6 (selection)



RUAG Space

Payload Fairing
Out-of-autoclave
Automated NDI

Upper Stage APU



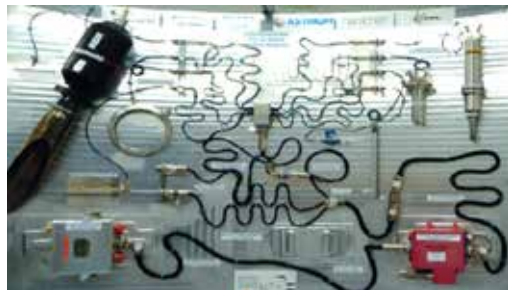
Airbus Safran Launchers

Advanced Friction Stir Welding
Al-Li base material



MT Aerospace

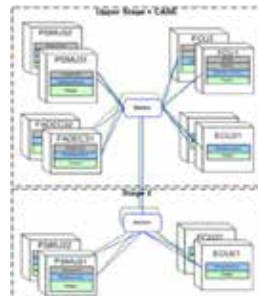
Opto-Pyro chain



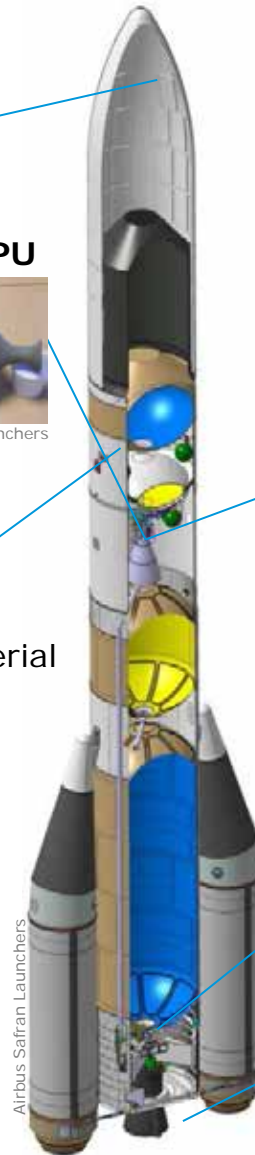
Airbus Safran Launchers

ESA UNCLASSIFIED – Releasable to the Public

TTEthernet



TTTech



Airbus Safran Launchers

Additive Layer Manufacturing

Vinci Injector Plate
Direct Metal Laser Sintering



Airbus Safran Launchers

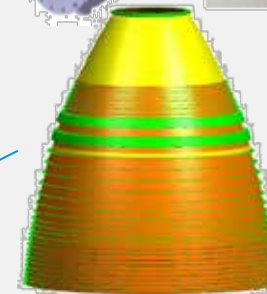
Vulcain 2.1 Gas Generator
Direct Metal Laser Sintering



Airbus Safran Launchers



Vulcain 2.1 Sandwich Nozzle
Laser welding
Laser Metal Deposition



GKN Aerospace

Looking beyond Ariane 6 and Vega C – Motivation for technology development and demonstration activities

Investment into system analyses and diversified development portfolio of key technologies, new production processes and integrated demonstration is needed to:

- Facilitate significant **recurrent cost reduction** of European launch solutions with a post Ariane 6 / Vega C perspective
- Safeguard **economic sustainability** and creating new business opportunities by **shortening the development cycles** and reducing the time to market for new launch capabilities, enabling to extend the mission range offered by European launchers
- Enable Europe to continue playing an **active role** in changing market environment
- Allow to **act quickly** towards opportunities / threats
- Secure unrestricted **access to new and critical technologies**, safeguarding innovation and engineering **competences** in Europe
- Open way for **spin-ins and COTS applications**

Next major milestone for ESA programme decision is the ESA Ministerial Council Meeting on 1./2. December 2016 in Lucerne

The following launcher programmes are proposed for decision:

FLPP Period NEO

- Continuing the proven System-Demonstrator-Technologies approach into the 2019/20 time frame

VEGA Evolution Preparatory Activities

- Defining the Vega E launcher configuration, using a LOX/Methane liquid upper stage, and extending its mission capabilities

Space Rider Phase 2.1

- Starting the development of the Space Rider reusable orbital vehicle, based on the IXV/PRIDE heritage

Light satellite, Low-cost Launch opportunities Initiative

- Fostering a standard launch opportunity on European launchers for the light satellite sector with the planned involvement of H2020 through IOV/IOD



🔄 The CM/16 proposal is part of a European Space Transportation Roadmap

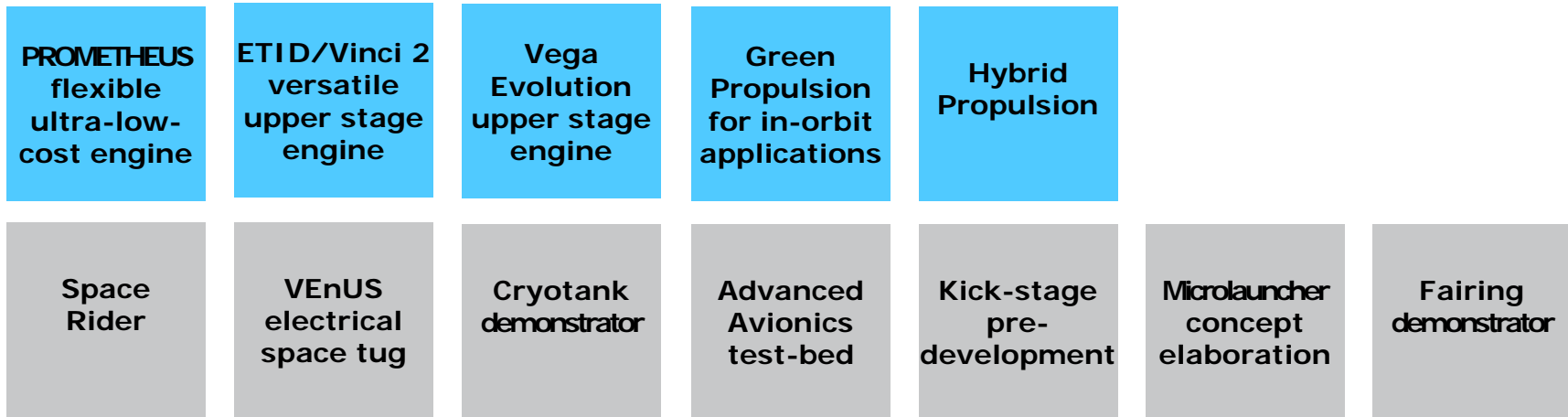
Activities planned for CM/16 decision



System Activities:



Sub-system pre-development & Flagship Integrated Demonstrators:



Technologies:



ESA Space Transportation technology development follows a comprehensive Roadmap

Relevant activities of this roadmap are covered through ESA Programmes, including:

- Preparation of next generation (ultra) low-cost liquid engines, which will be critical for the further evolution of European launchers
- Advanced storable “green” propulsion systems and hybrid propulsion in view of multi-purpose applications
- Progress towards next generation low-cost sub-systems and smart extended mission capabilities for European launchers
- Fostering a steady, but moderate long term demonstration approach towards reusability, assessing its practical interest for a European launcher vision
- Assess and prepare the introduction of new launch service applications, e.g. micro-launcher concepts, kick stages with green/electric propulsion

Based on CM 2016 decisions, activities to complement or extend this European Space Transportation Roadmap can be explored for the period beyond 2018 with the various stakeholders