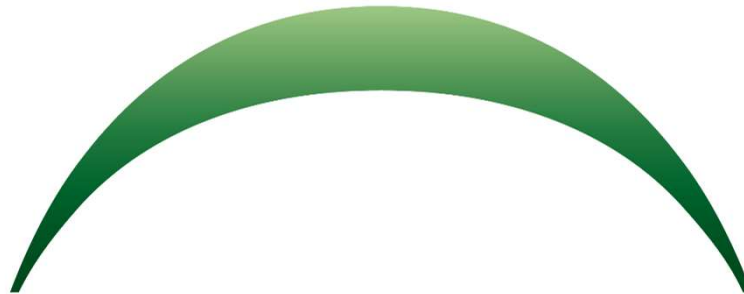


Workshop

New Space Economy: la grande opportunità per l'Italia



UMBRIA AEROSPACE CLUSTER



Elisa Fratticcioli, RF Microtech srl
Foligno, 10 ottobre 2019



Breve storia di RF Microtech





Nata come spin-off di Unipg

Le ragioni di uno spin-off

Le ragioni negative

- Difficoltà del trasferimento tecnologico: inefficaci i rapporti università-industria
- Difficoltà di gestione dei contratti di ricerca: burocrazia universitaria farraginosa
- Carenza di posti e risorse per i giovani laureati o addottorati

Le ragioni positive

- Possibilità di tradurre in applicazione i risultati della ricerca.
- Facilitazione dei rapporti con l'industria
- Semplificazione della gestione dei contratti di ricerca
- Creazione di posti e risorse per i giovani laureati e addottorati





Il contesto competitivo

- Università
 - Luogo privilegiato per la ricerca
 - Formazione dei giovani → interazione con la società
 - Contributo innovativo di idee dall'interazione con i giovani

→ Può fornire gli strumenti per l'innovazione





La cultura dell'innovazione in RF Microtech

- Eredità universitaria: caratteri della ricerca scientifica applicati ai nuovi contesti produttivi
- Alto grado di flessibilità e adattabilità a vari ambiti produttivi
- Portare innovazione in tutti i settori di competenza
- RF Microtech: dai componenti elettronici ad alta frequenza (*antenne e circuiti a microonde*), alle tecnologie fortemente avanzate (*RF MEMS*), alle applicazioni industriali (*misure di umidità, peso ecc. a microonde*), radar di localizzazione, forni a microonde, sistemi di disinfestazione ecc.



