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# TECHNOLOGY TRANSFER: APPLYING SPACE TECHNOLOGY IN THE MEDICAL INDUSTRY

*Pieter Deleye*





# WHY SPACE?

Extreme environment  
Safety  
Redundancy  
Reliability



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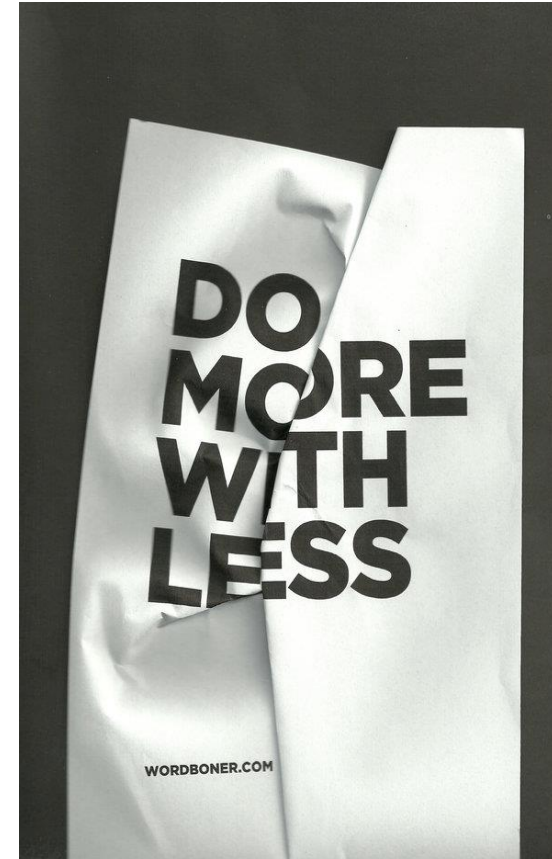




# TECHNOLOGY TRANSFER: WHY LINK WITH MEDICAL?

- Products life cycle shorter
- More Stringent Regulations
- R&D budgets become smaller
- Need for products with clinical added value
- Need for differentiated offering to protect market share

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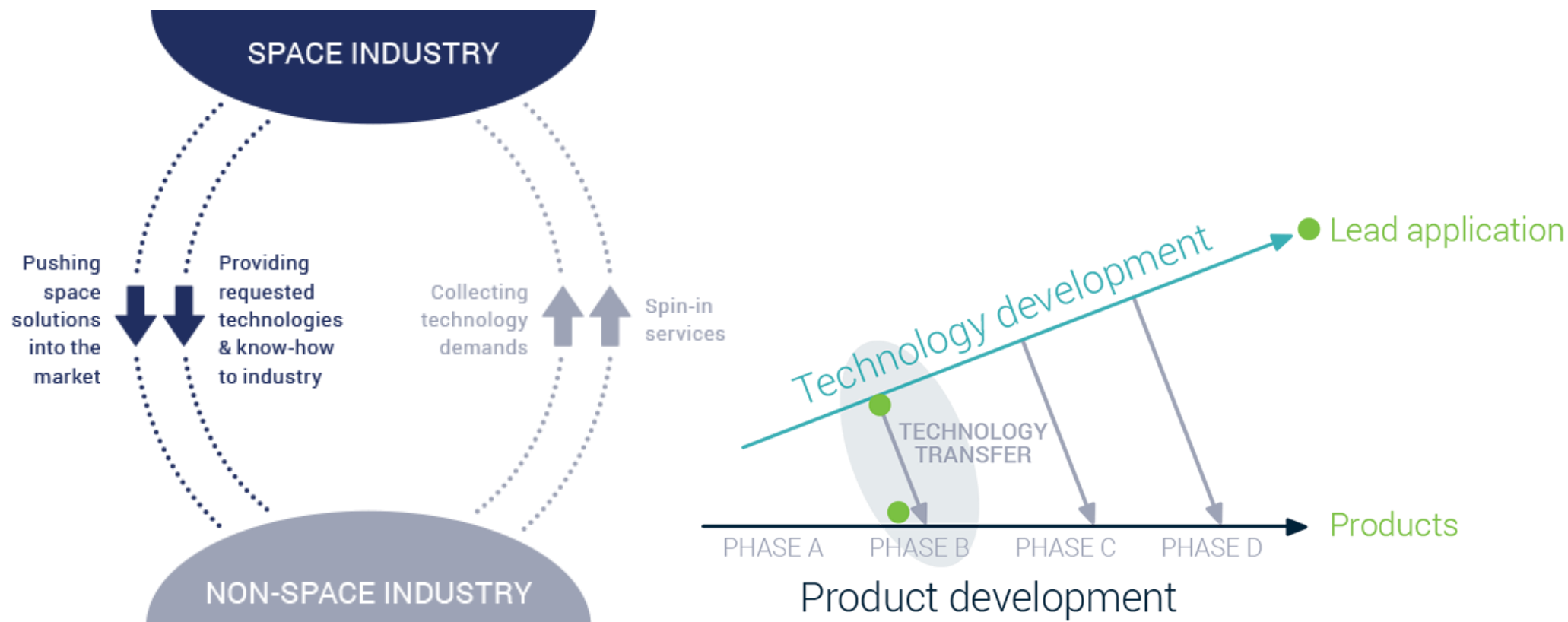
# TECHNOLOGY TRANSFER

