



ESMAP Meeting

Asset Management

May 2026



Asset Management in Terna

The electricity system



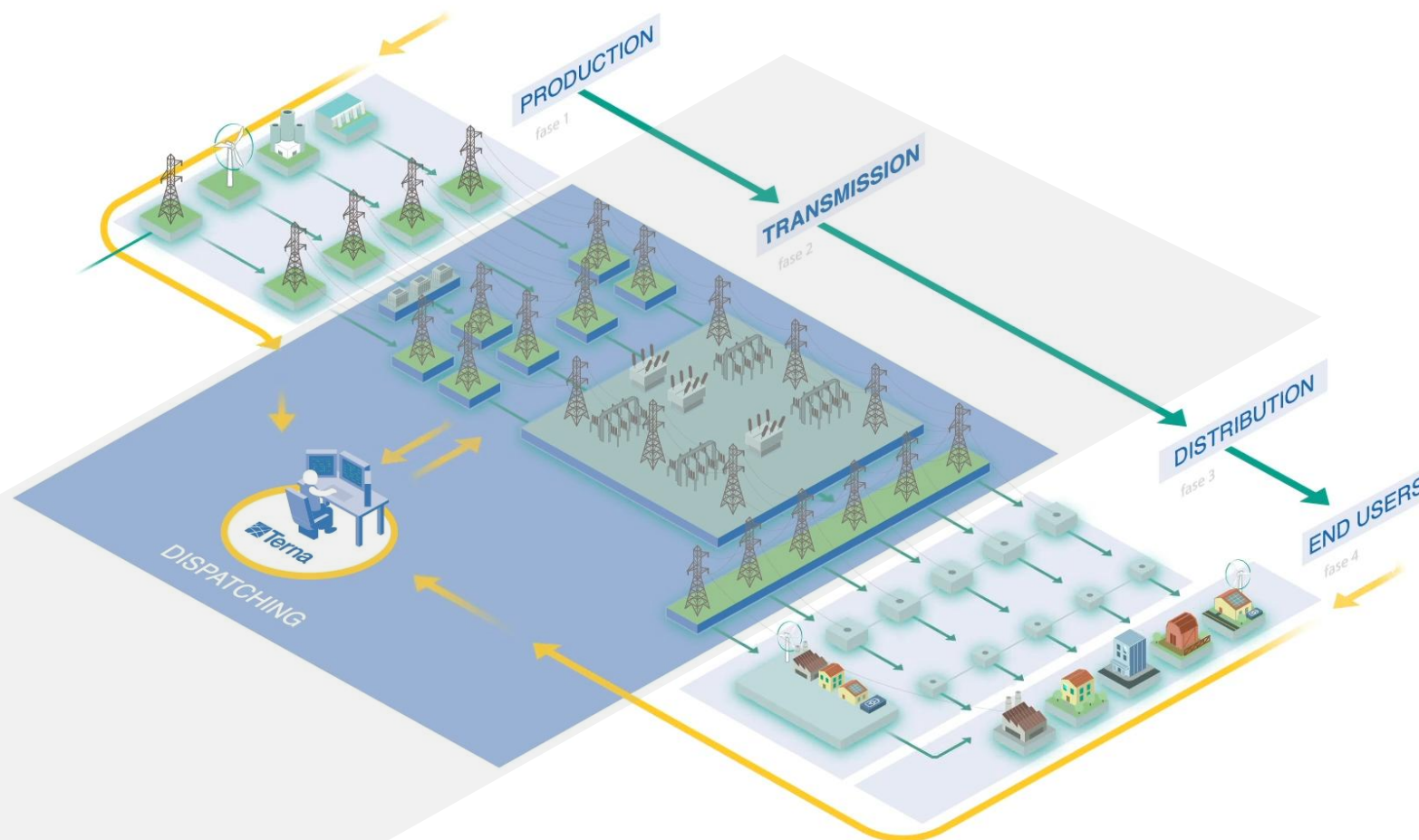
We ensure the transmission and dispatching of electricity, in a natural monopoly system and within a regulated market



