

— SPATIAL DIGITAL TWIN

Case Book

15 industrial use cases, from 3D capture
to operational decision.

For Industrial Decision & Performance — from digital
transformation to operational intelligence.

Introduction

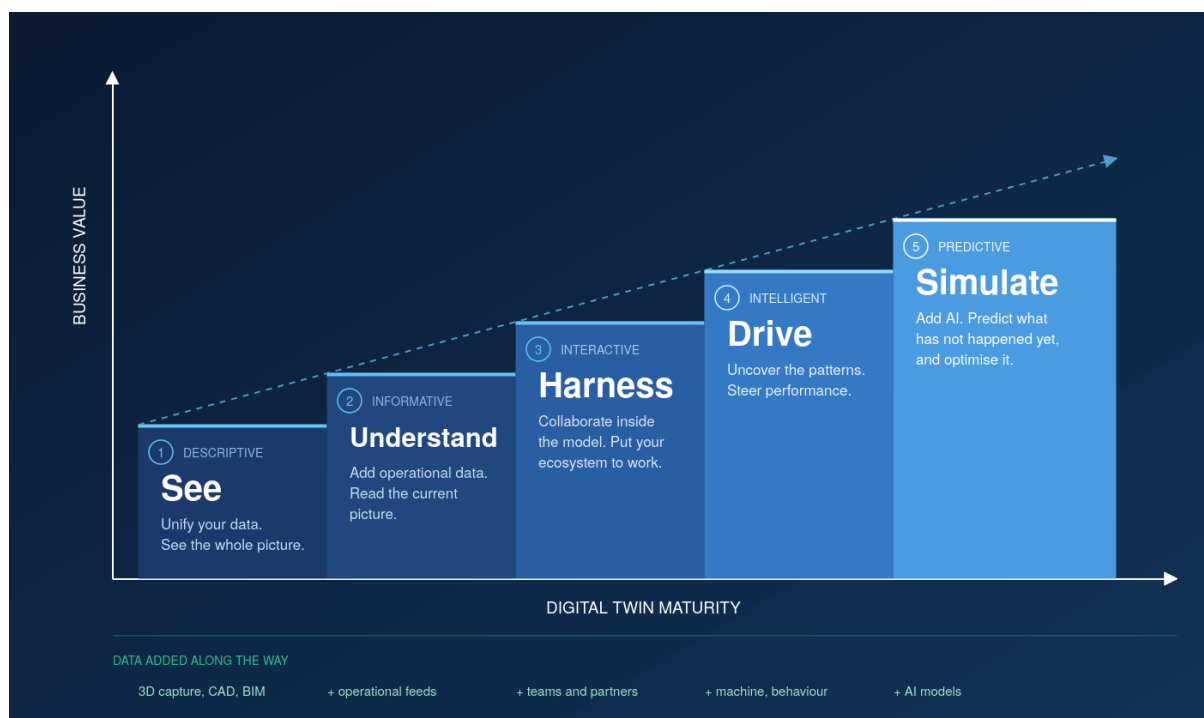
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What we build

A spatial digital twin is a faithful 3D replica of a site, a production line, a piece of equipment or a building — usable in virtual and augmented reality and built either from a real capture campaign (Lidar, photogrammetry, laser scanning) or from existing CAD and BIM data.

It is not a licensed product. Every twin is built to measure, on a base of assets and pipelines that carry over from one project to the next. That is what makes each successive phase cheaper and faster than the one before it.

And it is not a deliverable you buy once. A twin is an infrastructure that gains maturity and it gains it one value point at a time, each stage useful on its own and paying for the next.



Five levels, five promises and the data that arrives with each one.

For construction and AEC readers, the same progression reads along the lifecycle of the built asset: GIS → CAD → BIM → Digital Twin → Smart City, from information management to operation management.

From capture to the field, a continuous loop

A digital twin that only gets looked at is a model. What makes it an operational asset is the return path the moment the digital comes back to the person doing the work, in their own field of action.

Capture. The real becomes digital. Lidar, photogrammetry, CAD and BIM data, at centimetre accuracy.

Structure and understand. Data becomes intelligence. Operational feeds, computer vision, anomaly detection, flow simulation, optimisation.

Give it back. The model returns to the human in training, in an immersive scenario, on the job site through a headset, in a documented intervention.

Enrich. Every field intervention feeds the twin: photos, voice notes, summaries, traces. Restitution is itself a form of capture. The loop closes, and the twin gets richer with each turn.

Underneath, seven content blocks. They are not seven separate offers — they are what a twin can be made of, activated as maturity allows.

	Content block	Movement
1	XR Visualisation & Collaboration	Capture
2	AI Vision & Quality Control	Structure
3	Anomaly Detection & Prediction	Structure
4	Flow & Scenario Simulation	Structure
5	Process Optimisation (AI + Operations Research)	Structure
6	XR Training & Intelligent Assistance	Give back
7	Field Support & Smart Documentation	Give back

Blocks 6 and 7 are rarely a starting point. They become fast and affordable once an environment already exists built, in most cases, for an entirely different purpose.

Where the first project starts

Three situations account for almost every first project we take on.

A project to validate before it is built. A new plant, a new line, a new building, a new interface. Decisions have to be taken with no physical prototype to look at. We build the twin from plans and intent, and the decisions get made against something visible.

