



MULTI-HAZARD REAL
TIME MONITORING AND
EARLY WARNING SYSTEMS



WHO WE ARE

CAE was founded in 1977 by four electronic engineers and researchers, specialized in telecommunications, with a well defined purpose: to offer public and private bodies evolved technologies to monitor the environmental risk due to natural events.

Today we are the Italian company leader in designing, creating and servicing **multi-hazard monitoring and early warning systems and technologies**. Our solutions aim at mitigating the risk associated with extreme weather, hydrological and hydrogeological events, wildfires and water pollution.

We have completed more than 5.000 installations in Italy and around the world. We continuously invest in developing reliable, innovative and interoperable technologies useful to preserve the territory and to safeguard the population. In particular, we make dataloggers, measuring sensors, communication systems, as well as both web-based and desktop software.

Our goal is customer satisfaction, working alongside them from setting requirements to actual risk mitigation. Well trained and experienced technical staff is the key to supply the most effective turnkey services and solutions.

OUR FOCUS



GEOLOGICAL AND HYDROGEOLOGICAL RISK



RISK DUE TO EXTREME WEATHER EVENTS



WATER AND HYDROLOGICAL RISK



RISK DUE TO POLLUTION OF WATER RESOURCES



RISK DUE TO WILDFIRES

WHAT WE DO



CONCEPTION and DEVELOPMENT of **interoperable** hardware and software products, designed to minimise the risk of breakdown and data loss, thanks to **redundant elements** and **diagnostic sensors**. **Robustness** is guaranteed by attention to detail and use of **top quality materials**. We guarantee open and independently configurable systems, even by using **open source** technologies.

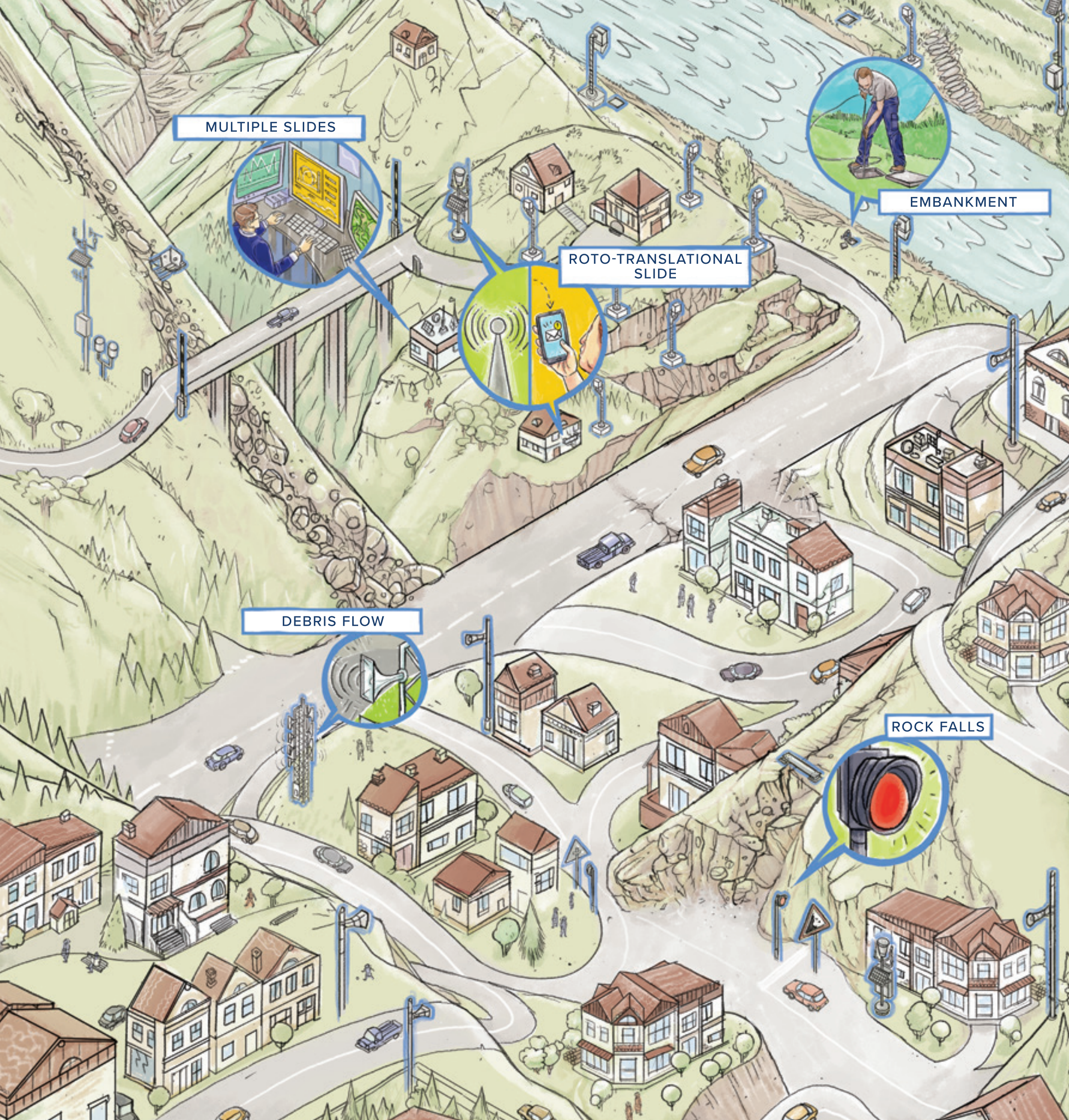
PRODUCTION of mechanical and electronic components, of telecommunications devices, etc. necessary for the systems. Excellence is guaranteed by scrupulous test and calibration procedures. Thanks to **product traceability** we have all of the information about the life cycle of a given article.