Circuit km
~ 76.000 km



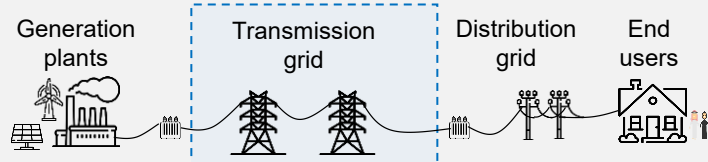
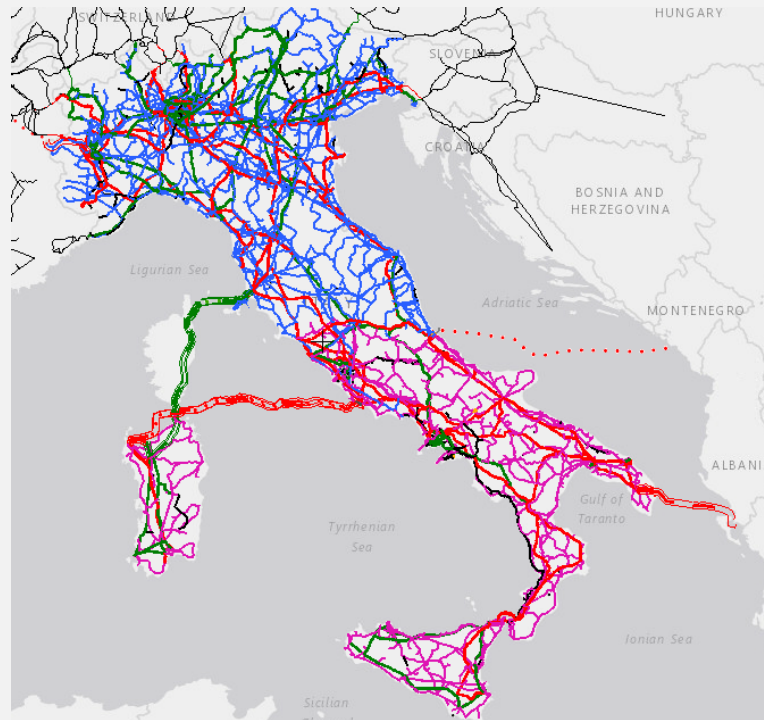
Substations
~ 920



Asset Management in Terna

Asset inventory

Key numbers at 31.12.2025



Circuit km
~76.000

- km overhead lines
- underground cables
- submarine cables

Lines



~ 920

- Transformer substations
- Switching substations

Substations

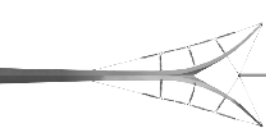


Special assets

- HVDC connections
- Synchronous condensers
- StatCom
- Energy storage

Maintenance: preserving asset condition and reliability
+
Renewal: replacing or upgrading ageing components



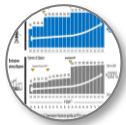


Increasing grid complexity



Structural uncertainty

- Growing renewables and reduced stability mechanisms
- External variables: extreme weather and geopolitical volatility



Scale and topological complexity

- Grid expansion and increasing data availability
- Stronger transmission-distribution interdependence



New technologies, new assets

- Regulation, compensation and storage assets
- Transition from electromechanical substations to digital substations
- Increasing technological heterogeneity

Asset Management approach

Asset Management is the structured set of activities used to manage assets throughout their lifecycle, ensuring reliability and performance, while reducing risks and costs and maximizing asset value.