RF Microtech

Fondata nel 2007

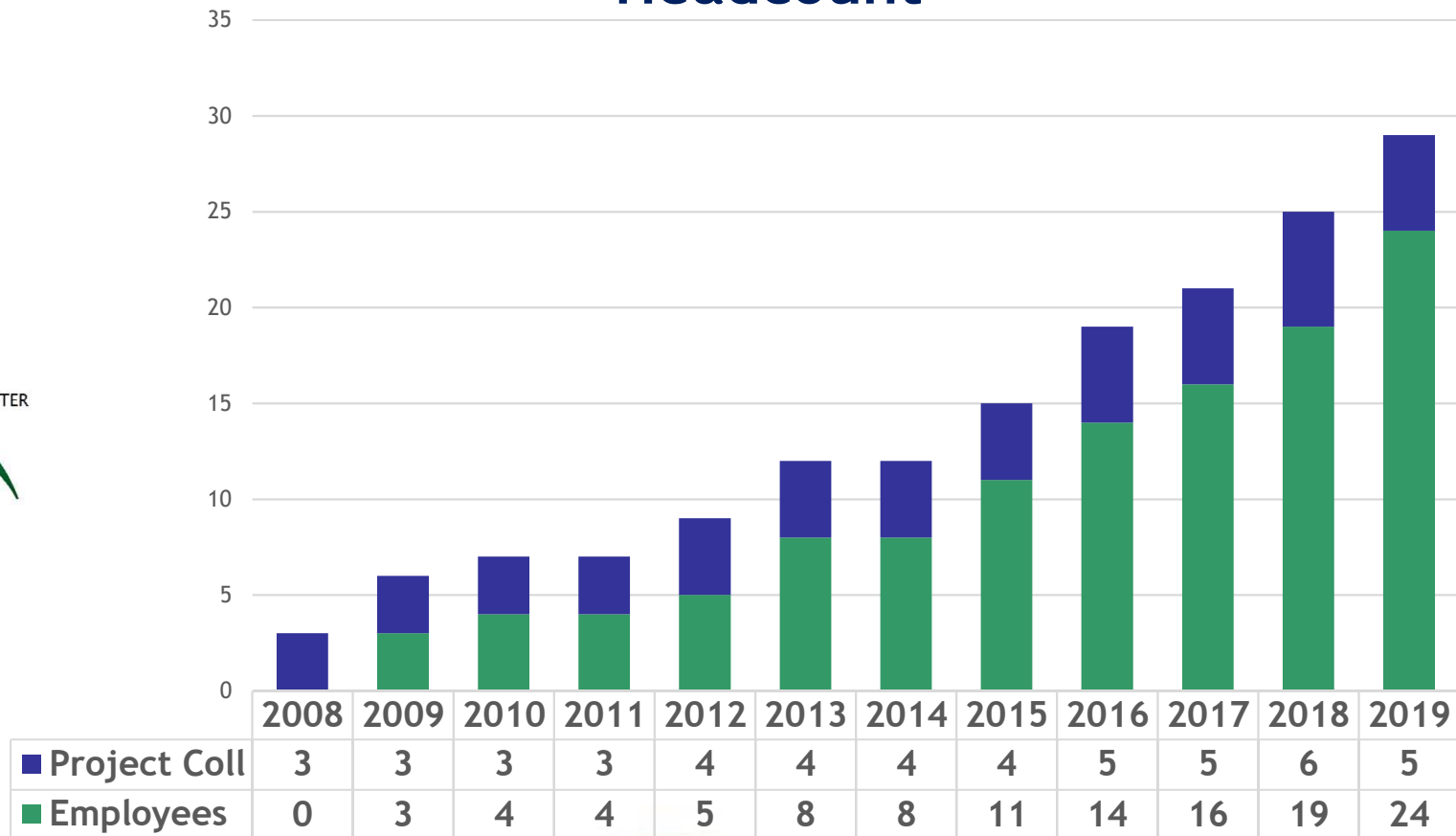
Nel 2010 sede in via Mascagni, S. Sisto

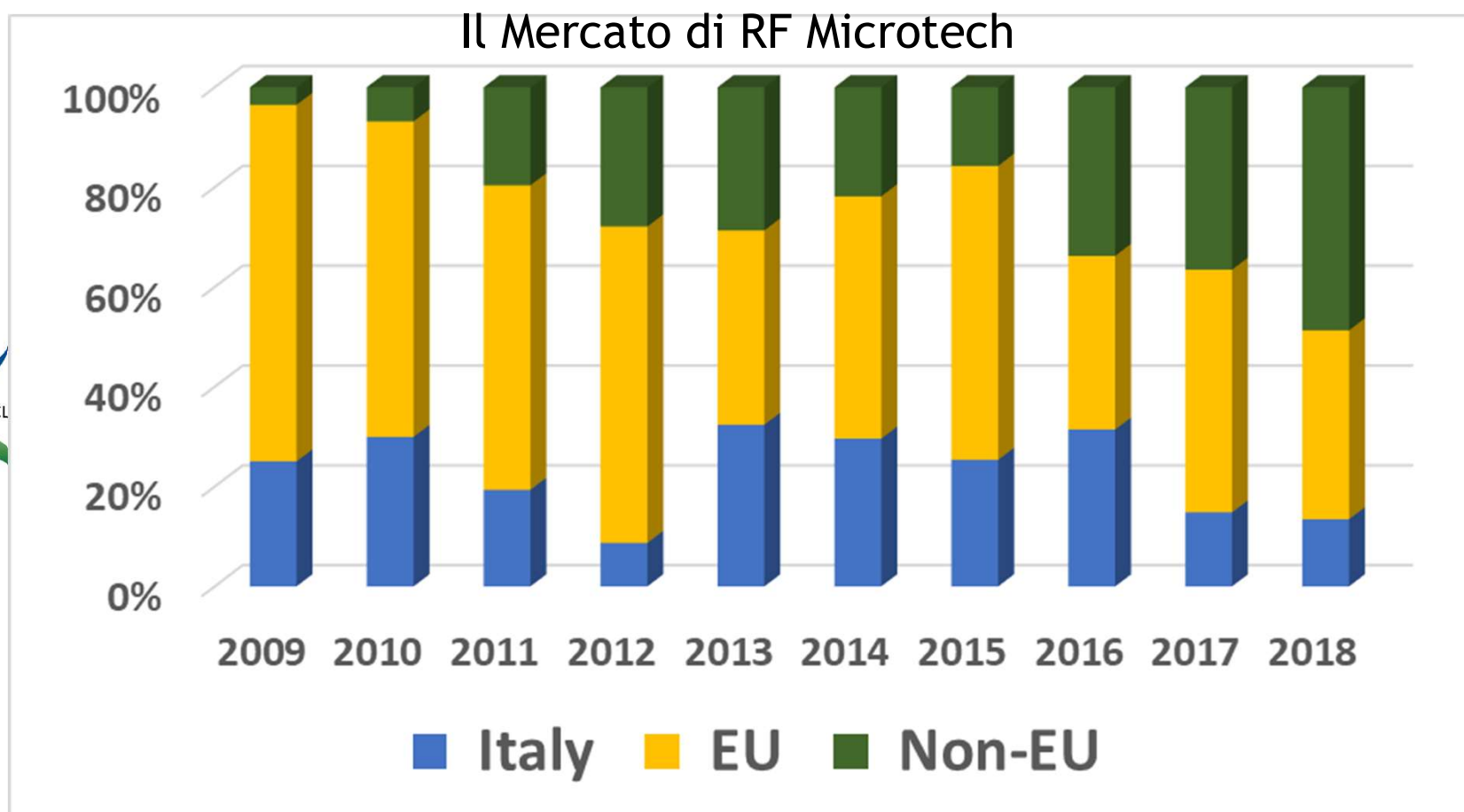
2016: Nuova sede con avvio produzione 24 Dipendenti,
3 aree di progetto, 1 area produzione e collaudo