DESIGN of **customised** systems. Every site is carefully studied to combine its characteristic conditions with the customer's specific requirements. The systems stand out due to the **redundancy of elements** and attention to **energy independence**.

INSTALLATION and START UP of instrumentation in the field and in the control centre, so as to guarantee the **reliability** of readings and lasting operation. The **specific qualifications**, high level **preparation** and **experience** of our technicians allow installations at extreme and logistically highly complex sites.

Continual **MAINTENANCE** of field equipment by local services and remotely. We can guarantee in situ action times of just a few hours and **24/7** remote assistance, working alongside the customer even and above all during emergencies.

SPECIALISED SERVICES such as: set-up of decision support systems, topographic surveys for calculating flow rates, forecasting modelling calibration, various administrative services.



GEOLOGICAL AND HYDROGEOLOGICAL RISK

WE OFFER SOLUTIONS TO MITIGATE THE GEOLOGICAL AND HYDROGEOLOGICAL RISK. THESE SYSTEMS ARE CAPABLE TO ALERT THE POPULATION AND USE NETWORKS OF WIRELESS SENSORS DISTRIBUTED OVER THE TERRITORY IN SELF-CONFIGURING MESH NETWORKS.

MULTIPLE SLIDES

In areas with many different types of landslides, we suggest integrated monitoring and early warning solutions, centralising in a single operations room the real-time control and analysis of multiple instability events.

ROTATIONAL AND TRANSLATIONAL SLIDES

Our systems allow continuous, real-time remote checking of the most significant parameters for slope stability, such as precipitation, deformation profile, piezometric levels and structural deformations.

DEBRIS FLOW

The monitoring systems proposed monitor many parameters, including critical instability trigger conditions, debris transit, leading edge height, erosion/deposit rate and the average speed of slides between multiple measuring stations, as well as activating the alerting devices provided.

ROCK FALLS

We present solutions for checking meteorological parameters that affect rock face stability and for verifying the status of deformations, which may generate falls on rock faces with deep fractures.

EMBANKMENT INSTABILITY

The systems proposed allow the study of imbibition and filtration dynamics of specific sections of embankments in response to floods. The data collected allow the management of emergency situations and the planning of any reinforcing works, checking their effectiveness.





RISK DUE TO EXTREME WEATHER EVENTS

WE OFFER SOLUTIONS TO MITIGATE THE EFFECT OF THE GLOBAL WARMING WHICH ACCELERATES AND ACCENTUATES THE NUMBER AND INTENSITY OF WEATHER EVENTS. MEASUREMENT RELIABILITY IS GUARANTEED BY SCRUPULOUS APPLICATION OF WMO (WORLD METEOROLOGICAL ORGANIZATION) GUIDELINES.

