

ESA SPACE SOLUTIONS DOWN TO EARTH



In Extenso
Innovation Croissance

PARIS HEALTHCARE WEEK CONFERENCE

Nicolas LOUEE - Tech Transfer Engineer – In Extenso Innovation Croissance

ESA TECHNOLOGY TRANSFER PROGRAMME : WHEN SPACE TECHNOLOGIES BOOST INNOVATION IN THE HEALTHCARE INDUSTRY

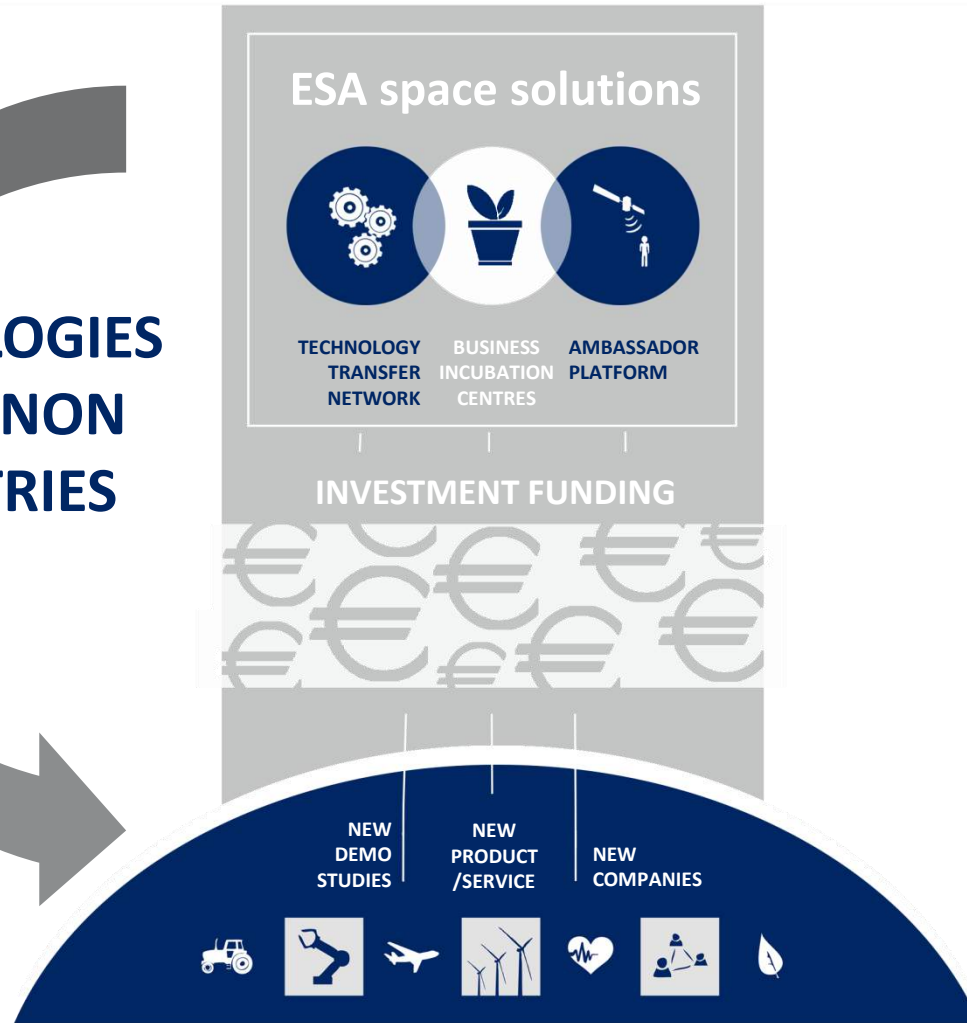
Paris – 16 May 2017



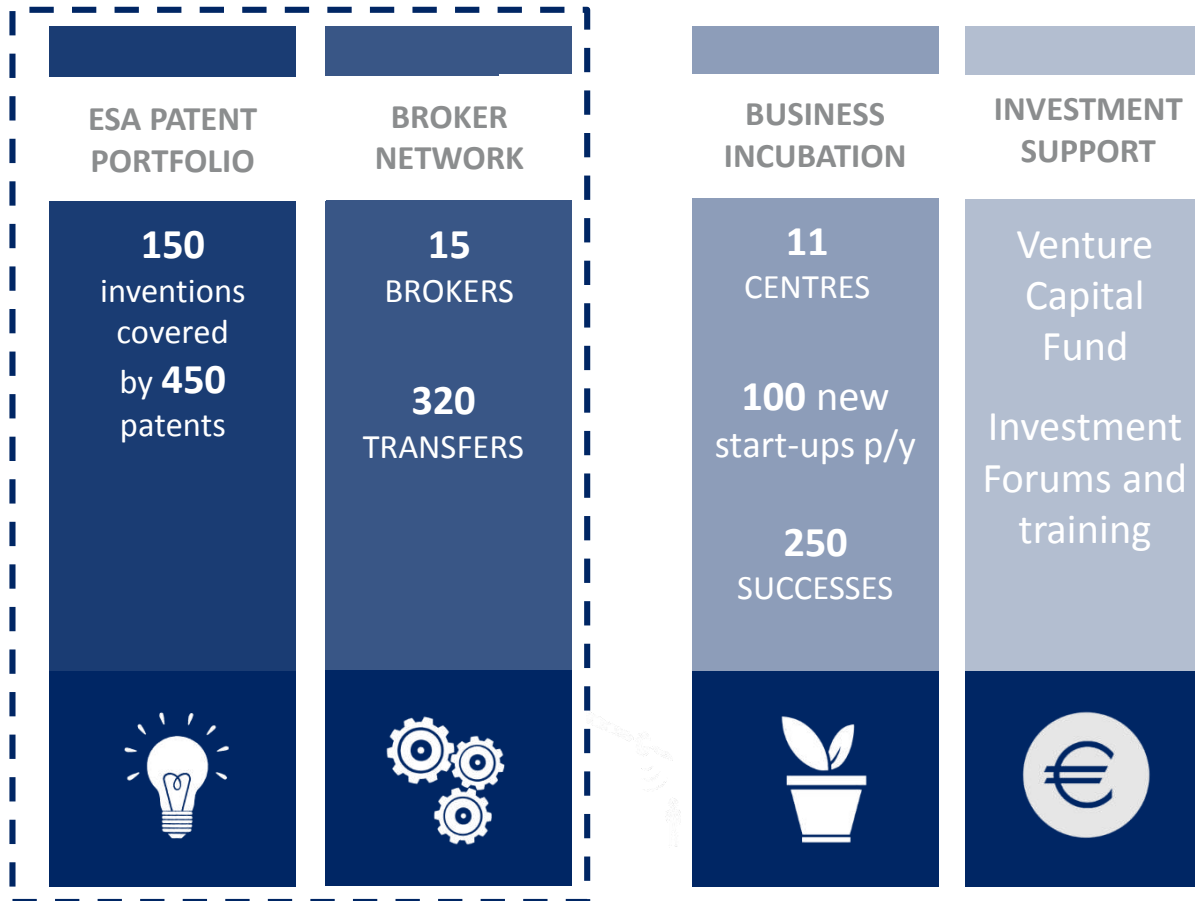
PARIS
HEALTHCARE
WEEK

ESA SPACE SOLUTIONS - MISSION

**SPACE TECHNOLOGIES
BENEFITS FOR NON
SPACE INDUSTRIES**



ESA SPACE SOLUTIONS – 4 PILLARS



ESA BROKER NETWORK

16 Countries

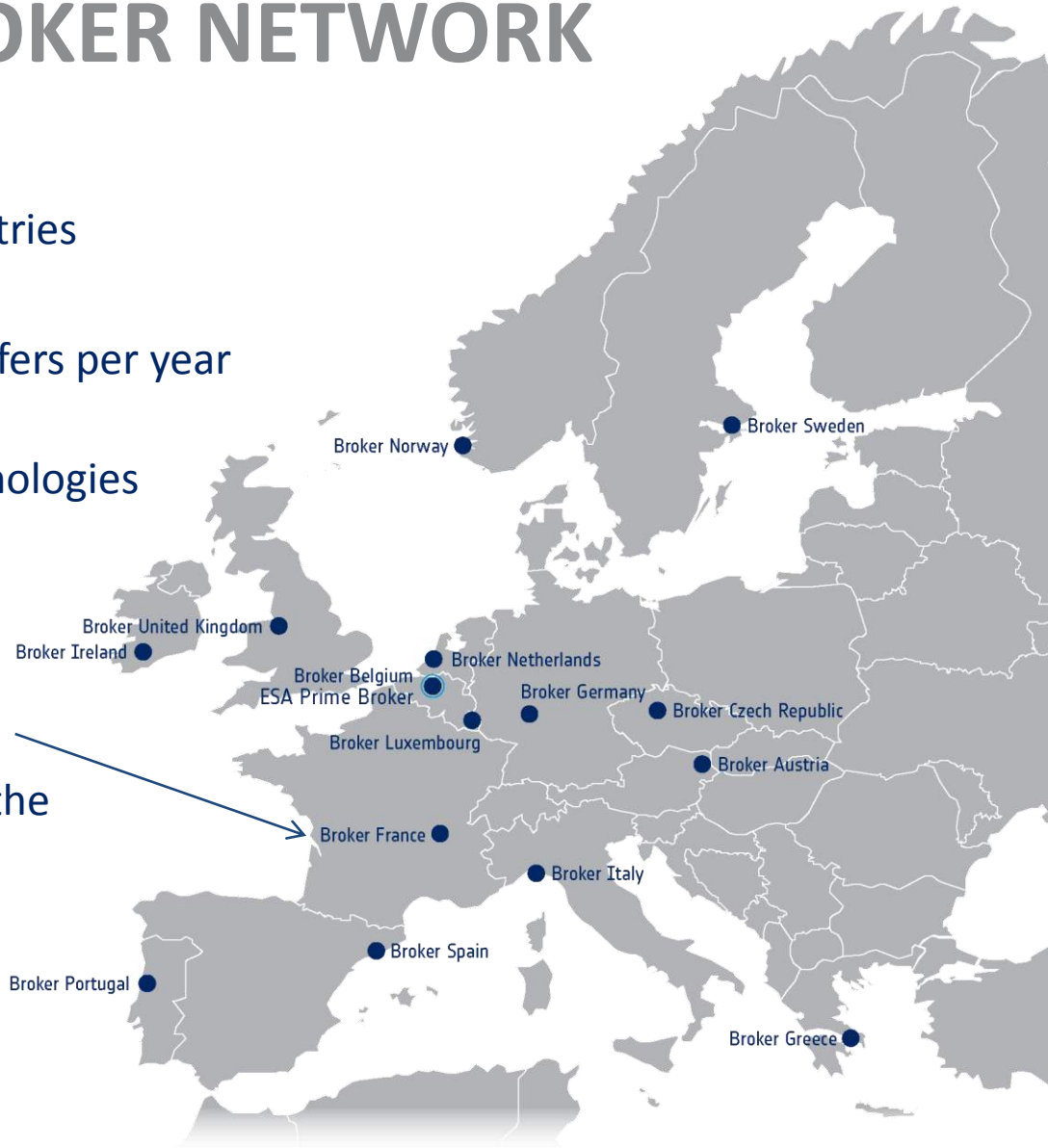
20 Transfers per year

