

High Level Control of Industrial Plant

Wide industrial plants are based on a number of production lines and direct controls. Industry 4.0 solutions are presently very diffused, so that the production processes and the single industrial machines are based on some computer-based control. For example, one for each vertical production line, or in some cases for each industrial machine. In most cases, they are marginally capable to be integrated to each other via network connections since in most cases, the single plant or industry machine have not been designed, neither deployed to be connected each other. Connections among the different machines or production lines can be used for providing instructions and synchronizations; reporting errors and production data, remote control/telecontrol, etc. Industry 4.0 is introducing the integration of IOT technologies and concepts of Cyber Physical System into manufacturing, with the support of Artificial Intelligence and ultimate technologies of Big Data.

Snap4Industry is a platform specialized from **Snap4City** in which any kind of IOT Devices, IOT Brokers can be connected to Data Shadow storage, on which it is possible to perform Big Data Analytics via machine learning and Visual Analytics with Dashboards. The solution providing these services can be located on cloud or on premise, as well as in mixed approaches. The Industry 4.0 solution allows to integrate in a unique platform the typical data stream of industrial plant as: ModBUS, OPC, RS485, HTTPS, CANBUS, ProfiBUS, etc. with those of IOT: NGSI, MQTT, COAP, AMQP, OneM2M, etc., and may be GIS based as: WFS, WMS, etc. At these aspects, the Snap4Industry solution is adding at the Industry 4.0 the integration with Smart City and with the administrative aspects of the factory such as data passing on protocols as: JDBC, ODBC, etc.

The innovations introduced by the high-level Cyber Physical Systems consists of managing the production at an higher level of integration in the factory, among production lines, among machines and by taking into account of a wider number of variables that may come from the industrial plant, from maintenance, from production, and from the environments, exploiting machine learning for optimization, prediction and anomaly detection. This approach is more effective for large plants in which the factory is a sort of industrial city spread on thousands of square meters and in which huge number of connections and IOT Devices can be located, and somehow integrated into the city texture. To this end, the highest security level, reliability and velocity of data transmission are major requirements to be satisfied.

INDUSTRY 4.0

HIGH LEVEL
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Snap4Industry as Snap4City supports end-2-end secure connections from IOT Devices and field up to the final remote user interface and dashboard and passed 2 Penetration Tests in 2019 performed by two major certified international industries. Technically, the industrial plant is managed with real-time data flows in industrial protocols, IOT devices, administrative and environmental data in the plant and in the neighbouring areas of the city. Particular interesting case is that of Altair (<http://www.altairchimica.com/>) industry which is one of the major chemical plants in Tuscany, which is spread in a large area and focussed on producing mercury-free chlorine-potash with ion-exchange membrane technology, the most advanced in the world.

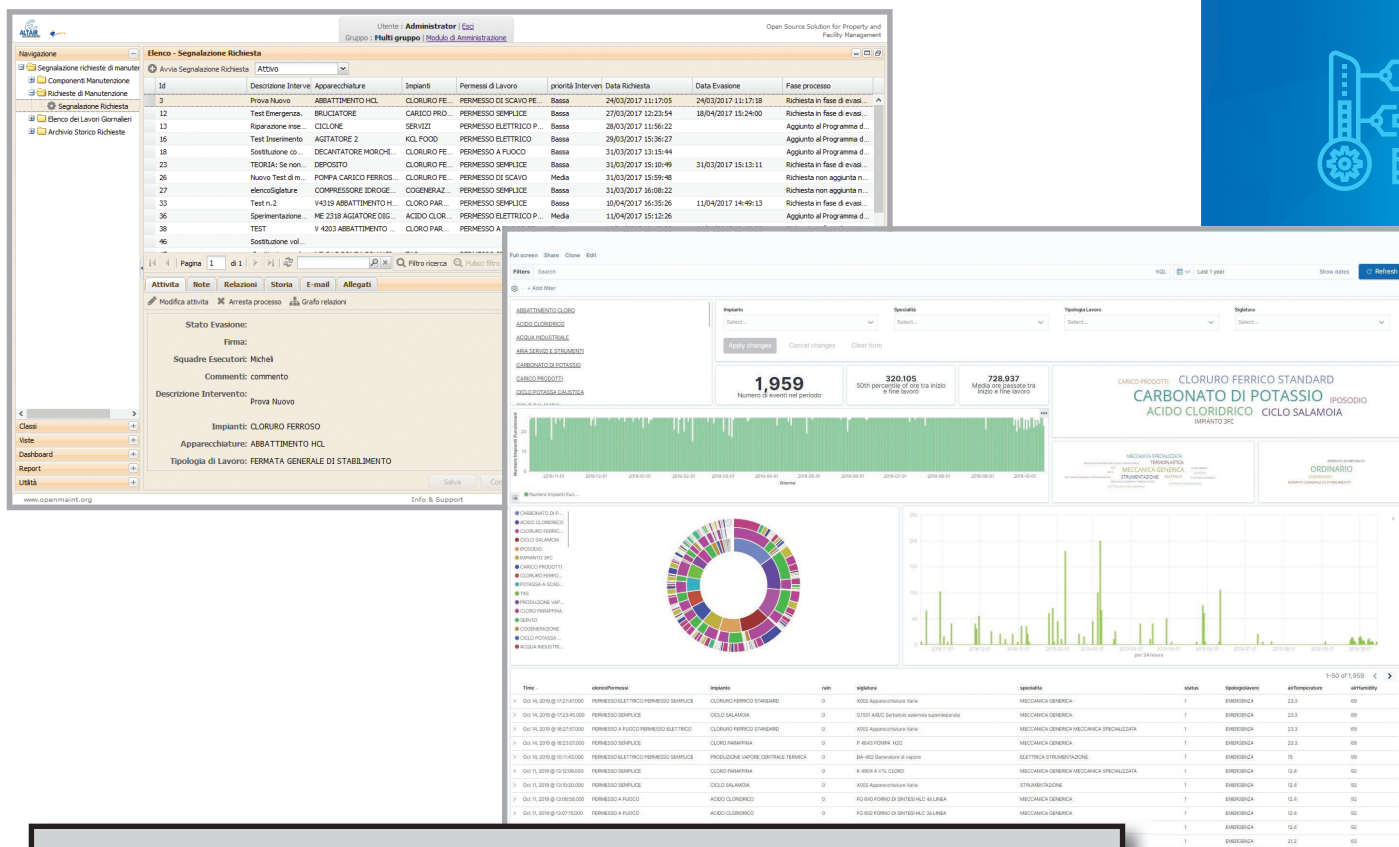
5G ENABLED TECHNOLOGY

SNAP4CITY PLATFORM

The Role of DISIT Lab

In the context of this implementation the first challenge has been the collection of environmental data collected by a number of drones. One moving on the chemical plant perimeter to assess and eventually detect the presence of contaminations which can be dangerous for the population.

Another aspect is the control and management of the maintenance of the whole plant. On this case, a large number of parameters have to be taken into account such as the planned actions vs critical events. In effect a so large plant works typical H24/7 with the aim of never stopping the production since most of the complex and large industrial plants cannot be stopped without incurring in relevant costs for the restart. Thus, predictive maintenance can reduce the time to stop and may prevent damages to other parts of the production processes. In this case a maintenance tool has been created for collecting data and also for their analysis by means of a visual analytic: maintenance analytic tool.



Extended version accessible from: <https://www.snap4city.org/546>

Contact: <https://www.snap4city.org>

Partners: Altair Chimica S.p.a., Snap4 S.r.l., UNIFI-DINFO



Regione Toscana

