

A photograph of two technicians in a cleanroom environment. They are wearing blue lab coats and hairnets. One technician is seated at a workstation with a computer monitor displaying data. The other technician is standing and working on a piece of equipment. The background shows a cleanroom setting with a "DO NOT DISTURB" sign and various cables.

**INNOVATIVE SOLUTIONS IN SPACE**  
*Small satellites: today's emerging applications, tomorrow's spectrum management challenges*

# Nanosatellites and CubeSats

## modular spacecraft



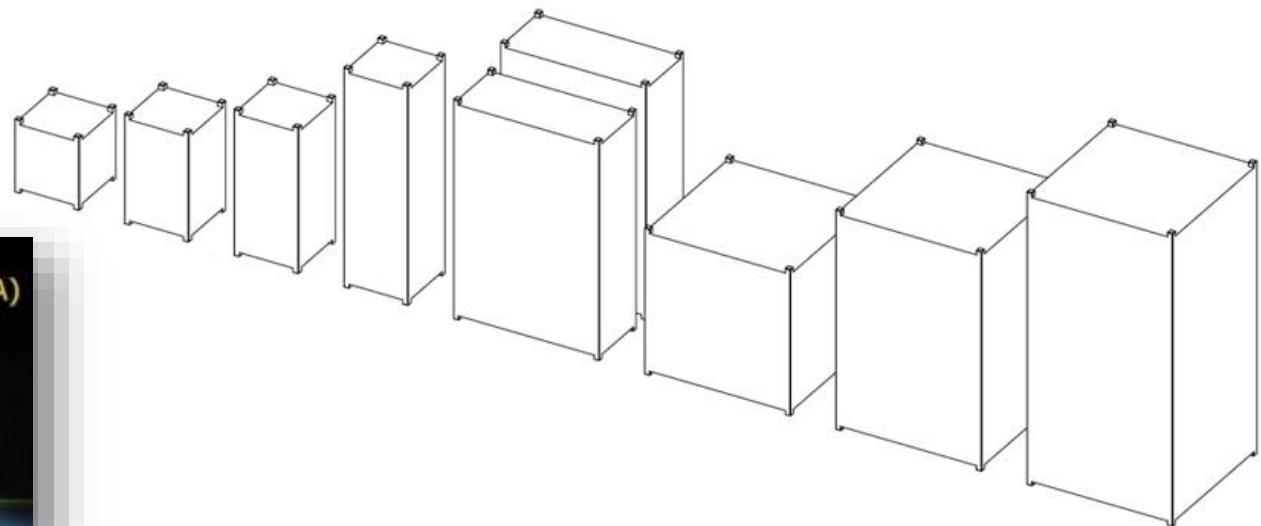
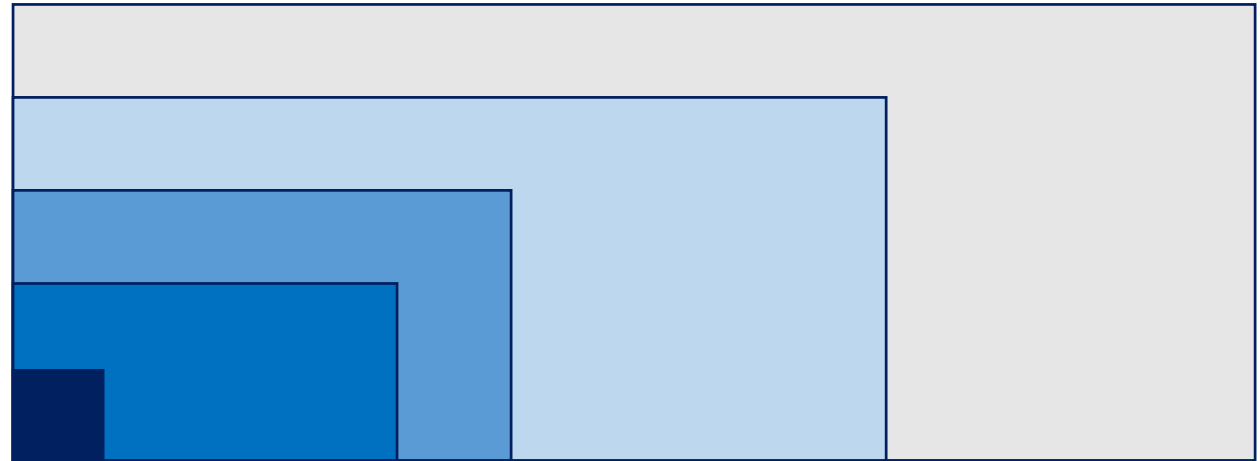
< 100 kg Microsat

