SpacePlane program

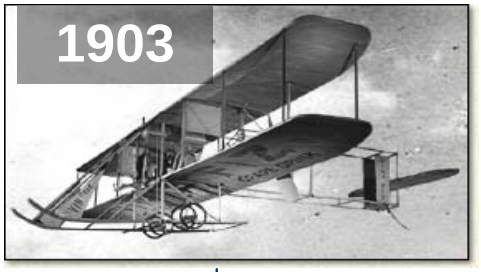
Program overview

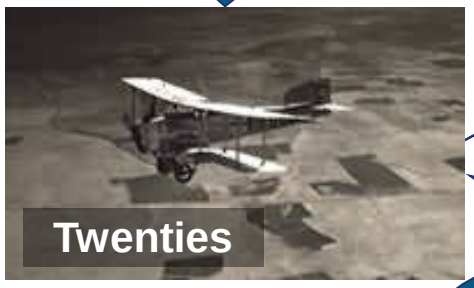
Paris - June, 16th

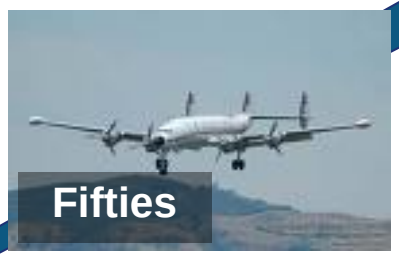
AIRBUS
DEFENCE & SPACE

The aeronautic business since early days

From experiments …







… to mature business

Price ticket for a Paris-London flight : 200 k$ at the time

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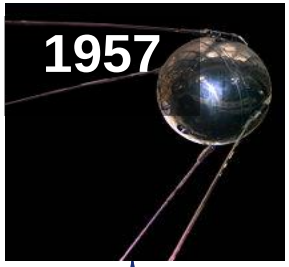
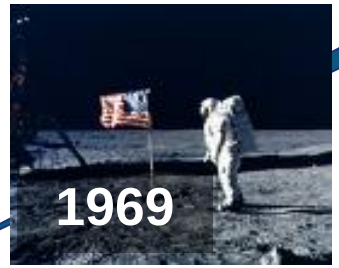
The access to space since early days

