Clean Sky 2 General Information Day
21 November 2013, Brussels

Large Passenger Aircraft (LPA) IADP
Michel GOULAIN (AIRBUS)
From *Clean Sky* towards *Clean Sky* 2

**CS1 Smart Fixed Wing Aircraft -ITD (SFWA)**
- is a unique environment for high TRL integrated Research and Development and large scale ground and flight demonstrators
- provides the frame for well aligned objective driven R&T covering development and maturation through numerical simulation, rig demonstrators, wind tunnel testing, small and large scale test under condition relevant for operation

**CS2 Large Passenger Aircraft IADP (LPA)**
- Will provide a platform for even more focussed large scale, highly integrated demonstrators with core partners and partners
- Build on down best candidate technologies emerging from *Clean Sky* (1) other national and EU R&T programs and additional technologies developed in *Clean Sky* 2 ITDs

**SFWA key technologies**
- NLF – wing for large transport aircraft and bizjets
- HLFC- technologies
- CROR engine integration
- Innovative empennage for next generation bizjets
- Innovative control surfaces
- Buffet Control Technologies
- Advanced load control architectures and function
- Advanced Flight Test instrumentation

Contribute to TRL - Scale
1 2 3 4 5 6
“Mature and validate disruptive technologies for next generation Large Passenger Aircraft through large scale integrated demonstration”

- **Platform 1**: Advanced Engine and Aircraft Configuration
- **Platform 2**: Innovative Physical Integration Cabin-System-Structure
- **Platform 3**: Next Gen. Electrical A/C Systems, Cockpit Systems & Avionics

Not legally binding
LPA-IADP: Work Breakdown Structure (WBS)
Setup and Implementation

Large Passenger Aircraft Platform – Integration Topics

Airbus with SAAB, Dassault Aviation, SNECMA and Partners

**Platform 1** Advanced Engine and Aircraft Configurations

**WP 1.1** CROR demo engine FTD

**WP 1.2** Advanced engine integration driven rear fuselage

**WP 1.3** Validation of dynamically scaled flight testing

**WP 1.4** Hybrid laminar flow control large scale demonstration
   - HLFC large-scale specimen demonstrator in flight operation
   - High speed demonstrator with hybrid laminar flow control wing

**WP 1.5** Innovative Flight operations

**WP 1.6** Demonstration of radical aircraft configurations

Estimated Volume of Activities ~560M€

Not legally binding
Setup and Implementation: LPA Platform 2

Large Passenger Aircraft Platform – Integration Topics

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Platform 1 - OAD
Platform 2 - OPD
Platform 3 - OSD
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Airbus with, Liebherr, Fraunhofer and Partners

Advanced Engine and Aircraft Configurations

Innovative Physical Integration Cabin-System-Structure


TRL 4-6 Aircraft Level

**Platform 2  Innovative Physical Integration Cabin-System-Structure**

**WP 2.1** Integrated product architecture

**WP 2.2** Non specific design technologies

**WP 2.3** Technology validation

**WP 2.3.1** Multi purpose demonstrators

- Next generation fuselage, cabin & cargo functional demonstrator
- Next Generation Cabin & Cargo functional demonstrator
- Next generation lower centre fuselage structural demonstrator

**WP 2.3.2** Testing generation cockpit features flight demonstration

**WP 2.3.3** Pre-Production Line Technologies

Estimated Volume of Activities ~290M€
Setup and Implementation: LPA Platform 3

Estimated Volume of Activities ~230M€
**High-level Objectives**

**LPA prospected contribution to H2020 environmental targets**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Target Range</th>
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<tr>
<td>Advanced engine integration (incl. expected engine benefits)</td>
<td>15 - 20%</td>
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<td>Laminar Flow technology</td>
<td>6 - 9%</td>
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<td>Innovative flight operations</td>
<td>5 - 10%</td>
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<tr>
<td>Next generation integrated fuselage - Cabin &amp; Cargo</td>
<td>5 - 10%</td>
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<tr>
<td>Next generation Cockpit, Navigation &amp; Avionics</td>
<td>8 - 10%</td>
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**Note:**
- Targets vs. 2014 state of the art.
- Targets cannot be expected to be fully cumulative when integrated at aircraft level
LPA prospected contribution to **H2020 smart & efficient mobility targets**

- Higher operational flexibility with respect to flight and ground operational procedures, contributes to higher operational efficiency in congested airspace
- Higher resilience against difficult weather
- Shorter turn around times on ground
- Flexible cabin concepts provides better offers to passenger needs (physical ability, on board services, amount, size and type of baggage,…) 
- Compliance to seamless cross-modal transportation concepts

Not legally binding
High-level Objectives

LPA prospected contribution to H2020 industrial leadership targets

- Strengthening of industrial leadership in the large transport aircraft sector through the entire supply chain, at European scale and scope
- Strategic alignment of R&T efforts across contributing disciplines, different sizes of contributing industries (SME, Medium large), Research Establishments and Academia towards common objectives
- Triggering of technology spill over into other industrial areas through contributing Core Partners and Partners
- High potential for progressive R&T of technologies emerging from national and European funded R&T programs (e.g. L1 and L2)
- Improving the “Econological” footprint of industrial manufacturing processes
## High-level Objectives

### LPA-IADP high level provisional schedule

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### Platform 2

- Next gen. fuselage, cabin and systems integrated demonstrator
- Next gen. cabin & cargo functional demonstrator
- Next Gen. Lower centre fuselage structural demonstrator

### Platform 3

- Integrated system and avionics demonstration
- Next gen. Cockpit ground demonstrator
- Cockpit feature flight demonstrator
- Pilot case demonstrator

### Contribute to TRL - Scale

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Update and detailing to be made based on "bottom-up planning, with Core Partners"
Further Information

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Please use:

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Thank you for your attention!