

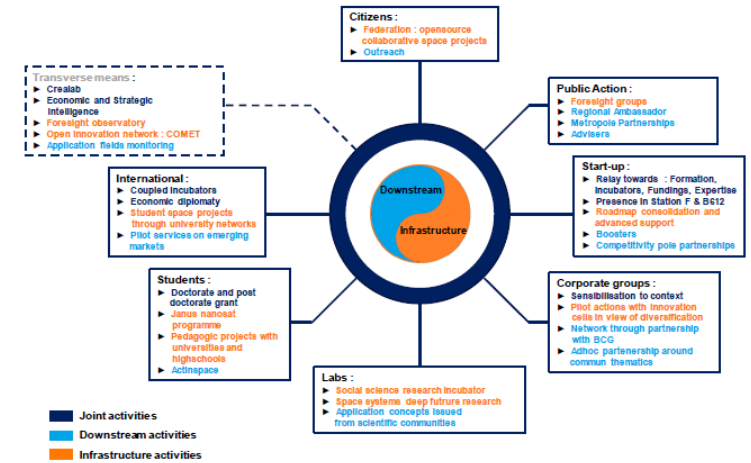
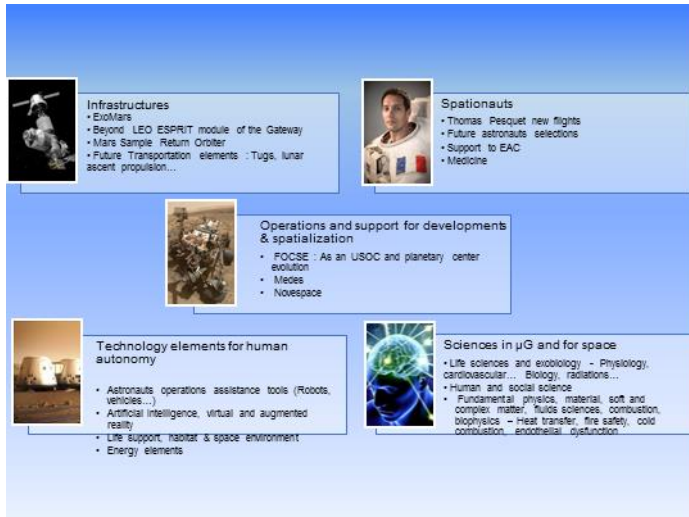


EXPLORATION AND INNOVATION @ CNES

**UN/JORDAN WORKSHOP, 25-28 MARCH 2019,
AMMAN (JORDAN)**

**DONATO GIORGI, CNES REPRESENTATIVE FOR THE
UAE AND MIDDLE EAST**

- **Synergy between science, robotic and human exploration**
- **Ideas and technologies, in a favorable environment, foster innovation and the economy**



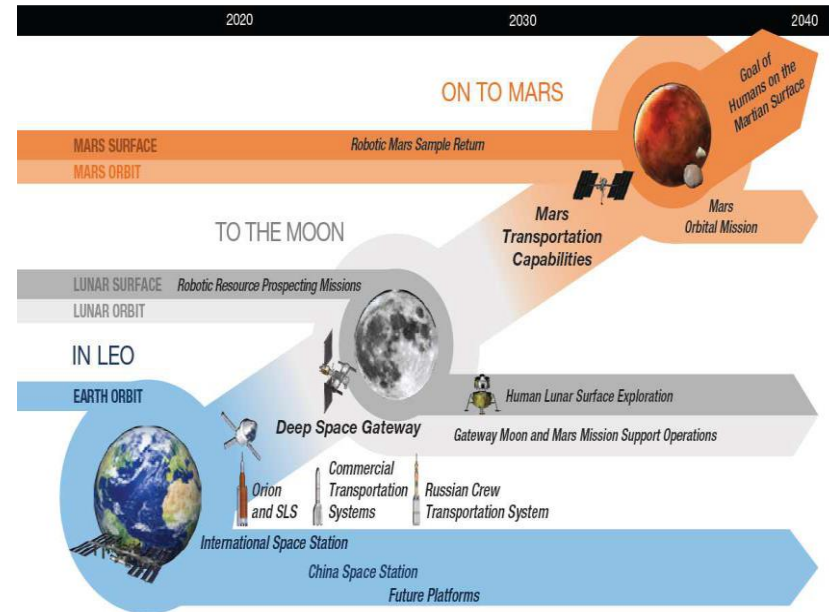
Through:

-major contributions to ESA programmes (science, robotic and human exploration)

-a major effort in bilateral and multilateral cooperation (USA, China, Japan, European countries...)

-consistent participation in international coordination bodies (ISECG, COPUOS, etc.)

As exploration cannot but be a global endeavour



HOW DO WE DO IT AT CNES?

Cooperation



Infrastructures

- ExoMars
- Beyond LEO ESPRIT module of the Gateway
- Mars Sample Return Orbiter
- Future Transportation elements : Tugs, lunar ascent propulsion...



Spationauts

- Thomas Pesquet new flights
- Future astronauts selections
- Support to EAC
- Medicine

French ESA contributions



Operations and support for developments & spatialization

- FOCSE : As an USOC and planetary center evolution
- Medes
- Novespace



Technology elements for human autonomy

- Astronauts operations assistance tools (Robots, vehicles...)
- Artificial Intelligence, virtual and augmented reality
- Life support, habitat & space environment
- Energy elements



Sciences in μ G and for space

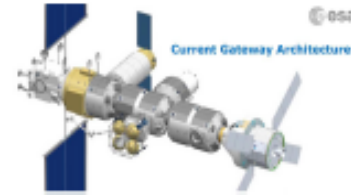
- Life sciences and exobiology - Physiology, cardiovascular... Biology, radiations...
- Human and social science
- Fundamental physics, material, soft and complex matter, fluids sciences, combustion, biophysics – Heat transfer, fire safety, cold combustion, endothelial dysfunction

Societal Spin-off

National budgets

ISS – CSS (Chinese Space Station)

- ❖ Long duration astronauts flights, sciences in μG , technological experiments, institutional and industrial operations
- ❖ Extension of participation to ISS after 2024 ?



LOP-G (Lunar Orbital Platform – Gateway) :

- ❖ Lead on ESPRIT Module (system abilities, Management, COM, refueling). Mid term : astronaut flight in lunar orbit, industrial activities for transport activities

Lune surface

- ❖ Short term : resources prospection and science, technological experiments. Mid term : samples return, transport by industry. Long term : human spaceflight and industrial activities in surface