From experiments …

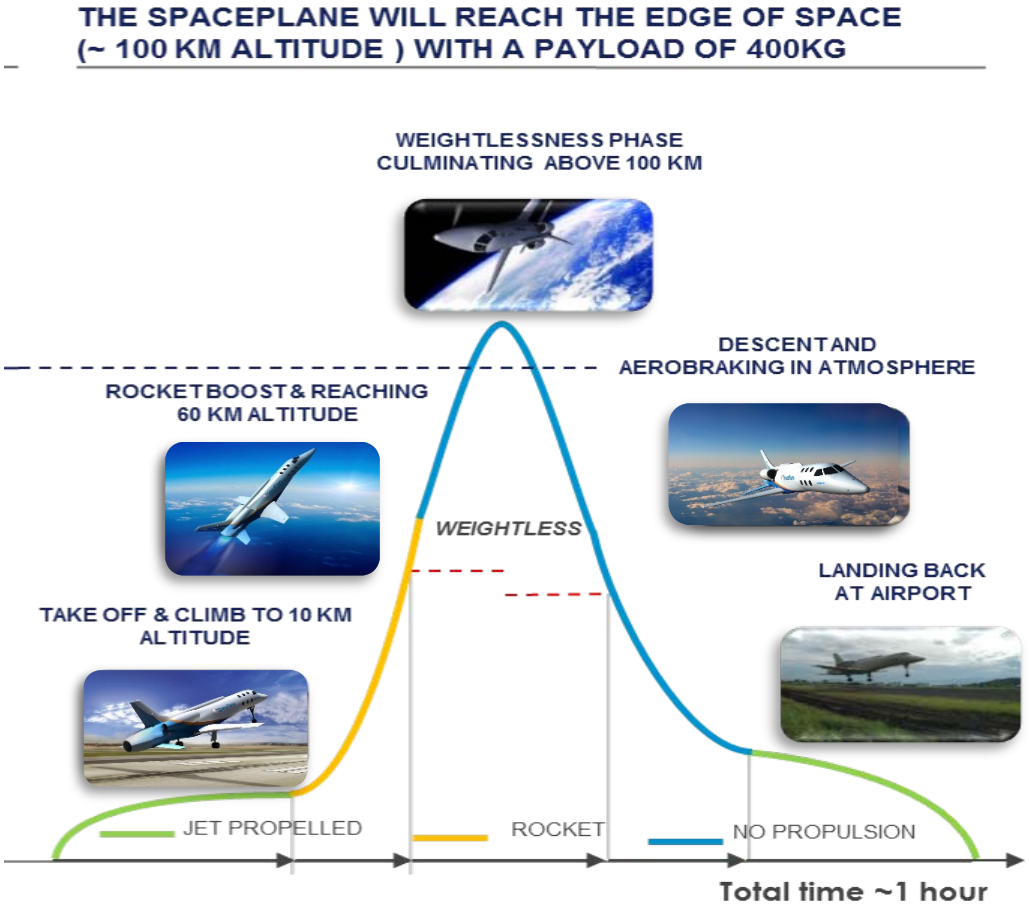


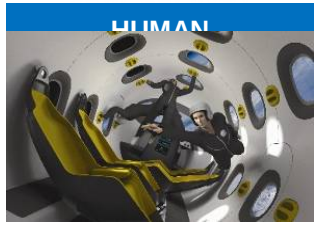


… to commercial business ?

500 humans including 1% «tourists» travelled to space in ~50 years : other animals not accounted !

SpacePlane : a versatile vehicle for «new space» markets





Affordable human spaceflight experience for individuals

Basic & applied research (Biology, Physics, Earth science,…)

