

Solutions for the 4.0 Factory

VR-STAR[®] - The game changer

In today's tough business environment, companies are looking intensively at innovations that will drive efficacy, efficiency and reduce operational costs, but that will still effectively manage operational risk and will maintain safety



Illogic masters the new industry 4.0 technologies:

VIRTUAL REALITY

AUGMENTED /
ASSISTED REALITY

SIMULATION
ENGINES

IOT APPLICATIONS

We work along with with our partner companies:



A&G our management consulting company focused on the process optimization



e.Magine focused on augmented intelligence and on other cutting edge ICT technologies



Show.it focused on cyber security

“DIGITAL VIRTUAL TWIN” ... DEFINITION

A digital twin is **bridge between the physical and digital world, a complete virtual model of a process, product or service**

This pairing of the virtual and physical worlds **enables training, analysis of data and understanding of systems** to:

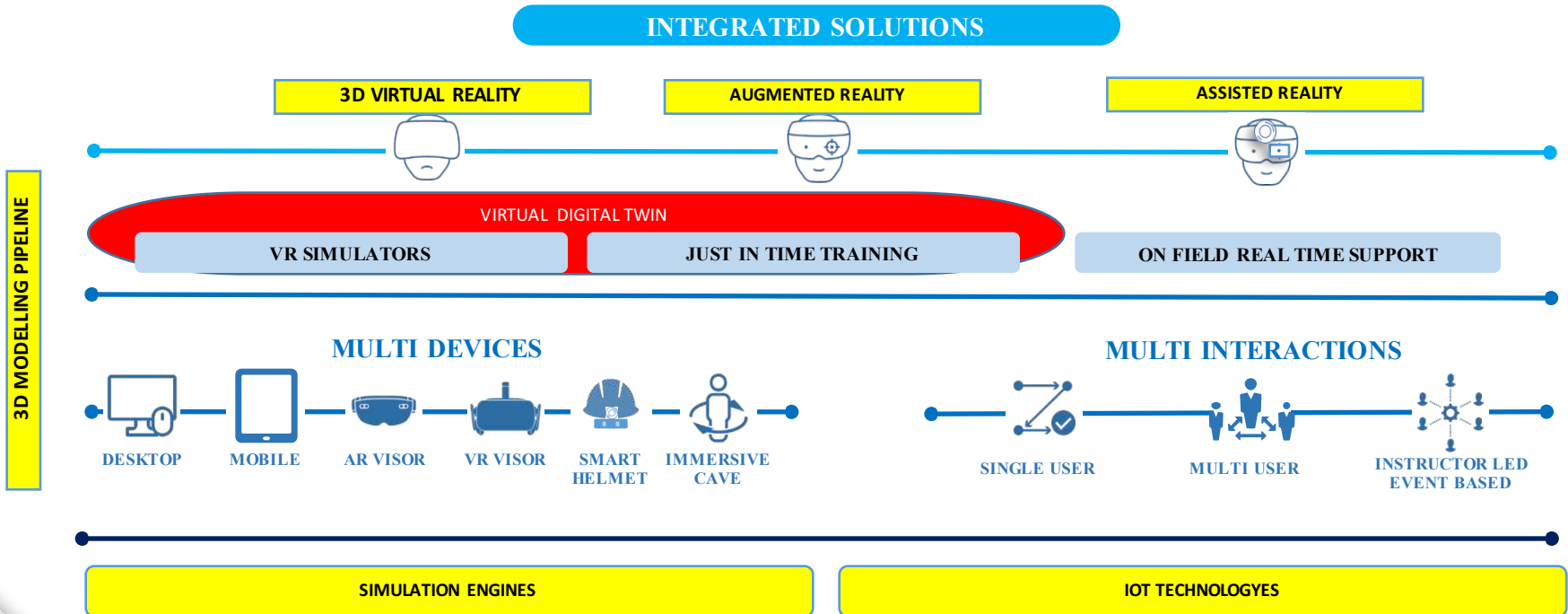
- head off problems before they even occur
- prevent downtime
- develop new opportunities
- even plan for the future by using simulations

Lessons are learned and opportunities are uncovered within the virtual environment that can be applied to the physical world — ultimately to transform your business



"DIGITAL VIRTUAL TWIN" ... APPROACH AND TECHNOLOGIES

Illog develops technologies and integrated solutions, with unparalleled technological point of strengths and full range of features

