LUMIKER

Technological Applications
WTG Blade Monitoring

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LUMIKER

We are a young company formed by industrial and telecommunications engineers with experience in the **electrical sector**. For several years we have been investigating the different sensor technologies **in optical fiber** as **Faraday, Bragg, Brillouin, Raman and Rayleigh.**

We have multiple patents that allow us to obtain real time measurements of any asset.

Three years ago we developed CAMOS for high voltage cables being the first company in the world to locate, predict faults by monitoring cable variables.

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Mission & Vision

- ✓ Society to be more efficient in Energy Management by using Photonic Systems.
- ✓ Improve Costumer OPEX with the best Asset Digital Monitoring Technology.
- ✓ Transfer Knowledge to our ecosystem with our turnkey Optic, Sensing and Electronic Solutions.

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TEAM

Benjamin Rosende
CEO& Founder RDT Group
Meng Industrial Engineer

Javier Bengoeceha
CTO & Innovation Director
MEng Teleco. Engineering

Izaskun Saratxo
SW Leader
Meng Teleco. Engineering

Juan Luis Garcia
Mechanical Leader
Meng Mech. / Beng Chemical Eng.

Daniel Bueno
HW Leader
Meng Automation & Electronics

Susana Valdivielso
Procurement & Admin Leader
Degree in Technical Administration

David Bengoechea
Project & Industrialization Leader
Meng Materials & Mechanical

Manuel Muñoz
Managing Director
Meng Aerospace with French

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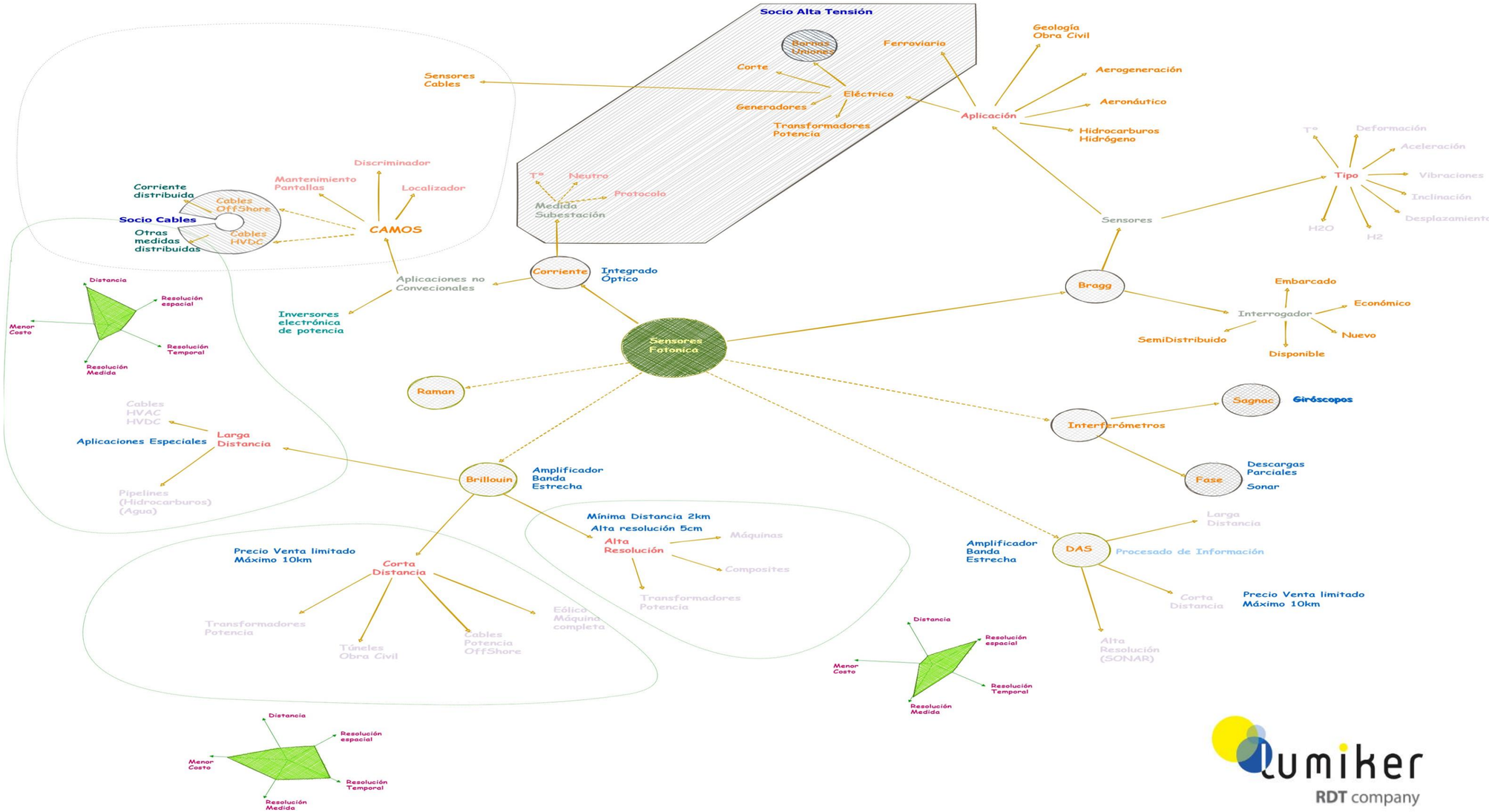
Technologies vs Product Map