## WHAT IS IT?



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*Synonyms: Knowledge transfer, technology spillover,...*



# TECHNOLOGY TRANSFER: BENEFITS



- Reduce Development cost
- Reduce Time-to-market
- Reduce Regulation time

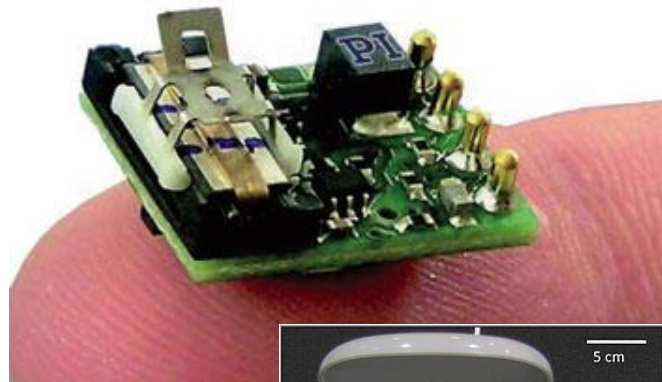


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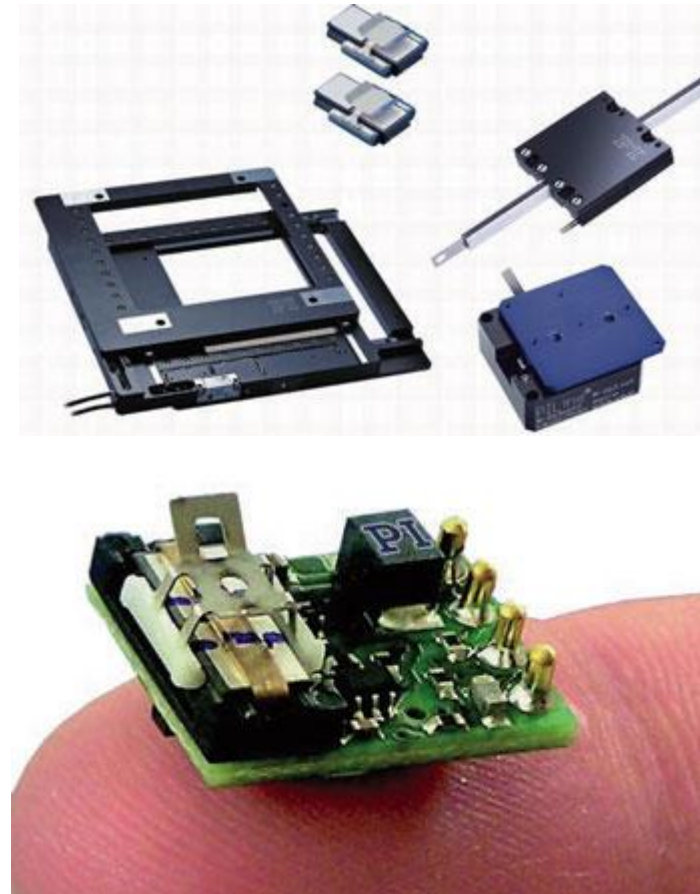
## SOME USE CASES