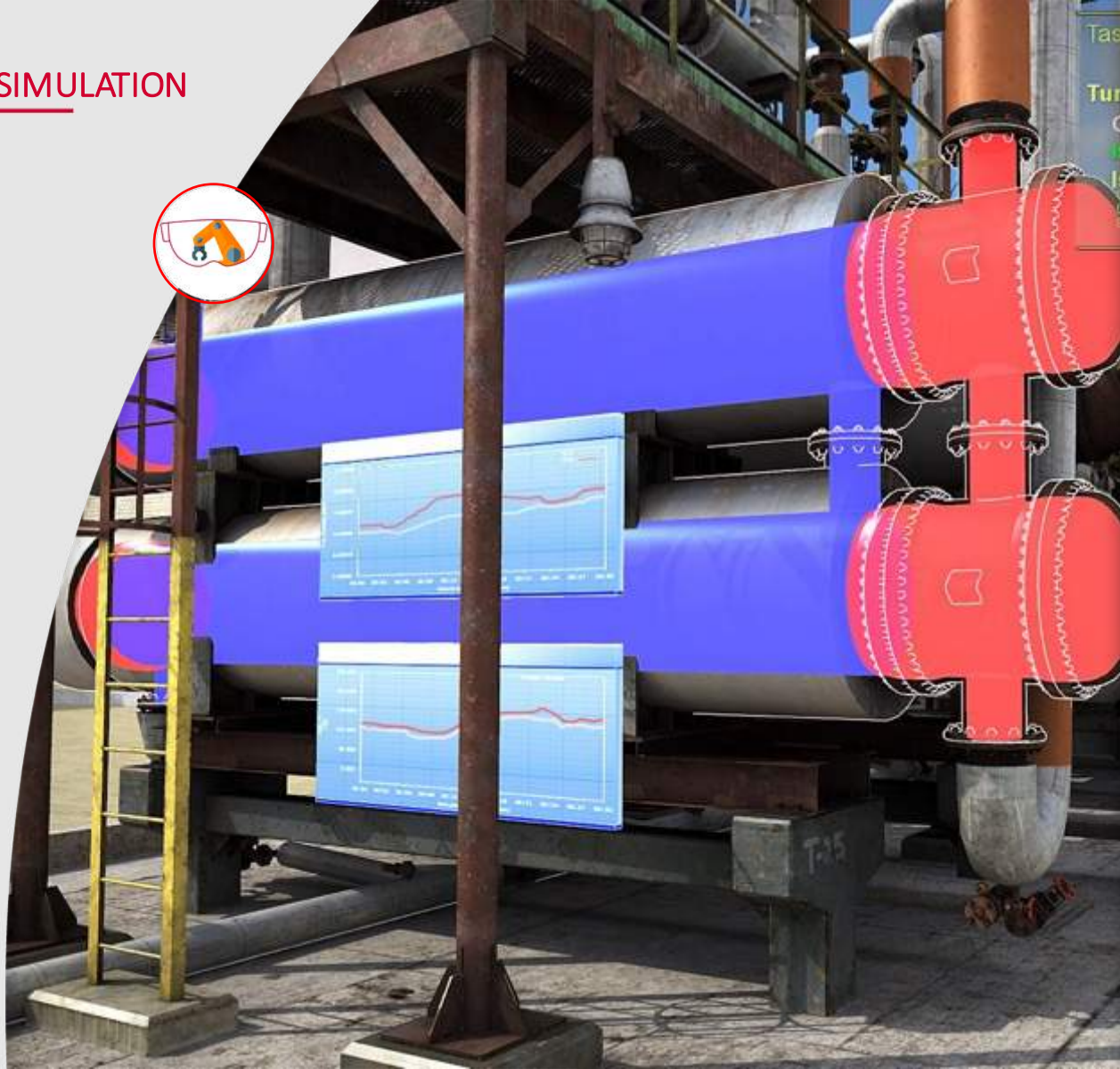


“DIGITAL VIRTUAL TWIN” 3D VIRTUAL REALITY & IMMERSIVE SIMULATION

“3D Virtual Reality” (VR) is a software technology that enables to create a virtual tridimensional photo-realistic copy of a real environment, such as buildings, industrial plants or equipment

Using specific devices, it is possible to enter in these virtual environments

Users can execute in real time all the actions that they can perform in the real world, simulating the functioning of different equipment and processes



“DIGITAL VIRTUAL TWIN” 3D AUGMENTED REALITY

“3D Augmented Reality” (AR) systems are cutting-edge technologies that enable effective industrial solutions

They allow the creation of applications which manages information layers made of 3D assets enriched with:

- Images
- Charts
- Videos
- Instructional content
- Step-by-step directions
- Real-time sensors information

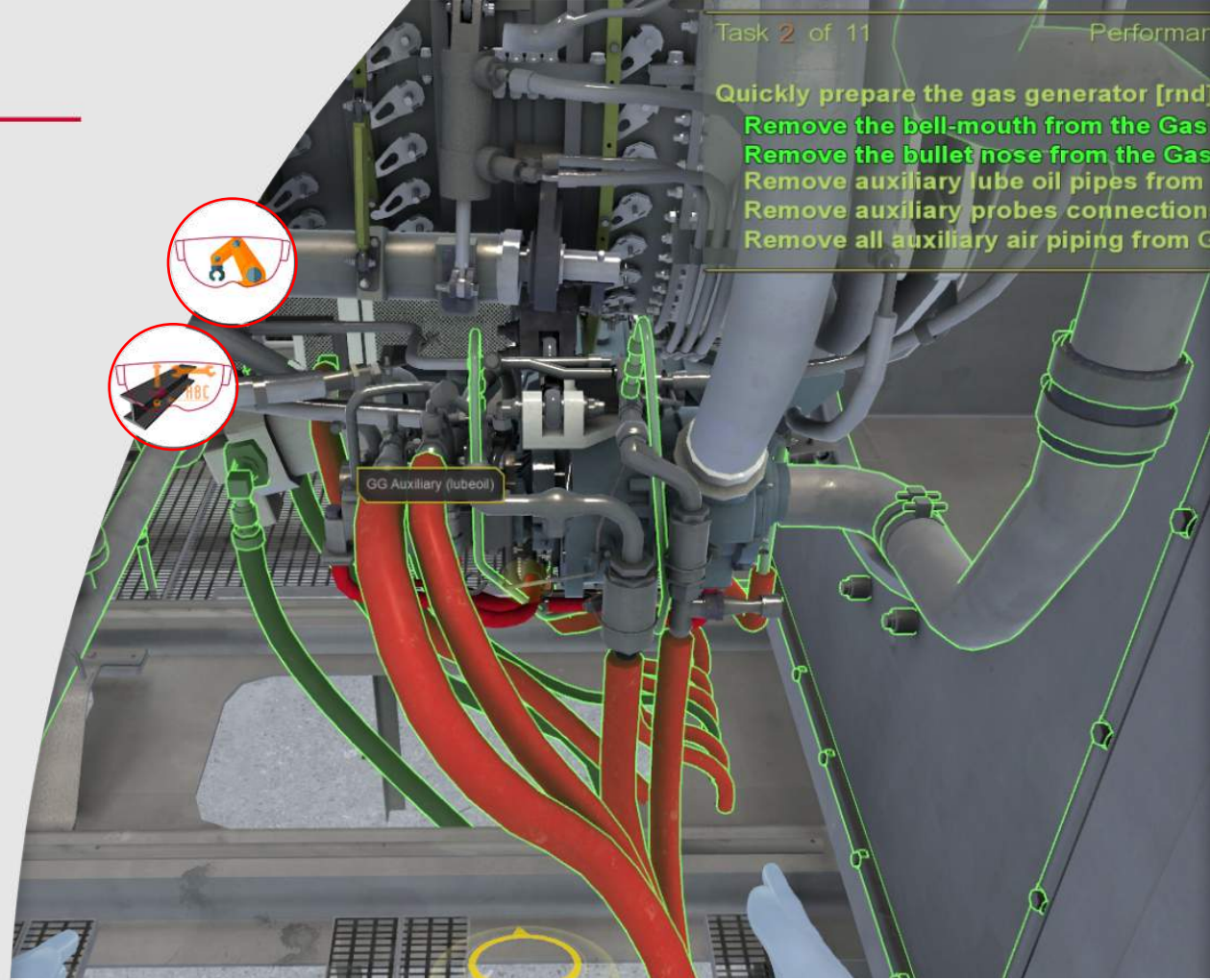
Operators have access to valuable information and are supported in activities and task completion e.g. maintenance repair and operation