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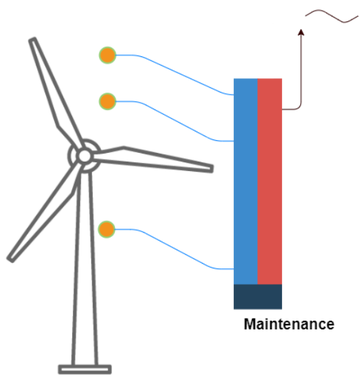
CONVENTIONAL SENSING IN WIND PARKS

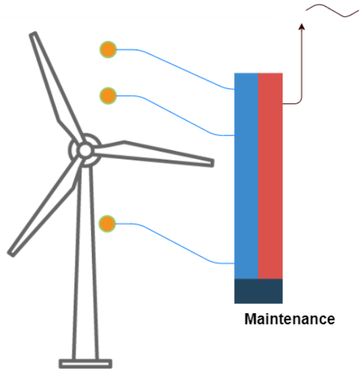
Sensors | Algorithms | Communications | Power Supply

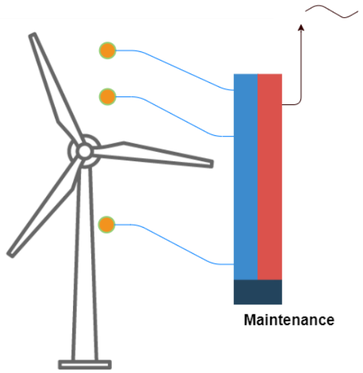
Cloud

Electronics

CONVENTIONAL SENSING IN WIND PARKS







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PROBLEMS

Self-Powered Systems +

Hard to establish correlations

Limited Cloud Process

LIMITED COMMUNICATIONS

LIMITED INFORMATION

IMPOSSIBLE TO UPDATE REMOTELY

Electronic Components +

DAMAGE

HIGH COST OF MAINTENANCE

STOP OPERATIONS

FAILURES

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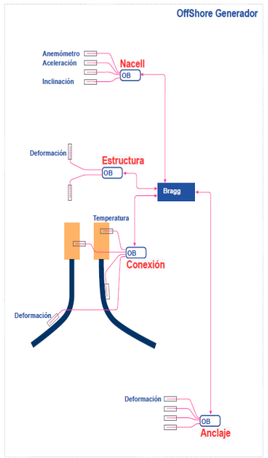
Proposed Technology for WTG Monitoring

BRAGG



Optical Box

Light Emitter and Receiver

LK Patent – Multiplexer.