# PIEZO-ELECTRIC ACTUATORS FOR MEDICAL INSTRUMENTS

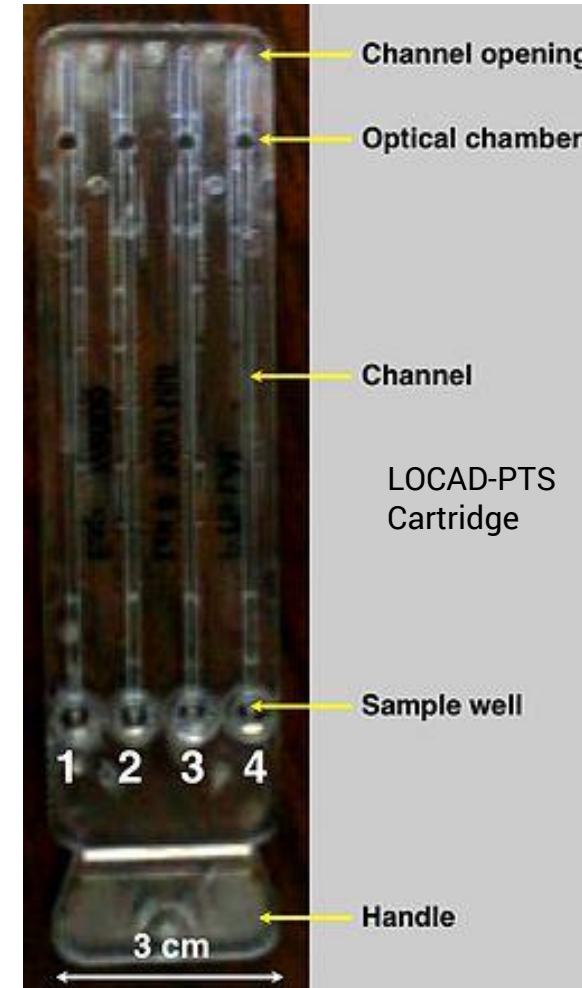
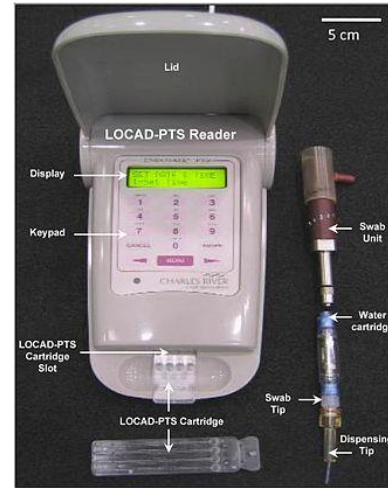
- Tech transfer in 2000
- Magnetic piezoelectric actuators for medical instrumentation
- Developed to reduce size & increase speed
- 10× faster response and resolution than classical motor-driven units.
- Counter astronaut cost of \$60K/h
- Cedrat Technologies (Fr)
- Further upgraded to ultrasonic linear drives => res. 50nm