“DIGITAL VIRTUAL TWIN” 3D VR AND 3D AR APPLICATIONS

In the context of the industrial plants, **Immersive 3D Virtual Reality and 3D Augmented Reality** can be used for:

- **Previsualization for Constructions**
- **Training of Human Resources**, improving efficacy and efficiency of the final results of training [OTS Operator Training Solutions]
- **Operational Process Optimization** by simulating and improving operational processes (e.g. maintenance, repair and operation procedures) and reducing costs
- **Real Time Assistance** to Field Operators executing actions in real time (e.g. maintenance, repair and operation procedures)
- **Risk Management**, improving and optimizing HSE* policies and procedures for preventing human accidents
- **Synoptic plant management**



Delivering real business value with high quality solutions for performances and costs savings

“DIGITAL VIRTUAL TWIN” 3D ASSISTED REALITY

The “3D Assisted Reality” (ASR) solution enables the delivery of real time remote support to Field Operators for interventions and operations through voice and video call features

The Remote Center supports Field Operators delivering them information on which tasks and activities have to be executed and completed

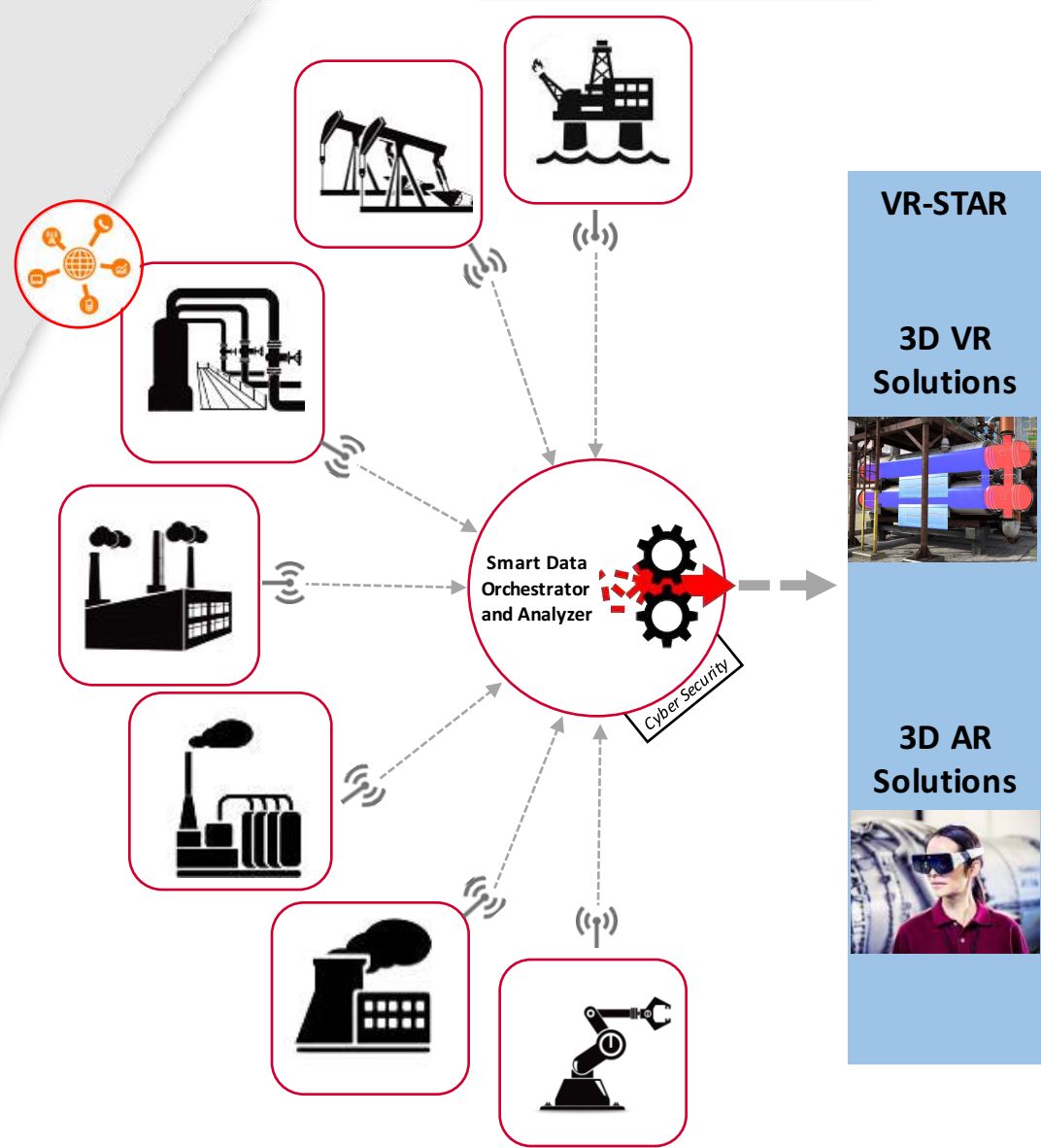
Operators receive and visualize instructions directly on dedicated devices (wearables) and can execute tasks and operations more effectively and efficiently