Launching satellites into Low Earth Orbit

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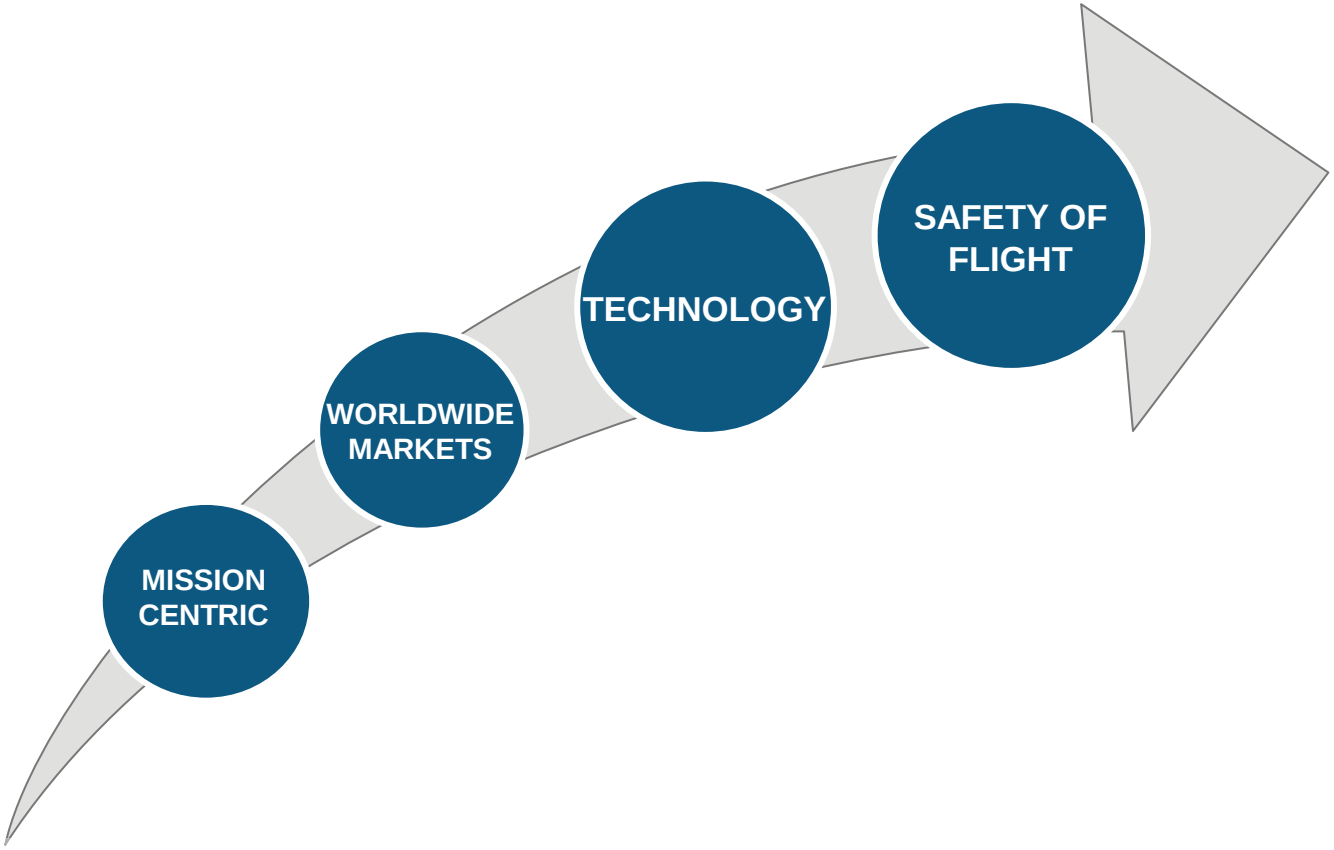
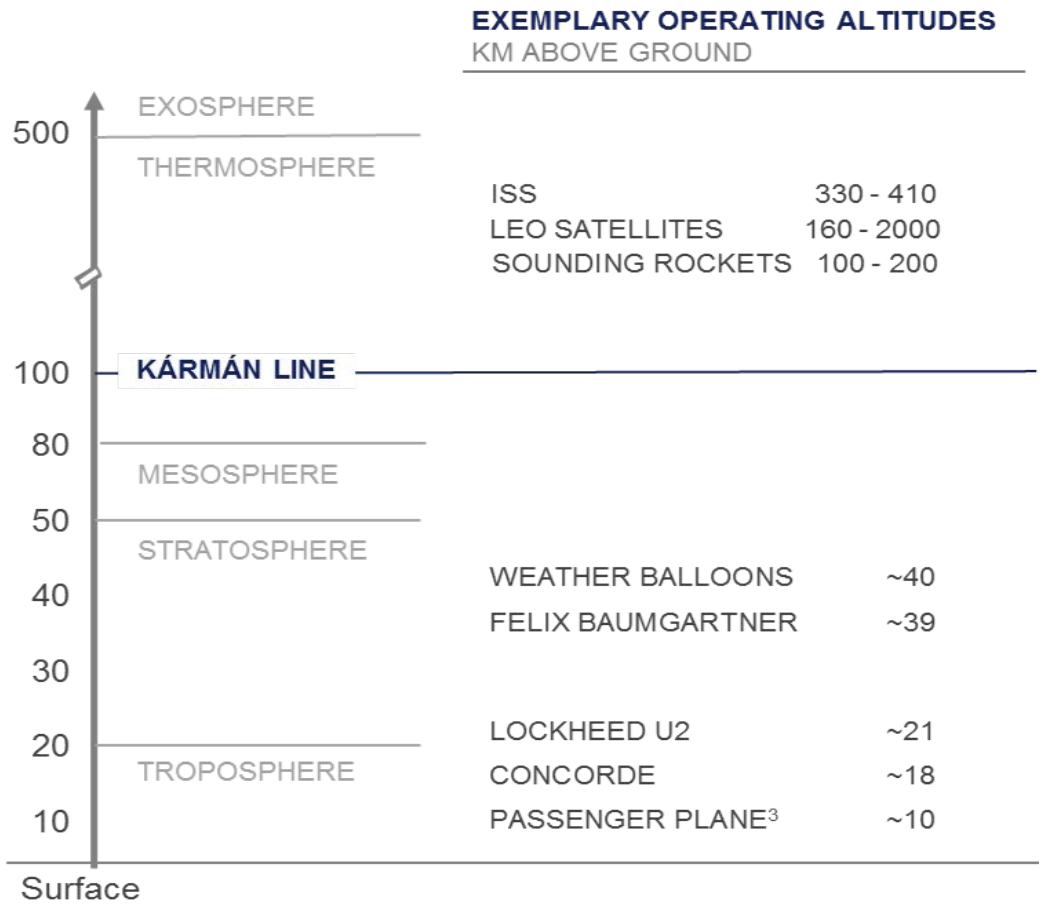
SpacePlane : 4 assets for a large scale & sustainable business