A machine that cannot be shown. Too large, too heavy, too costly, or simply invisible from the outside. The equipment is explored at full scale, opened up, run through its process at a trade show, in a client meeting, in front of investors, with nothing to ship.

An environment that cannot be taken offline. A live railway station, a running production line, a workshop full of critical machines. The environment is replicated so that concepts, procedures and people can be tested against it without a single stoppage.

None of these three depends on the maturity of your data. That is deliberate: they start from plans, from a product model, or from a procedure that already exists.

Climbing the ladder, one value point at a time

Almost every first project lands on the first level, and that alone justifies the spend. The environment, the assets and the pipeline then outlive the project that paid for them so the next level costs a fraction of the first.

Nobody signs a five-year maturity programme. Each phase is scoped to deliver something usable on its own and to leave behind what makes the next one cheaper value point by value point.

Data arrives the same way. A twin does not wait for a clean ERP or a fleet of sensors: the first level needs geometry and nothing else. Operational feeds and machine data are connected as they become available, and each connection raises the level.

The routes differ. **See → Harness:** a building validated before construction stays in use through the build and into occupancy. **See → Simulate:** a heritage scan becomes a BIM model, then a discrete-event simulation of visitor flows. **See → Drive:** a BIM model guiding crews on site goes on to feed an engine that sequences deliveries and crane movements

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TRANSPORT & MOBILITY · SNCB

Brussels-Virtual: the Belgian railway station enters the era of simulation

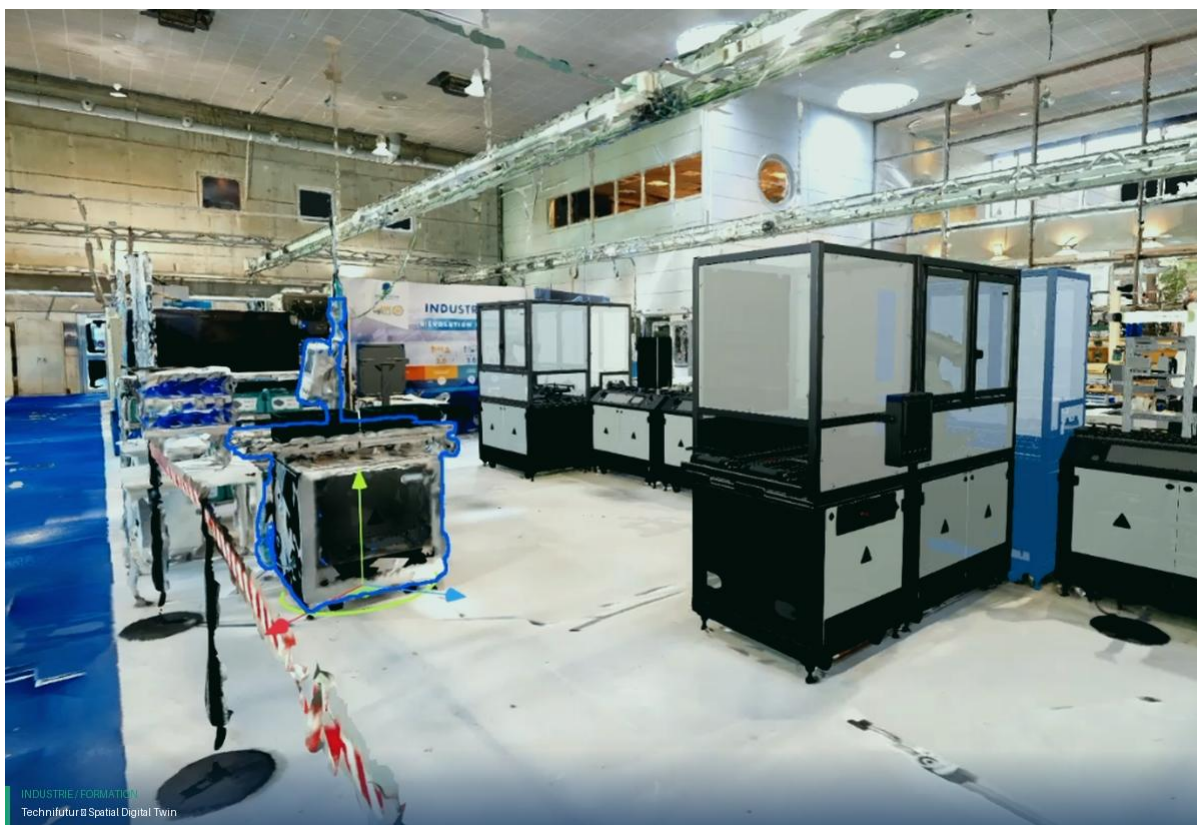
How do you test new ideas in a railway station without disrupting thousands of passengers? That was the challenge XRintelligence took on by co-building with the SNCB Innovation team a complete XR environment simulating a Belgian railway station fed by real-time operational data.

Brussels-Virtual is not a static 3D model. It is a modular, believable and multi-channel platform, designed to prototype, test and validate operational concepts under realistic conditions — without taking a single track out of service or impacting a single passenger. Platforms, underpasses, dynamic signage, trains, passenger flows: the entire railway environment is reproduced and connected to live operational data.

Two use cases have already been deployed. The first: an immersive training programme for Securail agents, enabling them to carry out a complete inspection round aboard a virtual train. The second: passenger information tests on station screens during major disruption scenarios which message to display, on which screen, at what moment, for which passenger category.