Can read from with the same fibre from different Sensors

Bragg Optic Sensors

Temperature, Strain, Vibrations…

SCADA (IEC)

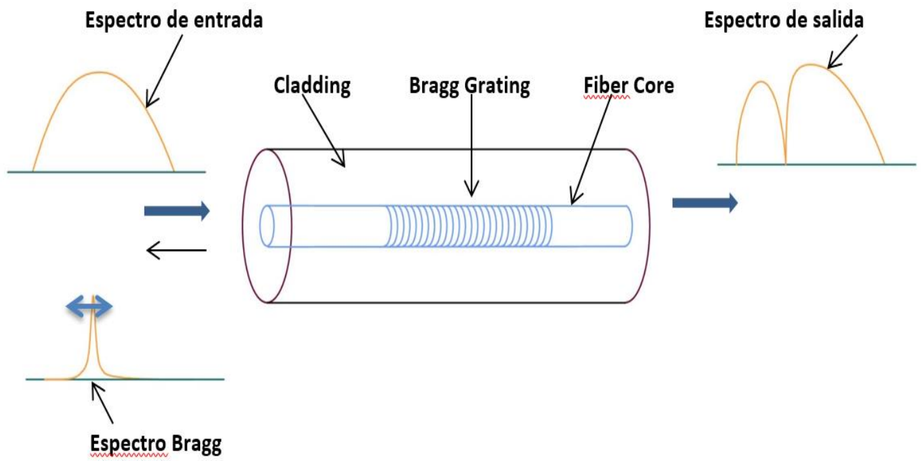
CPUs & Interrogators

Signal Treatment & Processing

Remote Connections

Local HMI Connection | Display

CLOUD & DATA Management



***Bragg Networks** are sensors on optical fiber for the measurement of deformation, vibration, temperature, inclination and other parameters.*

A Bragg network is a mm /nm periodic or aperiodic disturbance of the effective refractive index in the core of an optical fibre, over a certain length of, for example, a few mm or cm.

Benefits of BRAGG technology for WTG:

- ✓ Measurement of ANY Variable.
- ✓ Passive & Di-Electric +(Always Works)
- ✓ Continuous Real-Time monitoring.
- ✓ Electromagnetic Resistant.
- ✓ Easy to Install & Small ins Size (Curing Cycle in Composites).

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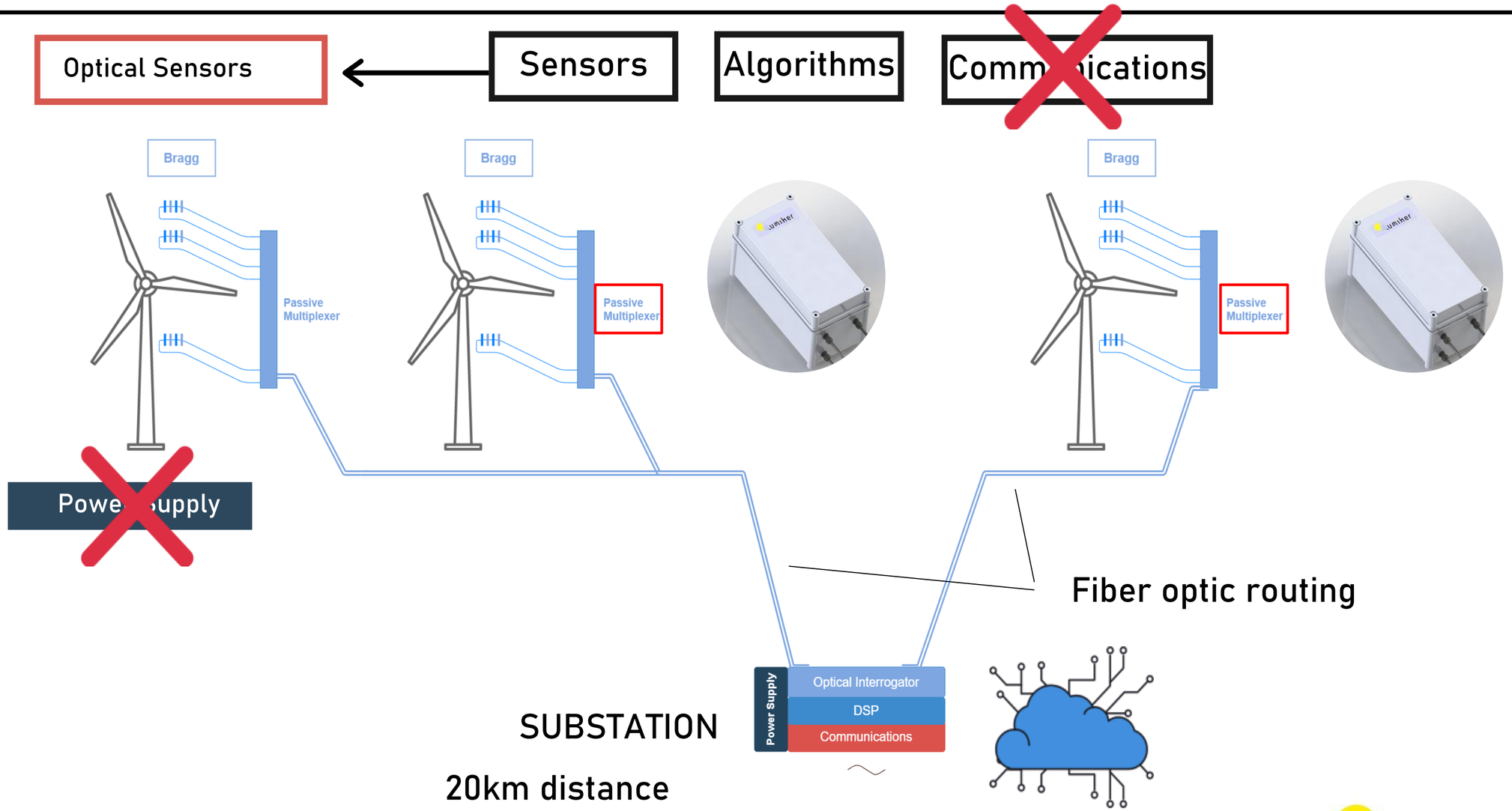
LUMIKER PROPOSAL