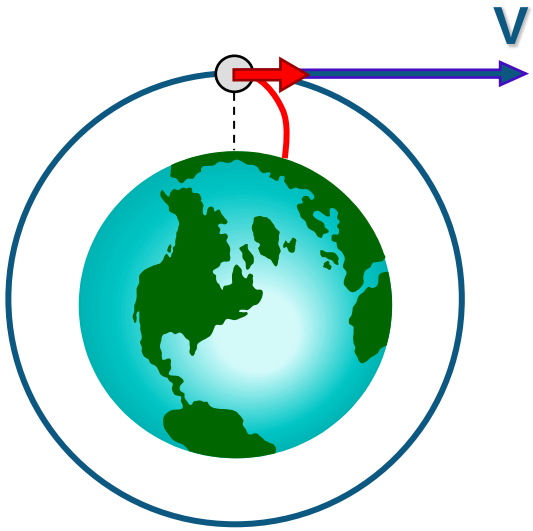


From a «Pioneer» type limited market

To a large scale & sustainable business

Mission analysis : suborbital vs. orbital





Energy fraction

To Low Earth Orbit (400 km) ➔ 100%

To the Moon ➔ 160%

To Geostationary Orbit (36000 km) ➔ 144%

Flight to 100 km ➔ 4%

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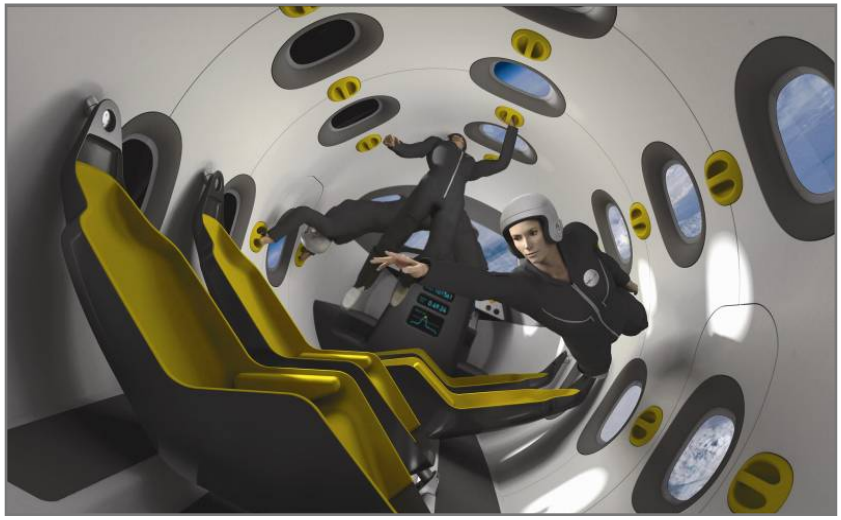
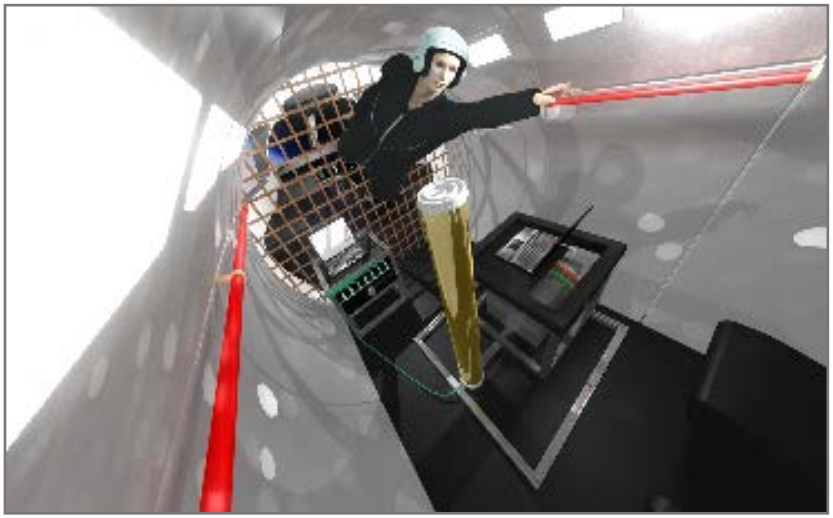
Commercial Human Spaceflight



