



From the smart lab to industry 4.0

SMART INDUSTRY



SMART INDUSTRY

A2A Smart City offers tailored projects to accompany companies into the industry 4.0 era and to maximise the efficiency of any solution.

01



SMART SERVICES

IT infrastructure and techniques that allow system integration, facilitating inter-company collaboration and collaboration with external parties (supplier - customer)

02



SMART ENERGY

Solutions for streamlining industries' energy costs to increase system performance and reduce wastage

03



SMART PRODUCTION & SMART SUPPLY CHAIN

New technologies that create greater synergies between operators, machines, instruments and all elements of the production and distribution value chain

04



SMART SECURITY

Systems to improve the security of companies and their employees

05



SMART WELLNESS

Systems for monitoring the work environment and the well-being of employees

SMART SERVICES

All the technological infrastructure that allows systems to integrate and interconnect, both internally within a company and externally with other companies.

A2A Smart City supports companies on their journey towards industry 4.0 by creating an interconnected technological network that optimises communication and allows for the near instantaneous exchange of information.

A2A Smart City provides all the services necessary:



Internet Connections
using fibre-optic FTTH and the development of MPLS connectivity solutions.



Wireless Networks
developed by specialised technicians according to specific client requirements



RF LoRaWAN Network
to connect all machines and sensors, thus enabling Big Data Analytics.





SMART ENERGY

A green approach to energy, based on savings and sustainability, is fundamental for 4.0 companies. IoT technologies make it easier to remotely monitor and manage energy consumption.

A2A Smart City offers a LoRaWAN Smart Energy solution that thanks to “submetering” instruments, can be applied to all energy installations and systems (electrical, water, gas, HVAC):

- sensors to monitor illumination and heat
- Electrical counters and energy consumption monitors
- smart valves and microturbines
- smart units and valves for plumbing
- I/O switches to modulate energy supply in plants and installations

Technological instruments such as these are combined with the latest management software:

- available in cloud and on smartphone or mobile device apps
- can be integrated with traditional SCADA systems to have one data management user interface
- allow energy consumption monitoring and real-time analysis to generate forecasts and reports
- can be configured to remotely manage all energy installations
- can be adapted according to specific client requirements





Advantages



DIAGNOSIS AND TARGETED MAINTENANCE

The submetering and energy diagnosis systems guarantee the highest transparency on consumption levels and on available data. They allow for local energy audits to be carried out in order to identify potential areas of improvement. Advanced and predictive diagnosis makes targeted maintenance, to reduce wastage and optimise costs, possible.



IMPROVED PRODUCTION AND ENERGY COSTS

Thanks to Big Data Analytics capability, production plants can be made more efficient and the full potential of companies can be harnessed through energy performance policies and intelligent remote management of individual installations.



INCREASED SECURITY

By separately managing illumination in each single room, the level of illumination can be increased in those areas where there are the most people.



DEVELOPMENT OF ENVIROMENTALLY EFFICIENT AND SUSTAINABLE BUILDINGS AND INDUSTRIAL PLANTS

CO₂ and greenhouse gas emissions can be reduced, optimising the performance of environments in line with legal requirements.



CONSTANT AND RELIABLE TRANSMISSIONS

Radio frequency transmissions between sensors and the LoRaWAN based service network infrastructure. The sensor batteries last up to 20 years, thanks to the very low power thresholds of the LoRaWAN Network.

SMART PRODUCTION



Different smart solutions allow for increased system cognitive functions.

Retrofitting

Optimises the performance of standard instruments by integrating them with LoRa technology: existing machinery will be capable of transmitting its data through the LoRa network. All types of automation protocols (RS232, RS485, MODbus, CANbus, 0-10V, 4-20mA, Profi-bus, Profinet...) can be integrated.

IoT sensing

Used to equip machinery and instruments with a "secondary sensing" system that constantly provides information on production and work environment conditions.

Smart Control

Thanks to LoRa technology, both existing and technologically advanced machinery can transmit data to a Smart Control system. Analytical capabilities, as well as the exchange of data between machinery and different instruments, are increased, making production more efficient and flexible.

NEW CONNECTIONS BETWEEN OPERATORS, MACHINERY AND INSTRUMENTS.

Advantages

A “smart” production line allows processes and equipment status to be monitored constantly. Real-time data from IoT sensors and the Smart Control system’s “Big Data Analytics” capability, optimise production cycles to the maximum extent.



ENERGY SAVING

Implementation of energy efficiency measures to reduce costs and increase productivity.



PLANNED MAINTENANCE

Effective planning of maintenance/ replacement activities, with a consequent increase in machinery life cycles.



