

SPACE 4.0 Intelligent Health From Technology Development (in Space) to Business Applications (on Earth)

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Intelligent Health 2022 / Basel

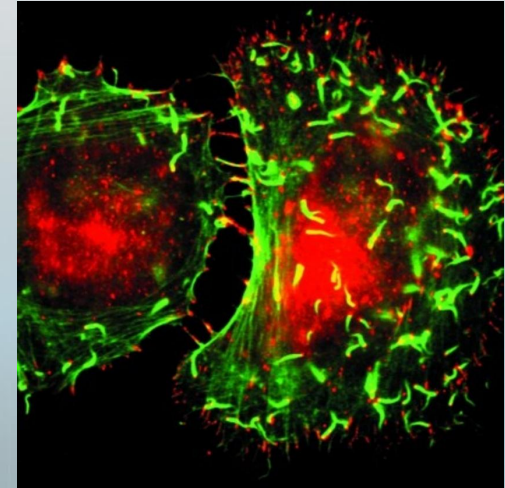
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1) Health for Space: clinical care & life sciences research

- Space = Isolation
- No mission abortion
- No Flight Surgeon as a default crewmember => autonomous crew
- => Need for Technological support

- Micro/hypergravity: unique environments for research
- Research support by "new" technologies (smaller, faster, lighter)



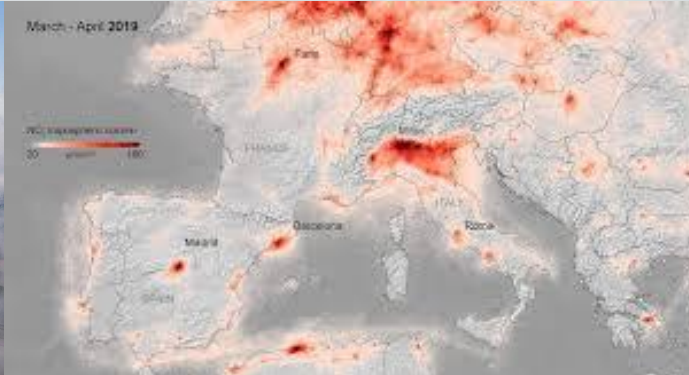
2) Space for Health: better clinical care on the ground

- Space technologies, data, expertise & know-how to support Health-related applications for European citizens
- Space health R&D targeting needs & products which are (sometimes) niche business opportunities (i.e.: not of primary interest for the non-space industry)
- Integration of non-space and space technologies & processes leading to new or enhanced products / services



Health at different scales

GLOBAL



LOCAL



INDIVIDUAL



Along the Health Continuum...

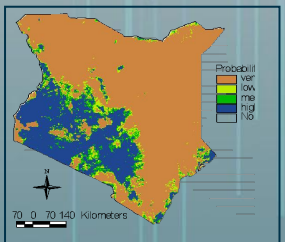
Prevention

Predictive risk maps

- pollution, communicable disease,...)
- EO Data
- Positioning in situ

Primary prevention

- Breast cancer screening
- COPD
- Cardio Vascular Disease Apps with monitoring and tracking features
- Countermeasure systems
- Nutrition



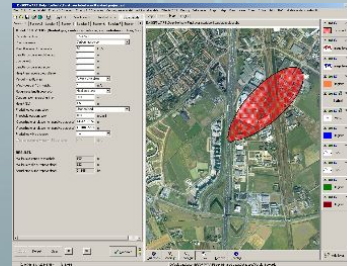
Early Warning

BCRNE info maps

- EO Data
- Positioning
- SATCOM in situ

Detection & Alerting Services

- Monitoring devices
- Sensors



Diagnosis

Instrumentation

- Multipurpose
- Compact

Remote diagnosis

- Via SATCOM
- Hybrid networks
- For crisis environments
- For medical deserts & isolated places