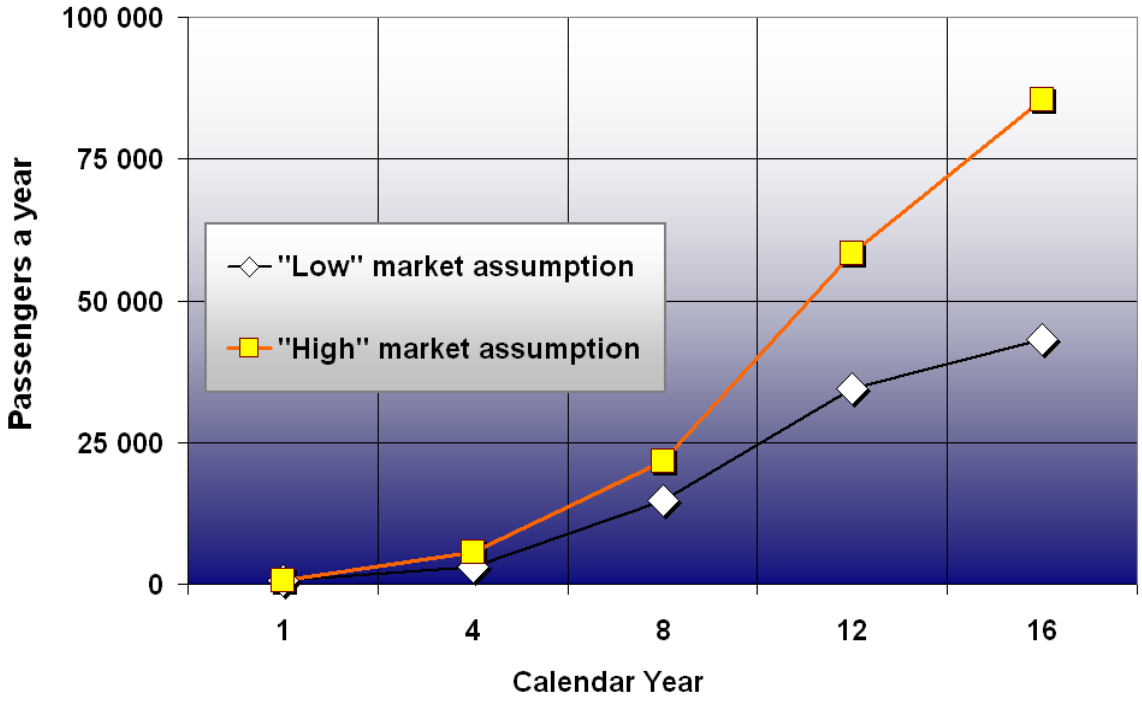
A unique patented cabin lay-out and seat design