INTENSE PRECIPITATIONS

The solutions proposed permit the management of alarms and mitigation of the risk associated with the most extreme phenomena. This is done using real-time precipitation intensity measurements, providing maximum precision from the very first minute.

HEAT WAVES

Our systems supply data for calculating climatic discomfort indexes and identifying risk situations resulting from heat waves, so as to alert the population in advance and prevent health issues.

HIGH WINDS

In the event of high winds, the system alerts the authorities and automatically manages the alarms, for example stopping traffic access to viaducts. The sturdy instruments can operate correctly up to speeds typical of hurricanes.

OFFSHORE MONITORING

The systems installed on offshore platforms supply weather and climate data about sky and sea conditions. They help with guidance for vessel docking and helicopter take off and landing.

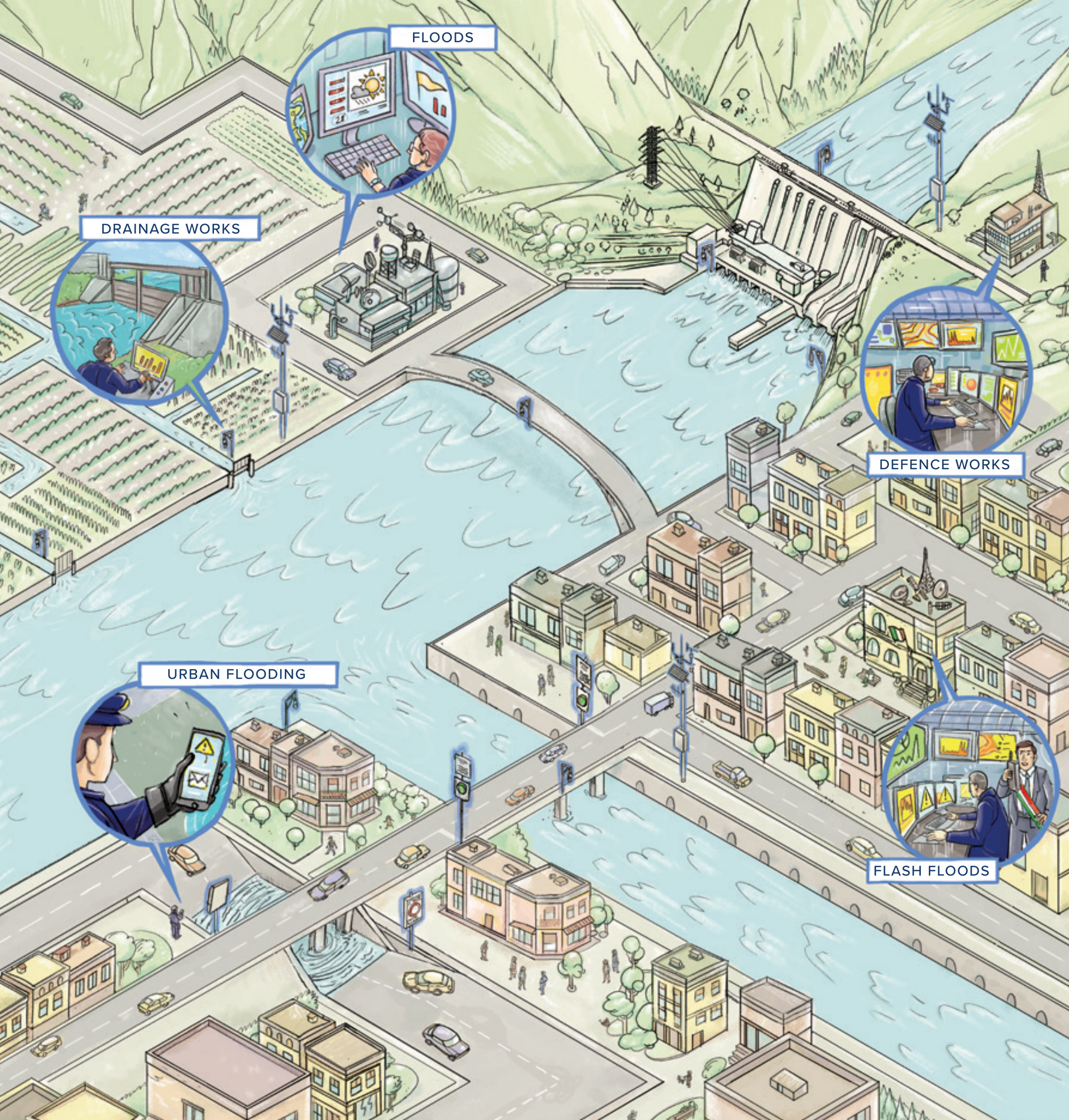
COASTAL MONITORING

We provide systems that generate measurements useful for guiding vessels into port, for sending out alerts in the event of stormy seas and coastal flooding and aiding analysis of coastal erosion and movement of sandbanks on the seabed.

SNOW AND AVALANCHE

Our systems help to mitigate the risk of avalanches and to analyse the contribution of snow melting to downstream river flood waters.





WATER AND HYDROLOGICAL RISK

WE COME UP WITH SOLUTIONS FOR MITIGATING THE EFFECTS OF WATER AND HYDROLOGICAL RISK USING NETWORKS THAT MEASURE A VARIETY OF QUANTITIES IN REAL TIME, USEFUL, ON ONE HAND, FOR FEEDING FORECASTING MODELS FOR SUPPORTING DECISION-MAKING AND, ON THE OTHER HAND, RELATIVE TO PRE-SET THRESHOLDS, FOR ACTIVATING NOTIFICATION AND ALERTING SYSTEMS.

FLOODS

The solutions we put forward provide real-time monitoring of large basins, feeding the forecasting models precisely and with lasting reliability.

FLASH FLOODS

To mitigate the risk of flash floods, we propose solutions for real-time monitoring of parameters such as river and precipitation levels. They also automatically manage alarms and alerts for the competent authorities.

DEFENCE WORKS

We suggest the integration of non-structural work that complements defence works such as embankments, dykes, storage basins, etc. These allow monitoring of the status of works and their operation over time, as well as supporting staff in emergencies.