400 Technologies

In Extenso

Innovation Croissance

French Broker of the
ESA Technology
Transfer Program



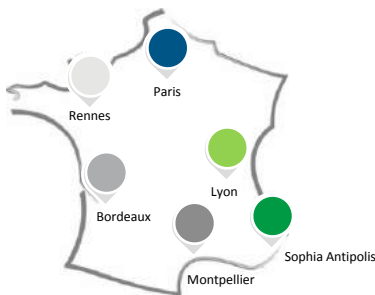
space solutions

In Extenso

Innovation Croissance

INNOVATION ADVISOR

WHO ARE WE?

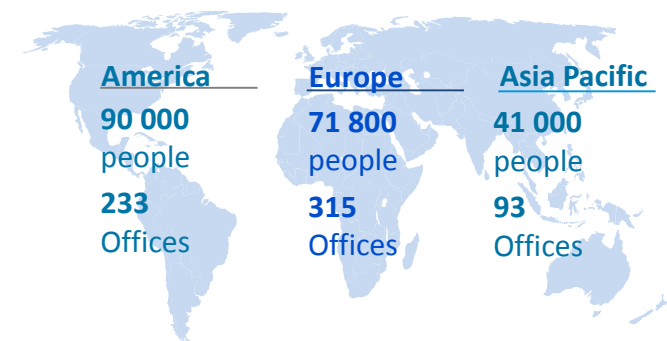


In Extenso Innovation Croissance :

- Subsidiary of **In Extenso**
- An entity of the **Deloitte** Network
- Five recognized partners in their fields of expertise and in the innovation ecosystem in France
- A team of **40 advisors**, with **scientific & business** expertise
- Scientists, Doctors and engineers from different fields
- **In Extenso** : **4 500** employees including **244** associates and **220** branches throughout France

- More than **15 years** of **experience** supporting the development of innovative projects
- **Methodologies** specifically developed for **technology assessment** and **start-ups' support**
- **Analytical tools** and economic, scientific and technical databases: **Data Intelligence & Business Intelligence of IP**
- A tool for monitoring **venture capital investments** in innovative companies called “barometer”
- **Privileged access** to decision-makers in major international groups

Deloitte. International Network



WHAT THE BROKERS CAN DO ?