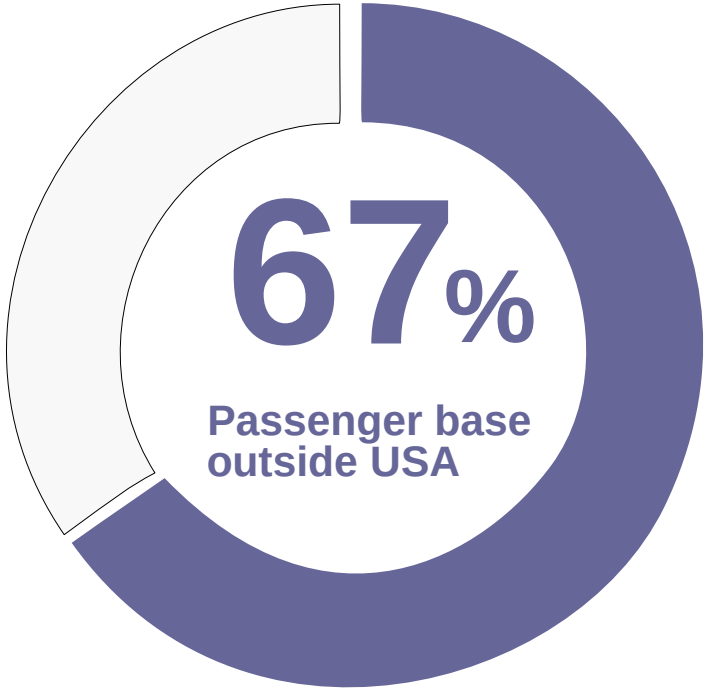
Science & Technology



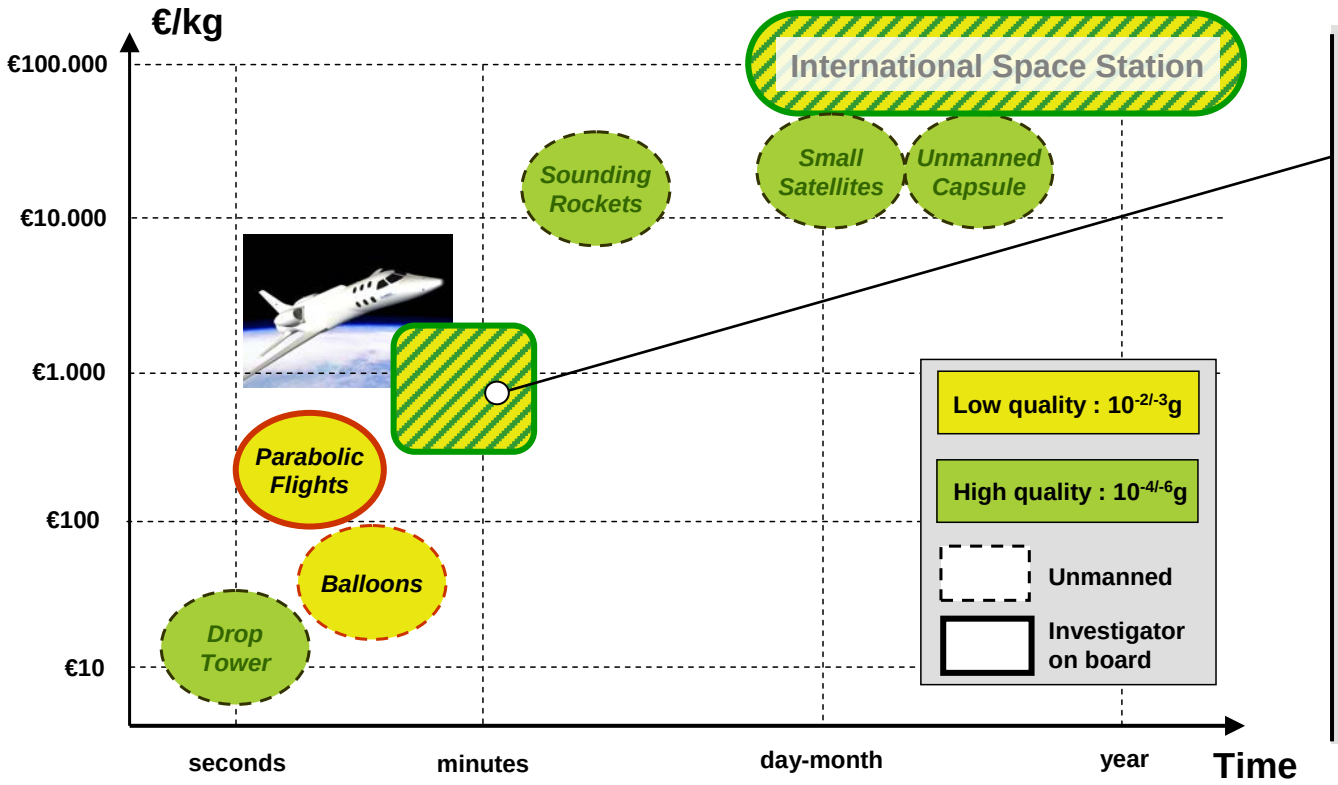
Microgravity set up with scientists on board