“DIGITAL VIRTUAL TWIN” INDUSTRIAL INTERNET (IoT)

Industrial Internet technologies (or Internet of Things – IoT) enable the collection and linking of data with analytical tools and with physical and industrial equipment

They combine the idea of intelligent machines with embedded technologies and the Industrial Internet and **enable 3D Virtual Reality and 3D Augmented Reality technologies** to use real time data coming from specific equipment sensors in the plant through a **Smart Data Orchestrator and Analyzer**

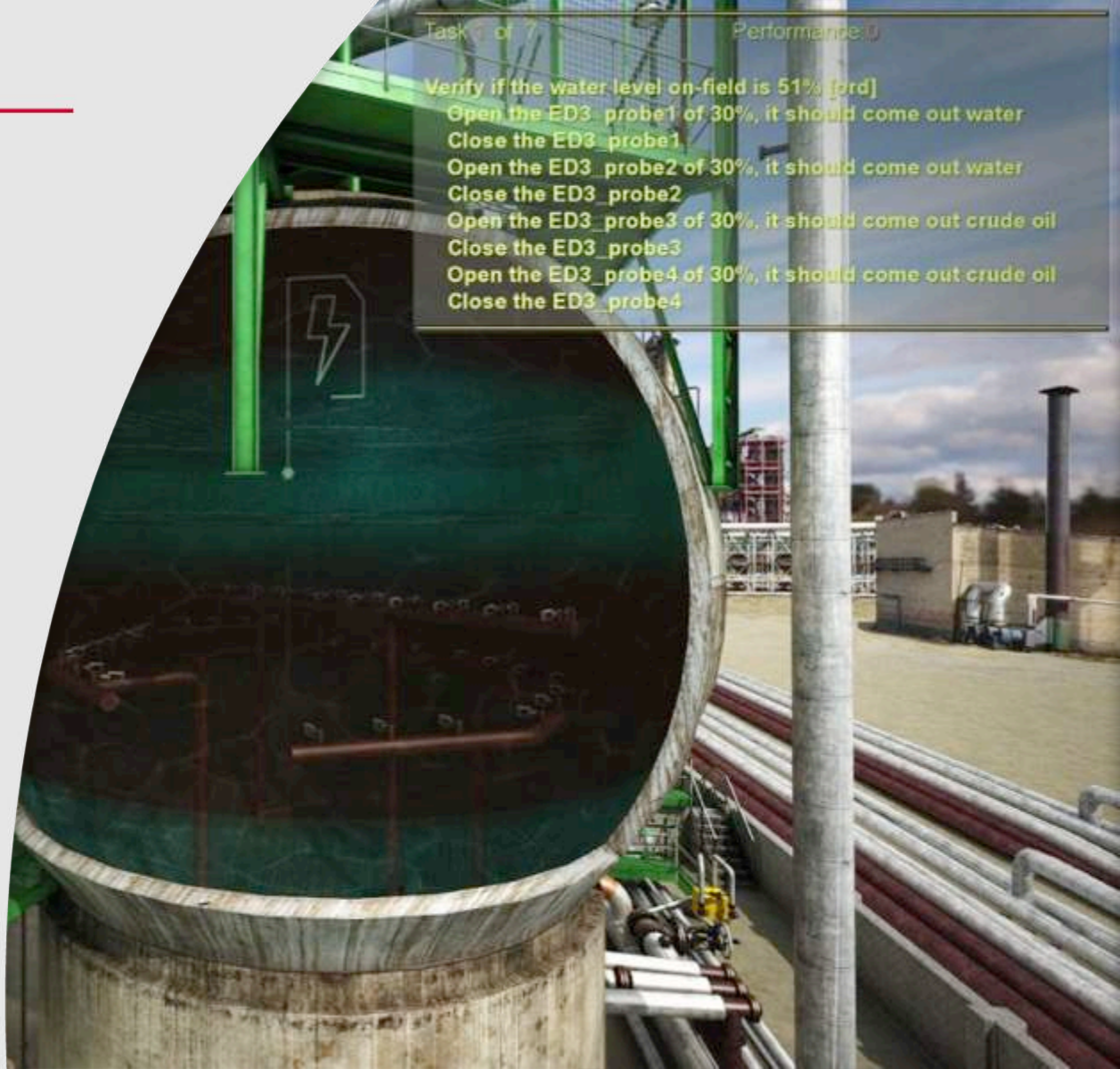


“DIGITAL VIRTUAL TWIN” CHEMICAL-PHYSICAL SIMULATORS

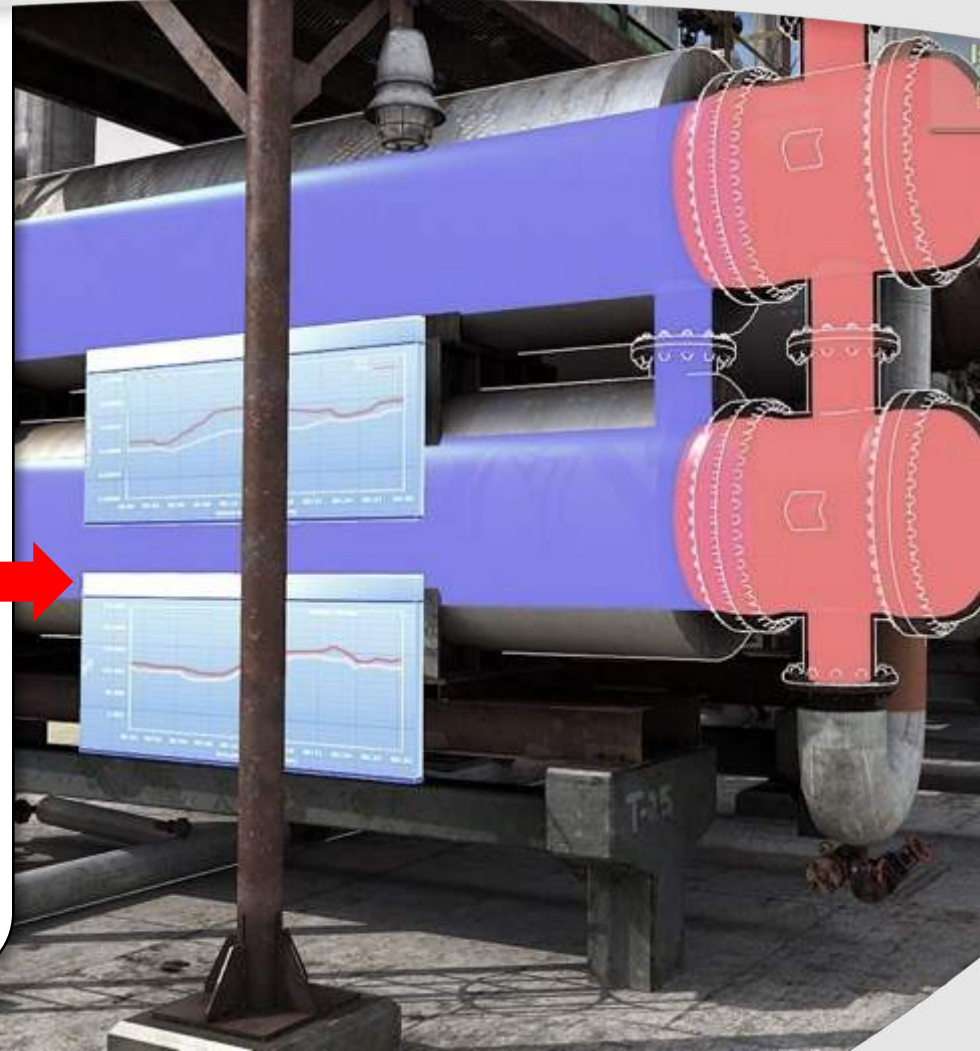
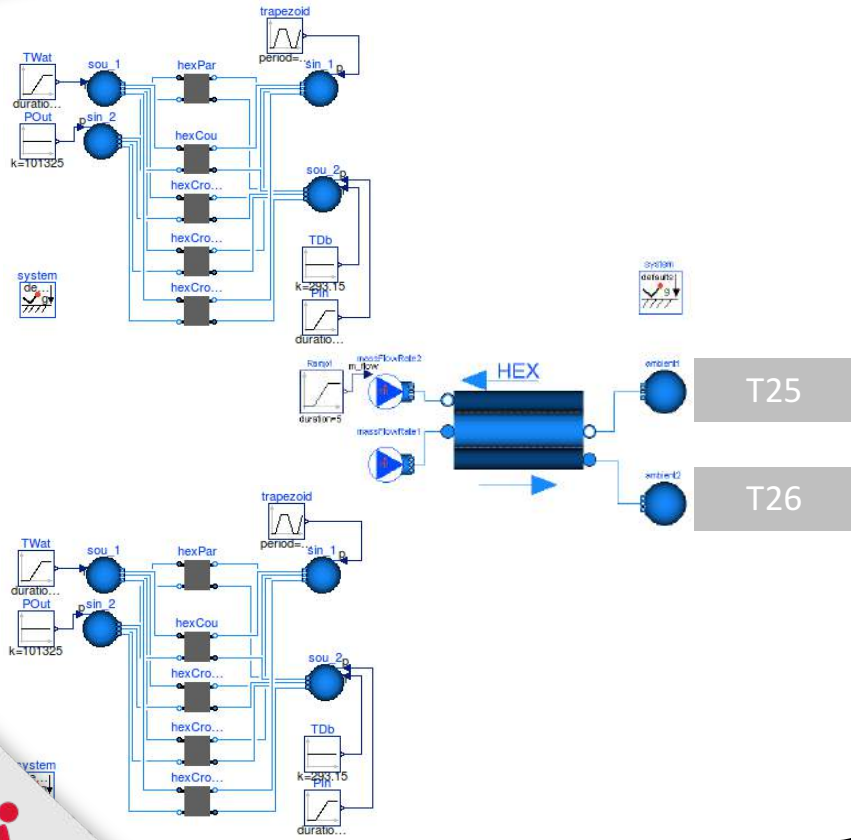
Chemical-Physical Simulators are software based on mathematical models used for designing, developing, analyzing and optimizing chemical and physical processes and chemical and physical reactions