Linear motor with driver. Velocities of 200 mm/sec

# SPACE ENABLING MEMS DEVELOPMENT

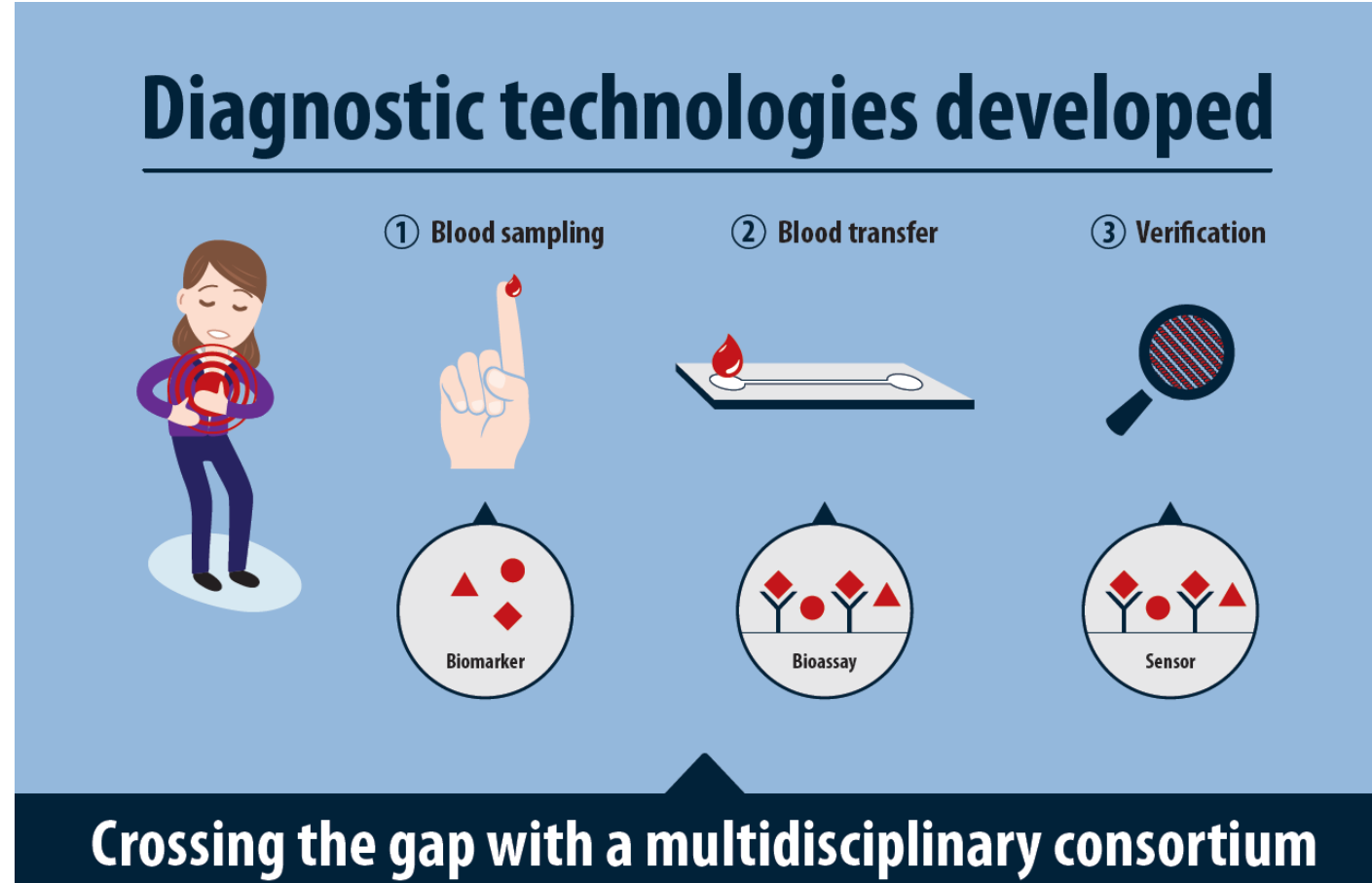
- LOCAD - Lab-on-a-chip Applications development
- 3 projects NASA
- LOCAD-PTS: handheld test device for microbial monitoring
- LOCAD-PTS Exploration: Microbial biome before and after spaceflight