< 50 kg Small Microsat

<24 kg Large Nanosat (12U CubeSat)

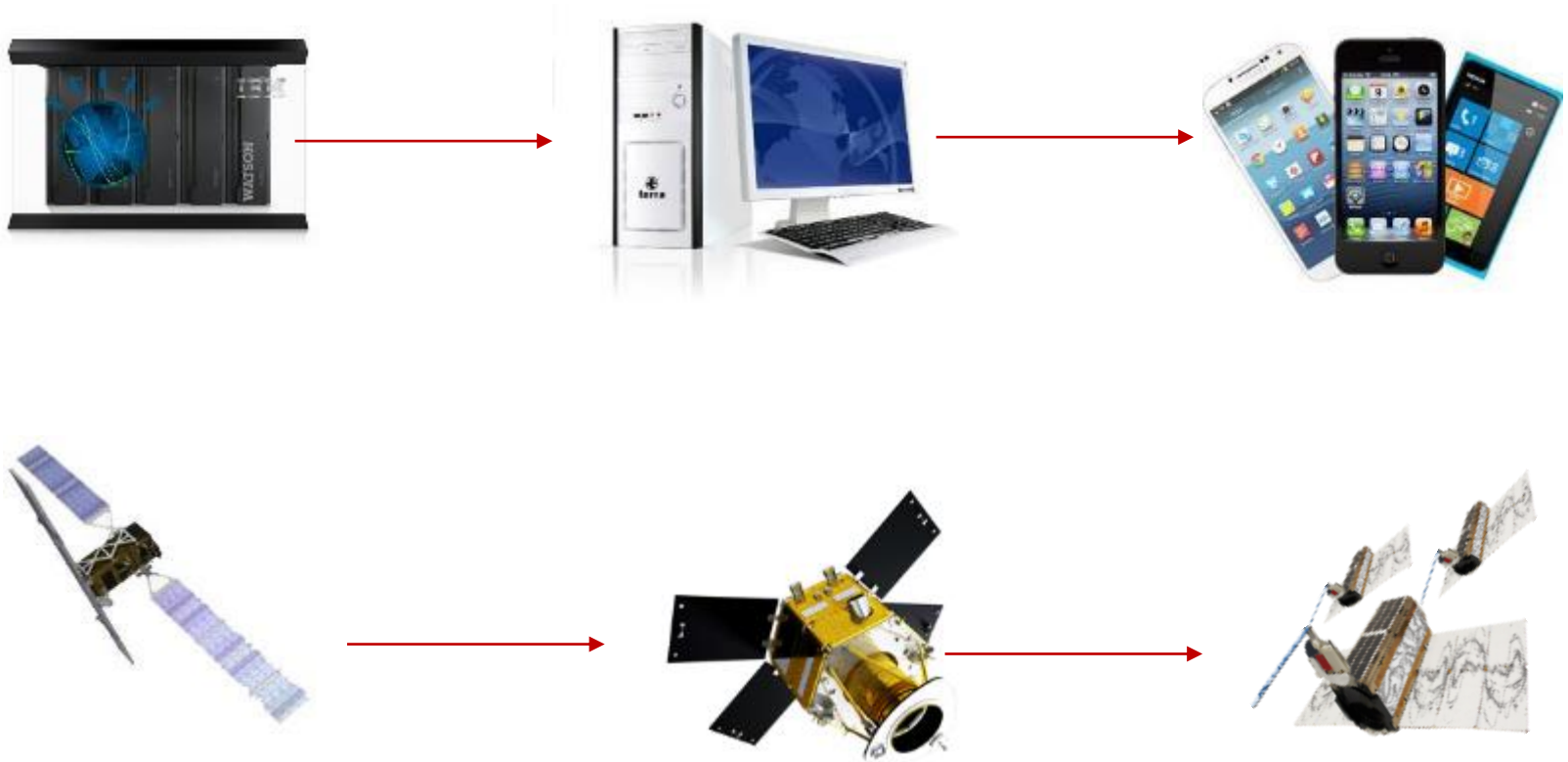
<10 kg Nanosat (6U CubeSat)