Fatturato ~2,5 M€



Headcount

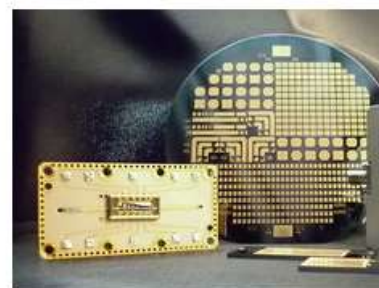
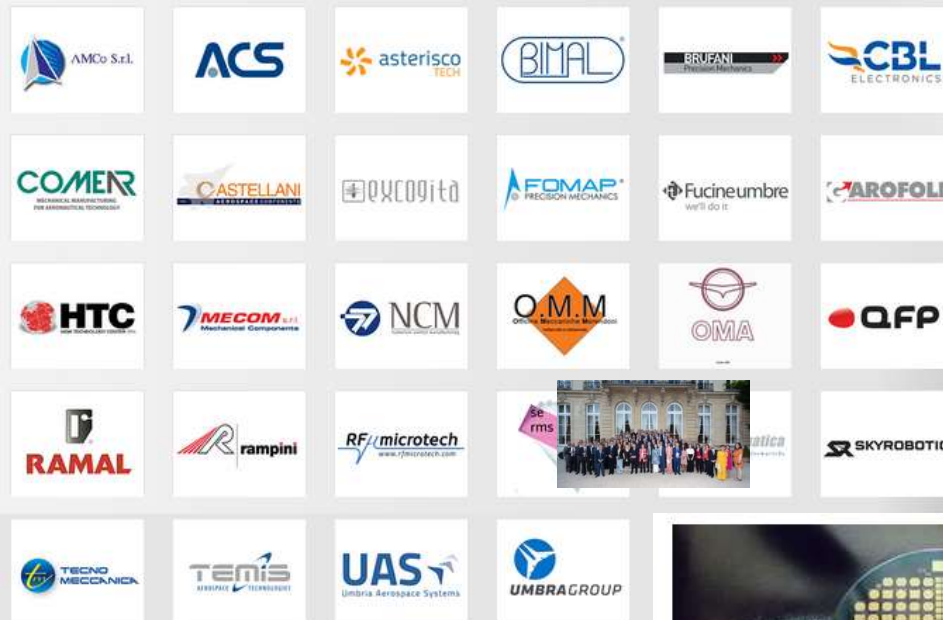




RF Microtech in Umbria Aerospace Cluster



Aziende



PROGETTAZIONE

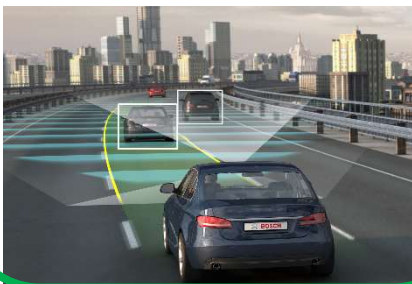


PRODUZIONE



Le tecnologie che impattano/impatteranno la nostra vita quotidiana

Advanced Driver Assistance Systems (ADAS) and Autonomous Vehicles



Satellite Communications



Industry 4.0



Internet of Things



Billions of Wireless Interconnections: Highly Flexible Systems

5G



Advanced Driver Assistance Systems (ADAS) and Autonomous



Vehicles will be capable of sensing their environment and navigating without human input.

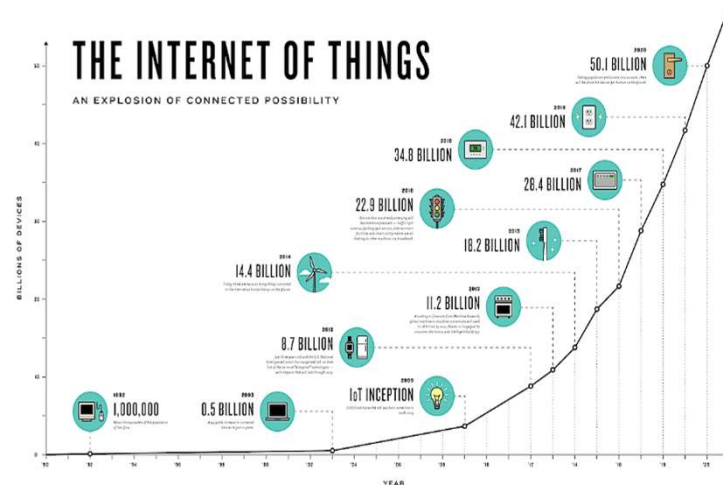
- Information fusion:
 - GPS
 - Telecommunications system
 - Satellite system
 - Radar/Lidar
 - Cameras
- Need for high data rate connectivity
- Need for very low latency connectivity for safety reason (real time)

Internet of things (IoT)



IoT is the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment

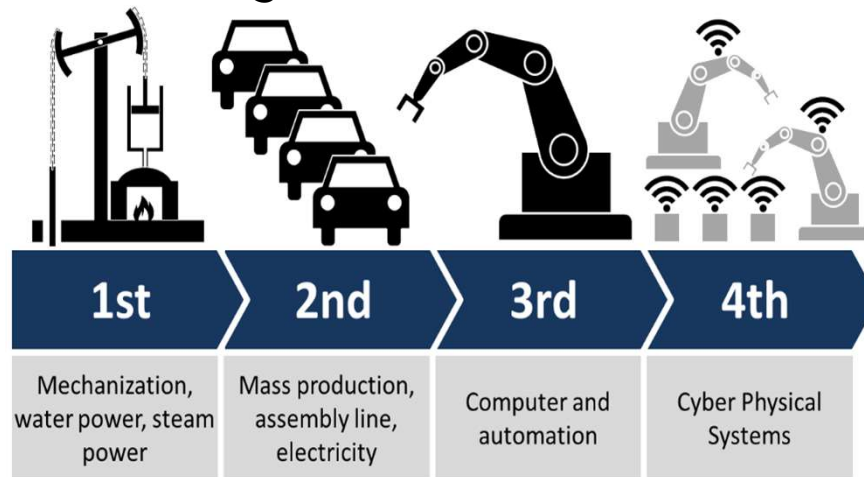
- Billions of smart devices together will be connected
- Possibility to remote control everything
- The overall flow of data dramatically increase



Industry 4.0

Smart factory or industry 4.0 is the current trend of automation and data exchange in manufacturing technologies:

- cyber-physical systems communicate and cooperate with each other and with humans in real time
- High interconnection levels
- High data rates