Brussels-Virtual is today a permanent, operational infrastructure, reusable across all SNCB projects. Every new use case builds on the same assets without rebuilding the base environment.

Technologies & partners Unity, Python, Meta Quest 3, SNCB Passenger Information API



INDUSTRY / TRAINING · Technifutur

Technifutur: when the industrial workshop enters a new dimension

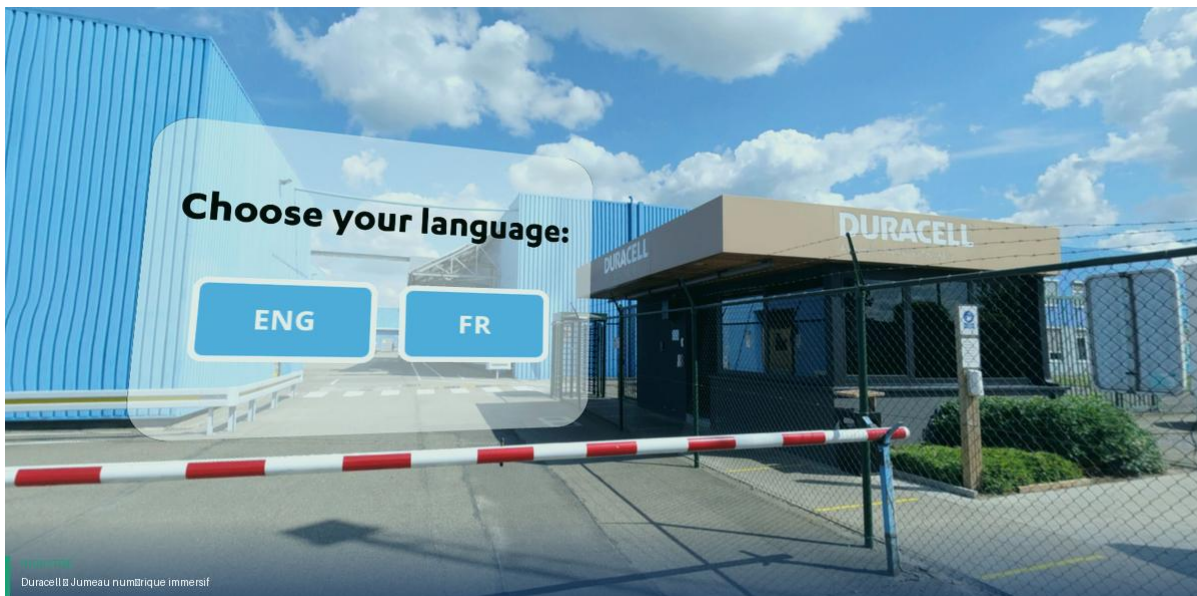
Technifutur, a Walloon competence centre specialising in industrial skills training, set out to equip its Seraing workshop with an operational digital twin capable of training operators, simulating equipment and visualising machine data in real time.

The challenge was twofold. On one side, a workshop housing cobots, Fanuc robots, Mazak CNC machines and refrigeration systems — heterogeneous, critical equipment that cannot be taken offline for conventional training. On the other, a clear ambition: to build not a technology showcase, but a reusable, scalable digital infrastructure ready to accommodate future data and artificial intelligence layers.

XRintelligence led the project end to end, from high-precision Lidar scanning through to the deployment of the immersive VR experience. The workshop scan — 600,000 points per second, centimetre-level accuracy produced a complete BIM model enriched with CAD data from critical equipment, then transformed into a real-time Unity environment: optimised geometry, levels of detail, robot rigging and machine cycle animations.

The outcome is an operational, multi-purpose XR platform: immersive workshop tours, machine simulation in VR, operator training scenarios and spatial 3D dashboards integrating machine KPIs in context.

Technologies & partners Immopass (mobile Lidar), Prevu3D (3D visualisation), Realvirtual (industrial simulation), Unity



INDUSTRY · Duracell

The Duracell plant in virtual reality: train, understand, prepare for the future

Industrial production lines are complex, dense and difficult to grasp without physical access to the site. Training a new operator, preparing a maintenance intervention or communicating about an installation normally requires taking equipment offline or mobilising field experts. Duracell wanted to move beyond these constraints by giving its industrial site a faithful and immersive digital representation.

XRintelligence produced a complete digital twin of the plant from a high-precision 3D scanning campaign. Buildings, production lines and key equipment were captured, modelled and integrated into a virtual reality platform allowing free navigation through the industrial environment at any time, without interrupting production.

The platform provides a faithful remote representation of the site, which is useful for staff training, technical intervention preparation and facility communications. It also forms an evolving foundation ready to accommodate future data layers, interactive scenarios and decision-support tools as the digital transformation progresses.