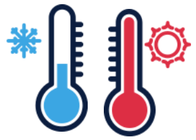
BRAGG



LUMIKER BENEFITS

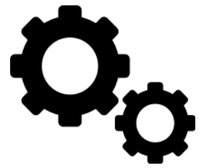
BRAGG

PASSIVE SYSTEM



RESISTANT TO ADVERSE ENVIRONMENTAL CONDITIONS

EXCELLENT ELECTROMAGNETIC COMPATIBILITY



NO MAINTENANCE REQUIRED

REAL-TIME MONITORING

MORE INFORMATION FOR THE MAINTENANCE

REMOTELY UPDATES

SPECIAL SENSING OF COMMERCIAL COMPONENTS OF WTG

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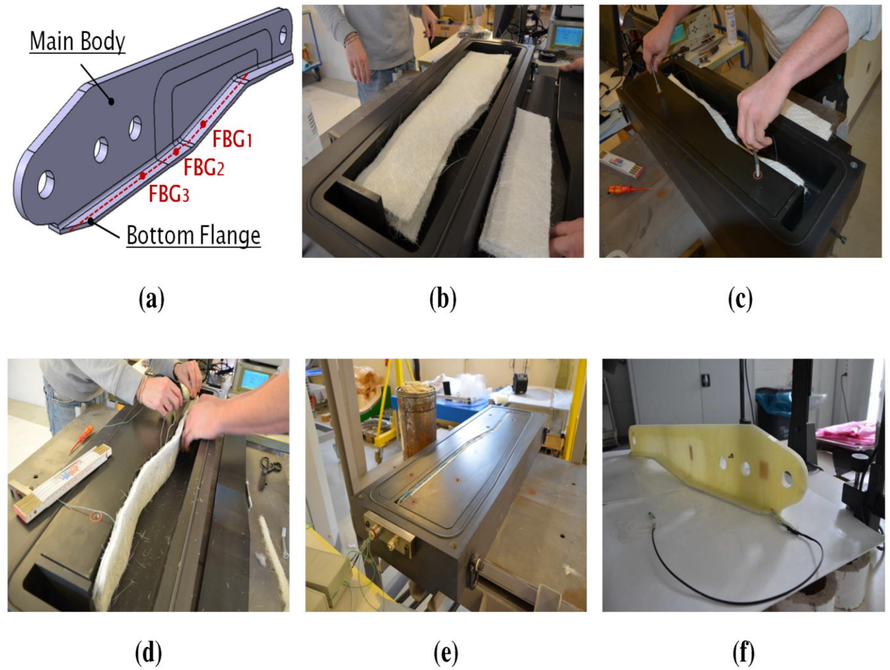
Proposed Technology for WTG Blade Monitoring