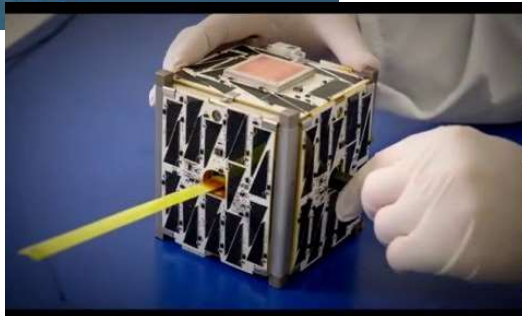
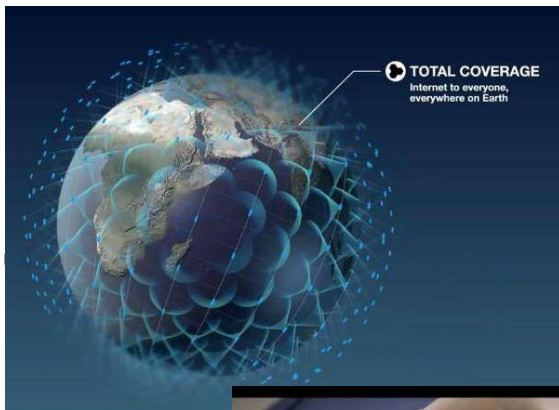


5th generation mobile networks or 5th generation wireless systems, are the proposed next telecommunications standards beyond the current 4G/IMT standards.

- Data rates of tens of megabits per second for tens of thousands of users
- Several hundreds of thousands of simultaneous connections for wireless sensors
- Spectral efficiency significantly enhanced compared to 4G
- Coverage improved
- Signalling efficiency enhanced
- Latency reduced significantly compared to LTE.

Nano and Pico Satellite Constellations

Pico-satellite constellations

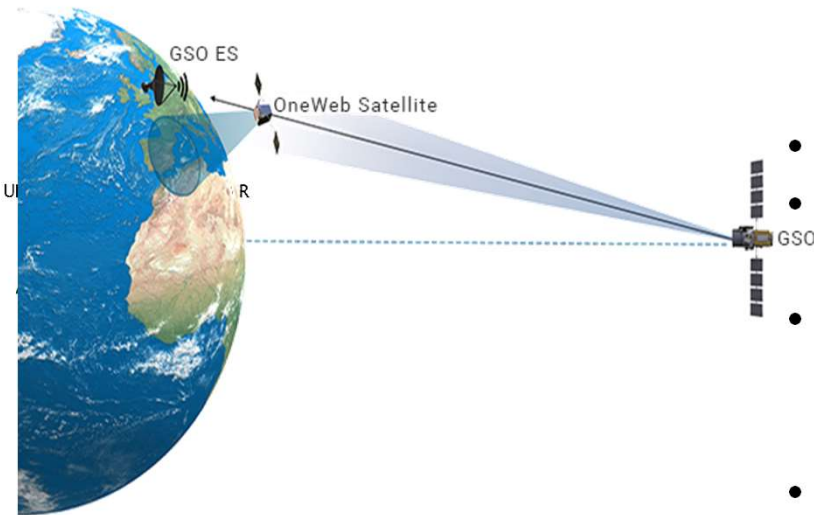


New trend in satellite communications

- Thousands low-cost satellites
- LEOs: Lower distance to earth for better web performance
- Coverage footprint over the entire planet.
- Small, low-cost user terminals will talk to the satellites in the sky, and emit LTE, 3G and WiFi to the surrounding areas.

Nano and Pico Satellite Constellations

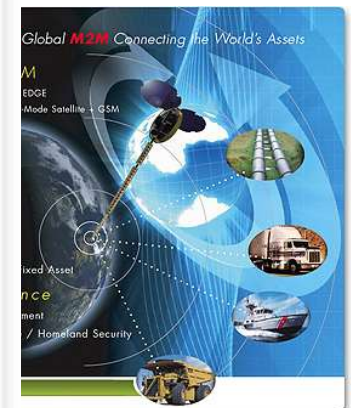
Pico-satellite constellations



Benefits of pico-satellite constellations:

- address the most demanding global connectivity challenges and sudden infrastructure crises,
- allows for fast connection in fast mobility
- elimination of the digital-divide: connection will be available everywhere
- Will expand low cost in-flight connectivity to business jet, commercial airline and military aviation customers.
- Satellite will experience for the first time the mass production with benefits for the cost of the connection service

Satellite Communication Networks for Data and IoT



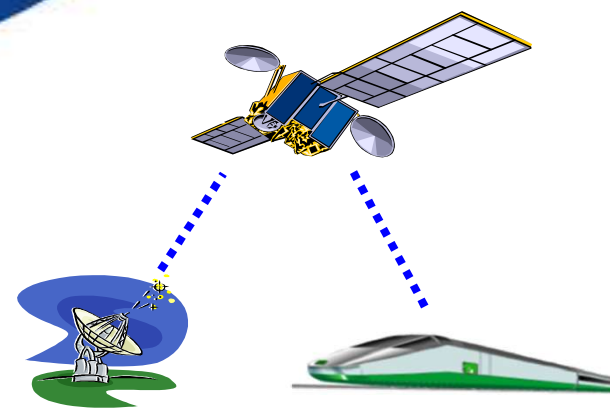


RF Microtech

Principali prodotti

Mobile Satellite Services

- ✓ Digital Radio
- ✓ Digital TV, Video Streaming
- ✓ Broadband Data streaming
- ✓ Internet on the move





Lightweight antenna for portable “on-the-move” solutions

Designed for compact installation, and fully autonomous operation for transmit and receive of high bandwidth data.