A

Asset Data

Registry, hierarchy, lifecycle information

B

Field Evidence

Inspections, sensors, aerial monitoring, digital substation systems

C

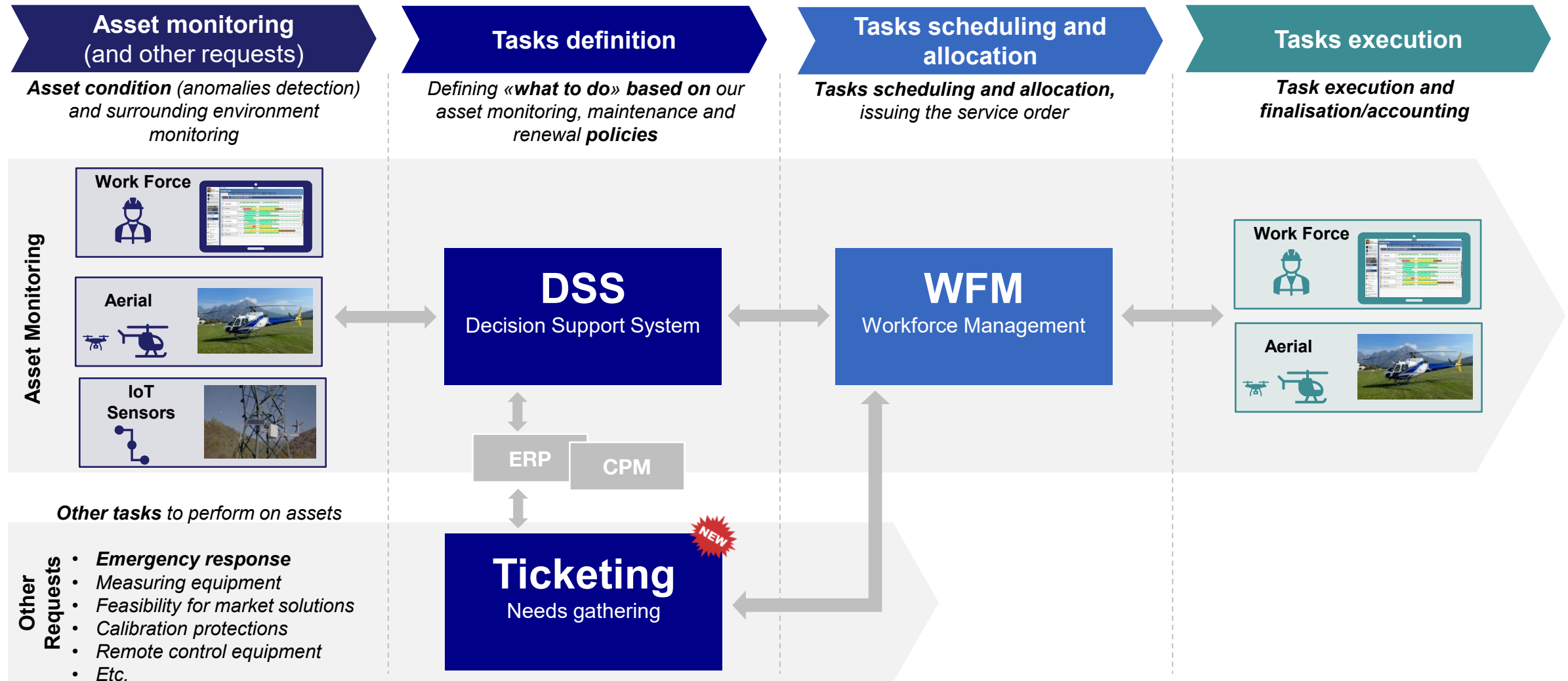
Operational Decisions

Maintenance, renewal criteria, investment planning

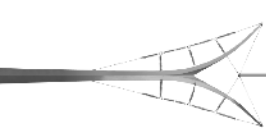
For a TSO, digitalization is about transforming asset knowledge into operational and strategic value. Asset Management provides the discipline to connect grid complexity, asset knowledge and operational decisions.

