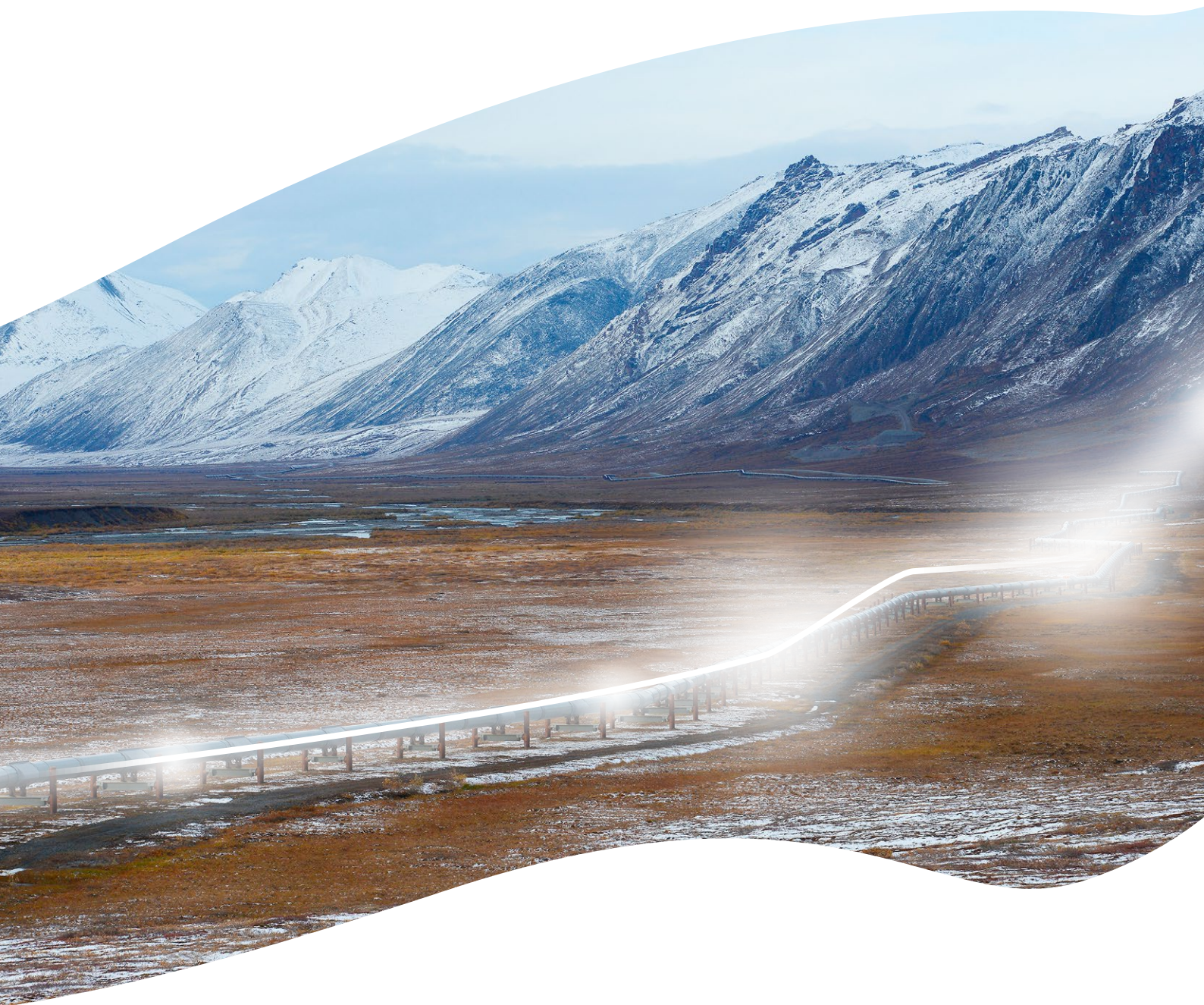




**Bandweaver**



MONITORING SOLUTIONS FOR  
**Pipeline & Process**



## SMART MONITORING SOLUTIONS FOR PIPELINE & PROCESS

› Informed decision making using an integrated monitoring system across all pipelines, process facilities and critical infrastructure.

Bandweaver has worked together with customers and partners for more than 10 years to develop security, process efficiency and asset integrity solutions for the petrochemical and industrial process industry.

Whether it is a remote long distance pipeline with limited security or an inner city pipe at risk of accidental damage from 3<sup>rd</sup> party construction or a process facility with condition monitoring requirements, Bandweaver's unique and versatile range of systems can provide a solution for you.