Innovations:

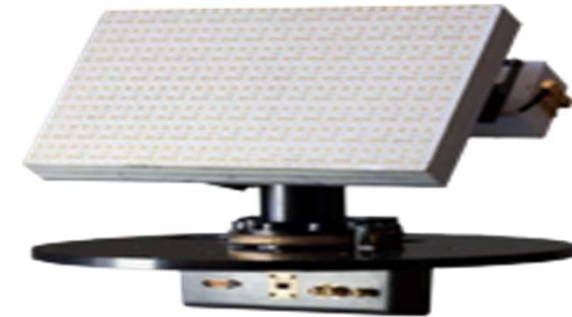
Small antenna: 30x18cm, Light <3kg

Low Power Consumption <20w

High Performance thin panel antenna

Modem Agnostic, Built-In tracking receiver

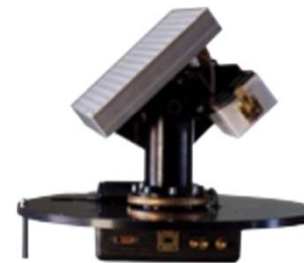
Fully Autonomous, All-In-One Approach (Gyro, IMU, Compass Etc...)



Satellite Systems

Conventional SAT

- Mostly Using Ku (overloaded)
- Big Size (most are 100X30 cm)
- Heavy ~60kg
- High P. Consumption (>350)



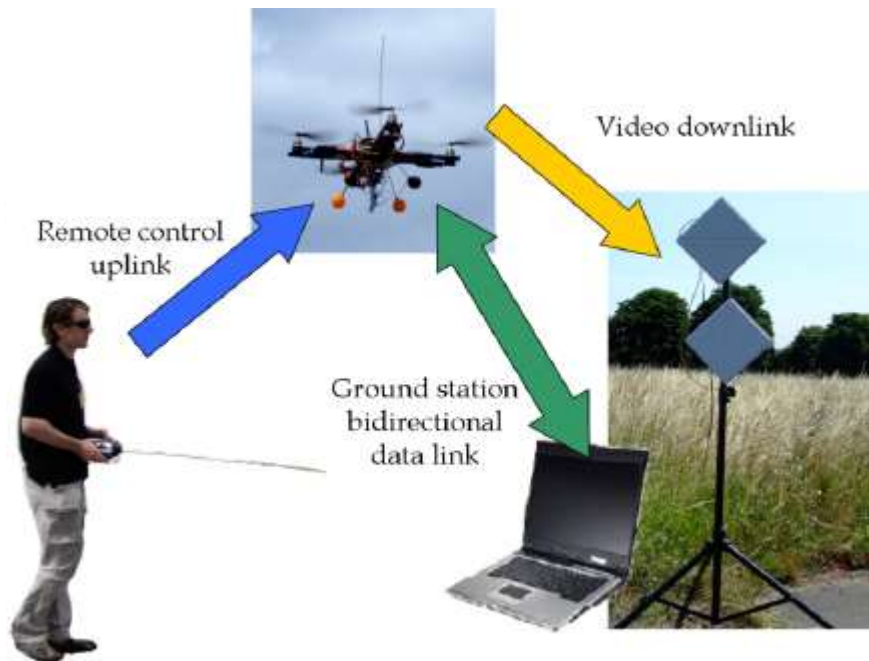
Satellite Systems

Solution

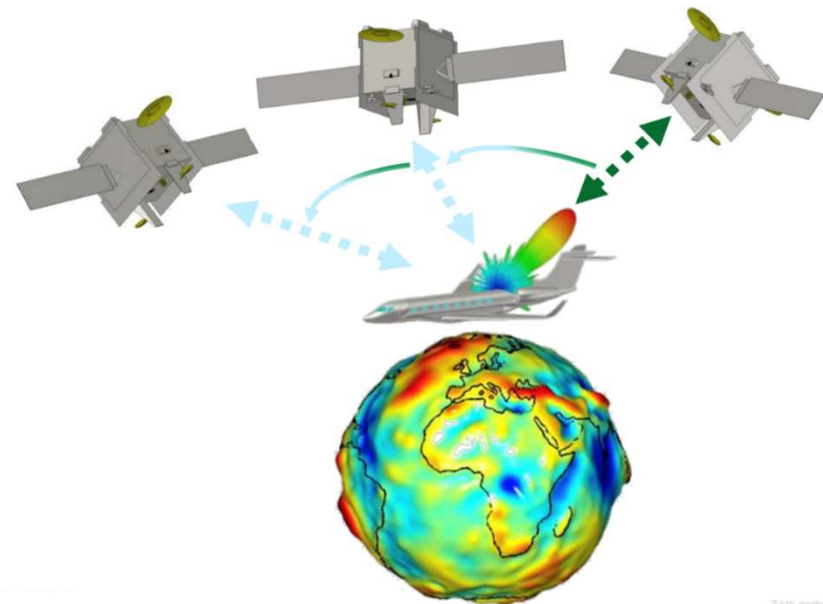
- Using Ka (open space)
- Small Size 30x18cm
- Light ~5kg (16w configuration)
- Low P. Consumption (<20w)