Asset Management in Terna

Process to define «what to do» on our assets



Asset technical condition monitoring is the foundation for asset management model and for the «what to do» process



Operator inspections



Inspections with an operator, involving **climbing** the supports and visual checks from the **ground** along the line route to verify the technical condition of the components and monitor the surrounding area where the asset is located.

Helicopter



Terna's fleet of helicopters for conducting overhead lines visual inspections, using infrared technology and LiDAR technology to detect tree interference.



Drones

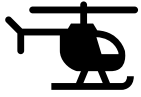


Instrumental visual inspections on overhead lines to detect any anomalies and gather information useful for asset monitoring.

IIoT Sensors

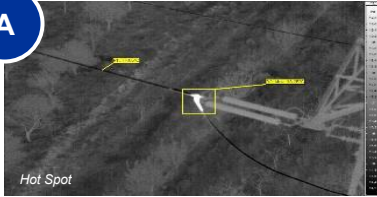


Sensors installed on assets to collect information on the condition of components and the surrounding environment, in order to detect the evolution of degrading phenomena.



Helicopter inspections

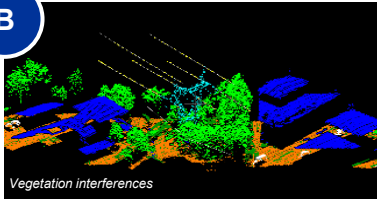
A



InfraRed

Hotspot detection on conductors (e.g. joints, dead-end clamps)

B



Lidar

Environmental data collection around overhead lines to assess vegetation interference and support maintenance planning.

C



Visible spectrum camera

Asset observation using high resolution cameras to understand the assets condition

The expansion of the proprietary helicopter fleet enabled the adoption of a Full Insourcing model in 2023, strengthening internal expertise and monitoring effectiveness.

Working Methods

1

TA

Technical inspection climbing pylons when powerline is out of service



2

TC

Technical inspection performing live-line working, with dedicated procedures



3

TD

Technical inspection with drones



VLOS (distance < 500m)



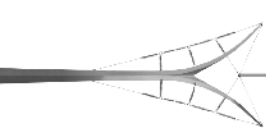
✓ Pylons inspection



Spans occasional inspections to detect anomalies on Joints, Anti-twist devices, Spacers, Conductors & Ground wires