Technologies & partners 3D Laser Scanning, Photogrammetry, 3D Modelling, Unity, Virtual Reality, Spatial Digital Twin



DEFENCE · Thales

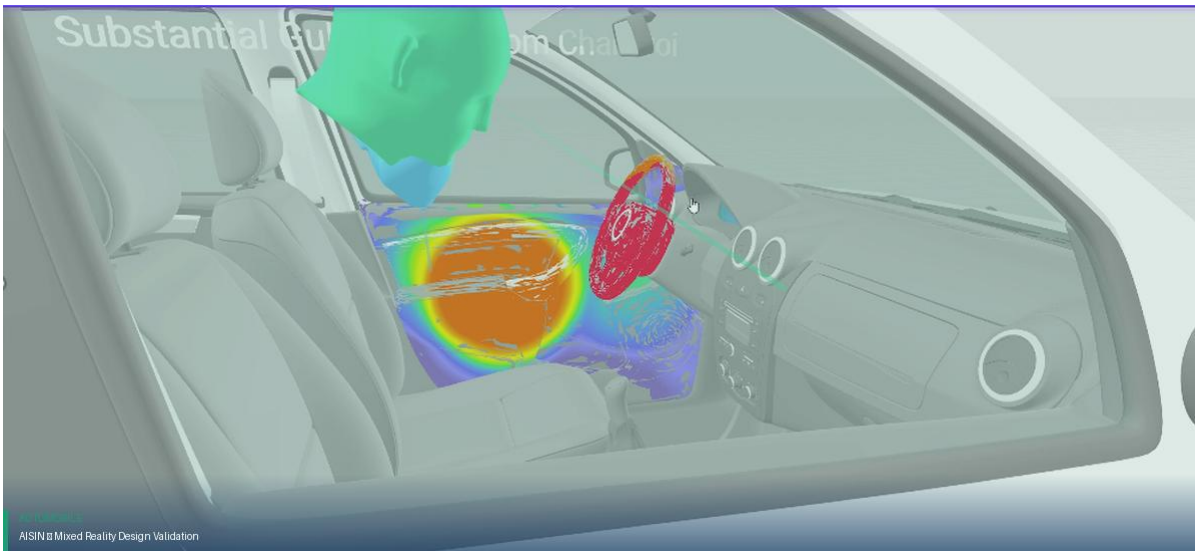
Prototyping a critical interface before building it: the Thales XR method

In defence system development, human-machine interfaces must be validated under conditions close to operational reality — but conventional development cycles leave little room for upstream iteration. As part of the MACS Light project, Thales wanted to rapidly evaluate new interfaces before their integration into operational systems, objectively measuring readability and cognitive load impact on operators.

XRintelligence developed a Rapid XR Prototyping platform based on a simplified digital twin of an AWACS E-3 Sentry cockpit. Several immersive scenarios were built to test MACS Light interfaces under progressively more complex conditions: active channel identification, spatial audio, simultaneous flow management and cognitive overload impact on performance.

Beyond the prototype, the project delivered a complete methodology transfer to Thales teams: asset library, tool training and progressive autonomy in XR prototyping. The value lies as much in accelerating design cycles as in capitalising on a new way of working.

Technologies & partners ShapesXR, Unity, Figma, Spatial Audio, Digital Twin, UX Testing, Cognitive Load Assessment



AUTOMOTIVE · AISIN

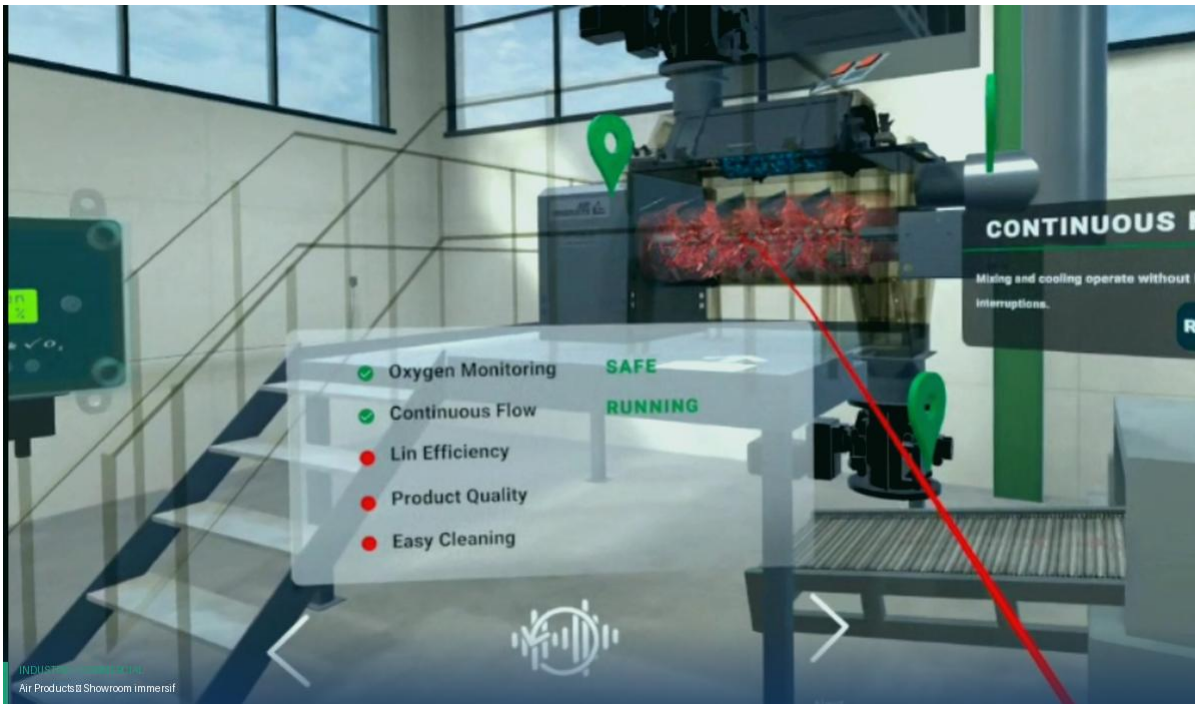
Designing tomorrow's vehicle without waiting for the physical prototype

In the automotive industry, interface and ergonomics validation traditionally happens once physical prototypes are available late in the process, and at high cost. AISIN Europe wanted to explore a new approach enabling early evaluation of future vehicle concepts while objectively analysing driver behaviour.