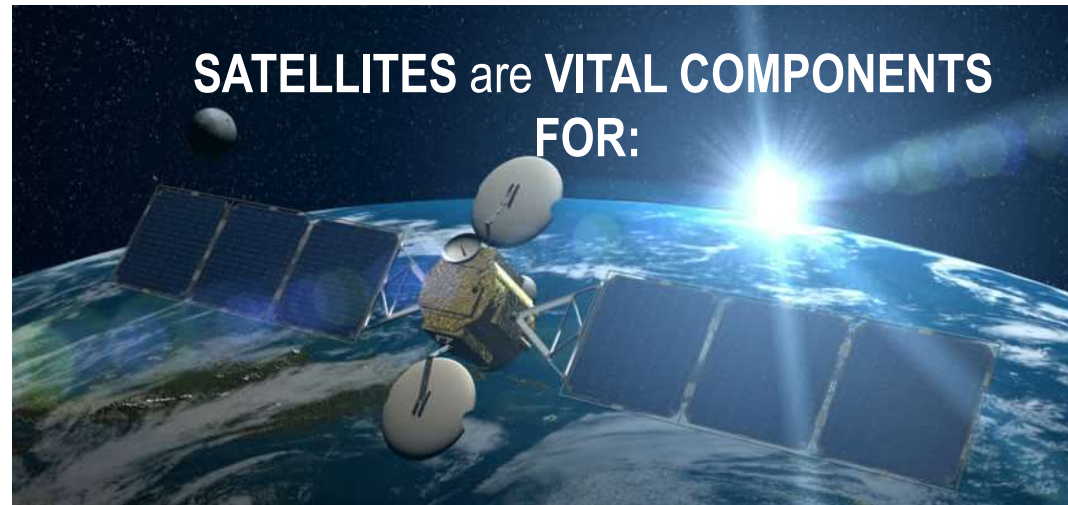
Applicazioni

UAV DATA LINK



Comunicazioni satellitari su mezzi in movimento

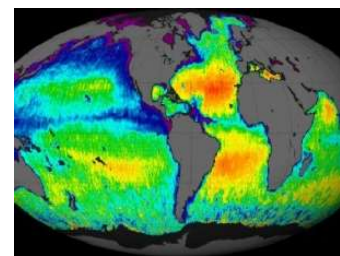




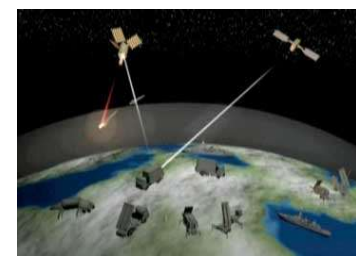
telecommunications



navigation



earth observation



security

Thousands of Satellites orbit around the Earth



HUNDREDS of MW filters assembled in EACH satellite

Each satellite LAUNCH costs **50-100,000 €/Kilogram**



**COST SAVING is
ESSENTIAL**

Miniaturized Filters



Smaller Satellites
Additional available Payload



Cheaper Launch
Satellite Business increases

Microwave filters:

Key components for terrestrial and satellite communications



satellites



military equipments

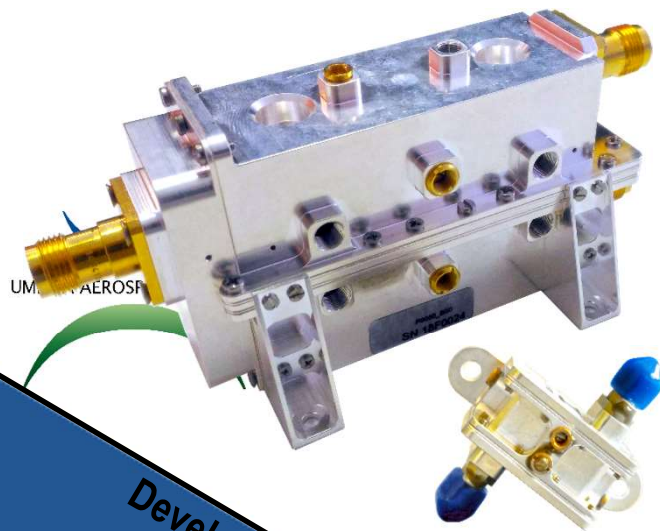


**terrestrial
telecommunications**

High performance filters: Bulky and heavy, need to be minaturized

High-power Compact Dielectric-loaded Filters

Technology developed for space applications in the frame of
ESA ARTES projects



Ultra compact (>50% smaller than conventional technology)

Very low loss

Hundreds watts of power handling

Custom design

Developed for space environments

Typical bands: L S C ($1 \div 5$ GHz)

Applications: *MSS (Mobile Satellite Services),
TT&C (Telemetry Tracking and Control)*

Developed in collaboration with:



Surface-Mountable Micro-Machined Filters

Technology developed in the framework of ESA ARTES project:

Compatible with SMD (Surface Mountable Device) technology and PCB (Printed Circuit Board) technology

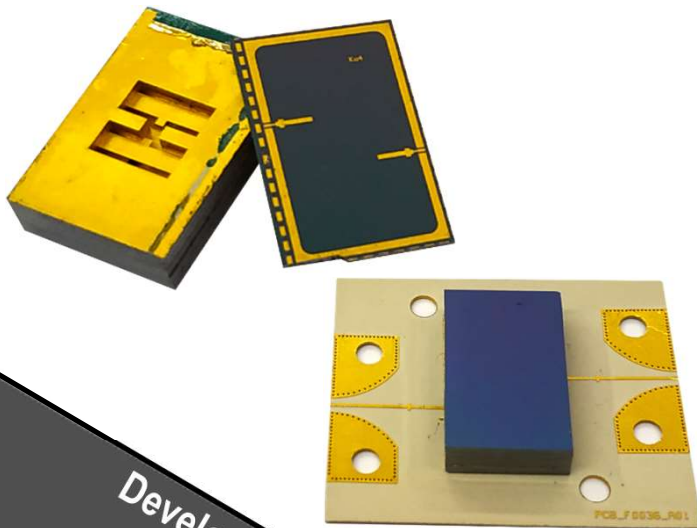
Low loss

Low cost (in batch fabrication)

High compactness

Typical bands: Ku Ka (and above: 10 ÷ 100GHz)

Applications: *ground-segment terminals, on-board input filters*



Developed in collaboration with:





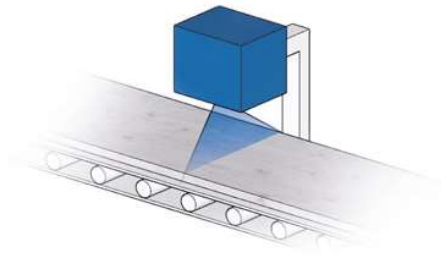
Applicazioni Industriali

- IoT
- Industria 4.0



Moisture, Mass and Density Sensors

Microwave Sensors for In-line Non-Destructive Measurements



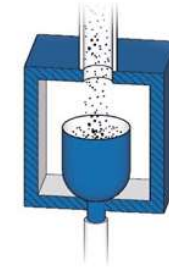
**Surface
Moisture Sensor**

- For paper and wood
- Moisture range 0 to 40%
- Up to 0.01% accuracy
- Up to 5000 samples/s



**Flow Through
Moisture Sensor**

- For plastic pellets and chips
- Moisture range 0 to 1%
- Up to 0.001% accuracy
- Up to 50 samples/s

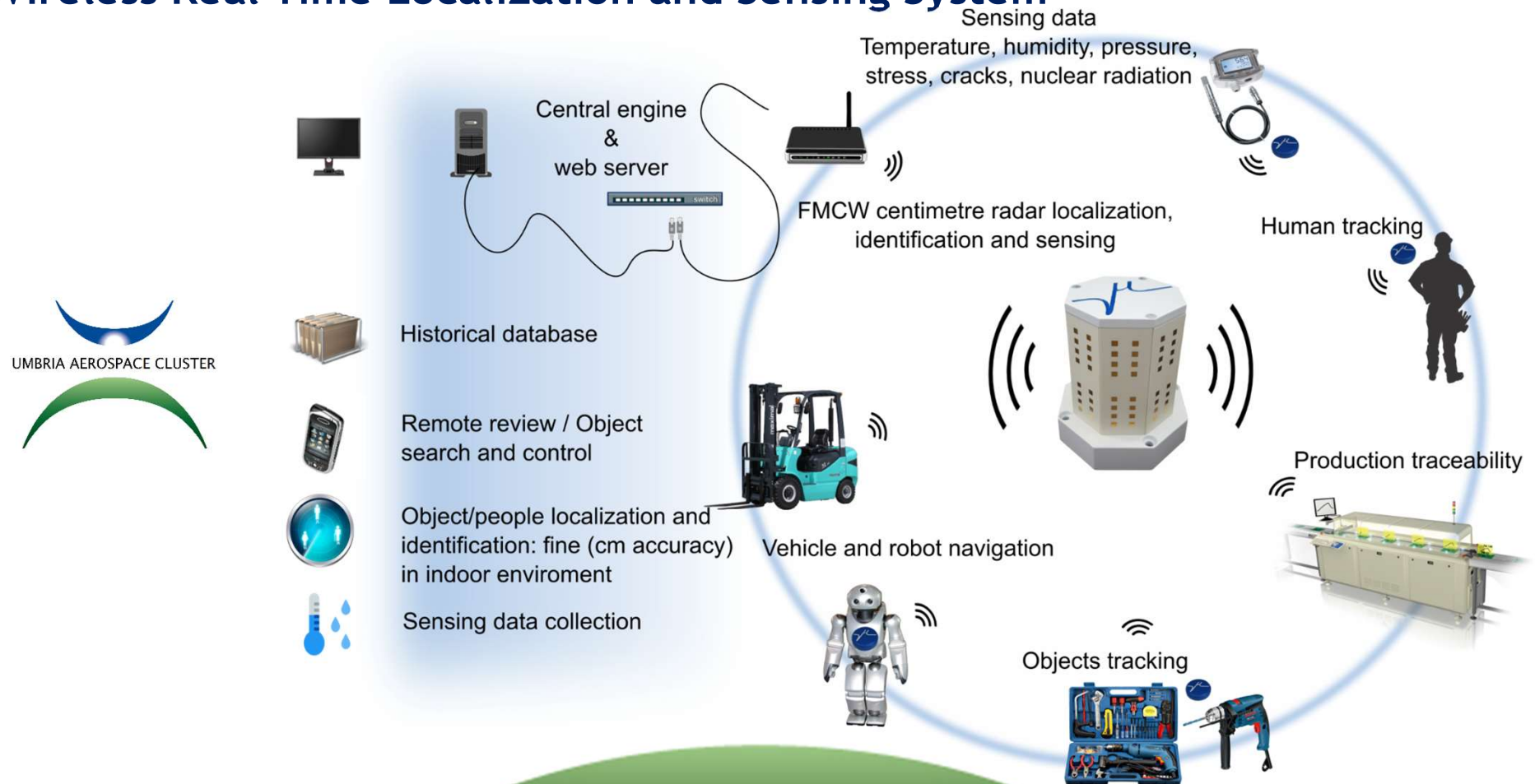


**High Precision
Weight Sensor**

- For capsule filling machines
- From 10mg up to 600mg
- Up to 0.5% accuracy
- Up to 500 samples/s