Treatment

Assisted treatment

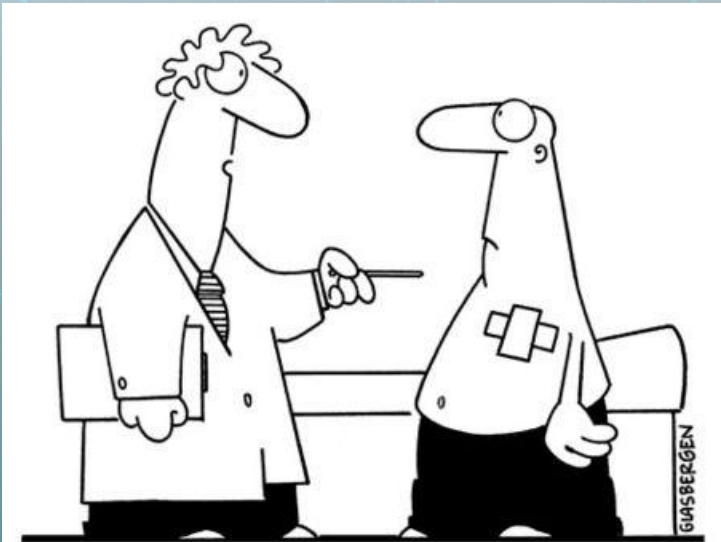
- Guidance
- Assistance
- Training



What does “intelligent” Health means for ESA?



□ Use of disruptive technologies



“It’s a pacemaker for your heart, plus you can download apps for your liver, kidneys, lungs, and pancreas!”

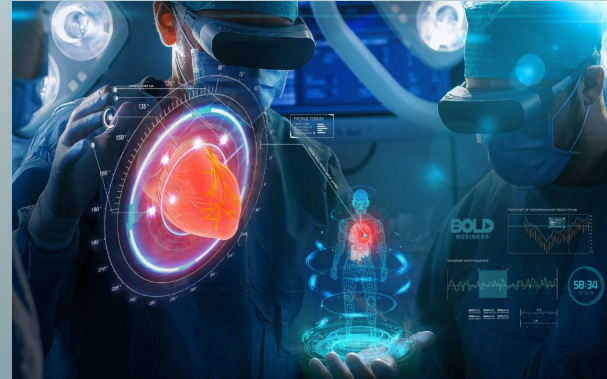
□ Use of new concepts, paradigms & workflows



“I looked up your symptoms on Google. If you want a second opinion, I can check Yahoo.”



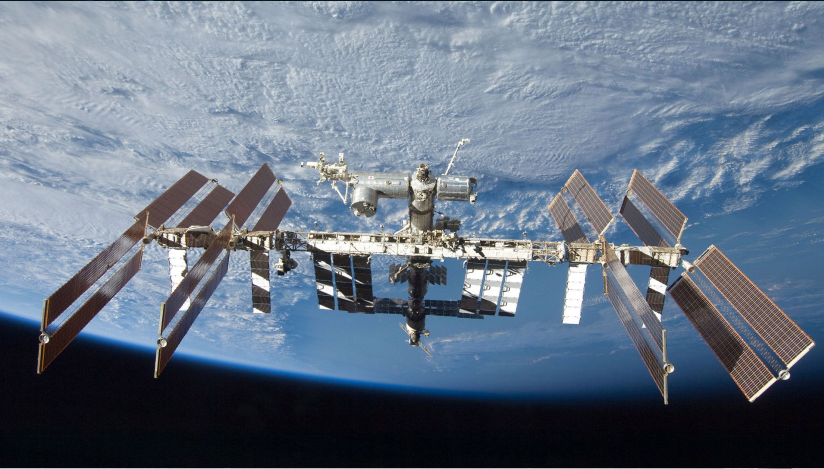
“Intelligent” Health - Disruptive Technologies



- **AI**, IoT, Blockchain
- Cybersecurity Technologies
- Advanced Robotics
- AR / VR & other Immersive Technology
- Uncrewed Aerial / Ground Vehicles