› **MORE THAN 1,250 INSTALLATIONS WORLDWIDE**



› **10,000KM OF INSTALLED FIBER BEING MONITORED**



› **MTBF\* OF OVER 31 YEARS FOR KEY COMPONENTS**

\*MTBF - Mean Time Between Failures



# THE BENEFITS OF INTELLIGENT SECURITY AND INTEGRITY SOLUTIONS

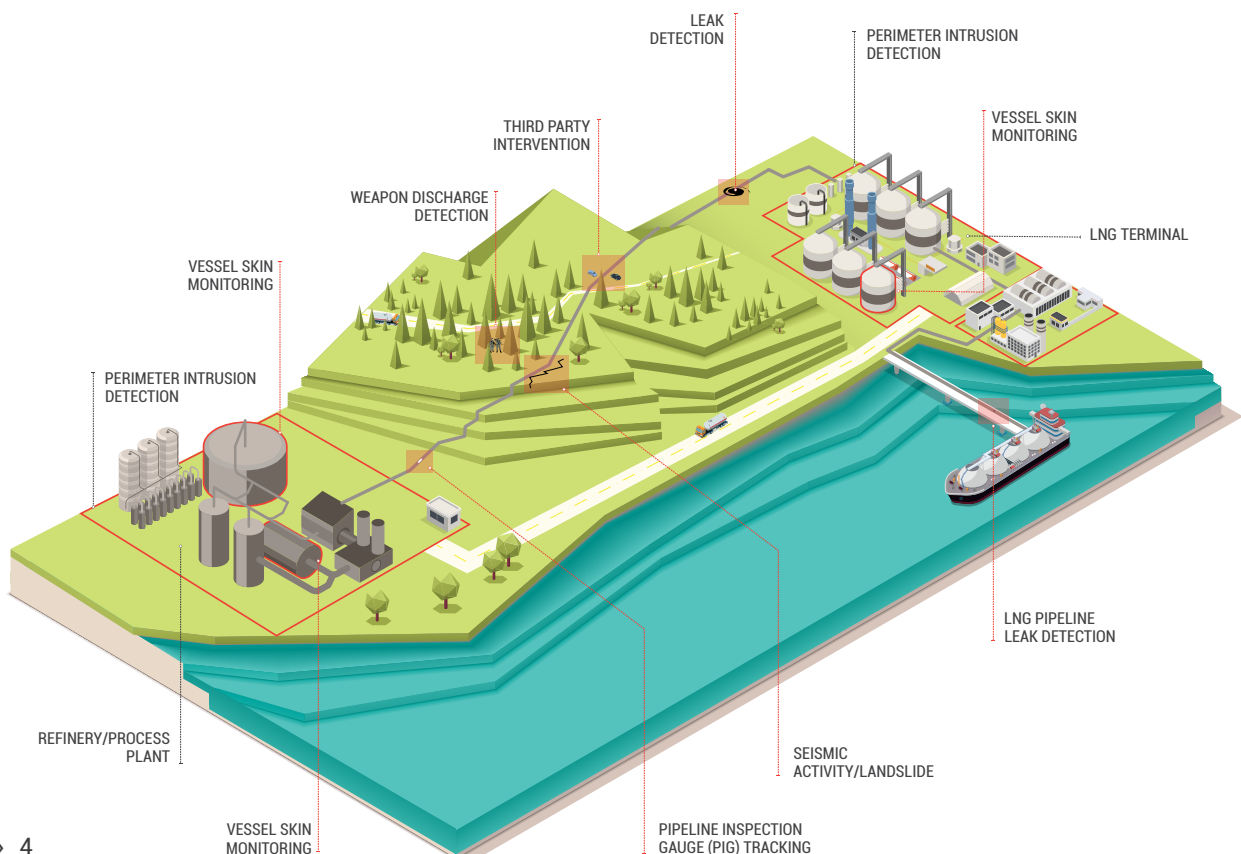
Feature	Benefits
DAS monitoring for Third Party Intervention (TPI) detection before the event occurs, whether it is malicious (terrorist, product theft) or accidental (3 <sup>rd</sup> party digging)	› Prevention of product theft, improved safety, lower maintenance and lower repair costs
Precise, real-time and actionable information at all points on the pipeline to within 5m of the event	› Rapid and focused decision making which improves custodianship over pipeline thus reducing risk to reputation damage
Proactive risk based maintenance using accurately measured real-time information	› Optimization of planned maintenance program and reduction in unscheduled downtime
Smart condition monitoring leads to effective prediction and prevention of equipment failure	› Reduced downtime leading to improved return on investment and delayed capital spending
Leak detection using both Distributed Acoustic Sensors (DAS) and Distributed Temperature Sensors (DTS)	› Early detection of leaks can prevent environmental damage, avoid fines and risk to reputation
Utilize existing telecoms infrastructure along pipelines working closely with telecoms/SCADA installer	› Ease of installation lowering overall cost of ownership
Smart software enables high probability of detection with a very low probability of false alarm activation	› Complete coverage of remote assets with limited capital expenditure and ability to quickly react to any threats before they occur