BRAGG

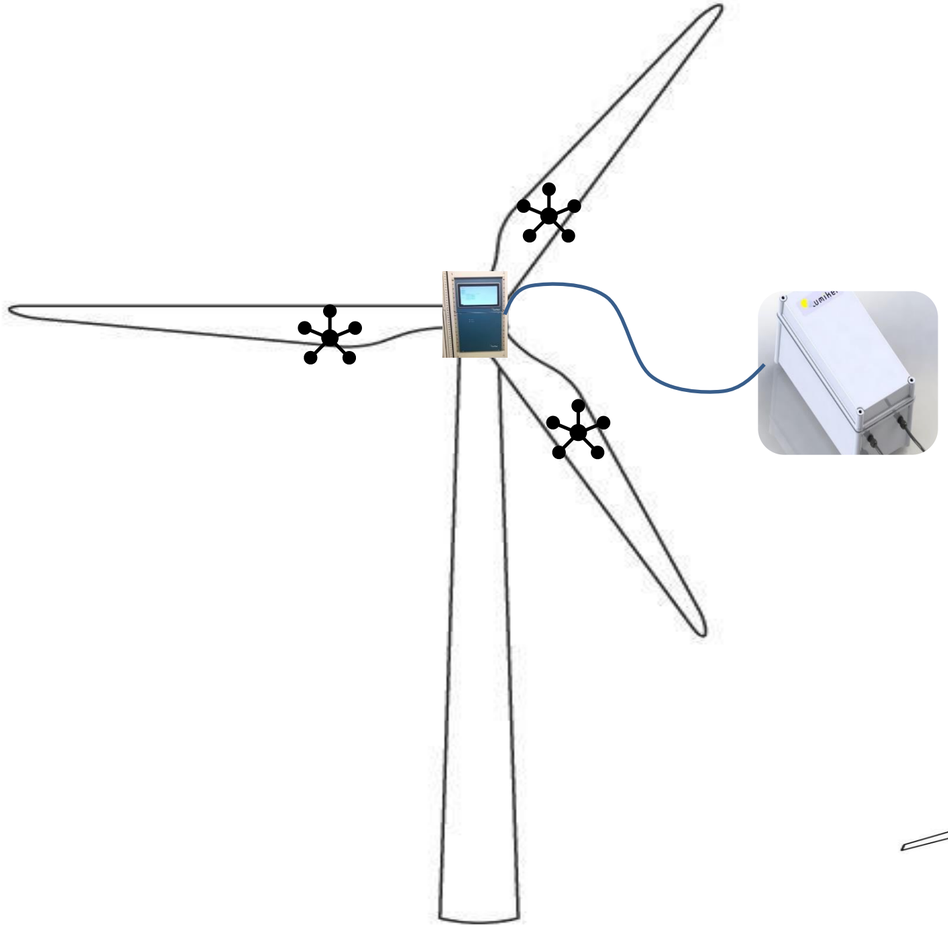


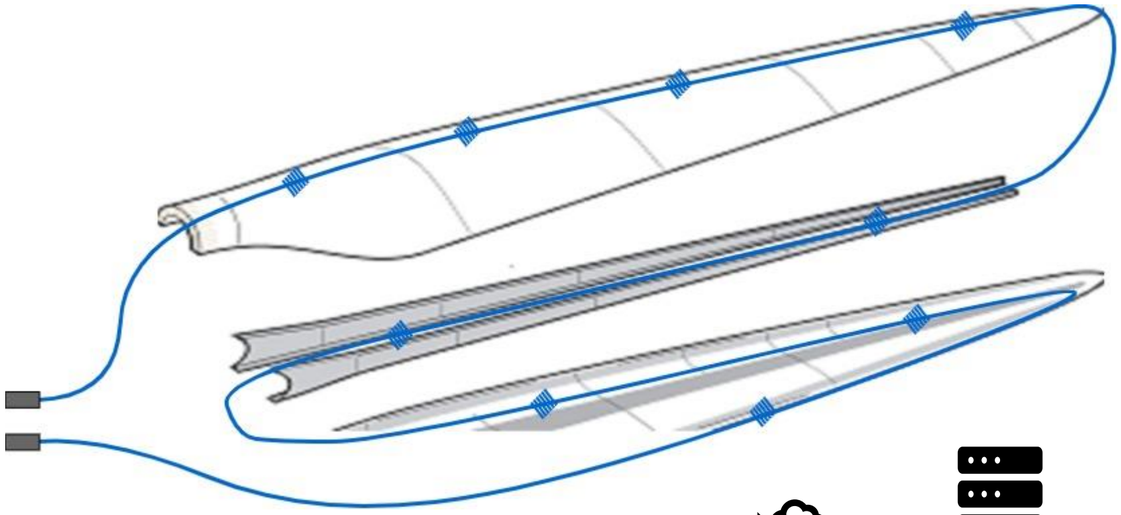
OPTION 1: Fiber Glass Protruded with Fiber Optic Bragg Can be cured in the Mold and Stand all Cycle Pressures & Temperatures

OPTION 2: Grating on the External Surface.