“Intelligent” Health - New Paradigms: in Space



Currently:
SCOOP & RUN

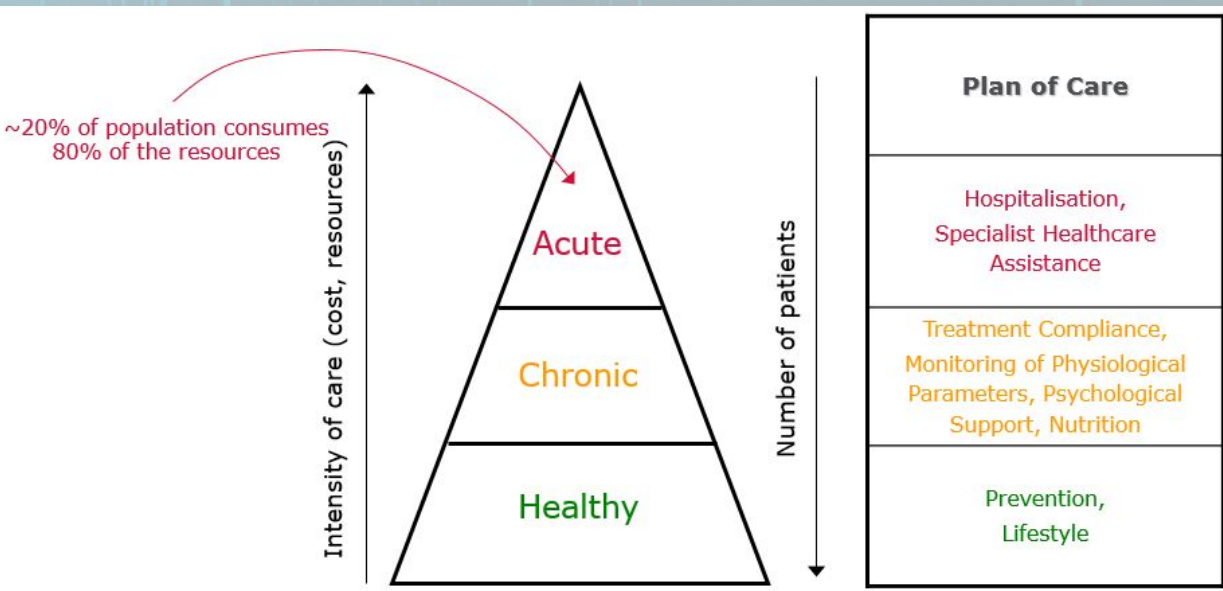




Tomorrow: STAND & FIGHT!



“Intelligent” Health - New Paradigms: on Earth



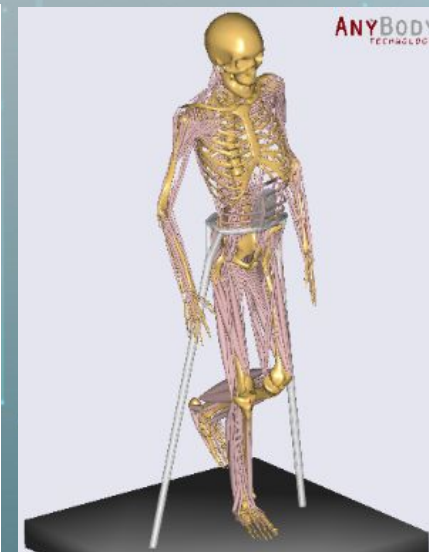
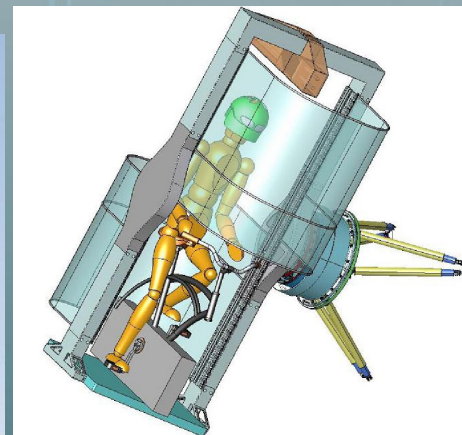
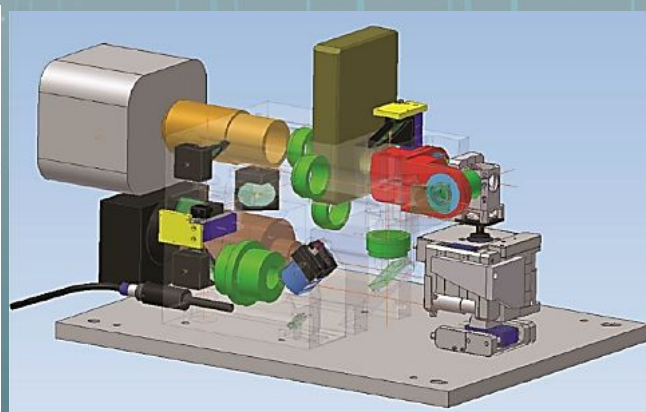
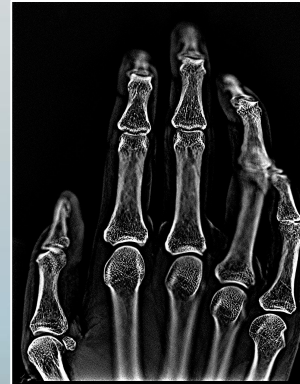
• Shifting paradigms:

- From hospital to patient-centred health
- From disease management to health management
- From treatment to prevention
- Inverting the pyramid of care
- Moving data instead of people
- Towards more autonomous care

