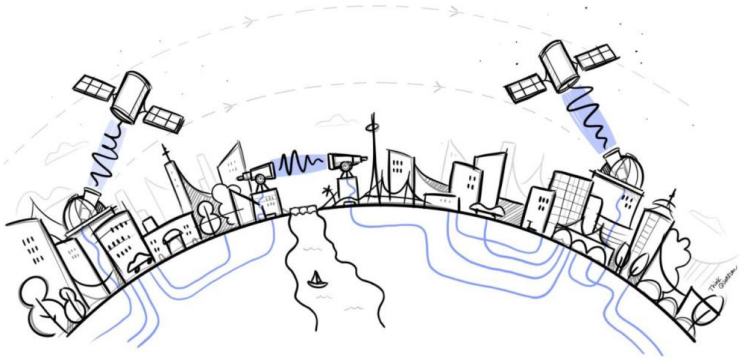

Stefano Bonora
CEO and founder

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DYNAMIC OPTICS
ADAPTIVE OPTICS TECHNOLOGIES

May 2021

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Group

OFFICINASTELLARE
OUR WORLD, YOUR SPACE

Italian Space factory
www.officinastellare.com

DYNAMIC OPTICS
ADAPTIVE OPTICS TECHNOLOGIES

Deformable optical devices and systems
www.dynamic-optics.it

ThinKQUANTUM

Quantum key distribution
www.thinkquantum.com

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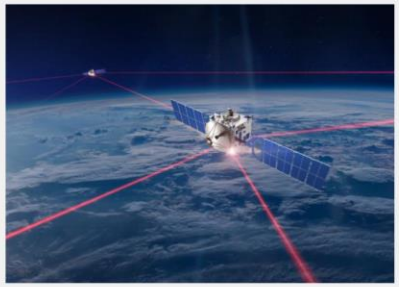
Space based applications: Earth Observation and Laser Communication/Ranging.

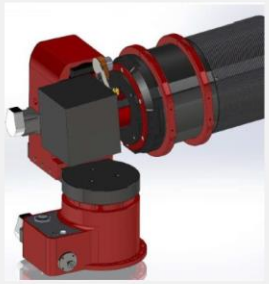


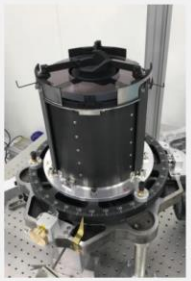



Officina Stellare offers a full-in-house TRL-9 expertise level on low cost, high performance, high replicability and reliability design space telescopes for Earth surface imaging*. Success achieved also through the "space qualification" of some new materials we obtained that enabled the access to new cost effectiveness solutions and opportunities. In short, Officina Stellare offers full Prime Contractor capabilities for Electro-Optical Space Payloads (telescope and focal plane instrumentation).*

Officina Stellare is also a leading player in the market of multi-role, multi-mission Optical Ground Station or laser communication, Quantum Key Distribution and laser ranging applications.







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Venice, Officina Stellare space telescopes multispectral constellation
Less than 1 meter ground resolution

www.officinastellare.com

Officina Stellare and the New Space Economy scenario.

Scenario

The term «*New Space Economy*» refers to those opportunities that will arise in the future thanks to a growing accessibility to Space and its data, infrastructure and technologies.

The "Space democratization" will foster a new market segment open to a diversified pool of potential customers.

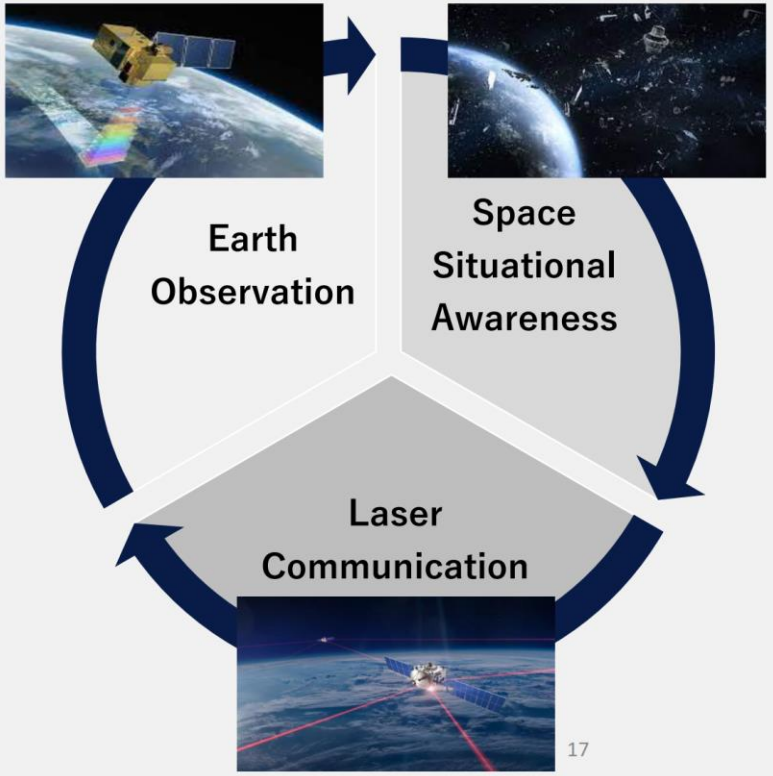
Space will no longer be the place in which the big institutional players achieve niche or research related success, but it will become a place in which applications will be made possible to the benefit of everyone's daily life.