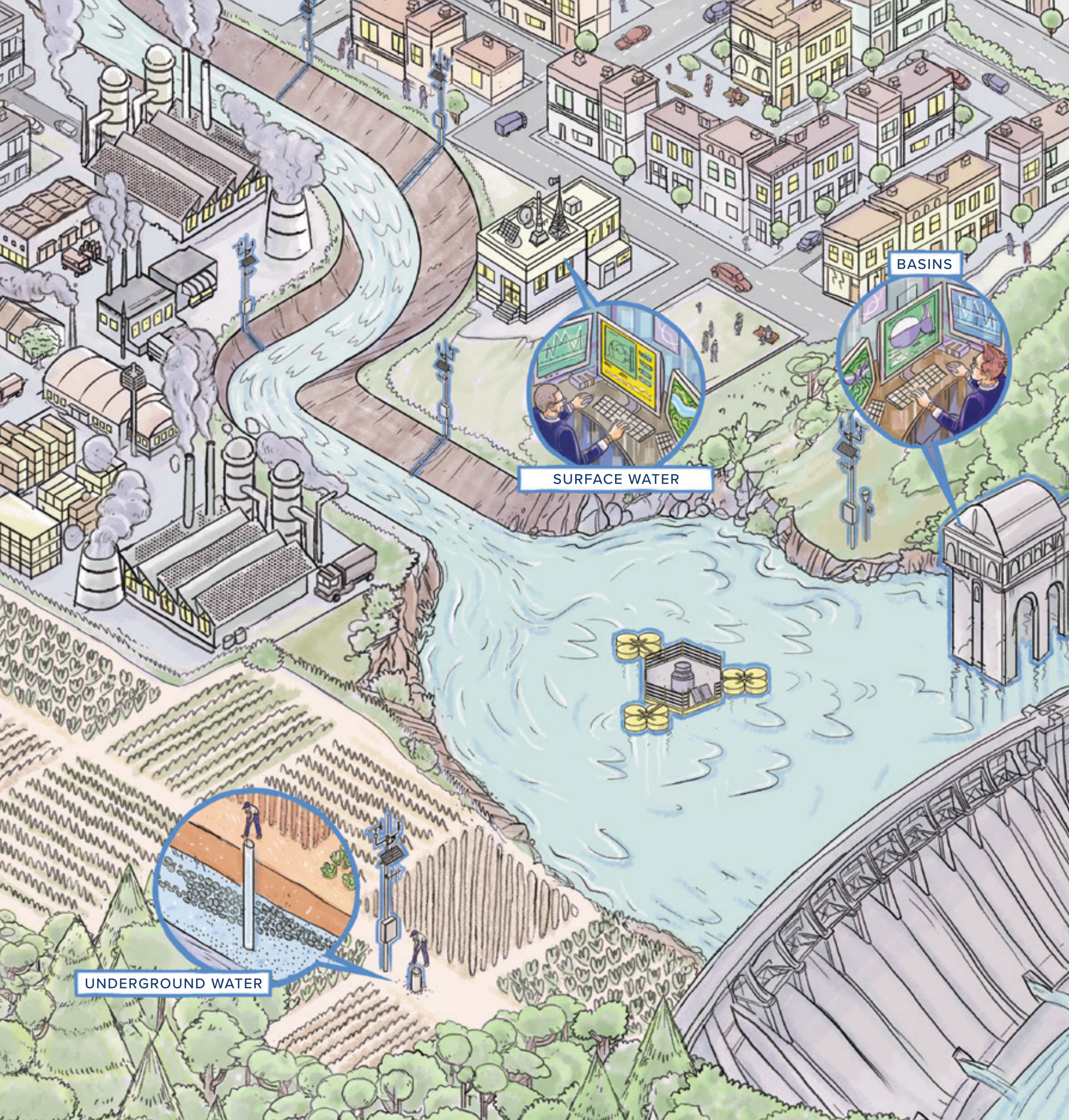
DRAINAGE WORKS

We propose flexible solutions that, due to their interoperability, are interfaceable with the respective systems of drainage associations for automatic control of floodgates, pumps and barriers.

URBAN FLOODING

Increasingly common heavy rains have brought a rise in the number of urban areas at risk of flooding: underpasses are the most vulnerable infrastructures. We provide solutions that allow automatic transit blocking, by activating special signals (bars, traffic lights, variable message signs) and alerting of staff responsible.





RISK DUE TO POLLUTION OF WATER RESOURCES

CAE OFFERS SOLUTIONS TO MITIGATE THE EFFECTS OF POLLUTION OF WATER RESOURCES. OUR SYSTEMS MEASURE CHEMICAL - PHYSICAL PARAMETERS IN LAKES, RESERVOIRS, WATERCOURSES AND AQUIFERS, SO THAT OPERATORS CAN BE ALERTED IF PRE-SET CRITICAL LEVELS ARE EXCEEDED.

WATER QUALITY IN THE BASINS

We propose systems that automatically measure, multiple times a day, the most significant water quality parameters at different depths. That helps to identify the correct height for drawing the water with the best characteristics for potabilization.