XRintelligence developed a mixed reality validation platform based on the Varjo XR-3 headset's Video Pass-Through. The solution reconstructs the real world in real time through the headset's cameras and integrates photorealistic virtual objects making the boundary between real and virtual virtually imperceptible. The driver interacts with a virtual vehicle anchored in their real environment.

The platform integrates advanced Eye Tracking and Spatial Analytics: every session is recorded and analysed to measure visual attention, driver behaviour and interface ergonomics. These objective data points feed directly into design decisions, months before the first physical prototype is manufactured.

Technologies & partners Varjo XR-3, Unity, Mixed Reality Video Pass-Through, Eye Tracking, Spatial Analytics, Digital Twin



INDUSTRY / COMMERCIAL Air Products

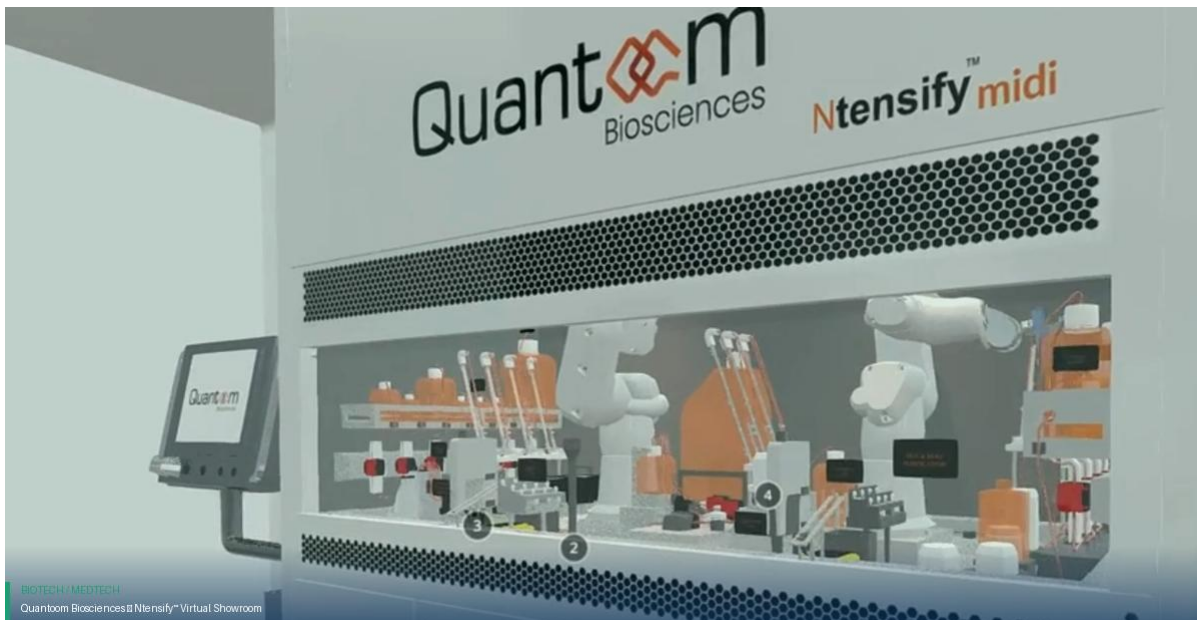
Bringing the machine to the customer: the Air Products immersive showroom

Transporting industrial cryogenic freezing equipment to trade shows is costly, logistically complex and often impossible. Air Products wanted to offer its prospects a credible alternative: an immersive experience enabling them to explore the equipment, understand its internal workings and concretely visualise the benefits of Freshline® Smart Technology — without moving a single machine.

XRintelligence developed an interactive virtual showroom in which the visitor explores equipment at full scale. They can observe internal machine architecture through transparent views, trigger liquid nitrogen injections, adjust production flow rates and instantly visualise the effects on the process. Each interaction transforms a technical advantage into an immediately understandable visual demonstration.

The platform evolves with product innovation: a new module for the Freshline Smart LIN Injection Continuous IQF Mixer was integrated without rebuilding the existing environment. Sales teams also have access to a supervision tablet enabling them to guide visitors through the immersive experience.

Technologies & partners Virtual Reality, Meta Quest, Unity, Industrial Digital Twin, Interactive Animations, Tablet Interface