Proposed Technology for WTG Blade Monitoring

BRAGG

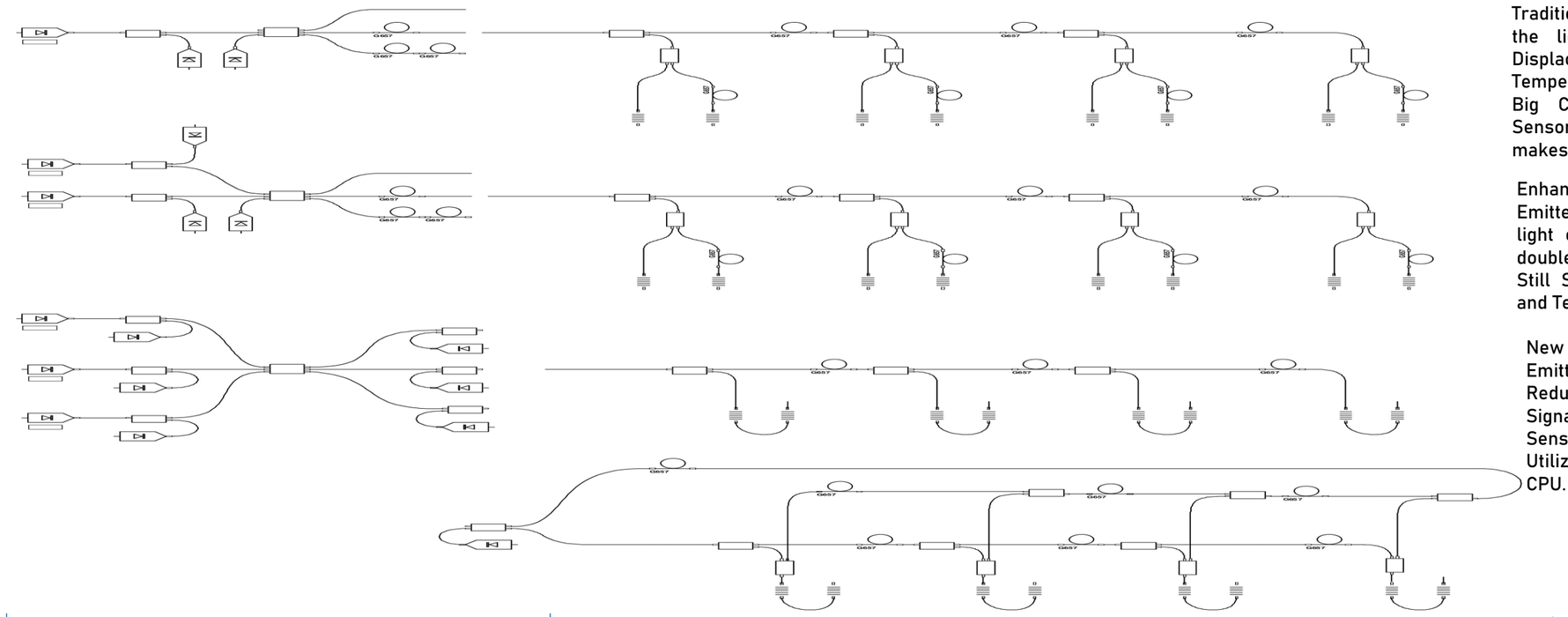


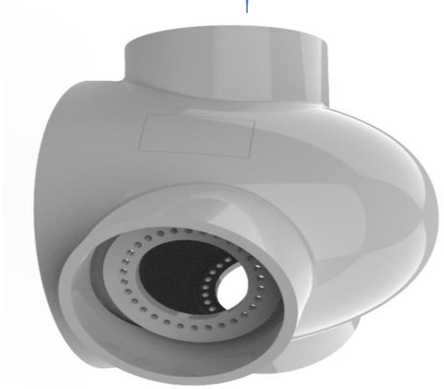


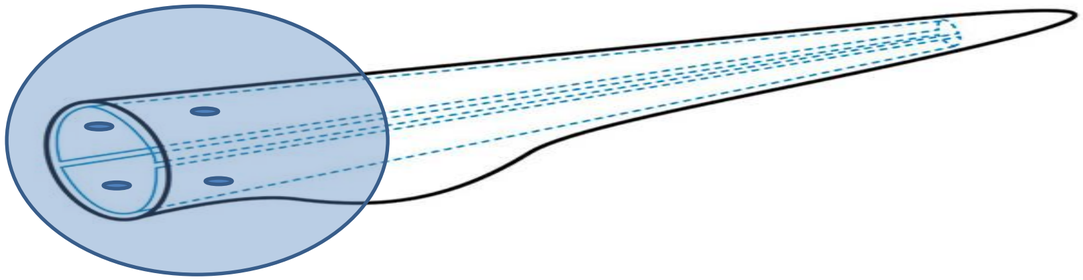
IEC60870-5-104

Proposed Technology for WTG Blade Monitoring