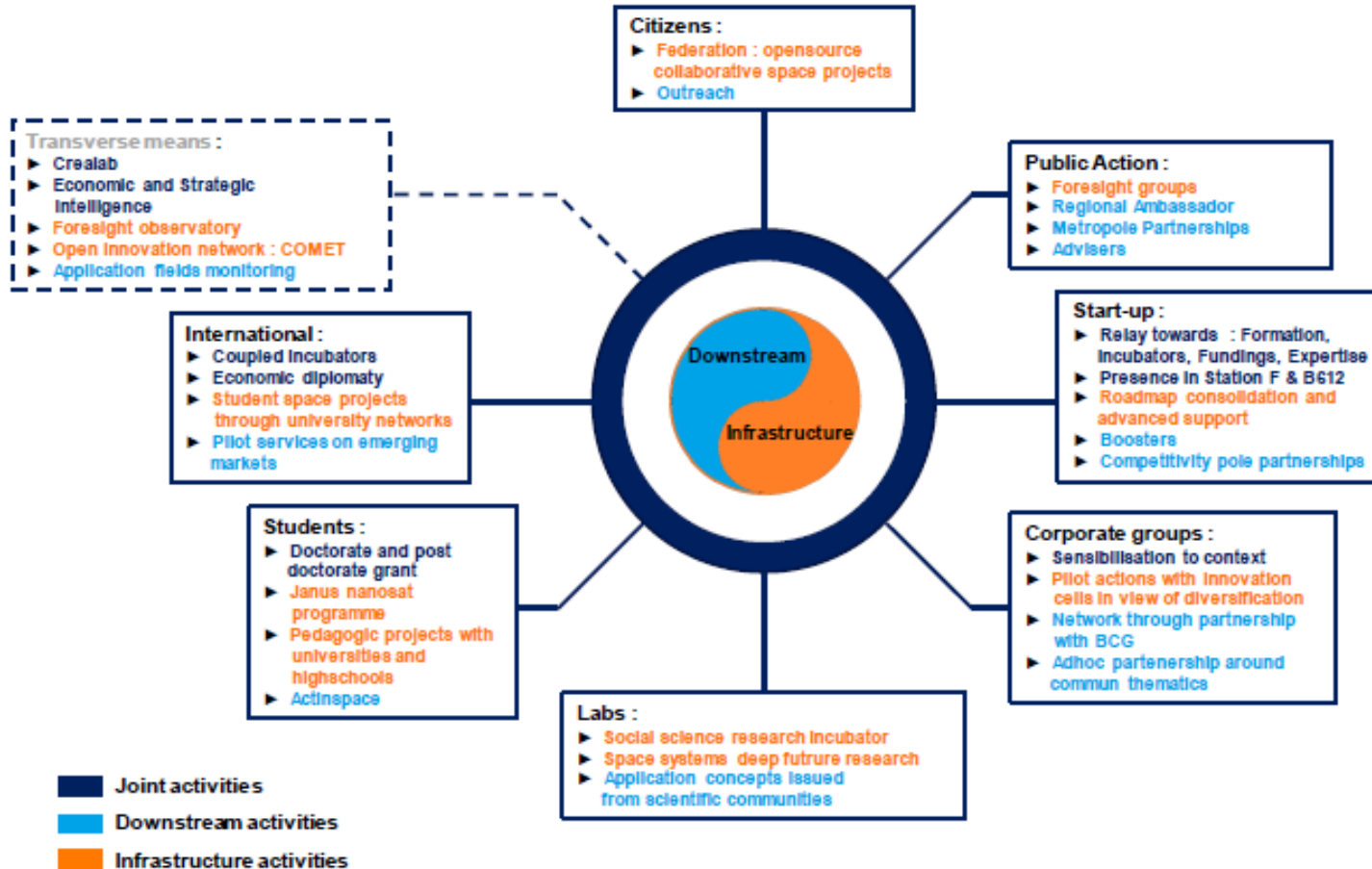
Mars

- ❖ Short term : Science et robotics missions : Insight (instruments), mars 2020 (instruments, Autonomous Navigation), Exomars (instruments, industry, AN) then Mars Sample Return (Lead on Orbiter, technology, operations et curation center).
- ❖ Human spaceflight as a long term goal

Today



Long term



INNOVATION ACCELERATOR – CNES (2/2)

Economic & strategic intelligence

- Operational collection
- Annual plan
- Public & private partners

Student projects & inclusive actions

- Pedagogic cubesat kits
- Student projects : > 400
- Universpace; Sirius Chair

Open source laborative projects

- Round trip : > 20 cities
- > 300 people in 3 months
- Regulation for projects

COMET : Expert communities

- Open governance
- Enlargement to Europe & non space actors

CNES-TIM : Support to Start-up

Technological advanced concepts

- 10 actions (1 cpl. 6 prep.)
- Large cofunding
- PME, lab, indus. startup

Incubator for social science research

- 11 disciplines
- 6 specific research
- Publ. in 2018 Cospar

Nanosat club

- 60 members
- Dedicated workshops on payload, launchers...

Creativity

- Creative rooms
- Creative sessions
- Oper. excellence method

APIS : main group innovation support

- 3 pilot actions
- Contacts out of space
- Foresight, creativity, study

Strategic orientations

- 2 pilot activities
- Artificial intelligence
- Biomimeticism



THANK YOU FOR YOUR ATTENTION!

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