SOURCE SPACE TECHNOLOGIES

WITHIN OUR PORTFOLIO AND EUROPEAN NETWORK REGARDING YOUR NEEDS

PROMOTE YOUR SPACE TECHNOLOGIES

THROUGH A DEDICATED WEBSITE SHARED BY THE WHOLE TT NETWORK AND
VISIBLE BY MANY INDUSTRIAL END-USERS

TRANSFER YOUR SPACE TECHNOLOGIES

THANKS TO MARKETING AND OPERATIONAL SUPPORT ON A DEDICATED MARKET

SHARE YOUR SUCCESS

PROMOTE A SUCCESSFUL TRANSFER CASE THROUGH A SUCCESS STORY

2 TYPE OF TECHNOLOGIES

ESA IP PATENTS

BETTER EFFICIENCY OF THERMAL AND ELECTRICAL CONVERTERS METHOD OF PRODUCING REINFORCED METALLIC MATERIALS

Technology description

New system of producing a reinforced metallic component, it consists in using a container with two compartments interconnected by a passage. A porous reinforcement medium (e.g. ceramic) is placed in the first compartment, and metallic metal is placed in the second compartment. The container is evacuated and sealed. The container and its contents are then heated to above the melting point of the matrix metal. When the matrix metal is molten a high pressure is applied to the outside of the container (i.e. MP), forcing the matrix metal to impregnate the porous medium. When the solidification is complete the container is cooled and the pressure on the outside released.

Applications

This system can be used in different sectors involved in material manufacturing such as: aerospace (airframe components), automotive (brake pads or disks, exhaust pipes, pistons, cylinders or any heat shielding components), mining (refining coils), energy systems, defence, biomaterials (prostheses) and also in scientific applications (particle accelerators components).

Added-value and benefits:

- The system minimizes the oxidation and removes oxides on the surface of the melt.
- The method increases the preservation of the form and minimizes the residual porosity.
- For magnesium and magnesium alloys the container can be produced at low cost from low carbon steel.
- The container shape can be complex.
- Weight of the reinforcement is enhanced.
- The method ensures a fully dense composite.

Technology readiness

The process has been fully demonstrated.

IP Status

An international patent application has been filed: [WO/2008/120136](http://www.wipo.int/patdb/search/wo/2008120136)



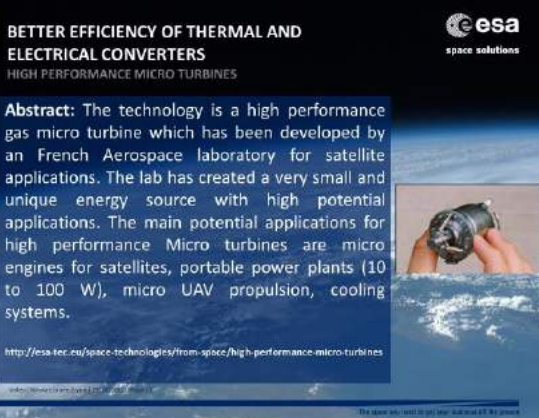
http://www.esa.int/Our_Activities/Space_Engineering_Technology/IP_for_commercialisation

BETTER EFFICIENCY OF THERMAL AND ELECTRICAL CONVERTERS HIGH PERFORMANCE MICRO TURBINES

Abstract: The technology is a high performance gas micro turbine which has been developed by an French Aerospace laboratory for satellite applications. The lab has created a very small and unique energy source with high potential applications. The main potential applications for high performance Micro turbines are micro engines for satellites, portable power plants (10 to 100 W), micro UAV propulsion, cooling systems.