BRAGG







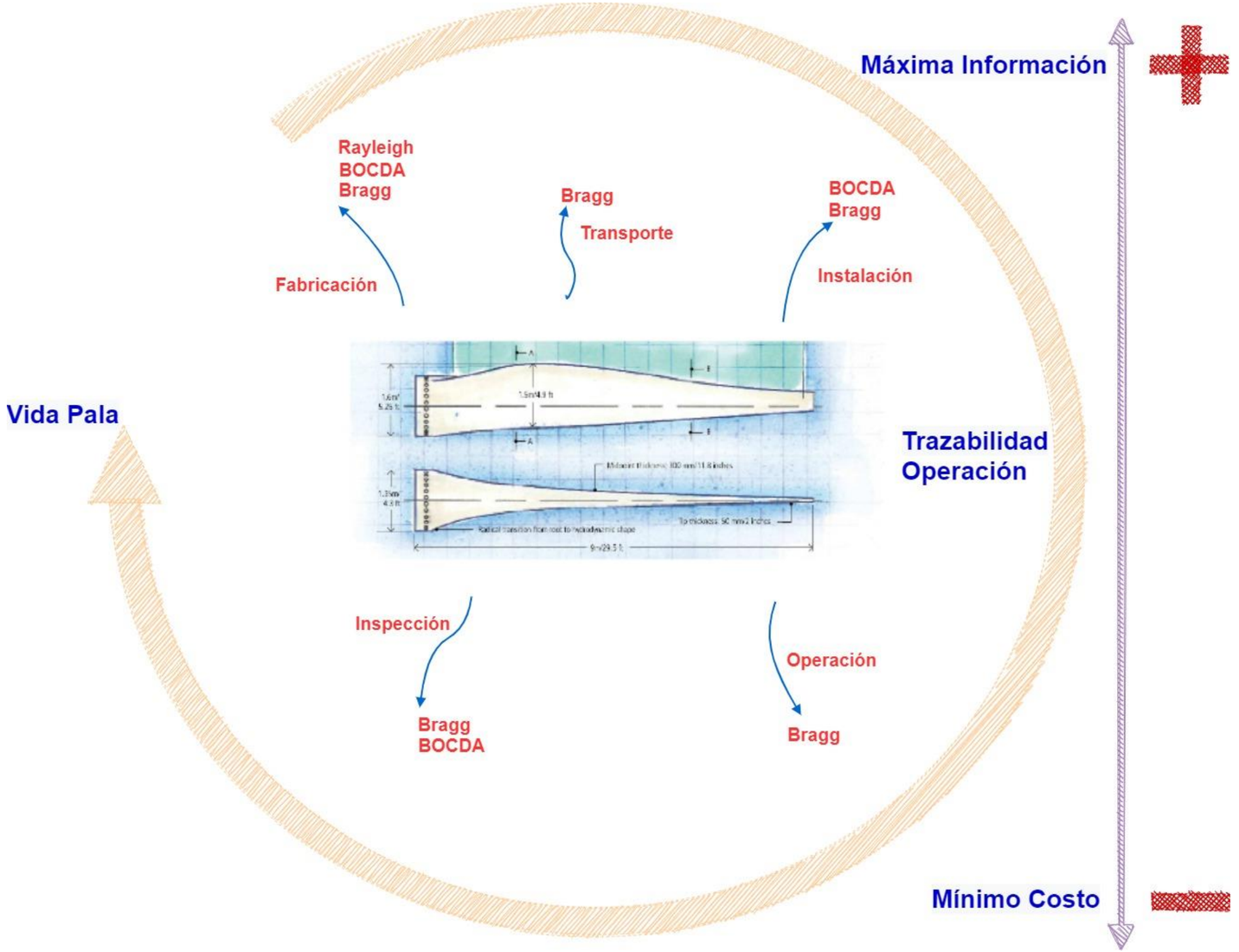
Traditional: No redundancy on the light Emitter. Separate Displacement and Temperature Normally Gives Big Cages To protect the Sensors. Possible Attenuation makes CPU Expensive