REAL-TIME PRODUCTION MANAGEMENT

Real-time, immediate and also remote overview of production activity advancement, providing decision making support to improve productivity.



QUALITY AND PRODUCT TRACEABILITY

Analysis and regular reporting on production plant and process performance.



INTERCONNECTION

Integrated communication system, also for third party products such as peripheral devices.





Asset Tracking – Smart Supply Chain

A company's whole supply chain can be managed with smart IoT technology to exponentially increase its efficiency. Constantly tracking vehicles, goods and consignments is important in order to:

- increase production efficiency
- manage maintenance
- optimally manage resources
- improve the quality and security of logistics

With the objective of increasing efficiency, sensors connected to packages or vehicles send real-time information to allow effective and constant monitoring of the entire production and logistics chain.

Thanks to an innovative method, LoRa technology is also capable of locating sensors at any time via triangulation, even in enclosed spaces where GPS signals are weaker.

SMART SECURITY

Security is fundamental in a 4.0 company. A LoRa network is a technological platform that enables a vast range of smart solutions that can be developed according to specific client requirements, at any time after network implementation.



Anti-intrusion systems

IoT technology provides **authentication solutions for access** as well as cutting edge anti-intrusion solutions that can easily be integrated with traditional security systems. The security networks, which are based on tamper-proof long battery life sensors, can trigger alarms or sirens, activate video cameras or alert the authorities.

Information and alarms can be managed from mobile devices or centralised cloud based software.

Anti-intrusion sensors also allow continuous monitoring of building access points, thus avoiding energy and heat wastage.

- **High security system.**
- **Very low technology costs.**
- **Constantly efficient network**
Sensors connected to the LoRa network are independent from the connection to the local internet network and powered by their own battery.
- **Energy Saving**
Real-time monitoring of the status of all building access points keeps consumption inefficiencies and wastage under control.





Video surveillance and video analysis

A **technologically advanced video surveillance service** guarantees higher security levels. Hi-tech sensors capture ultra-high definition images and contain video analysis algorithms that are a fundamental part of modern-day IoT technology. The video cameras are interconnected and converge onto a centralised operations platform where all acquired information is processed.

The aggregation and elaboration of data allows management to become proactive rather than reactive. A response model previously based on repression turns into a model **based on prevention** that preempts and quickly intervenes when certain types of occurrences, such as gathering crowds or abandoned objects, take place.

A PREVENTIVE SECURITY MODEL



Fire fighting solutions and detection of smoke and gases

With an efficient network of IoT sensors environments can be monitored constantly, drastically decreasing the time necessary to **recognise an emergency** and its nature: flames, heat, smoke and gas leaks can be detected extremely fast, reducing the risk and the impact on people and companies to the minimum.



Advantages

- The sensors detect flames, smoke and gas leaks.
- Temperature variations associated with fire are identified.
- The sensors regularly send data on building status (temperature, presence of gas...) through the reliable LoRa communication network.
- The sensors work on very low power thresholds and therefore batteries can last up to 20 years.





Flood prevention solutions

The solution offered by A2A Smart City uses IoT sensors on a LoRaWAN network to constantly monitor **plumbing as well as liquid and gas leaks**.

The sensors can be installed on the inside or on the outside of the plumbing used for liquids or gases. They quickly detect problems (changes in pressure, leaks, flooding...) and provide real-time monitoring, rapid alarm response and decision support in order to appropriately manage services and emergencies.

Advantages

- Reduction of financial losses thanks to immediate detection of flooding and gas leaks.
- Improved safety for people.
- Fast detection of any kind of problem.
- Long battery life that can last up to 20 years thanks to the LoRaWAN network's low power threshold.
- Complete coverage of the building and its plumbing, with minimal infrastructure and very low costs.



People counter service

Counting the number of people in an environment, or transiting through it following a specific path, is important in order to **optimise the management of energy resources** and a building's safety. Knowing the number of people that have accessed a certain area also allows for the optimisation of maintenance and cleaning activities.



Acoustic monitoring service

LoRa technology offers a vast range of options in terms of microphones and speakers for real-time **bidirectional communication** (to inform or to dissuade). **Sound analysis can also be provided so as to automatically detect shouting, gunshots or any other kind of anomalies.**

IoT sensors, that constantly measure noise levels and sounds to warn of any dangers, are useful instruments for the management of services and emergencies.



SMART WELLNESS

Asset Tracking Man tracking

A2A Smart City offers wrist watches or wearable devices capable of providing information on vital signs (temperature, heart rate), as well as locating people and sending alarms in case of emergencies such as a critical fall. Should there be an emergency or somebody feels unwell, **the device immediately sets off an alarm** through a cloud based server that transmits it to both an operations centre and to the mobile devices of first responders who can quickly intervene. The data, which the sensors send continuously in real-time, is also used by Cloud based software to monitor workforce health and optimise use of company resources.