<1 kg Picosat (1U CubeSat)



# The nanosatellite 'revolution'

disruptive concepts in the space sector



# The space sector is changing out of the laboratory, into the factory



# Innovative Solutions In Space

## the nanosatellite specialist



Established in 2006

Small satellite company (1 – 30 kg)

Vertically integrated organization

- Research and development
- Components and subsystem production
- Satellite mission design and implementation
- Satellite launch services
- Satellite operations

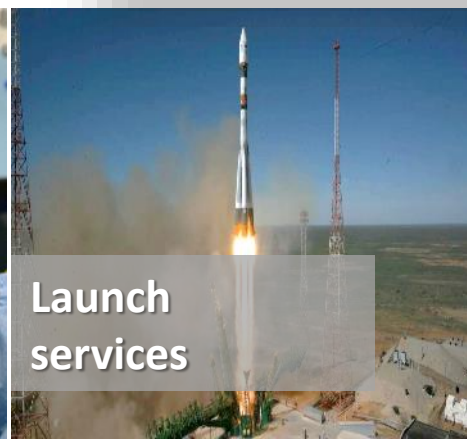
- 65 FTE based in Delft, The Netherlands



Standard products



Satellite Solutions



Launch services



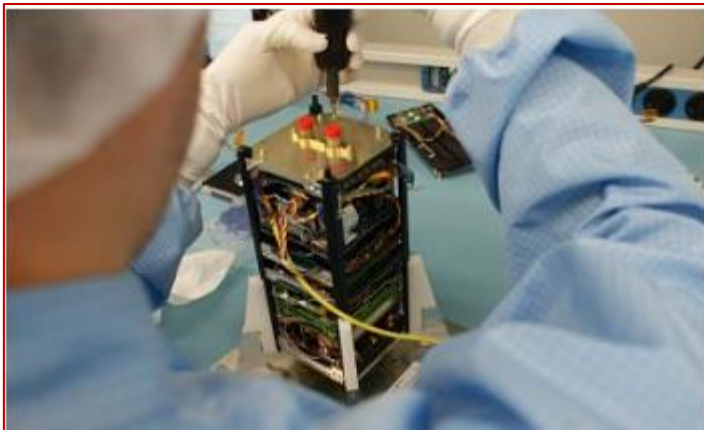
Applications and services

# Innovative Solutions In Space

the nanosatellite specialist



- 7 Satellites currently operated
- +250 Antennas delivered
- +75 Radios delivered
- 20 Ground Stations deployed

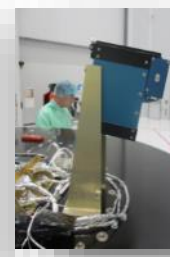


# Launch services

It's our mission to launch yours



- 10 Launch campaigns
- 100% success rate
- 7 Different Launch Vehicles
- 75 satellites delivered



# Small satellite products off-the-shelf standardized parts



The screenshot shows the CubeSatShop website interface. At the top, the logo "CubeSatShop" is on the left, and navigation links for "PRODUCTS", "VENDOR INFORMATION", "HOW IT WORKS", "FAQ", and "INQUIRY LIST" are on the right. Below the navigation, there are four filter tabs: "One-stop webshop", "Standardized products", "Available as off-the-shelf", and "Multiple vendors". A left-hand menu lists various product categories such as "Antenna systems", "Attitude actuators", "Attitude sensors", "Cameras & payloads", "Command & data handling", "Communication systems", "CubeSat kits & buses", "Ground stations", "Integrated ADCS", "Launch adapters", "Propulsion & pressurisation", "Solar panels & power systems", and "Ground support equipment". The main content area features a grid of product images and a large text block that reads "One-stop webshop for CubeSats and NanoSats" with a "View products" button. Below this is a blue banner with the text "Join CubeSatShop" and a "Start now" button.