If connected to 3D virtual reality platforms they **enhance the quality and results of the final 3D simulations and support a deeper understanding of processes**

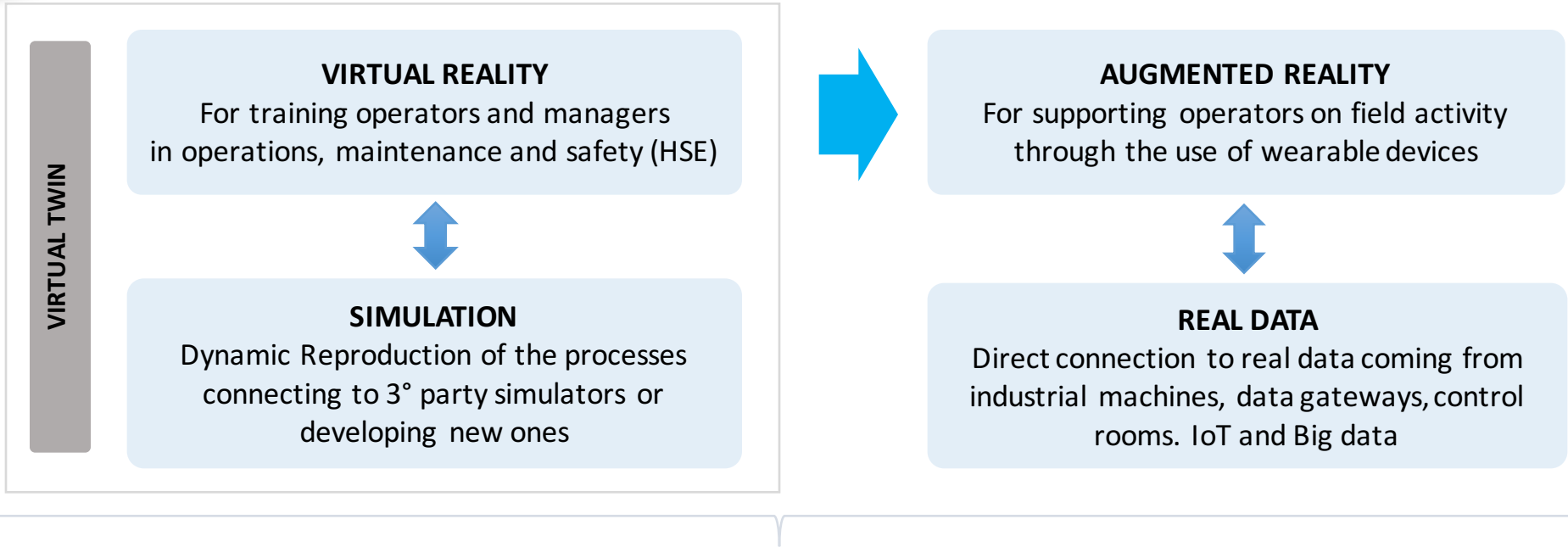
Our 3D virtual reality platform provides a **native chemical physical simulator** and, if preferred, supports the connection to the most important professional 3rd party industry chemical-physical simulators



