Press release

SystemX initiates a multi-sector R&D programme to design interoperable digital twins of complex industrial systems and develop a European standard

Building on its proven expertise in the design of multi-sector digital twins, the research and technology organisation IRT SystemX, is implementing a new ambitious R&D programme named JNI (Jumeaux Numériques Industriels). The aim of this programme is to develop an equipped methodological environment for the design of digital twins offering complex industrial systems resilience and sustainability. Bringing together a dozen of industrial and academic partners, this programme evaluates the performance and tests the interoperability of digital twins within several industrial use cases. The shared ambition is to generate standards proposals on the national and even European level, to foster the interfacing of data and interoperability between systems.

Palaiseau, 2 February 2023 – SystemX, the research and technology organisation (*Institut de recherche technologique* - IRT) dedicated to the digital engineering of systems of the future, is implementing a structuring research programme for industrial sectors as a whole, named "Digital twins for the resilience and durability of industrial systems" (JNI - *Jumeaux Numériques pour la résilience et la durabilité des systèmes Industriels*). This five-year programme already brings together **Airbus Protect, Cervval, Cosmo Tech, GRTgaz, Naval Group, RTE, Safran, SECTOR Group,** and **Schneider Electric**, as well as several academic partners. Together, they share the common ambition to define and implement a **European frame of reference** for the design, development, interoperability and evaluation of digital twins of complex industrial systems, in order to **guarantee their sovereignty, management and performance**. The programme already includes two R&D projects and will involve new partners as new projects are launched.

"The secure processing of data stemming from industrial systems is at the heart of the industry of the future and the extended enterprise. It aims to increase the operational efficiency of industrial systems throughout the supply chain. To date, there is no existing standard for data collection and each applicative case adopts its own framework, which greatly complexifies the scaling up of this type of application. The digital twin, which aims to provide a digital replication of industrial systems, offers the great opportunity to develop a standard towards data interfacing, which is an essential pillar for the large-scale deployment of the industry of the future. This is the ambition displayed by our new programme which should be structuring for all industrial sectors", explains Abdelkrim Doufène, Strategy and Programmes Director at the IRT SystemX.

About the JNI programme

Duration: 5 years

5 projects of which **2 have been launched**

Partners: Airbus Protect, Cervval, Cosmo Tech, GRTgaz, Naval Group, RTE, Safran, SECTOR Group, Schneider Electric, and several academic partners

Ambitions:
- design an equipped methodological environment for the development of digital twins for complex industrial systems,
- develop a European standard to foster the interfacing of data and interoperability between systems.

Main technological barrier: Resilience and sustainability of industrial systems

The initiation of this R&D programme stems from the results of literature review, interviews, as well as collaborative workshops with around thirty industrial partners and experts. The players underlined the potential of digital twins on several levels: the optimisation of industrial processes, the optimisation of supply chain flows and the prediction of calls for spare parts, the standardisation of interfaces to the service of industry, the simulation and the prediction of non-quality in production, the deployment of predictive maintenance or even the optimisation of additive fabrication. The

roadmap of this programme was developed around the prioritization of these topics, in a spirit of co-construction.

Establishing a methodological and technological framework for the design of industrial digital twins

This dozen-million-euro programme is centred on a first pivotal ambitious 3-year project ("Digital twins for the resilience and durability of industrial systems" - JNI - *Jumeaux Numériques pour la résilience et la durabilité des systèmes Industriels*), which brings together Airbus Protect, Cervval, Naval Group, RTE, Schneider Electric and academic partners. It aims to **define an equipped methodological environment for the development, instantiation at a lower cost, and deployment of digital twins for complex industrial systems**, all the while taking into account the evaluation of risks and conformity requirements in terms of cybersecurity. The methodologies developed are to be generic and multi-sector.

The ambition is to make standardisation proposals, on the national and European levels, for the **methodological and technological framework** developed within the programme. Discussions have already begun with associations such as AFNet, AIF or even AFNOR.

Use-case oriented projects

In the era of complex industrial systems, and in order to meet the challenges linked to the reduction of maintenance costs of these systems, IRT SystemX is launching with its industrial partners Airbus Protect, Cosmo Tech, GRTgaz, RTE, Safran and Sector Group, the project "Predictive Maintenance and Health Indicators (*Maintenance Prédictive et Indicateurs de Santé*) which addresses issues of predictive maintenance through the use of digital twins. It aims to define relevant health indicators, on the basis of data flows gathered in real time or delayed time on the industrial asset, by developing generic tools and methods for the selection of frugal data dedicated to the construction of degradation or aging models. With this in mind, the digital twin must enable the detection and prediction of weak signals, to offer optimal predictive maintenance plans.

The roadmap of the programme plans for the launch of 5 projects, each for a minimum period of 3 years. The next projects will cover the following topics:

- Digital twins for the optimisation of productive resources and the supply chain
- Digital twins for the optimisation of energy use and carbon footprint
- Digital twins for the audit and resilience optimisation of a critical system

Offering every sector an interoperable technology of industrial digital twins

Finally, SystemX aspires to **provide all RTOs (IRT) and Institutes for Energy Transition (ITE) within the framework of the FIT association**, the equipped methodological environment for the conception of industrial digital twins, so that each sector can **use an interoperable digital twin technology** to enhance the global and local management of its complex industrial systems.

DIGITAL TWIN SEMINAR

Thursday 9 February, at CentraleSupélec

This seminar, organised by S(cube) and Ile de Science, aimed to explore the concept of digital twin in all its diversity, its scientific challenges as well as associated societal and industrial issues.

Abdelkrim Doufene, Director Strategy and Programmes at the IRT SystemX, was the President of the Scientific Council of the seminar.

2 round-tables brought together experts from SystemX: The first on Industrial Digital Twins and the second on Digital Twins of Urban Territories.

Programme: https://colloque-iledescience.partageonslessciences.com/programme-jumeaux-numeriques-2023/

About the IRT SystemX

SystemX, a French Institute for Technological Research (IRT), specialises in digital systems engineering. It provides expertise in analysis, modelling processes, and decision-making simulations of complex systems. SystemX coordinates partnered research projects, and promotes work relations between academia and industry, and across disciplines and fields.

This means jointly tackling technological and scientific challenges in four top IT industries: autonomous transport and mobility, industries of the future, defence and security, and environment and sustainable development. Through use-case projects, SystemX research engineers address major societal and technological challenges in order to accelerate the digital transformation of industries, services and territories. Since its creation in 2012, SystemX has launched 62 research projects (38 of which are ongoing), as part of the Paris-Saclay research and university cluster, which is driving the revival of French and European industries. These projects involve over 100 industrial partners and 55 academic laboratories, 181 full-time employees (ETP schemes) and 134 individuals who rely on their own resources. SystemX also has project teams in Lyon and Singapore. For more information: www.irt-systemx.fr |@IRTSystemX | LinkedIn | YouTube

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