Officina Stellare's focus for this young market include:

Earth Observation (EO)
Thousands of launches planned in the future years.

Laser Communication (LC)
The future will require higher data transmission capacity, thus pushing the need for Laser Communication from/to Space.

Space Situational Awareness (SSA)
The increase in the number of orbiting satellites will require more effort in the SSA to enhance safety.



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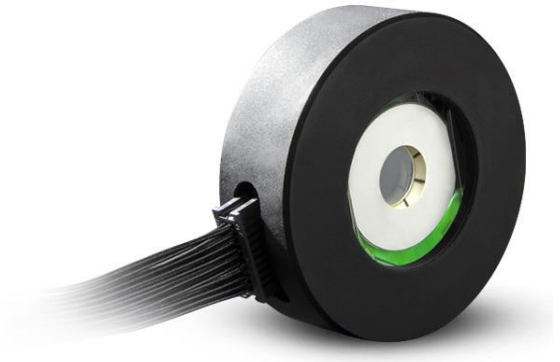
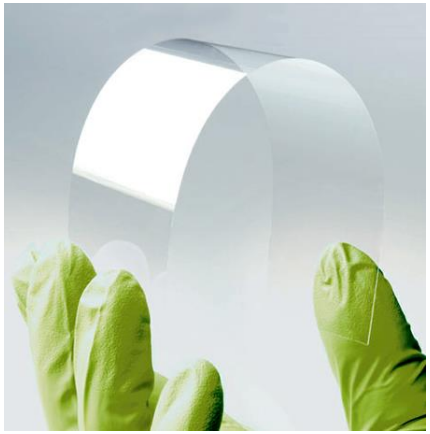
PRODUCTS

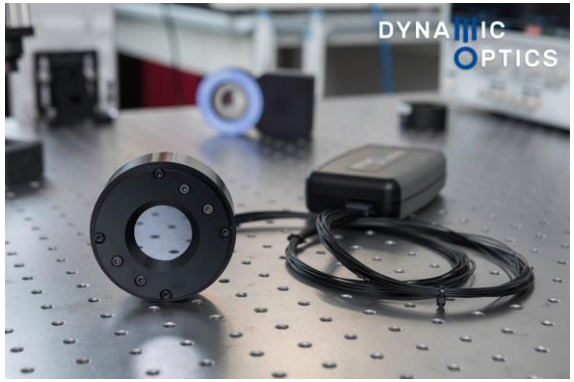
Adaptive Lenses





Flexible glass membranes

Deformable mirrors



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OUR INTEREST IN SPACE OPTICS