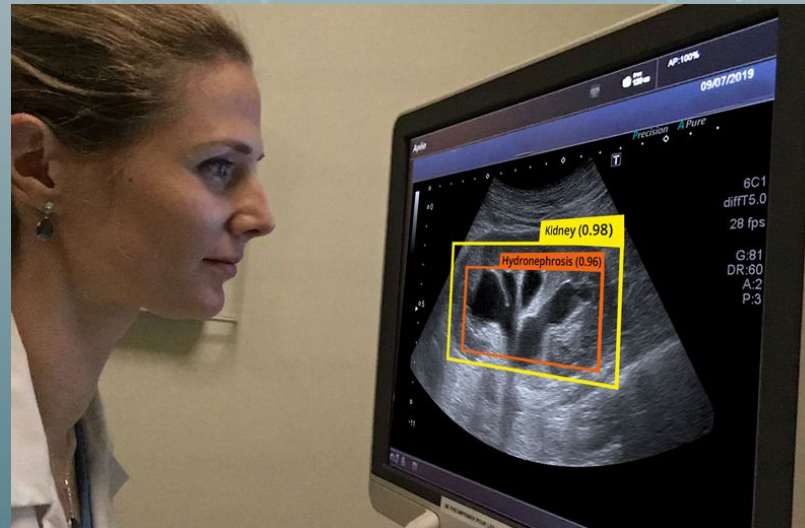
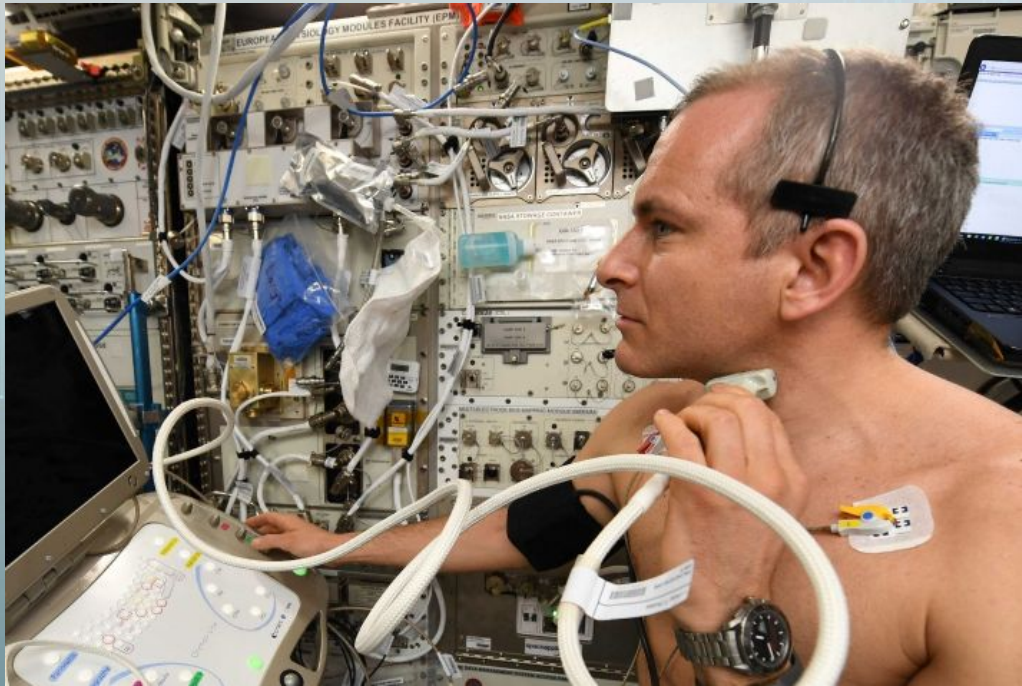


New technology: starting point for everything ESA does.