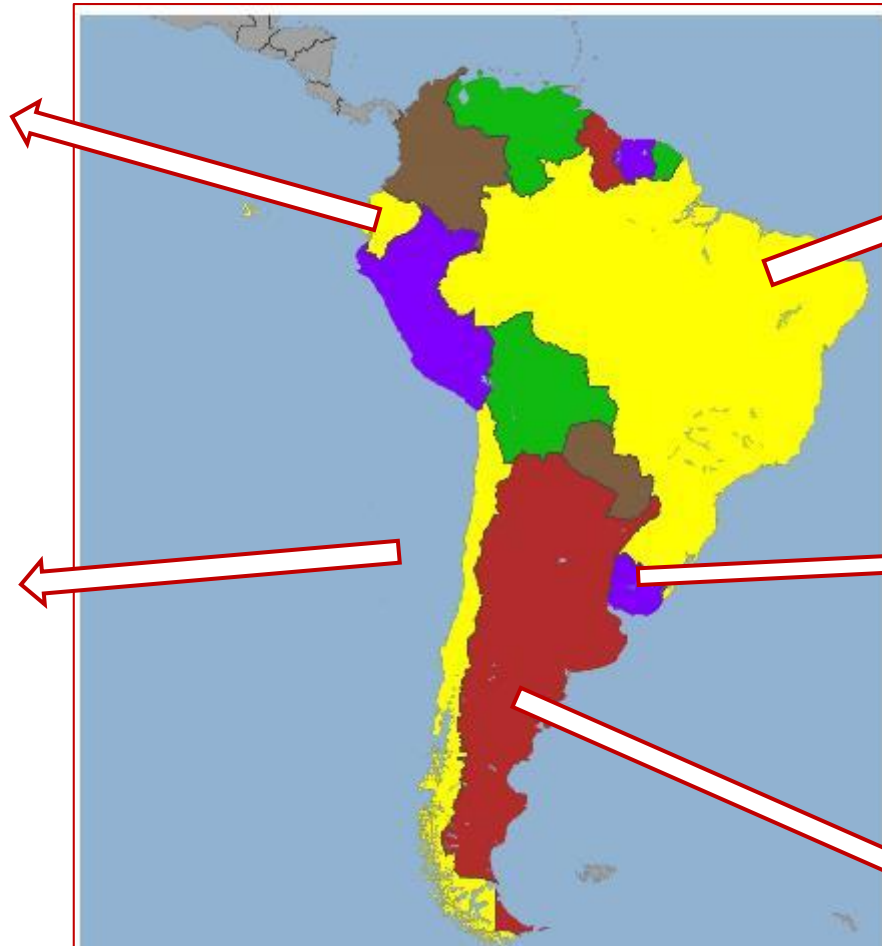
# ISIS in Latinoamerica

## Providing space access to Latinoamerica



### **Ecuador:**

Launching campaign of **Pegaso** (2013) and **Krysaor** (2013)



### **Brasil:**

**NCBr-1**  
**ITASAT**  
**CONASAT**

### **Chile:**

Launching campaign of **Suchai** (on-going).