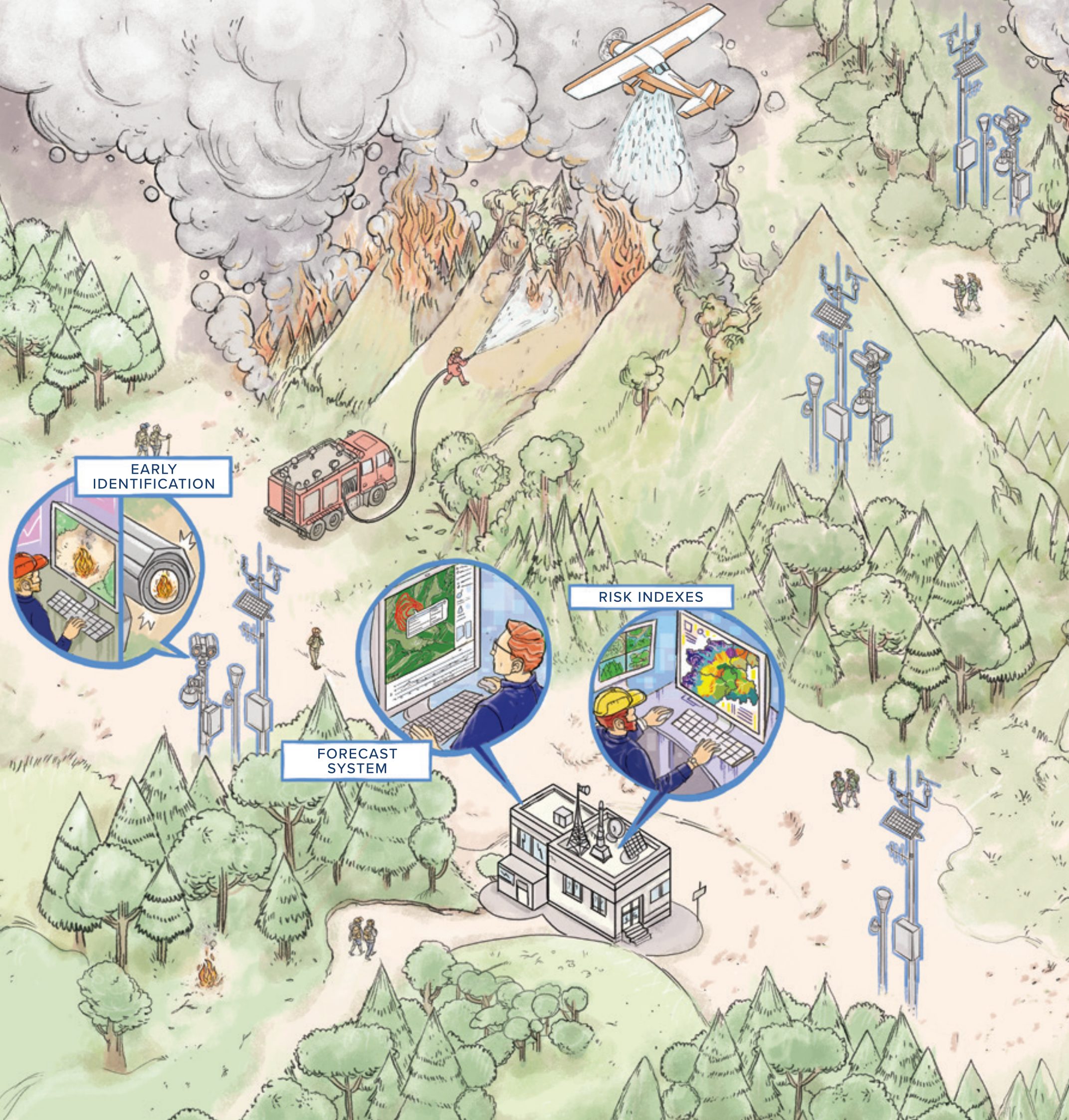
POLLUTION OF SURFACE WATER

The systems for checking and monitoring surface bodies of water involve continuous and unmanned measuring of some of the most important chemical - physical parameters for evaluation of the water quality index. The system allows the sending of alarms to operators when critical thresholds are exceeded; it records acquired data and relevant events for documentation.

POLLUTION OF UNDERGROUND WATER

We provide solutions that can be installed at depth for real-time monitoring of aquifer water quality and quantity. The values can be used both to estimate the quantities of underground reserves, and to determine the potential for using them for irrigation or drinking water.





RISK DUE TO WILDFIRES

WE SUPPLY SYSTEMS THAT MITIGATE THE RISK OF WILDFIRES BY CALCULATING GEOREFERENCED RISK INDEXES, RAPIDLY IDENTIFYING IGNITION AND FORECASTING THEIR SPREAD OVER THE TERRITORY. THIS SET OF INSTRUMENTS KEEPS THE POPULATION SAFE AND CAN AID PROMPT AND EFFECTIVE ACTION BY THE AUTHORITIES FOR PUTTING OUT THE FLAMES.

IGNITION RISK INDEXES

The system provides risk indexes that highlight the likelihood of fires starting, taking into account the territory's characteristics, the type and distribution of vegetation, anthropic activities and relevant meteorological parameters, such as moisture in the soil, wind and air temperature.