“DIGITAL VIRTUAL TWIN” CHEMICAL-PHYSICAL SIMULATORS



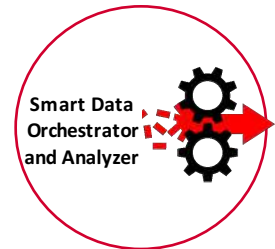
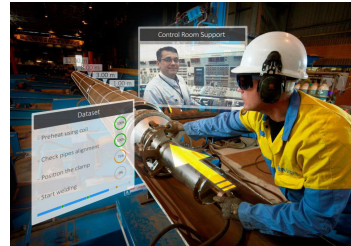
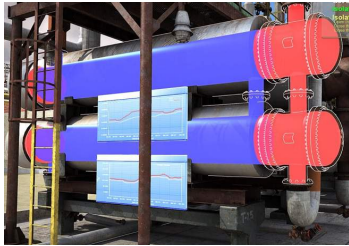
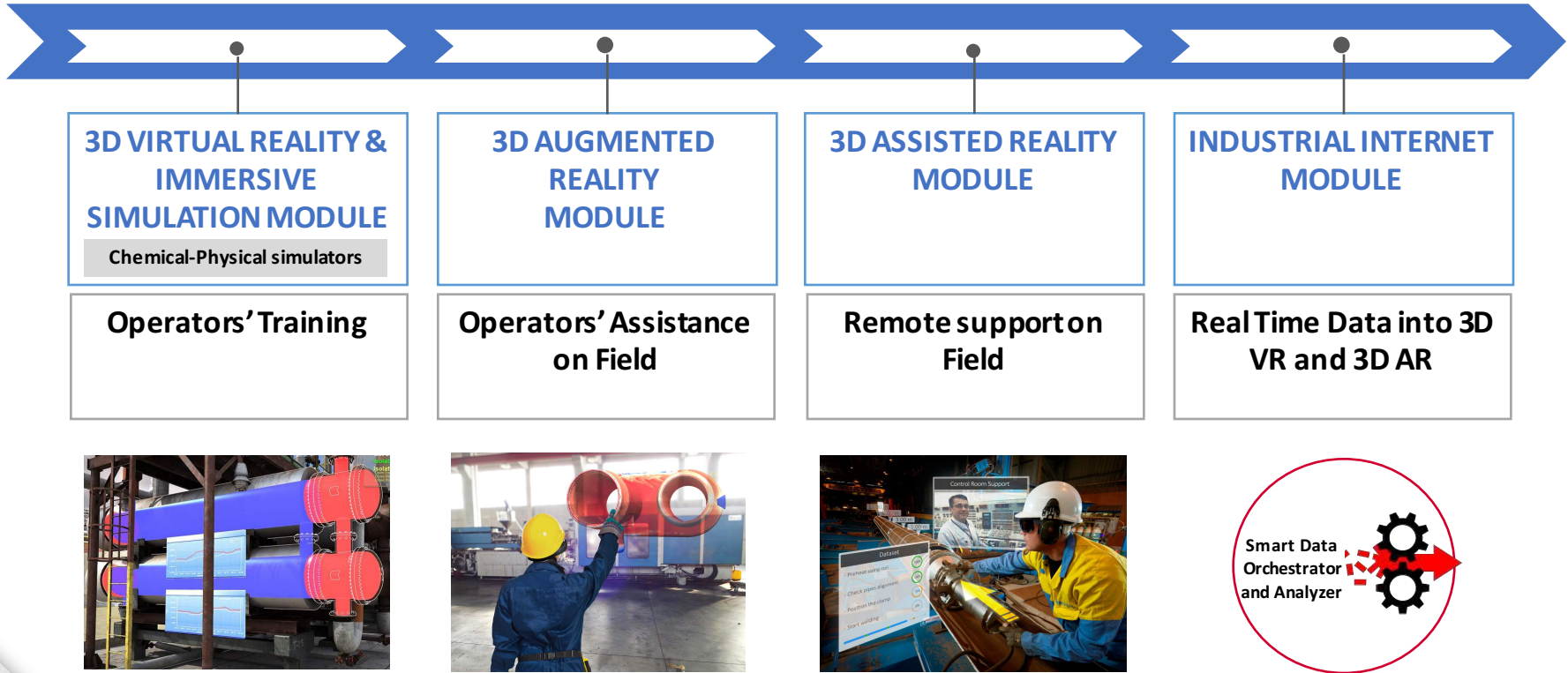
“DIGITAL VIRTUAL TWIN” ... INTEGRATIONS



Oil&Gas, Power Energy, Manufacturing, Aerospace, Automotive, Railways.



“DIGITAL VIRTUAL TWIN” ... EVOLUTIONS



**BENEFITS AND ECONOMIC
ADVANTAGES**

Our solutions for industrial plant
create business value in terms of

COST SAVINGS

(measurable)

and

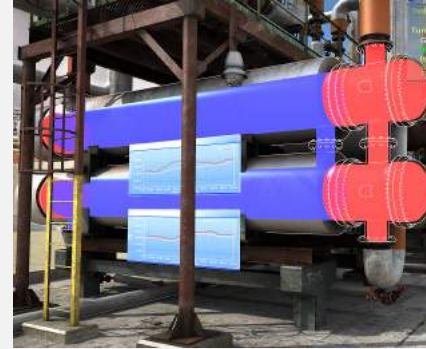
GENERAL EMPOWERMENT

(not measurable)

** This diminished trend allows huge
cost savings thanks to lower trend
of damages of industrial
equipment*

**SAVINGS
ON BUDGETS
FOR TRAINING**

= 33%



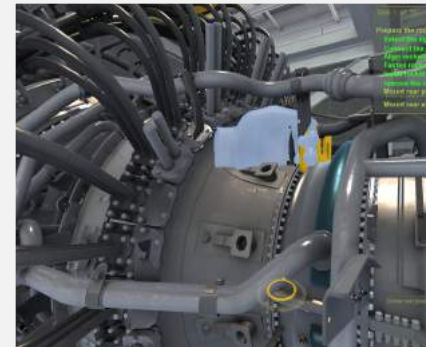
**SAVINGS THANKS TO
OUTAGES
PREVENTION AND
MANAGEMENT**

= 14%



**SAVINGS ON
BUDGETS
FOR "MRO"**

= 5%



**DIMINISHING TREND OF
INDUSTRIAL ACCIDENTS
CAUSED BY HUMAN
MISTAKES***

= 13%




“VR-STAR®” is the most complete software suite available on the market. It combines fully developed state of the art functionalities and technologies

It enables a **better comprehension of processes and procedures** and it enables the reaching of a **higher quality of training** through:

- **higher understanding of ordinary and extraordinary processes**, higher knowledge transfer, higher knowledge retention
- **simulations of all safety-critical tasks** rarely performed in reality (thus empowering “HSE” policy)
- **tracking and certification of field operators’ training activities**



Illogic developed and still develops proprietary solutions providing for each of them unparalleled technological point of strengths and full range of features. Our solutions are always developed according to these pillars:


**TOTALLY
PROPRIETARY
TECHNOLOGIES**

Proprietary solutions that enable complete control of the core source code: **it can be evolved and customized to industries' standards. Moreover the code can be inspected and analyzed enabling management of issues that are related to cyber security** (off-the-shelf platform do not allows this possibility e.g. Unity)


**CLIENTS CAN
MANAGE IT AND
EVOLVE
CONTENT**

Final Clients can use user-friendly features to maintain, configure and evolve features and content directly and autonomously. No need to rely on vendors or programmers


**BASED ON THE
MOST USED
TECHNOLOGIES**

Tech core is based on the most used and most performing open source technologies today available. Communities of Programmers around the world assure and provide the needed technology evolutions. We provide the best talent to integrate and customize those solutions to industry standards

SOLUTIONS FOR THE 4.0 FACTORY ... VR-STAR®

WHY WE ARE A STEP FORWARD



CUTTING-EDGE AUGMENTED REALITIES TECHNOLOGIES FOR JUST IN TIME TRAINING AND FOR MAINTENANCE REPAIR AND OPERATIONS

VR-Star integrates different augmented realities technologies [**HoloLens** (Microsoft), **Meta 2** (Meta)] providing shared interaction features for 3D Virtual Reality and Augmented Reality users and Just in Time training applications.