Laser communication

Development of adaptive optics system for Optical Ground Station

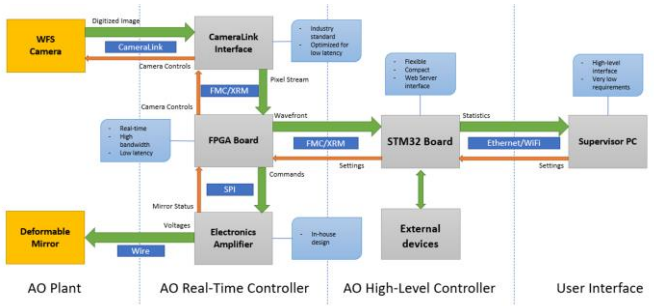
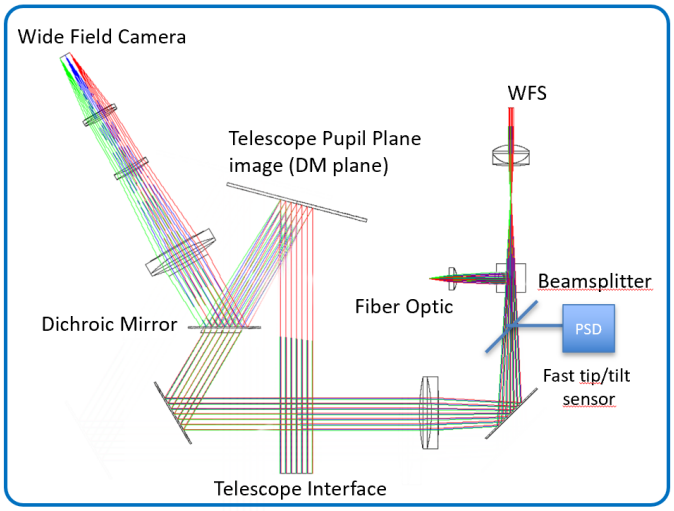


Figure 3: Block diagram of the control system.

Adaptive optics components for space

Deformable lenses, deformable mirrors, steering mirrors

OPTICAL BREADBOARD



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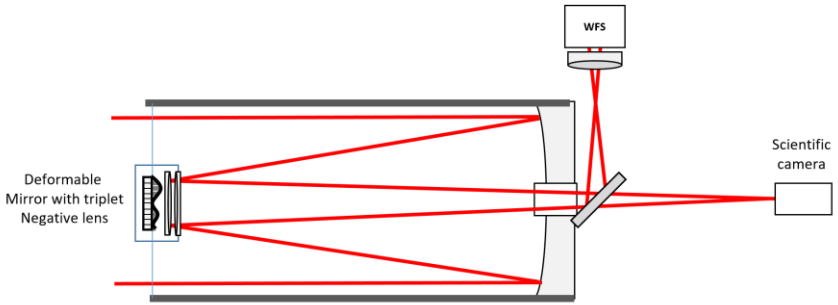
INNOVATIVE SOLUTIONS FOR LASERCOM

TELESCOPE	
Manufacturer	Officina Stellare
Optical set	Spherical primary mirror, deformable secondary mirror with refractive triplet in double pass
Primary mirror diameter	300 mm
Focal ratio	f/21
Focal length	6300 mm
Linear obstruction	100 mm
Dimension	1364 x 657 mm
Weigth	27.31 kg
Back focus length from back plate	198 mm

Deformable mirror:
50mm aperture, 32 actuators



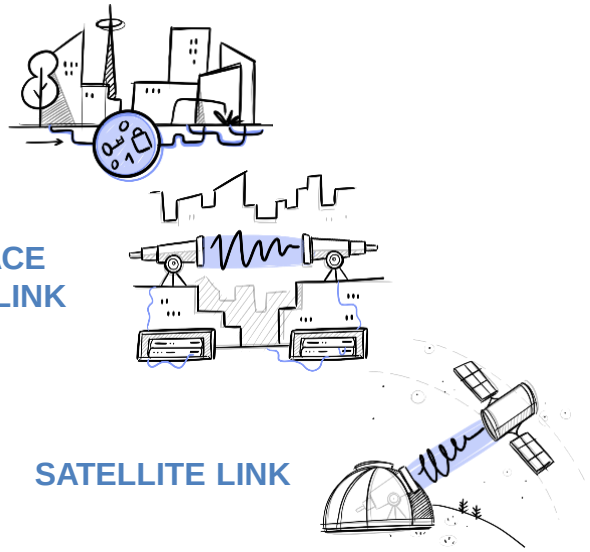
Ritchey Chretien 11" f/8 telescope
Officina Stellare