EARLY IDENTIFICATION OF FIRE

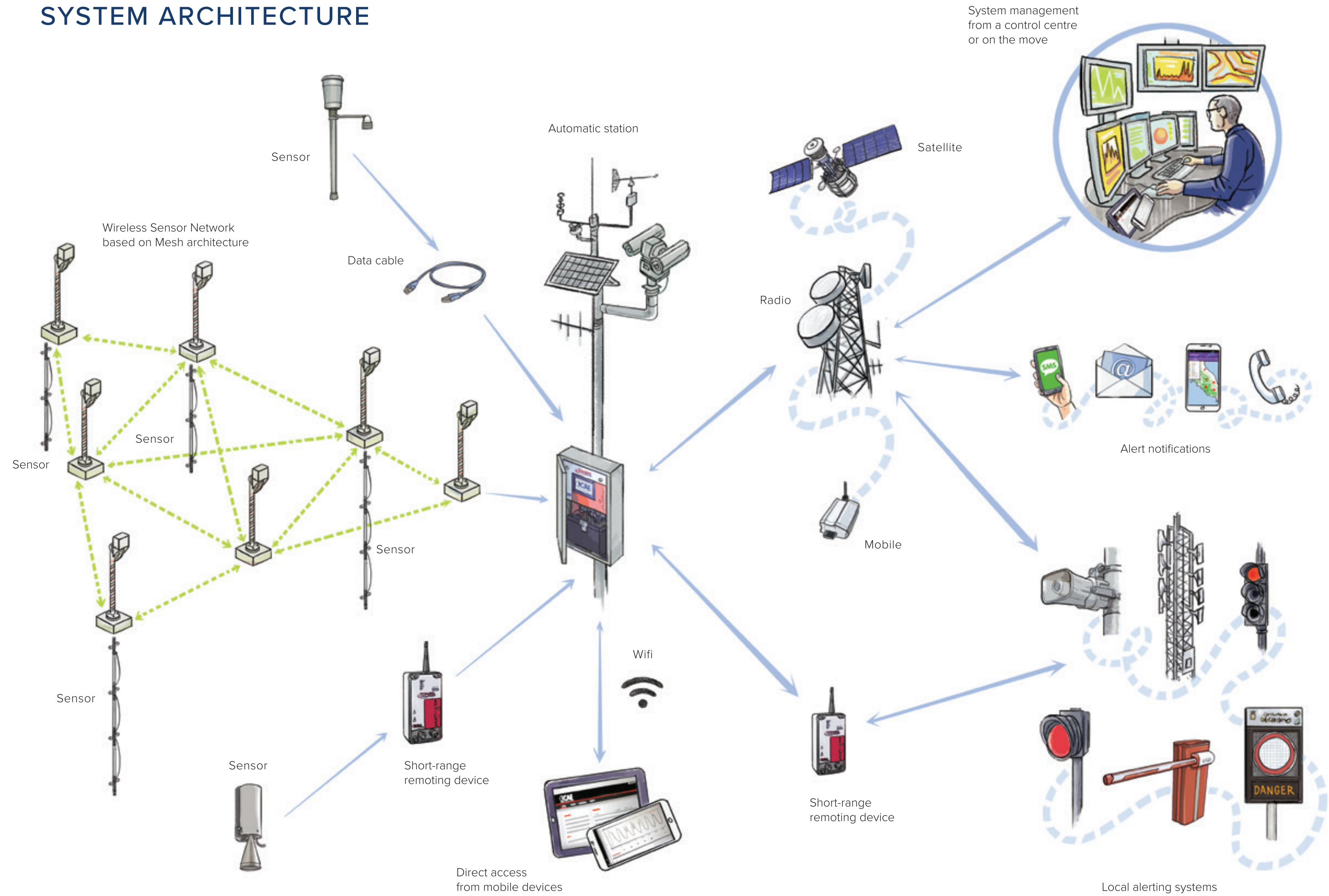
The solution offered autonomously identifies the ignition of a fire and calculates its coordinates using the combination of visible and thermal images. It also allows powerful zooming to check and validate automatic alarms and to trace fire detection back to previous stages.

FORECAST SYSTEM FOR PROPAGATION OF THE FLAME FRONT

CAE systems include forecasting models that can show the probable propagation of the flame front on georeferenced maps, for easier planning of interventions using equipment and personnel.



SYSTEM ARCHITECTURE





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