Enhanced: Double light Emitter. Redundancy. More light can be pumped when double source is working. Still Separate Displacement and Temperature.

New LK Solution: Triple light Emitter with Pump. Redundancy, Very Stable Signal. Can Integrate Sensors & reduce Fibre Utilization whilst improving CPU.

Proposed Technology for WTG Blade Monitoring

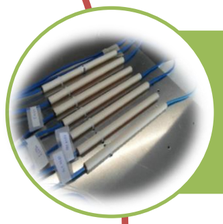
Optical Sensor



Wind Blade Optical Monitoring

ADDITIONAL CHARACTERISTICS

LUMIKER technology makes it possible to reduce the use of existing fibre optics, through the installation of multiplexers that increase the number of optical transformers connected at the same time. It also includes the internal manufacturing of patented double braided fibre to have system redundancy.



Specifically Adapted & Calibrated Bragg Sensors for ease of installation, high precision and durability.

The Product is Standardized and Modular: The system consists of 3 elements (Processing unit, Optical Bragg Sensors and Multiplexers), the number and placement can be adapted depending on the specific needs and characteristics of each site. Each Sensing equipment can include special connectors to ease the assembly and disassembly of blades.

The system is passive, Atex and EMC and designed to last the same life as the facility not requiring any additional Maintenance Task, guarantee of a continuous non-stop monitoring.

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Wind Blade Optical Monitoring

BENEFITS FROM LUMIKERS BRAGG SYSTEM WTG

Increase the Resiliency and Maximise the Utilization of the WTG
Allows to measure in real-time and to connect with operational or field brigades in order to upkeep the park functionality.

Minimises the need of preventive maintenance and the need for periodic field tests.
This avoids the movement of personnel to the facility hence greater efficiency is achieved in terms of costs and time.
Reduces the risks of physical safety due to Visual Inspection

LUMIKERS Interrogators & CPU are prepared to connect remotely, defining any IEC60870-5-104 –SCADA Alarms, integrating a fault locator, to plan and reduce corrective maintenance costs.

The solution will allow to improve blade design, linking the operational. data to the twin digital model.
It also allows to predict blade RUL and to define best Energy deployment Strategy for the whole park

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Take Away

Solution Economic Efficiency:

- ✓ Reduces Maintenance Costs, height human tasks, and the need to replace blades as a lack of predictive/preventive maintenance.
- ✓ Increases the Global Park Efficiency balancing the atmospheric vs operational condition.
- ✓ Increases the ability to assess Blade RUL.

Additional Maintenance & Supply Security:

- ✓ Reduces the Number of field trips and manual live-line works.
- ✓ Reduces time require to localise faults.
- ✓ Reduces errors associated with the use of multiple pieces of equipment.

Quality and Continuity of Supply:

- ✓ Reduces WTG Outages, and the number and time of Interruptions.
- ✓ Improves resiliency and efficiency of the overall power supply.
- ✓ The system is Passive, does not require the use of additional energy sources.

Digitalization and Knowledge Creation:

- ✓ Real-Time Remote Monitoring minimises the number of trips to the facility.
- ✓ Increase in real-time information on the status of the facility.
- ✓ Data Storage and Treatment Encourages innovation for the development of new technologies & integration of solutions.

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CONTACT

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