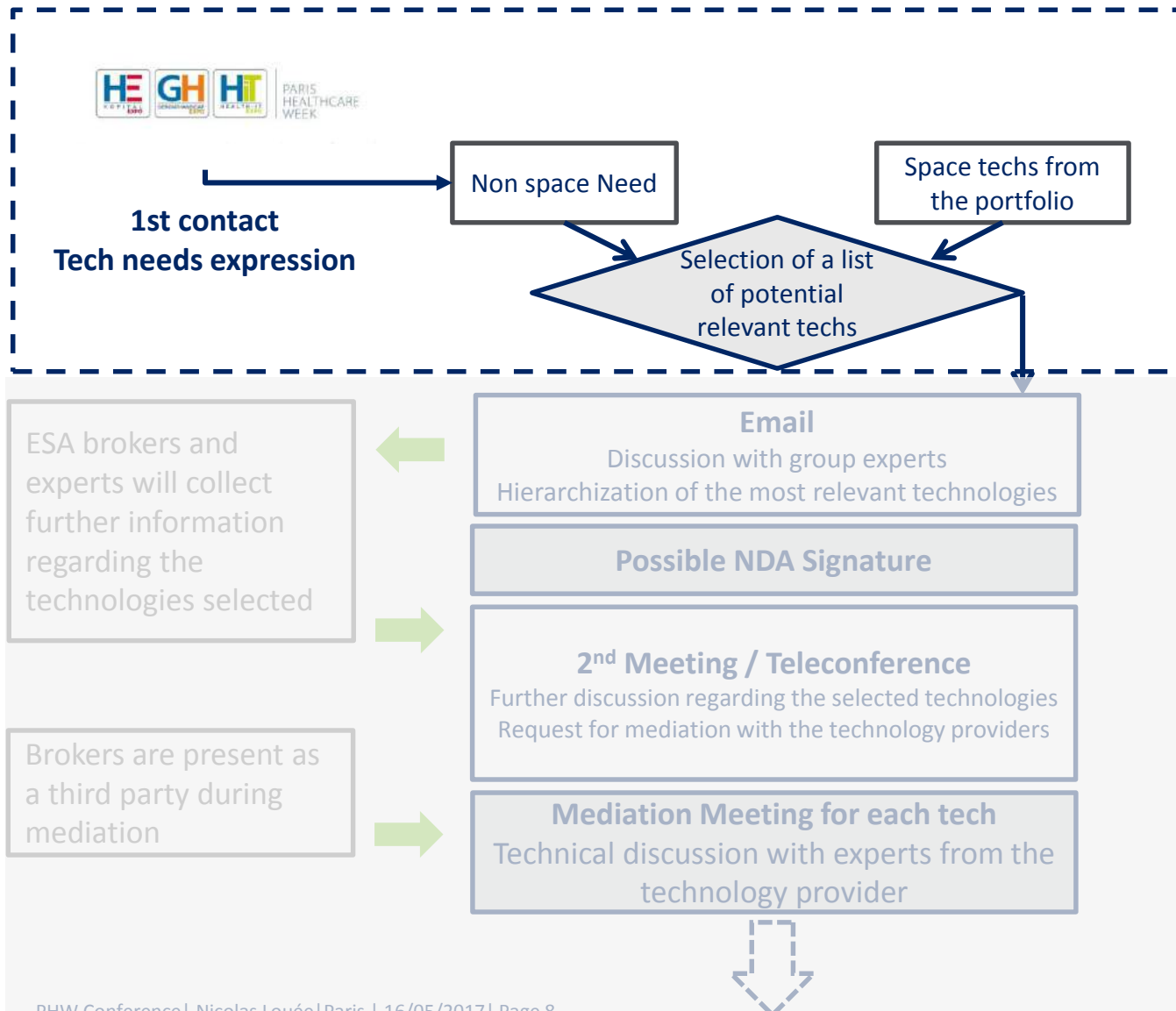
<http://esa-ec.eu/space-technologies/from-space/high-performance-micro-turbines>



SPACE TECHNOLOGIES FROM BROKERS

- Different TRLs (labs, SMEs, startups)
- Different types of collaboration
- Technologies from all over Europe

WHERE ARE WE IN THE PROCESS ?