Commercial Human Space flight



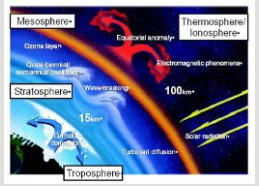


Science & Technology

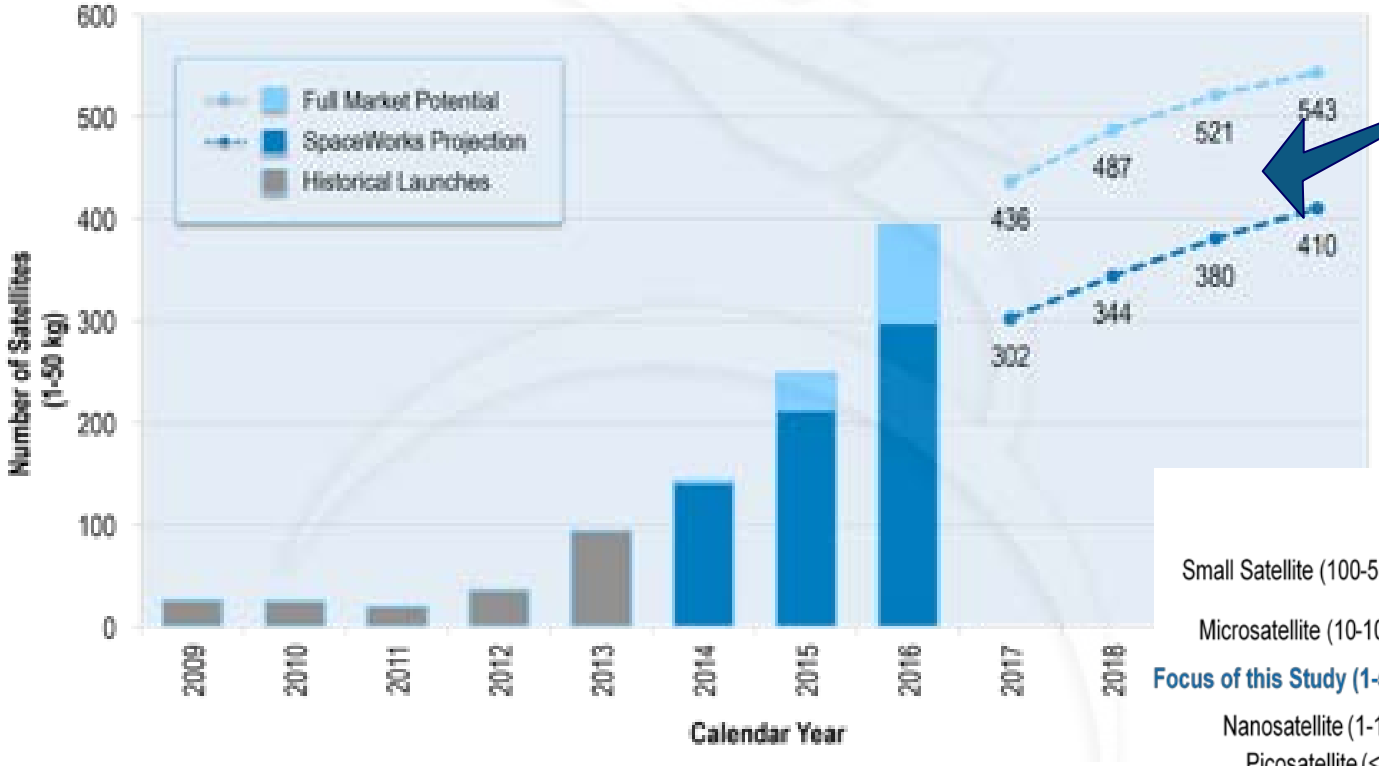


The sweet spot for various applications

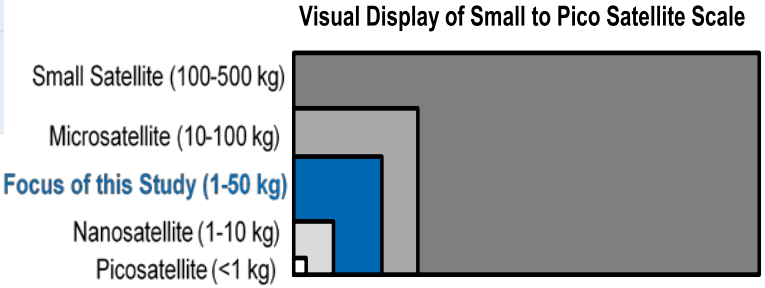
- ➔ *Atmospheric research*
- ➔ *Suborbital Astronomy*
- ➔ *Longitudinal Human Research*
- ➔ *Micro-gravity*



Small satellites to Low Earth Orbit



Emergence of new class of Space vehicles unlocks (small) Sats business



Source : SpaceWorks (2014)

An extreme flight envelope

requesting a special effort in aerosciences

(1) Mach range : from subsonic to supersonic (Mach 3)