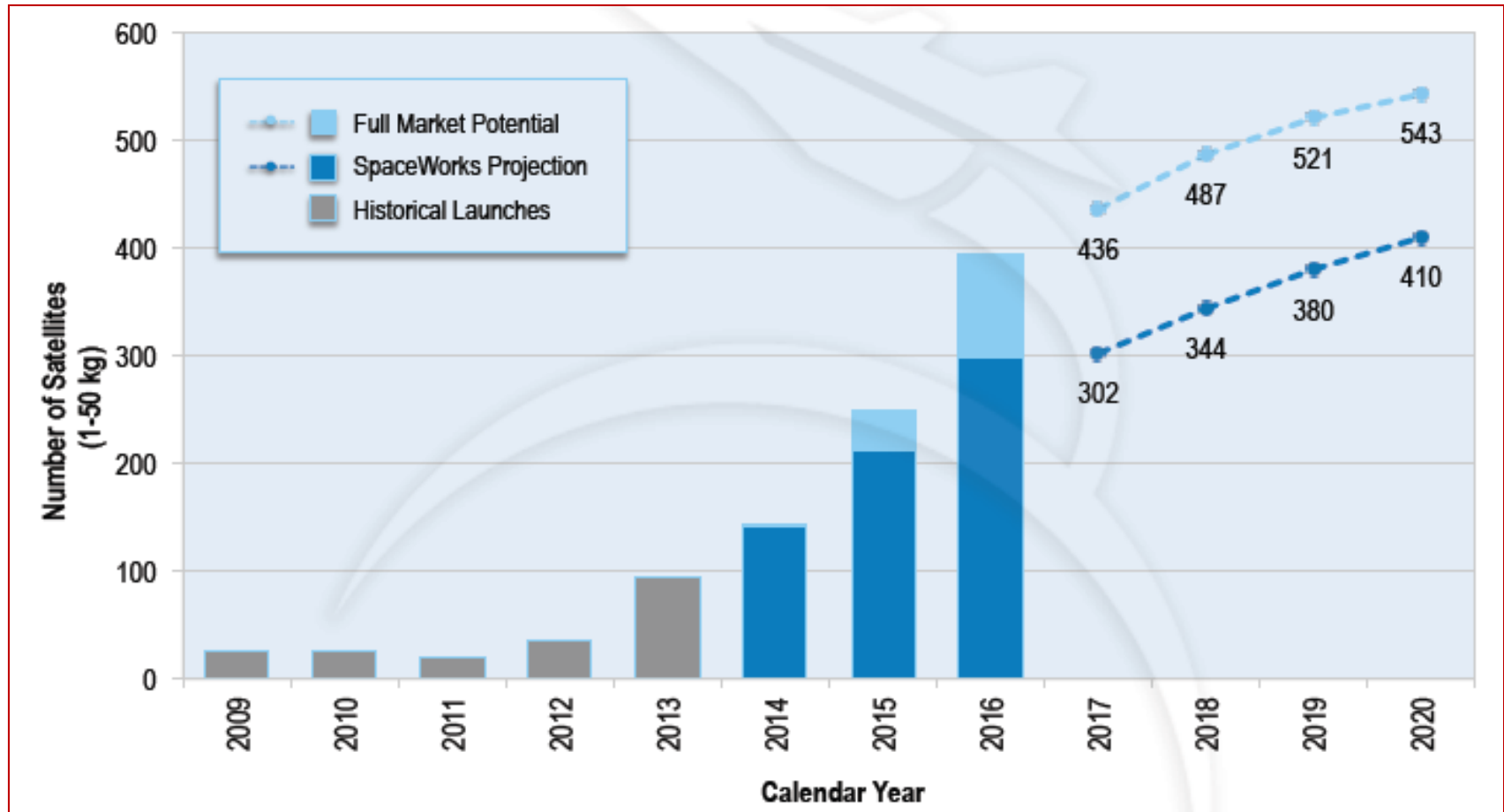
### **Uruguay:**

**AntelSat**

### **Argentina:**

Launching campaign of **CubeBug-1** and **CubeBug-2**

# A growing market nanosatellites take flight

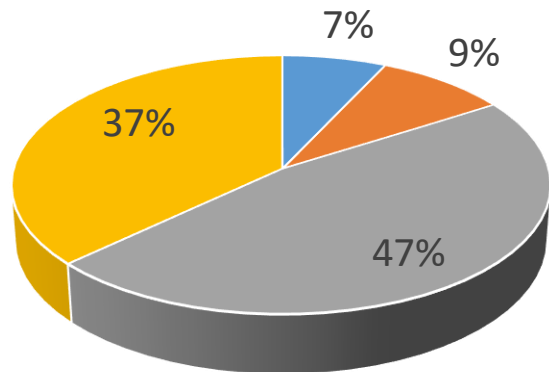


# Applications and services nanosatellites enable many applications



**2009-2015**

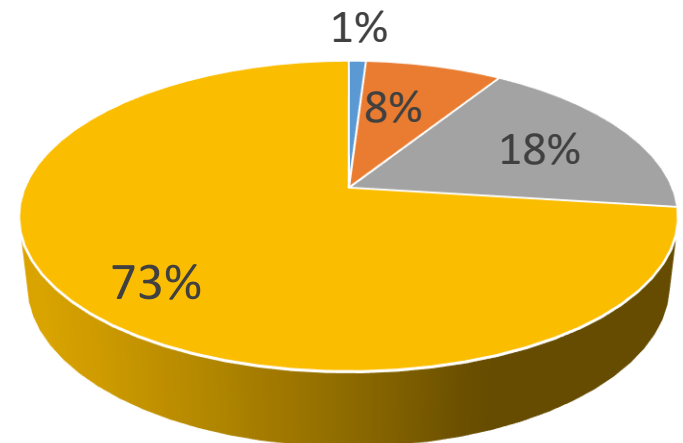
Small Satellites Application Share



**2016-2018**

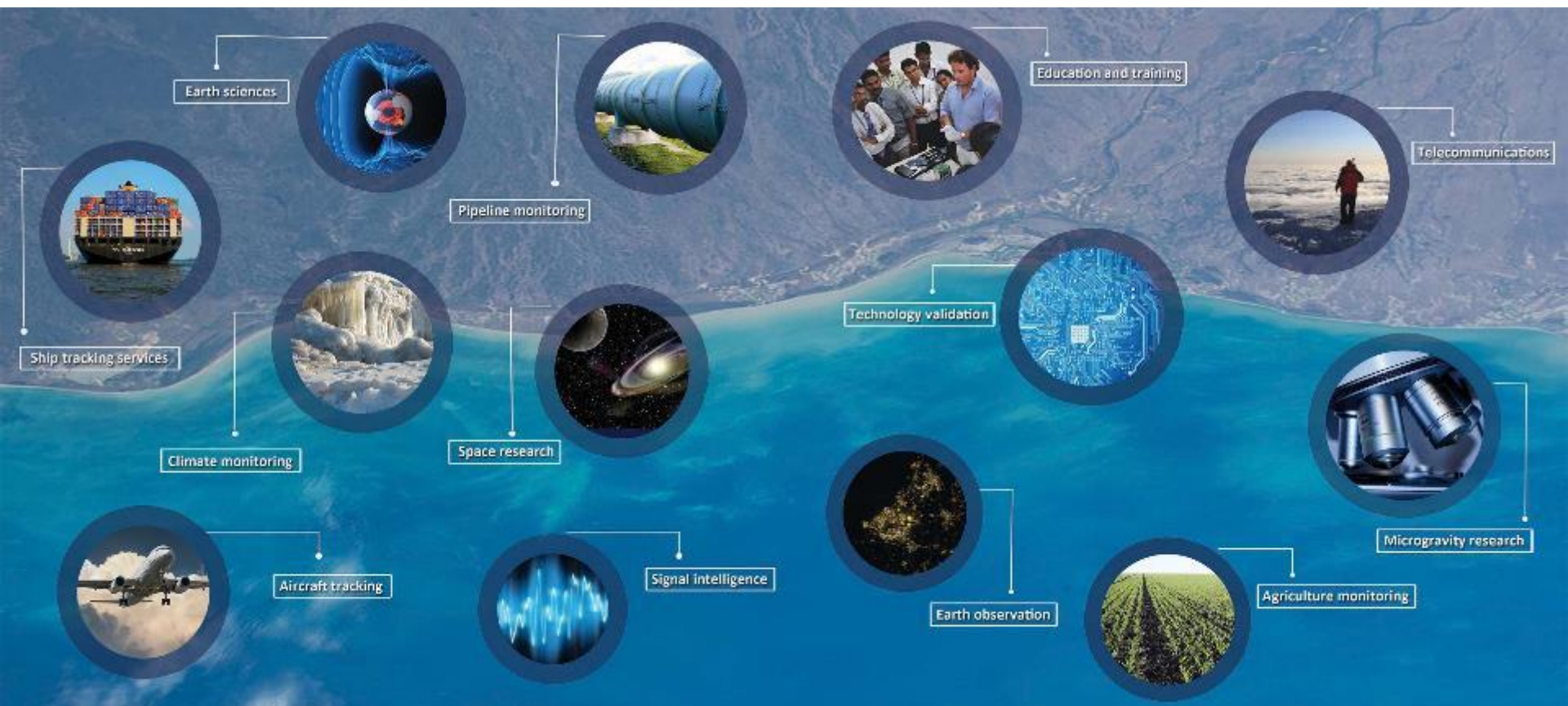
Small Satellites Application Share

- Communications
- Scientific
- Technology
- Earth Observation / Remote Sensing



Source: adapted from  
Spaceworks

# Applications and services nanosatellites enable many applications

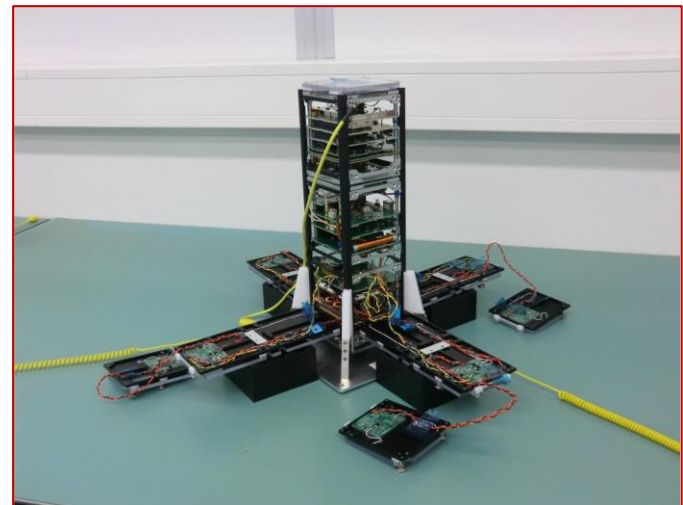


# Satellite solutions

## TRITON



- Large vessel tracking
- 3U CubeSat (2.5 kg)
- Power:4-6 W
- Patented Automatic Identification System(AIS) receiver
- Cost approx. \$1.5M
- Possibility to share resources
  - Reducing revisit times



# WRC-15 Agenda Item 1.7

## TT&C Spectrum requirements for short duration mission NGSO satellites

- High growth in the number of small satellite missions
- Many missions have operated under the amateur-satellite service although such use sometimes was not in line with the provisions of the Radio Regulations