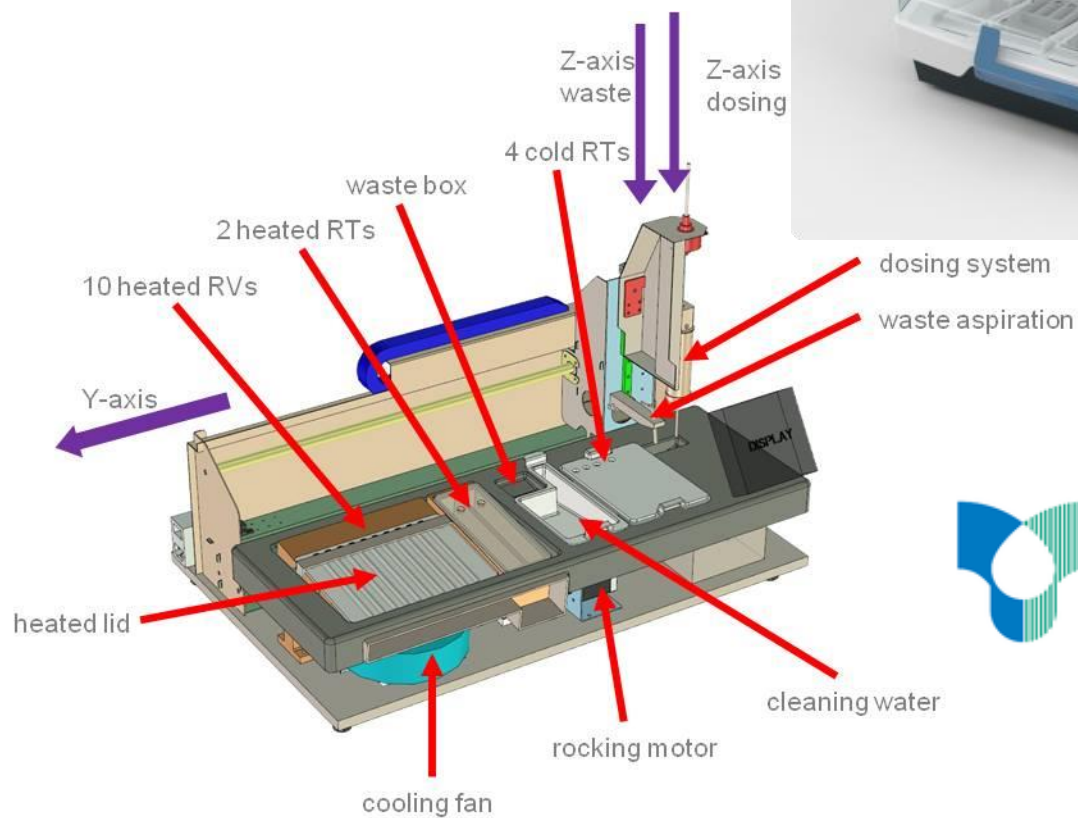


# LOCAD - MICROBIOMED

- Lab-on-chip demonstrator for immunological detection of human diseases
- Verhaert, CSL & Imec



# TENDIGO™ - MAKING BLOOD AND URINE TESTING ACCESSIBLE



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# ADECHOTECH

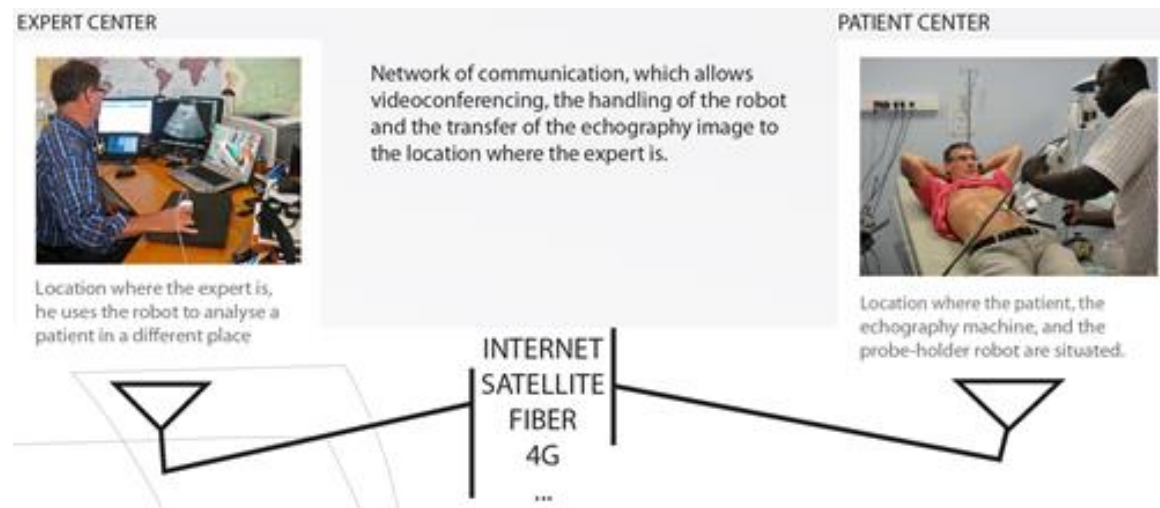
## FROM REMOTE-ECHOGRAPHY FOR ASTRONAUTS IN SPACE MISSIONS TO HEALTHCARE SERVICES IN REMOTE AREAS