Advantages



- **Reduction of the time** that a person remains on the ground, meaning health risks are lower.
- **Greater safety** for employees during emergencies.
- **Optimised management of energy resources** according to the location of people within buildings.
- **Guaranteed operation** even without electricity: the sensors are not connected to the electrical grid.
- Sensors and instruments in a **LoRaWAN network** work using very low power thresholds

Environmental monitoring

Environmental sensors monitor the air and atmospheric conditions, both from a physical standpoint (temperature and humidity) and a chemical standpoint (presence of pollutants).



Advantages

- Alarms are triggered when pollutant limits are exceeded.
- Useful information is gathered for the management of heating/cooling systems.
- Useful information on production site conditions is gathered in order to increase production efficiency.
- Predictive maintenance can be organised to maintain the high quality site conditions.

Radioactivity monitoring

Measuring radioactivity levels in industrial buildings is key to health and safety, to both prevent dispersal and constantly monitor the presence of radioactive substances such as Radon.

Advantages

- Prompt alarms in case of dangerous radioactivity limits being exceeded.
- Quick detection of radioactivity dangers and emergencies.





The LoRa Alliance is a nonprofit organisation bringing together companies from across the globe with the objective of developing and standardising the LoRaWAN communication protocol.

A2A Smart City, that has been a LoRa Alliance member since December 2015, develops LoRaWAN networks using standard 1.0.2, the latest release which is only available to LoRa Alliance members. LoRa networks using the 1.0.2 standard have already been widely deployed by A2A Smart City across

Lombardy and will soon also be deployed elsewhere in Italy.

All the technological solutions offered are implemented according to the LoRaWAN standard that uses radio frequencies in an electromagnetic spectrum from 867 and 869 MHz.



- **Long Range:** each gateway has a coverage of 5km in urban areas and 10km in non-urban areas.
- **Low Power:** the sensor batteries can last up to 10 years and there is no need for a connection to the electrical grid.
- **High Capacity:** High Capacity: manages millions of messages for each monitoring station/sensor.
- **Geolocation:** supports geolocalisation without GPS and without additional battery consumption.
- **Standardized:** ensures interoperability of applications, IoT service providers and telecommunication service providers.
- **Security:** guarantees privacy and data protection by means of encryption (embedded end-to-end AES-128).
- **Low Cost:** the infrastructure and nodes have low maintenance and energy costs.

INDUSTRY 4.0 FISCAL INCENTIVES

In order to reap maximum benefit from an investment, in Italy A2A Smart City offers overall support also with regard to the financial aspects of Industry 4.0 projects.

On 21 September 2016 the Italian government presented the Calenda plan, putting 13 billion euros **towards the development of Industry 4.0** during the 2017-2020 period. The incentive plan supports the three main pillars of the digital development strategy.



Investment support for digital transformation

Relaunch of the Sabatini law for the purchase of hi-tech capital goods; extra depreciation in order to favour the transition to digital, investment in 4.0 technologies and the development of the Italian digital industry:

- Hyper-depreciation
- Super-depreciation
- Capital goods
- Rotation fund.



Training and Research & Development support

Stimulus to private investment in R&D in order to favour innovation in processes and products, guaranteeing the future competitiveness of companies.

Funds: increased tax credits and higher tax credit limit threshold.

University: centres of excellence dedicated to innovation.

Training: for people, organisations and company management that must change processes and business models.



Support to start-ups and innovative SMEs

Newcos, start-ups and innovative SMEs working in the technology field benefit from a dedicated regulatory framework that includes aspects such as administrative simplification, the labour market, fiscal incentives, insolvency:

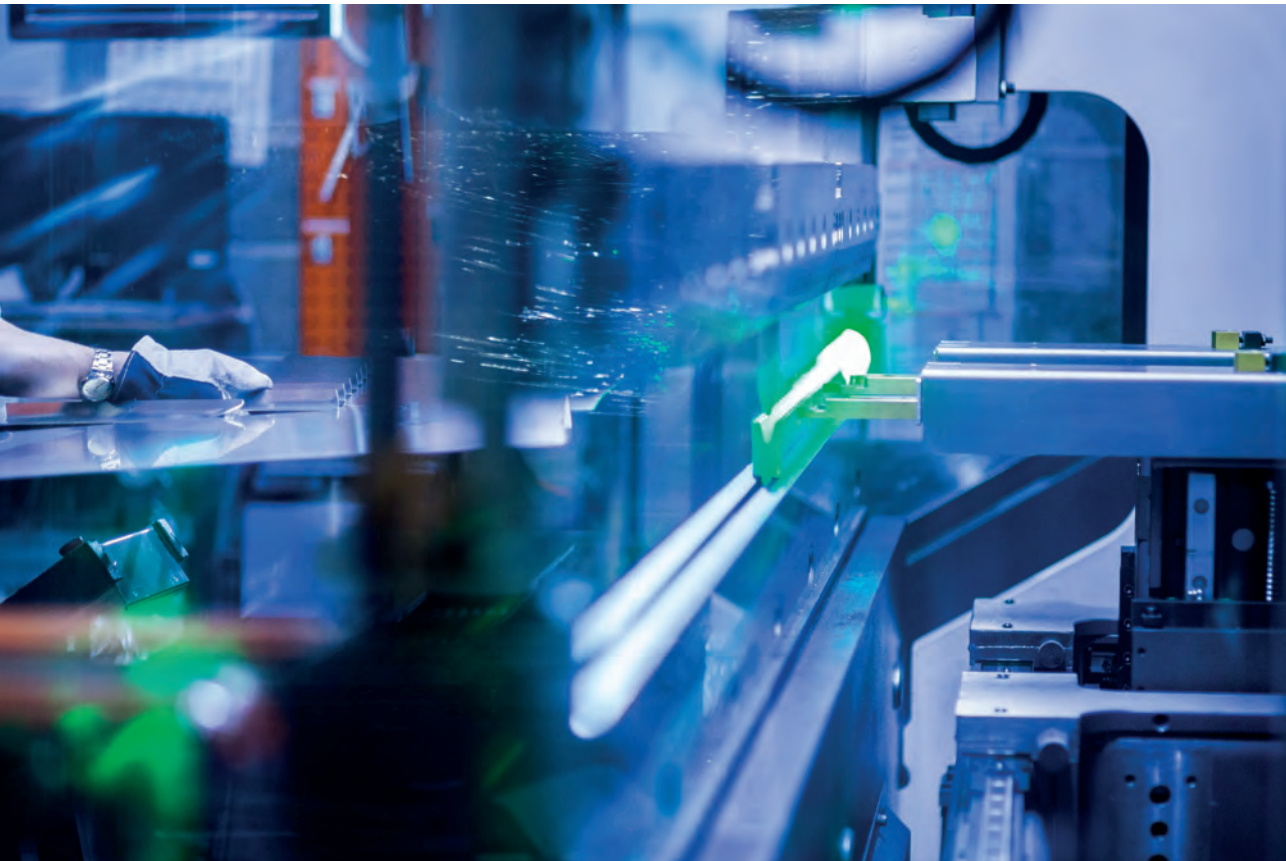
- 30% tax deductions
- Start-up losses absorption
- PIR (Individual Saving Plans) – detaxation of business incubator programme
- Funds for industrialisation
- Venture Capital funds.



ENABLING TECHNOLOGIES

Smart Manufacturing, or Industry 4.0, adopts digital technologies capable of increasing the interconnection and cooperation of resources (physical assets, people and information) used in operational processes within manufacturing plants and along the entire value chain.

Cyber Physical Systems (CPS), meaning IT systems capable of interacting with the physical environment in which they operate, are therefore created.



01



Interconnected and rapidly programmable collaborative robots

ADVANCED MANUFACTURING SOLUTIONS

02



3D printers connected to digital development software

ADDITIVE MANUFACTURING

03



Production processes supported by augmented reality

AUGMENTED REALITY

04



Simulation between interconnected machines to optimise processes

SIMULATION

05



Integration of information along the value chain, from supplier to consumer

HORIZONTAL VERTICAL INTEGRATION

06



Multidirectional communication between production processes and products

INDUSTRIAL INTERNET

07



Management of large quantities of data on open systems

CLOUD

08



Security during network operations and on open systems

CYBER SECURITY

09



Analysis of a wide range of data to optimise products and production processes

BIG DATA ANALYTICS



Each of the 9 cornerstones identified can only be attained if the underlying infrastructure is **solid, cutting edge and constantly updated.**

Industry 4.0 represents the advent of digital innovation in operational, manufacturing and logistics processes: thanks to enabling technologies, companies will be able to revolutionise their business models.

The objective is to integrate new production technologies to improve working conditions and increase the production capability of plants. Human capital and the development of the skills necessary to take full advantage of new technologies, is at the heart of this. The rise of Industry 4.0 is also coming about thanks to the introduction of measures and incentives that aim to transform industry and manufacturing by encouraging investment. Enormous benefits can be expected from its implementation.



info@a2asmartcity.io

a2asmartcity.io
lineacom.it