- WRC-12 Issue 9.1.8 studied characteristics of nanosatellites and picosatellites and possible modifications to the regulatory procedures, but did not address spectrum requirements

# WRC-15 Agenda Item 1.7

## TT&C Spectrum requirements for short duration mission NGSO satellites

- Successfully proposed by CEPT\* during WRC-15
- WRC-15 adopted [Resolution 659 \(WRC-15\)](#)
- Objective: study suitability of existing SOS spectrum and if necessary study new allocations or upgrade of existing allocations to support TT&C requirements of growing number of smallsats
- Such new allocations should not be subject to coordination under RR Article 9 (to minimize throughput time for ITU filing)
- Short duration missions: typically < 3 years

\*CEPT is the European Conference of Postal and Telecommunications Administrations, 48 European countries cooperating to regulate posts, radio spectrum and communications networks

# WRC-15 Agenda Item 1.7

## TT&C Spectrum requirements for short duration mission NGSO satellites

- Need for a common access mechanism which facilitates sharing between multiple users **and** eases coordination process
- Need for development of common (standardized) RF characteristics to allow sharing and ease coordination with incumbent users
- Access on the basis of compliance with such agreed and standardized characteristics which are relevant from a frequency management perspective



# WRC-15 Agenda Item 1.7




## TT&C Spectrum requirements for short duration mission NGSO satellites



- Studies are underway in ITU Working Party 7B, which meets twice-yearly in Geneva
- Currently, spectrum requirements are being determined, and initial sharing studies are being performed
- Interesting in contributing to these studies? ***Contact your radiocommunications administration***

# Conclusions

- ISIS is one of the key player in the market of design, manufacturing and launching CubeSats and Nanosatellites, including related ground segment equipment
- WRC-15 Agenda Item 1.7 is crucial to ensure a sustainable growth and space access to new players in the sector of CubeSats and Nanosatellites

A close-up photograph of a technician wearing white gloves and a blue lab coat, using a screwdriver to work on a small, gold-colored satellite component. The component is mounted on a black frame and has two red caps. The background shows a clean, light blue workbench with various tools and equipment.

Thank you for your attention!

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[www.isispace.nl](http://www.isispace.nl) | [www.isilaunch.com](http://www.isilaunch.com) | [www.cubesatshop.com](http://www.cubesatshop.com)