QUANTUM KEY DISTRIBUTION CHANNELS

FIBER-LINK

FREE-SPACE OPTICAL LINK

SATELLITE LINK



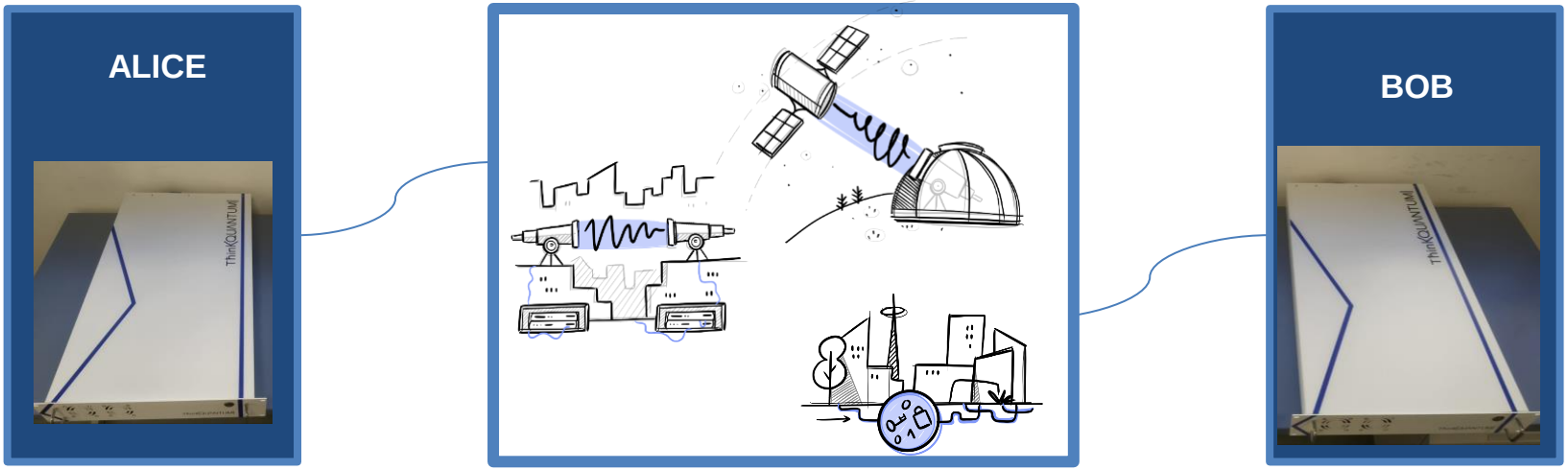
QKD can be implemented with different protocols and communication channels depending on project constraints:

- **Fiber-link** is commonly used for communication between fiber-connected points, typically within the distance of few tents of km in metro networks
- **Free-space Optical-link** is used for longer distances or when points cannot be fiber-connected
- **Satellite-link** is required to cover large distance applications as well as key pillar in national and regional infrastructures

Future QKD networks, challenged by a variety of constraints, will integrate Fiber AND Free-Space AND Satellite links. ThinkQuantum designed a multichannel Technology Platform where **Alice and Bob devices work independently form the communication channel** easily couplable with fibers (fiber-link), compact telescopes (free-space optical link) or mid-large telescope (satellite communication / ground station)

www.thinkquantum.com, info@thinkquantum.com

MULTICHANNEL SOLUTIONS BASED ON ONE QKD TECHNOLOGY PLATFORM by THINKQUANTUM



In such ThinkQuantum Platform, **Alice and Bob devices work independently form the communication channel**: acc. to the installation & infrastructure constraints, they can be coupled with fibers (fiber-link), compact telescopes (free-space optical link) or mid-large telescope (satellite communication / ground station).

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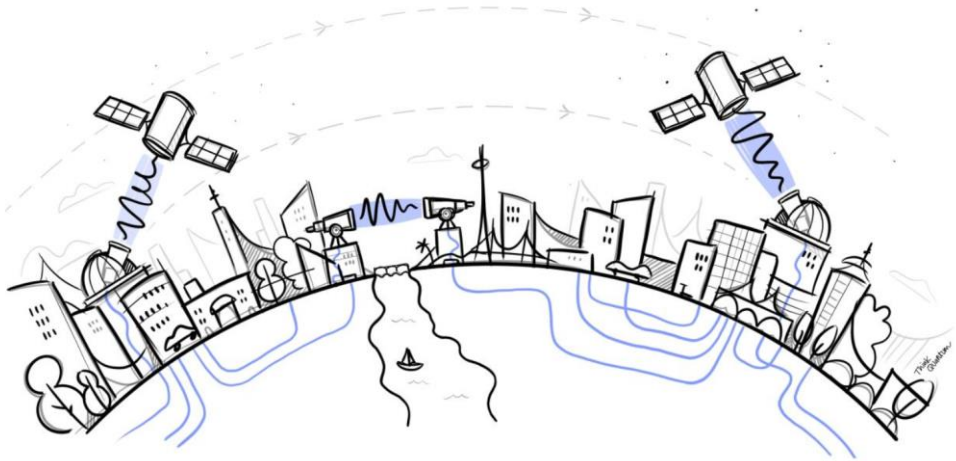

ThinkQUANTUM

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