BIOTECH / MEDTECH Quantom Biosciences

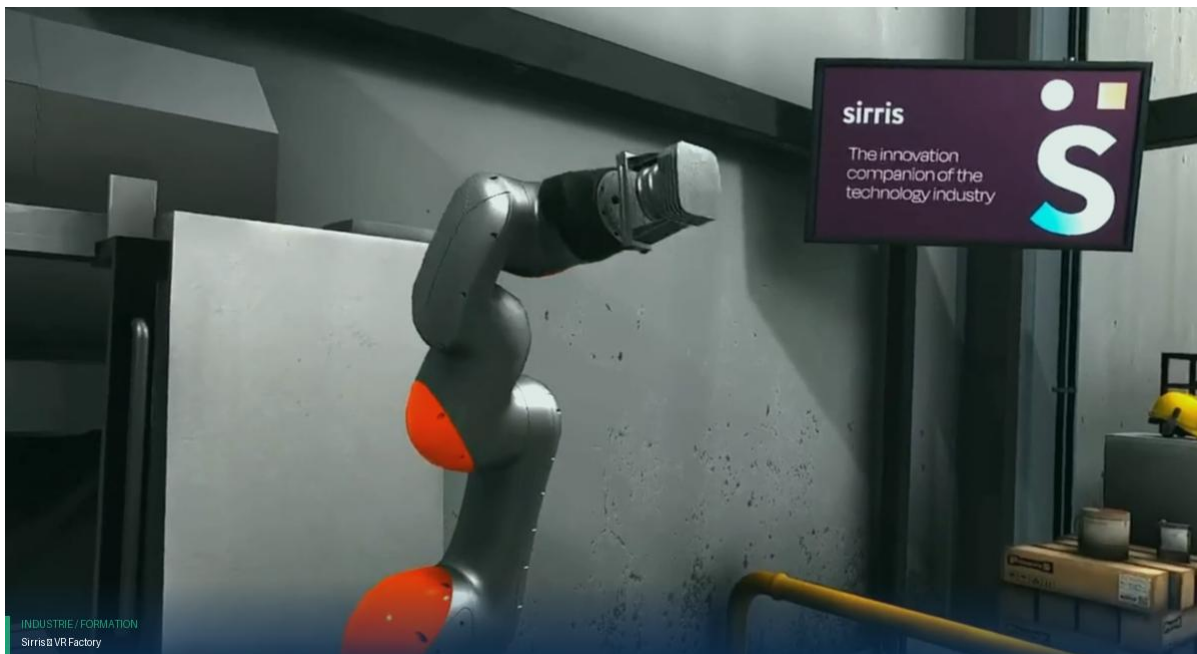
Making the invisible visible: the Ntensify™ platform virtual showroom

Quantom Biosciences develops Ntensify™, an automated mRNA production platform designed to accelerate the manufacturing of vaccines and mRNA therapies. Presenting this technology to industrial partners and investors poses a particular challenge: the process is complex, equipment is rarely accessible and its internal workings are invisible to the naked eye.

XRintelligence developed an interactive 3D Virtual Showroom faithfully reproducing the Ntensify™ equipment in an immersive web environment, accessible from any browser. The user freely navigates around the machine, triggers animations, displays exploded views of subsystems and discovers each step of the process from mRNA synthesis to final purification — with integrated explanatory content at every stage.

The showroom is a permanent digital demonstrator, deployable at any time by commercial and scientific teams for client meetings, international trade shows or investor presentations with no logistical constraints and no equipment to move.

Technologies & partners Spatial Digital Twin, WebGL, Interactive 3D, Product Visualization, Industrial Animation, Virtual Showroom



INDUSTRY / TRAINING · Sirris

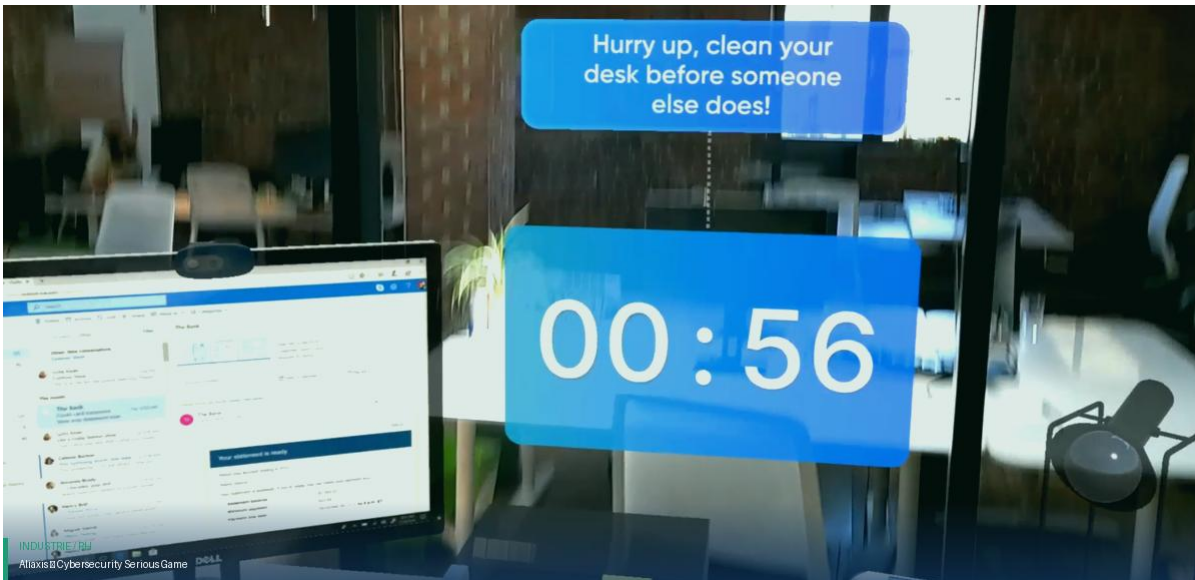
Sirris VR Factory: when the virtual plant becomes a tool for industrial transformation

As part of its mission to guide companies toward Industry 4.0, Sirris wanted a virtual factory capable of demonstrating advanced manufacturing technologies, training operators and experimenting with new industrial concepts without disrupting physical installations or halting production.