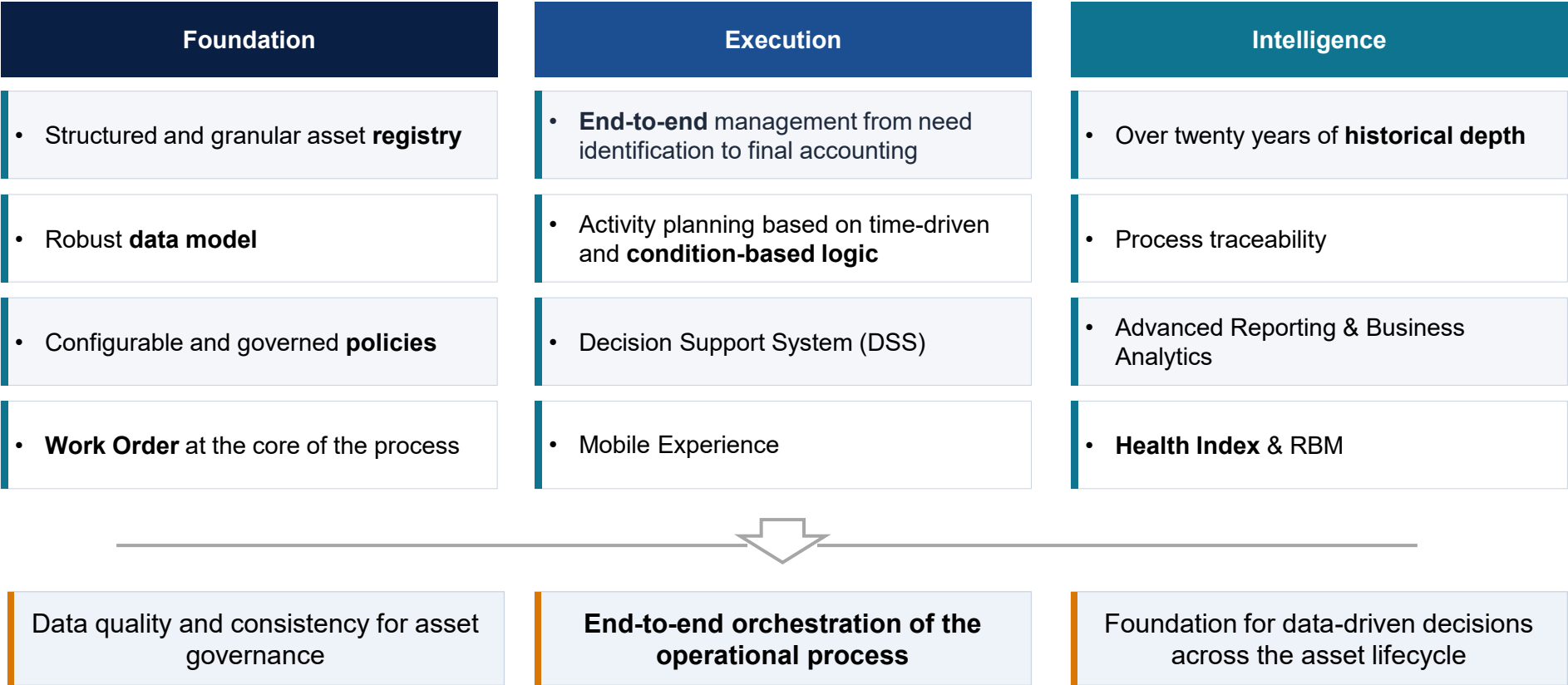
BVLOS, taking into account the ongoing evolution of technology and the regulatory framework.



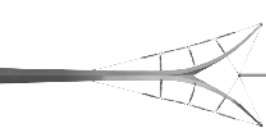
EAM



Enterprise Asset Management (EAM):
transforming asset management across the entire asset lifecycle through the adoption of an Enterprise Asset Management solution



At the heart of the Digital Shadow is the EAM platform, enabling an integrated, controlled and data-driven operating model, aligned with the ambition of becoming a High Reliability Organization.



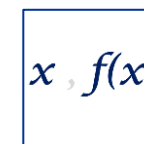
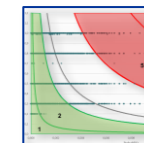
Asset Intelligence



Asset Intelligence means building a business-oriented digital capability, grounded in reliable data and robust models, to support decision-making processes across the entire asset lifecycle.

The Asset Intelligence value chain

- 1 Digital representation of the asset base**
Structured asset data, technical attributes, inspection evidence and environmental context data contribute to a digital representation of RTN assets, helping to understand their condition, relationships and behavior over time, also through selected BIM-based pilots.
- 2 Enterprise Asset Management and vertical applications**
EAM provides the operational and information backbone of the Asset Management model: asset structure, work orders, historical depth, configurable policies and the Decision Support System. It integrates with vertical solutions supporting specialised domains such as vegetation management, conductor condition, fibre optics, substation safety, SF₆ and flight activities.
- 3 Business models and algorithms**
Analytical methods and algorithms turn data into indicators, correlations and comparable scenarios, combining on-condition and data-driven approaches, asset health indices, survival curves, probabilistic analysis, predictive models and computer vision applied to the grid.
- 4 Data to Value / Asset Decisions**
The insights generated support the definition of maintenance priorities, advanced risk-based policies and renewal plans, strengthening asset governance from a High Reliability Organization perspective.



Digital Asset Management aims to turn technology and innovation into governed operational value, connecting asset data, field evidence and decision-making within stable processes.