SUCCESS STORY : CONDORSCAN NEXT GENERATION INTRA-ORAL SCANNER



space solutions

In Extenso

Innovation Croissance

SPACE ORIGIN

- **Medicis** (Moyen d'Evaluation de Décalage entre Images, Commun à l'Imagerie Spatiale) is an **innovative software used for sensor calibration, digital elevation model (DEM)** and digital surface model (DSM) computation, image overlay and computing deformation between images.
- Developed by **CNES** (French National Center for Space Studies) and based on images acquired by **Earth Observation satellites**, it can for instance be used to **measure ground displacement due to earthquakes**. Associated with a resampling software, Medicis allows to superimpose images and to reconstitute 3D models and has been implemented for the Pleiade satellite data processing.



DESCRIPTION OF ON SPACE APPLICATIONS:

- Aabam develops **Condor Scan, a camera able to realize 3D dental scan**
- As opposed to other methods, scanning is performed by using natural light instead of structured light, which provides a **better accuracy**. Realist and detailed color images additionally enable an **easy distinction of tooth structure, restoration, tissue and blood**.
- The dental impression is taken in **real time and does not require the use of analog substances such as powders**. The use of the Condor is meant to be easy: it requires no calibration and is composed of a touch screen and a single button handpiece, no larger than a toothbrush.



SUCCESS STORY : MAASTRICHT UNIVERSITY PLANET HUNTER SHARPENS EYE SURGERY



space solutions

In Extenso

Innovation Croissance

SPACE ORIGIN

- Developed in the scope of ESA's Darwin space telescope, the Hummingbird technology helped the engineers to **be very precisely aligned in order to resolve planets** around the other stars, despite the vibrations from the busy road outside the basement.
- The team invented and patented a 'horizontal coupling' mechanism, which keeps horizontal vibration sensors level at all times and **therefore prevents errors that normally occur when horizontal vibrations** are countered at ultra-low-frequencies of one cycle every two seconds such as traffic, wind, sea waves or people walking.



DESCRIPTION OF NON SPACE APPLICATIONS:

- Doctors at the University Eye Clinic Maastricht found their microscope was quivering, **making one in five sight-saving operations impossible**. Wind blowing on the outside of the shiny new hospital was enough to vibrate the ceiling supporting the microscope.
- The solution: first-ever active vibration damper to **counter low-frequency vibrations in surgical microscopes**
- So what's next for the surgical microscope vibration damper? "It can be useful for all kinds of precision operations such as **brain surgery, neurons or tiny blood vessels**



SUCCESS STORY – NEEDLE FREE INJECTION FROM SPACE PROPULSION



space solutions

In Extenso

Innovation Croissance



SPACE ORIGIN

- 10 years of collaboration with Hirtenberger and SNPE (Société Nationale des poudres et explosifs), both experts in space propulsion
- Integration with a pyrotechnic injection system developed by SNPE, who used it for the Ariane space booster

DESCRIPTION OF ON SPACE APPLICATIONS:

- CROSSJECT developed ZENEO®, a world-leading needle-free injection platform, designed to improve patients' safety and comfort and to enable a better observance of treatments
- Can deliver drugs intradermally, subcutaneously and intramuscularly.

SUCCESS STORY : SATELLITE REMOTE SENSING HELPS EARLY DIAGNOSIS OF BLADDER CANCER

SPACE ORIGIN

- A French aerospace laboratory developed new characterization tools and techniques for satellite remote sensing, hyperspectral images analysis and treatment
- Its expertise on online learning of patterns of interest such as objects or changes in aerial and satellite images is also used.

DESCRIPTION OF ON SPACE APPLICATIONS:

- With a sensitivity of about 15%, traditional bladder cancer detection techniques are quite inefficient for early stage bladder cancer.
- Solution: Observation of cell fluorescence with the objective of providing complementary knowledge to pathologists, allowing them to make a more informed diagnosis.
- Collaboration on-going in order to develop new algorithms and artificial intelligence solution in order to provide unique performances in terms of capacity to accurately diagnose early bladder cancer (sensitivity) while avoiding false positives (specificity).



INNOVATE ? EXPLORE SYNERGIES ? DO IT WITH SPACE !



In Extenso
Innovation Croissance

DEMANDING APPLICATIONS

WHERE ULTIMATE PERFORMANCES AND RELIABILITY ARE REQUIRED

HARSH ENVIRONMENT

TECHNOLOGIES FOR SPACE MUST REACH A HIGH TECHNOLOGY
READINESS LEVEL

LONG-TERM VIEW



THANK YOU FOR YOUR ATTENTION

VISIT US – STAND E7

NICOLAS.LOUÉE@INEXTENSO-INNOVATION.FR