Anglo-French Concorde was flying at Mach 2

(2) Altitude : from ground to 100 km (or 350 kft)

Concorde was flying at 18 km altitude

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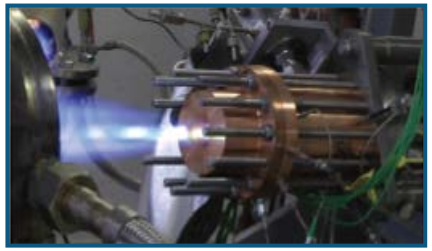
Reusable rocket engine

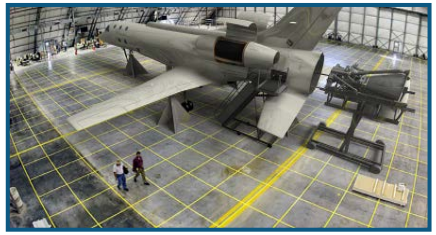
embedding aeronautic-like safety

(1) Liquid oxygen & methane propellants

(2) Design rules derived from aeronautic standards

(3) Operating costs matching daily access to space





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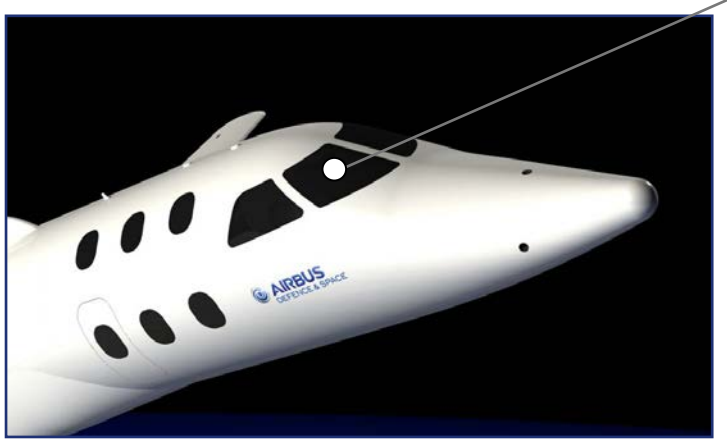
A dedicated cockpit design

fitting highly dynamic missions



(1) Enhanced navigation system

(2) Avionics suite & displays customized for single pilot operations

(3) Expanded auto pilot software

Program developed by Airbus Defence and Space

Aeronautics & Space technologies at heart of Airbus Group

At crossroads of aeronautics & space

Design derived from airplane background

- ➔ *One single vehicle*
- ➔ *Liquid technology for rocket propulsion*

Vehicle behaving as an airplane during most time

- ➔ *No issue when interacting with Standard Air Traffic*
- ➔ *Take-off & landing from and to a standard runway*
- ➔ *Powered take-off & landing*

Safety of Flight

Program organization

- ➔ *apply aeronautic best practices and space rules on top*

Propulsion architecture: Performance or Safety driven ?

Turbofans used for aeronautic phases of the mission (climb and powered descent)

Rocket propulsion only for extra acceleration to 100 km

SpacePlane program targeting a 100% aeronautic-like certification

Mass transportation to space
(passengers or cargo)

Operations : anywhere & anytime

➔ ***Safe vehicles make daily operations possible from populated areas***

Safety of Flight

Large scale & sustainable business

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SpacePlane : a game changer

(1) the gateway to 3 «new space» markets

(2) at crossroads of aeronautics & space

(3) a unique set of technologies for the sake of Safety (of flight)

Commercial Human Spaceflight

A unique patented cabin lay-out and seat design

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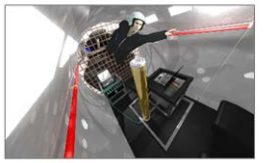

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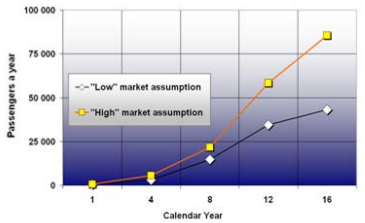

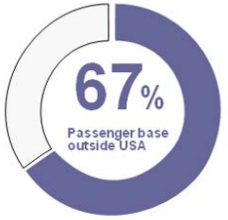

Aeronautics & Space technology at heart of Airbus Group

AIRBUS DEFENCE & SPACE

Our vision :
SpacePlane for daily access to space

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