# PIPELINE & PROCESS MONITORING APPLICATIONS

## Application areas

- › Third Party Intrusion (TPI) detection (intentional sabotage or unintentional digging/drilling in vicinity)
- › Perimeter Intrusion Detection System (PIDS)
- › Pipeline Inspection Gauge (PIG) tracking
- › Condition monitoring of pipe and valves
- › Seismic and landfall detection
- › Pipeline leak detection both for liquid (hydrocarbon, water and chemical) and gas
- › LNG terminal and pipeline security and integrity
- › Vessel integrity (leak detection and skin monitoring)





## SYSTEM APPROACH

› Bandweaver’s extensive range of sensors and integrated smart software solutions, combined with our ability to interface with industry standard communication protocols, enable us to tailor the system to meet your specific needs.

Monitoring Scenario	Fiber Technology	Smart Software
Third Party Intrusion (TPI) detection	DAS	Maxview Event class
Perimeter Intrusion Detection System (PIDS)	DAS	Maxview Event class
Pipeline Inspection Gauge (PIG) tracking	DAS	Maxview Event class
Condition monitoring of pipe and valves	DAS/DTS	Maxview Event class
Seismic and landfall detection	DAS/DTS	Maxview Event class
Vessel integrity (leak detection and skin monitoring)	DAS/DTS	Maxview Event class
Pipeline leak detection both for liquid (hydrocarbon, water and chemical) and gas	DAS/DTS	Maxview Event class
LNG terminal and pipeline security and integrity	DAS/DTS	Maxview Event class

## Bandweaver services

Bandweaver has the expertise and personnel to provide services with the following disciplines, to ensure the system performs to your needs:

- › Front End Engineering Design (FEED)
- › Project management
- › System installation and commissioning
- › Product training
- › Support and maintenance



## SMART SOFTWARE FOR INTELLIGENT DECISIONS

› Distributed fiber optic sensing generates very large amounts of data at all points along your assets. However, the key to getting valuable decision making information is linked to having smart software algorithms that can quickly and effectively interpret and simplify the data.



### Condition monitoring

The software can be configured with specific thermal models for your vessel or pipeline and the surrounding environments to provide early warning and to allow you to run an efficient risk based maintenance program.

### Event classification & smart zones

Bandweaver has developed a library of event classifications to provide the system with the intelligence to identify the following and to minimize nuisance alarms:

- › Mechanical digging and drilling
- › Vehicle (light and heavy distinction)
- › Personnel movement and manual digging

Each section of pipe or facility can be configured as a specific smart zone with algorithms tuned to the specific environment.



### Integration and action

Once you have the information, you need to act. Bandweaver's system can be seamlessly integrated into existing systems and can activate surveillance or deploy rapid response teams.



# COMPLETE COVERAGE FOR REMOTE LOCATIONS

› Intelligent solution that provides complete protection to all points of your assets and critical infrastructure wherever you are.