Wireless Real Time Localization and Sensing System





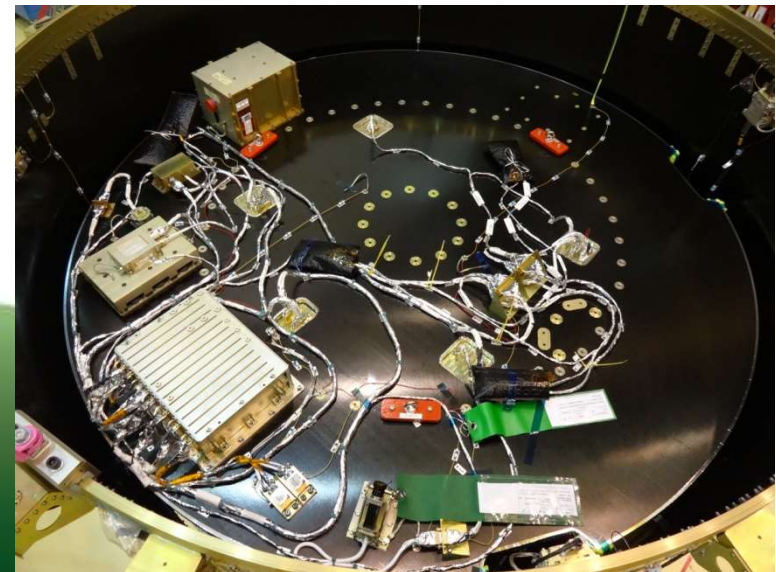
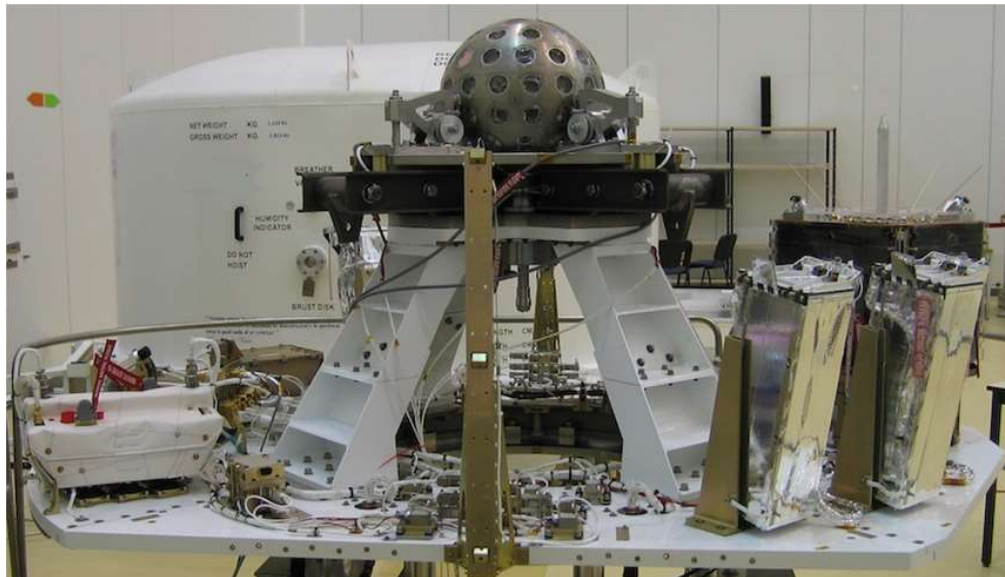
La New Space Economy ha un potenziale impatto su tutti i settori emergenti



Influenza su reti di impresa esistenti e potenziali....

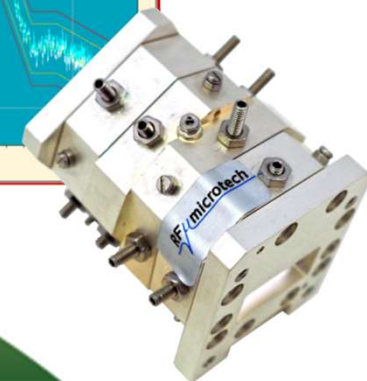
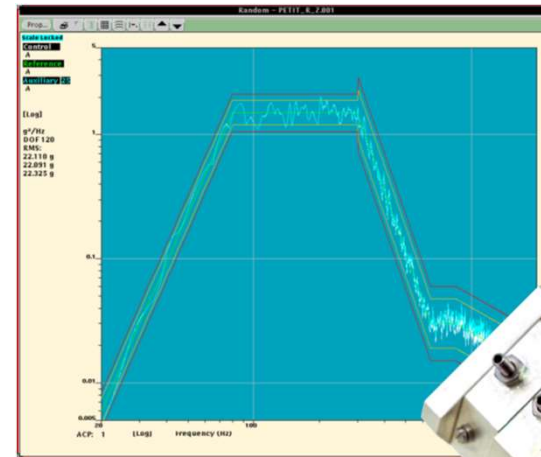
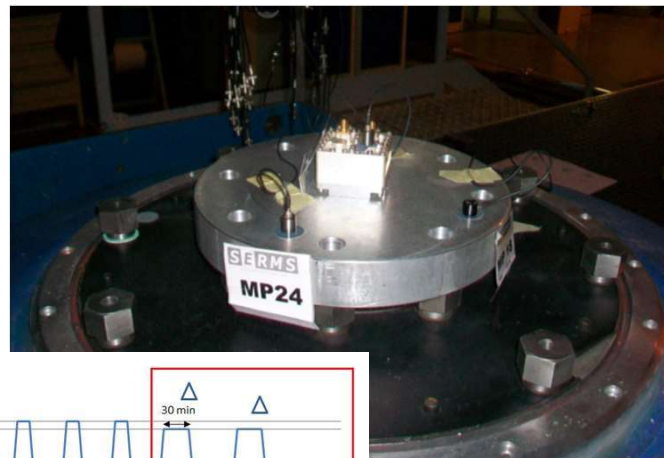
(Possibile) Collaborazione con ART/TEMIS su Telemetria a RF

- Market: Aerospace/Defence/Railway
- Technology:
 - Acquisition and data processing
 - Acquisition and video processing
 - Acquisition and audio processing
 - Human-Machine Interface technology



Collaborazione con SERMS per test di qualifica

- Settore: Filtri per applicazioni spaziali
 - Resistenza alla vibrazione
 - Resistenza allo shock
 - Caratterizzazione in temperatura





CONCLUSIONI

- New Space Economy: legata trasversalmente a tutti i settori produttivi emergenti (Automotive, 5G, IoT...)
- Opportunità di crescita e intensificazione collaborazioni
- Necessità di forti investimenti nel settore, a rischio (concreto!) di restare indietro





Grazie per l'attenzione



www.rfmicrotech.com