XRintelligence co-developed, in collaboration with the MIIL (Media Innovation & Intelligibility Lab) at UCLouvain, a complete industrial Spatial Digital Twin integrating equipment, workstations and learning pathways adapted to different user profiles. The experience is multi-user: several participants explore the same virtual environment simultaneously, discover manufacturing processes, interact with equipment and test scenarios before real-world implementation. Attention was paid to the phygital dimension: opening a CNC machine is performed using a real physical handle synchronised with the virtual door erasing the boundary between the physical and digital worlds.

The first demonstrator was deployed at Sirris A6K in Charleroi. Building on this success, a second demonstrator is currently being rolled out at the Sirris House of Manufacturing in Kortrijk, extending the platform to a second industrial innovation hub. VR Factory is now a permanent infrastructure supporting awareness, training and the digital transformation journey of industrial companies.

Technologies & partners Spatial Digital Twin, Unity, Virtual Reality, Multi-user Collaboration, Location-Based Entertainment, Phygital Experience, Industrial Asset Library, MIIL UCLouvain



INDUSTRY / HR Aliaxis

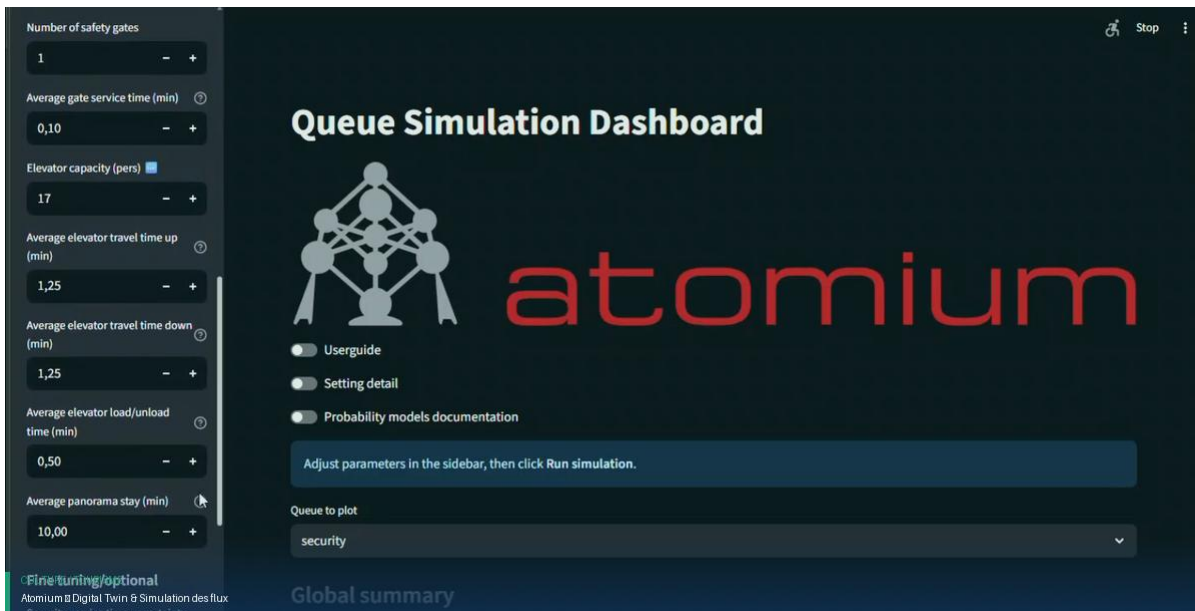
Cybersecurity becomes a game: the Aliaxis immersive serious game

Cybersecurity awareness campaigns often struggle to engage employees in a lasting way. Traditional training is perceived as constraining and messages are not retained. Aliaxis wanted a different approach — an experience capable of making a lasting impression at an internal event in Montreal.

XRintelligence developed a Mixed Reality serious game on Microsoft HoloLens. Faced with a virtual desk superimposed on their real environment, the participant has one minute to identify as many cybersecurity risks as possible: badge left on the desk, password on a Post-it, unsecured USB key, unlocked computer. Each selected object triggers a pedagogical explanation. A final score and leaderboard transform awareness into a competitive and memorable experience.

The approach — understandable in under a minute, usable with no prior training — enables rapid deployment at internal events and easy adaptation to other themes: physical security, quality, regulatory compliance.

Technologies & partners Microsoft HoloLens, Mixed Reality, Serious Game, Gamification, Spatial Interaction



CULTURE / TOURISM · Atomium

The Atomium goes digital: spatial twin and visitor flow simulation

An iconic Brussels landmark, Atomium had no usable 3D model enabling digital management of its heritage. Managing visitor flows is also a permanent challenge in ensuring fluidity, safety and experience quality without being able to test new scenarios under real conditions.

XRintelligence conducted the project in two complementary stages. A 3D laser scanning campaign captured the complete geometry of the building with precision, transformed into a BIM model in Revit format a Spatial Digital Twin of reference for future operations, maintenance and transformation projects.

From this digital twin, XRintelligence developed a visitor flow simulation platform based on Discrete Event Simulation. A web interface allows teams to define attendance scenarios and automatically analyse their impacts: waiting times, congestion zones, overall journey performance. Atomium now has a genuine decision-support tool to optimise the visitor experience without disrupting operations.