### Space Heritage : Research's on remote echography for astronauts

In 1995, exploration studies into space medicine were entrusted to Professor Philippe Arbeille, head of the research unit in Space Medicine and Physiology in the University of Tours (France). He rapidly observed the potential of this concept of remote-echography in space missions where heavy equipments are very limited and health monitoring of astronauts is a main concern. His researches have been supported by the French National Space Agency (CNES) and the European Space Agency (ESA).

### Application in healthcare services in remote areas

With its MELODY solution, the French startup Adechotech offers to the expert to be connected to the patient site by teleconference, and manipulate the ultrasound probe via a tele-operated automated arm. This innovation is a great answer to crisis management, healthcare services in remote areas and to the lack of doctors in some areas and countries. The solution has been implemented in French Guiana.



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# BODYCAP - INNOVATIVE SPACE-BASED ACTIVITY TRACKING PATCH

- Integrated remote monitoring system for crewmembers in space analogues.
- No gel, cable-less electrodes
- Integration of tech in discrete activity tracking patch for actimetry, skin temperature & tilt.

## Applications:

- Occupational therapy: overweight people, post-surgery monitoring
- Sleep disorders: activity monitoring, circadian rhythm analysis
- Pediatrics: monitoring of agitated infants, activity monitoring
- Chronic disease: activity monitoring for frail people or during rehabilitation programs
- Eldrely people: activity monitoring

## Key figures:

- Weight: 10g
- Size: 41 mm x 37mm x 7mm
- Sampling 25 or 50Hz
- Stores 3 days of data
- Communication: BLE (Bluetooth 4.0)
- Transmission range 8 m
- Autonomy in charge : 1 week
- Charging period: 2 hours:



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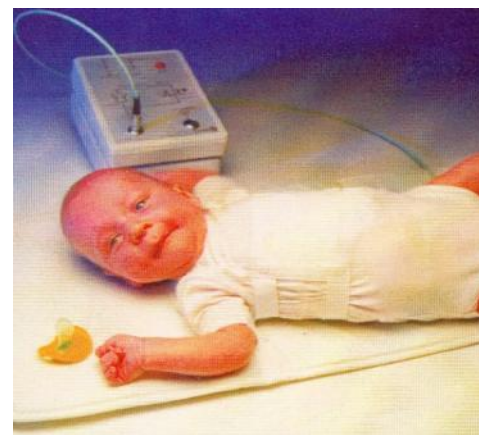
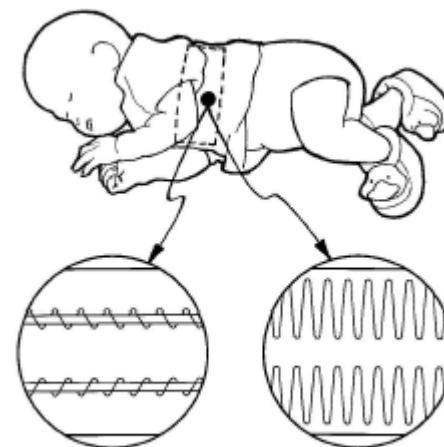
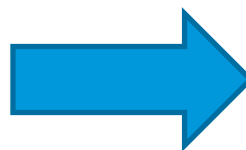
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# BIOFEEDBACK MONITORING / WEARABLES