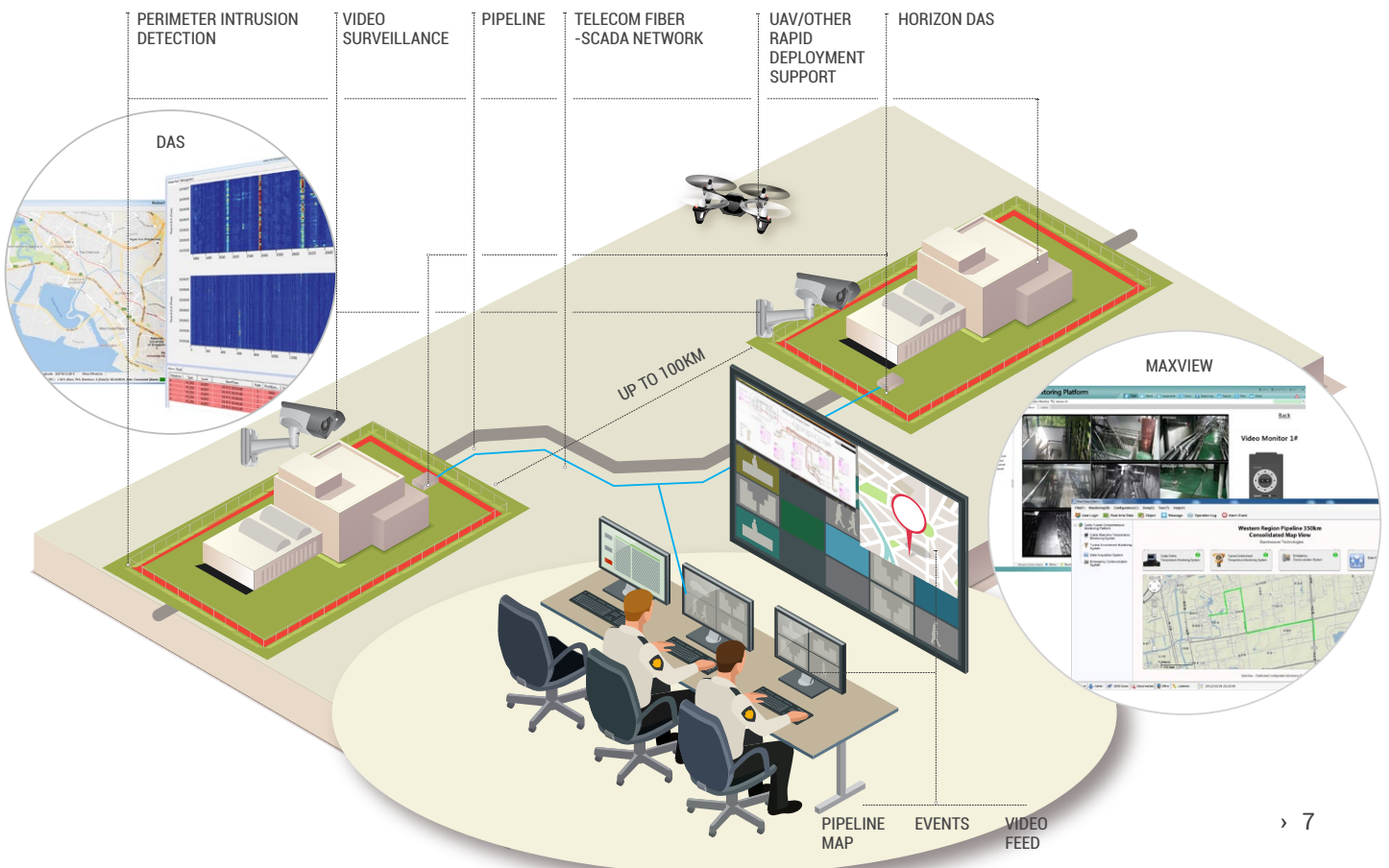
Valuable assets are often in the most remote areas covering hundreds or thousands of kilometers.

Often the damage is not apparent to the pipeline operator for weeks risking extensive environmental damage or product loss.

## The Maxview advantage

Bandweaver's Maxview software platform pulls it all together. It is a fully customizable SCADA software, with advanced visualization and the ability to consolidate and visualize multiple systems from multiple sites to a web based interface. Maxview can handle multiple DTS and DAS systems (also 3<sup>rd</sup> party DTS/DAS systems) and 3<sup>rd</sup> party sensors and data feeds.

Maxview also has the capability to export seamlessly to any 3<sup>rd</sup> party DCS and control system. We have interfaced with multiple control systems (Honeywell, Siemens, Emerson, ABB) and using many protocols can customize according to your needs.



# BANDWEAVER – A GLOBAL LEADER

› With more than 300 employees and facilities in 4 global hubs and 450 projects across 6 continents, Bandweaver is committed to providing you with state of the art, reliable monitoring systems to improve the efficiency and security of your assets.

## Reliability and approvals

Bandweaver is ISO 9001 certified and undergoes a rigorous continuous improvement program and tests all of its products to leading international standards.

- › Extensive environmental testing on all products
- › Components to meet telecom standards  
> 31 years MTBF
- › Products designed to minimize maintenance (e.g fan free design) and low total cost of ownership



› 10,000 SQM  
STATE-OF-THE-ART  
PRODUCTION FACILITY



› CLASS 100  
CLEANROOM AND  
TESTING FACILITIES



› MORE THAN 30  
R&D ENGINEERS



North America

United Kingdom

Dubai

China



**Bandweaver**

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