Technologies & partners 3D Laser Scanning, BIM (Revit), Discrete Event Simulation, Python, Web Application, Microsoft Azure



REAL ESTATE / ARCHITECTURE Ethias

Rives Ardentes: value by value, the digital twin that grows with the project

As part of the construction of its new Rives Ardentes headquarters in Liège, Ethias chose to build its digital twin progressively — advancing from value point to value point, with each stage delivering concrete benefits and laying the foundations for the next. The goal was to create a living digital platform capable of accompanying the project throughout its entire lifecycle.

XRintelligence developed a complete Spatial Digital Twin of the building in Unreal Engine 5. Over 60 specific assets were modelled, a reusable library built, and an industrialised production pipeline established to rapidly generate VR experiences, cinematic videos and 360 kiosks. The simulation integrates natural lighting by time of day and season. User satisfaction score: 4.6/5.

The platform then evolved into Touch XR 360: 280 4K images automatically generated from the digital twin, accessible from a touch kiosk or responsive web interface without a VR headset. Each new project stage builds on existing assets and workflows, reducing costs and delivery times.

Technologies & partners Unreal Engine 5, BIM, Blender, Reality Capture, VR, Kiosk 360, GPU Rendering, Asset Library, Sketchfab



TRAINING / SAFETY Ethias

When AI triggers the fire: evacuation training in 3D simulation

Training staff in fire evacuation procedures is a permanent logistical challenge: running a real drill mobilises the entire building, disrupts operations and can only be repeated at long intervals. Ethias wanted an alternative capable of training its teams effectively, at any time, without organisational constraints.

XRintelligence developed a pioneering virtual production pipeline combining the Rives Ardentes digital twin with AI-animated avatars and synthetic voices. In the simulated environment, fire outbreaks are triggered by AI agents making each scenario dynamic, unpredictable and realistic, with no actors, no recording studio.

The first delivery scenario covers alarm activation and the mobilisation of floor wardens. With the pipeline validated, each new scenario can be produced rapidly, opening the way to a complete library of immersive training content.

Technologies & partners Unreal Engine 5, AI Avatars, Synthetic Voices, Mixed Reality, Digital Twin, Virtual Production



CONSTRUCTION Roosens Beton

Build faster, build better: digital intelligence on the construction site

Prefabricated house construction relies on precise coordination between materials, lifting equipment and assembly teams. Much of the best practice lives in the heads of team leaders, passed on orally limiting performance reproducibility and complicating continuous improvement. Roosens Beton wanted to transform this expertise into a digital, optimised and reproducible process.

XRintelligence developed a platform built around two modules. The first is an optimisation engine that automatically determines the optimal assembly sequence, pallet positioning, delivery sequences and crane movements using Constraint Programming (CP-SAT). Each team receives a detailed operational roadmap before starting their shift.

The second module supports teams directly on site. Using a Meta Quest 3 headset in mixed reality, the BIM model is precisely anchored on the concrete slab: workers visualise the building before it is built, accurately mark out future walls and detect problems upstream. The digital model becomes a real-time construction guide on the job site.

Technologies & partners Spatial Digital Twin, BIM, Reality Capture, Mixed Reality (Meta Quest 3), Unity, Constraint Programming (CP-SAT)



MOBILITY / ROAD SAFETY · Bruxelles Mobilité

Feeling speed to understand its dangers: the VR City30 experience

Convincing drivers of the real effects of speed in urban environments is a communication challenge as much as a safety issue. As part of the City30 policy rollout, Bruxelles Mobilité wanted to allow citizens to personally experience the differences in perception between driving at 30 km/h and 50 km/h.

XRintelligence developed VR City30, an immersive simulation in which the participant drives through identical urban traffic situations at both speeds. The platform records gaze movements, reaction times, braking actions and hazard identification in real time. At the end, each participant receives a personalised report comparing their performance at the two speeds.

Deployed during prevention campaigns and public events, the solution provides Bruxelles Mobilité with both a high-impact awareness tool and a behavioural database enabling objective measurement of the effectiveness of its prevention actions.

Technologies & partners Virtual Reality, Unity, Eye Tracking, Behaviour Analytics, Spatial Analytics, Pico Neo Eye, HTC Vive Eye



TRAINING / UX · Orange Innovation

Training tomorrow's designers for immersive experiences: the Orange Innovation programme

UX teams in large organisations are highly proficient in conventional digital design — but immersive environments follow radically different rules: spatiality, presence, volumetric interaction, new behavioural metrics. Orange Innovation wanted to prepare its UX teams in Rennes, Paris and London to design XR experiences with the same methodological rigour they apply to web or mobile design.

XRintelligence designed and delivered several modules of a 15-day training programme in English, using a training-by-doing approach applied to a running project thread. Modules cover XR design fundamentals, volumetric rapid prototyping in ShapesXR, immersive user testing methods and cost reduction through early iteration.

An advanced workshop covered Spatial Analytics and AI applied to XR: Eye Tracking, Gaze Tracking, 3D behavioural analysis and AI-driven personalisation. XRintelligence introduced its 3D Spatial Analytics Maturity Model a framework structuring the progression from 2D metrics to AI-assisted predictive systems.

Technologies & partners VR, AR, MR, UX Design, ShapesXR, Rapid Prototyping, User Testing, Spatial Analytics, Eye Tracking, AI

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For Industrial Decision & Performance

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