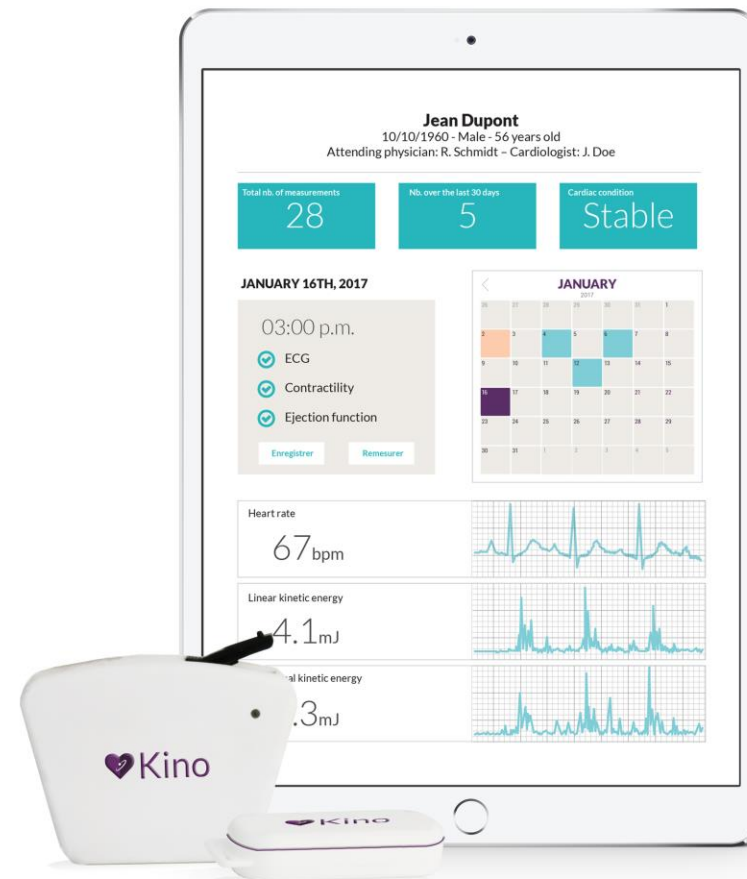
- Measuring elongation of abdomen & chest
- Correlate that data to breathing as well as exhausting & inhaling gas concentrations.
- First technology transfer (Verhaert)



# CARDIAC MONITORING SYSTEM



- Upgrade beyond ECG
- Measures:
  - Contractility
  - Ejection function
- Ultra-sensitive micro-accelerometers capable of measuring the linear and angular energy
- AI for change detection



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Proxima mission helping surgeons and patients

Providing healthcare professionals in neurosurgery with specific information on the intracranial pressure.

#SPACESOLUTIONS

Food complements to keep astronauts healthy

Nutraceutical to fight muscle loss during human space flights now help improve the autonomy of elderly or injured people



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# EU TECHNOLOGY TRANSFER BROKER

We manage space technology transfer for ESA.

## ESA PROVIDES

- Funding (<100K€)
- Marketing
- Technology
- Start-up network

8% of tech transfer towards medical.



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# EU TECHNOLOGY TRANSFER BROKER



## BUSINESS INCUBATION

- Support start-ups with space technologies
- Inspire and advice entrepreneurs
- Provision of technical expertise
- 120 new start-ups annually
- 16 BIC centers in EU

## TECHNOLOGY BROKERAGE

- 15 technology brokers – act as network
- Collaborate with local industry to spin-off ESA space technologies
- Re-use in non-space sectors to shorten development times & reduce development costs

## INTELLECTUAL PROPERTY

- # new innovative, sophisticated technologies and applications through ESA space programmes
- To support Europe in top notch technologies  
~European Commission



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# FURTHER SUPPORT IN YOUR CHALLENGES...

**Point.**  
POSITION •  
CONNECT •  
DEVELOP •  
**IoT**

Empowering IOT with GNSS technologies



This project has received funding from the European GNSS Agency under the European Union's Horizon 2020 research and innovation programme under grant agreement No 870283.



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# WE ARE HIRING!

## TECHNOLOGY TRANSFER CONSULTANT

- Persons interested in working with and leveraging highly sophisticated space technologies
- Looking for a profile that has technical and business experience
- Technology brokerage for ESA
- More info: [job.mastersininnovation.com](http://job.mastersininnovation.com)



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# CONTACT



## Space for innovation



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