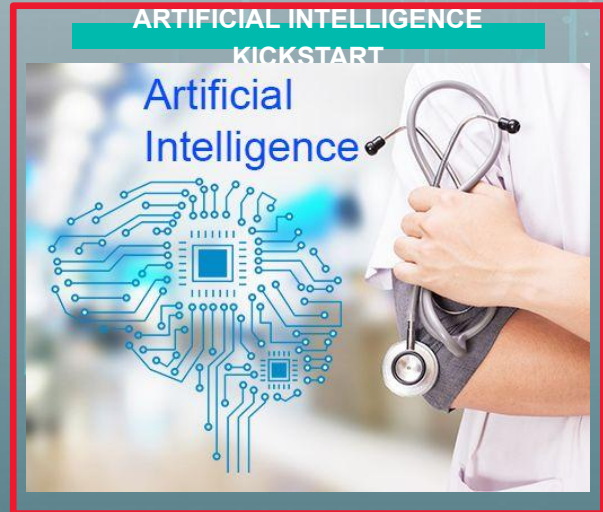
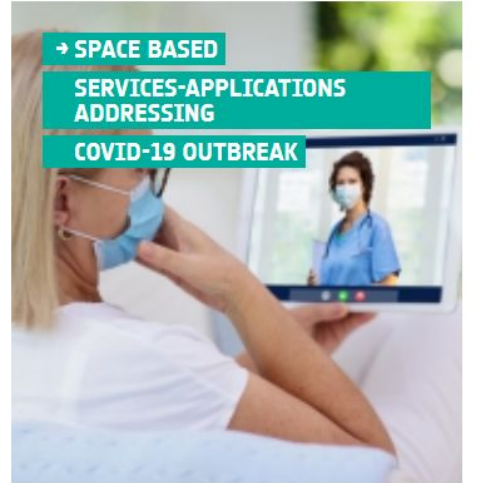
- Crew health
- Science / Research Instrumentation
- Planetary Exploration & Protection
- Support to Downstream Business Applications activities



ALISSE: AI for Ultrasound images recognition



Health @ ESA means also Application Projects





Satellite Communications



Earth Observation



Satellite Navigation



Human Spaceflight technologies

- Provide connectivity where terrestrial communications is insufficient
- Enable remote monitoring through transmission of sensor data
- Backup communications for drones

- Provide contextual situational awareness
- Provide collection of data for production of images and maps environment
- Provide location data for epidemiological analysis
- Support cross-certification of patient data
- Track and route emergency vehicles/ambulances
- Enable applications in the VR/AR sector
- Definition of waypoints for drones

- Provide support to sanification/decontamination
- **AI algorithms used for spacecraft**
- Support monitoring (e.g. COVID-19 patients)



Health can lead to successful (business) projects



EARTH SCAN: AI with SATCOM



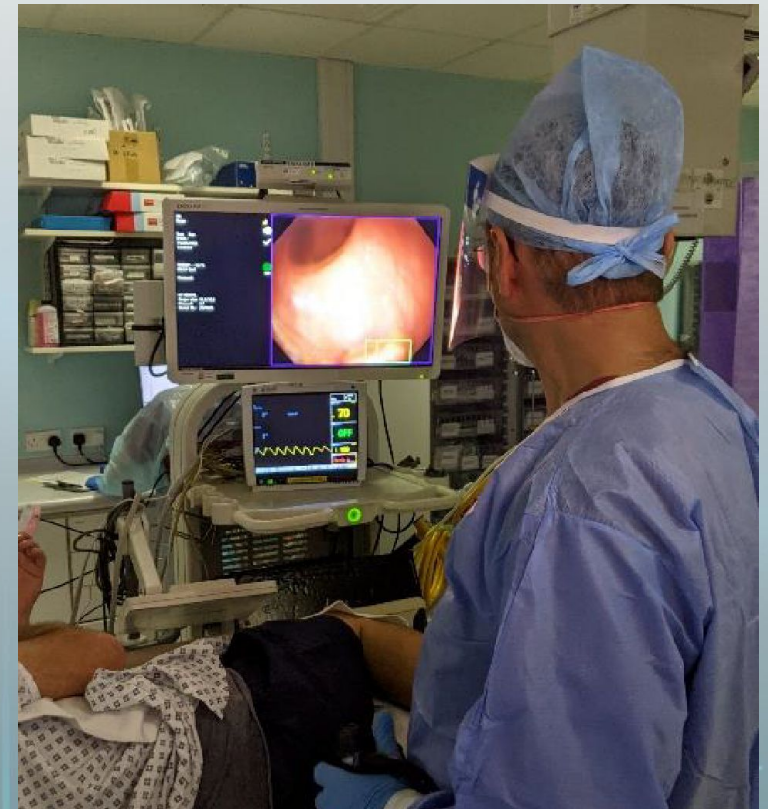
EARTH SCAN - a cloud-based Artificial Intelligence system supporting doctors to locate and characterize polyps during the colonoscopy.



- Up to 25% of polyps missed
- Adenoma detection rates vary from 7-50%.

EARTH SCAN helps to increase detection and facilitate diagnosis via AI. The system is 10 years ahead of competition.

- **Targeted Users:**
Radiologists involved in coloscopy, OEM of coloscopy devices
- **Pilot partners:**
University College of London



Satellite connectivity between the colonoscopy site and the AI server providing stable and permanently accessible communications coverage



Join the Adventure – Space is the Limit !



www.esa.int/health &
business.esa.int



Thank you for your
attention