3D assets and content are created and managed directly in VR-Star and can be used and reused in VR and AR applications, enabling concrete time and cost savings in projects delivery.

A dedicated data orchestrator collects and manages data from sensors in the plants and broadcasts the information in real time to Operators working in the plant



CONNECTIONS TO THE MOST ADVANCED INDUSTRY CHEMICAL-PHYSICAL SIMULATORS

Possibility to connect to the most important professional chemical-physical simulators compliant to all industry standards. Dynamic simulation of chemical-physical events enable deeper understanding of processes



SOLUTIONS FOR THE 4.0 FACTORY ... VR-STAR®

WHY WE ARE A STEP FORWARD



PHOTO-REALISTIC QUALITY AND SCALABILITY

VR-Star takes photo-realism to a higher level thanks to technologies and features that were specifically developed for simulating industrial scenarios and easily scales up to simulate entire plants. It boost training retention and performances on the field, thanks to the realistic point of reference that trainees gain



INTEGRATION WITH DIGITAL ASSET MANAGEMENT SYSTEMS

VR-Star can integrate with plant digital asset management platforms to retrieve digital assets and information on equipment and operating assets and use them directly into digital twin projects. Projects can be delivered with higher level of information and with significant cost and time savings



OPERATORS' TRAINING, MONITORING AND TRACKING

VR-Star enables:

- tracking of performances and evolution of Operators' results over time
- tracking of the best results achieved
- reporting of the activity plan and tracking of certification expirations



SOLUTIONS FOR THE 4.0 FACTORY ... VR-STAR®

WHY WE ARE A STEP FORWARD

✓ INSPECTABLE SOURCE CODE (CYBER SECURITY ISSUES)

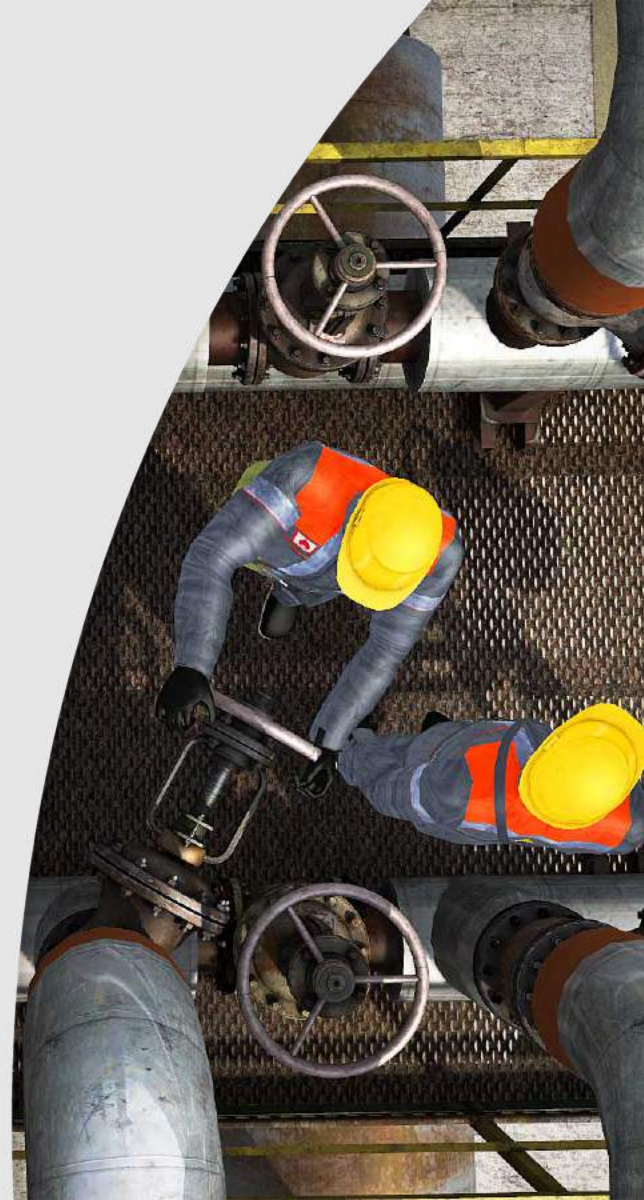
VR-Star is a proprietary solution that enables complete control of the core source code: it can be inspected and analyzed enabling management of issues that are related to cyber security (off-the-shelf platform do not allows this possibility e.g. Unity)

✓ INDUSTRIAL INTERNET SOLUTIONS

Industrial Internet technologies enable VR and AR technologies to use real time data coming from specific equipment sensors in the plant through a smart data orchestrator and analyzer

✓ ADVANCED USER INTERACTION

User interaction is enhanced thanks to gestural interfaces and other types of advanced interfaces. *The User / Operator can focus on the actions and tasks to perform, thus reaching higher level of knowledge transfer and training.* Our solution interfaces with industry input and output device like: Desktop, Mobile, Hololens, Daqri, Oculus Rift, Immersive cave, Voice



SOLUTIONS FOR THE 4.0 FACTORY ... VR-STAR®

WHY WE ARE A STEP FORWARD



KINEMATICS

The platform supports kinematics simulations thanks to specifically developed features

Kinematics is mandatory for maintenance repair and operation simulation



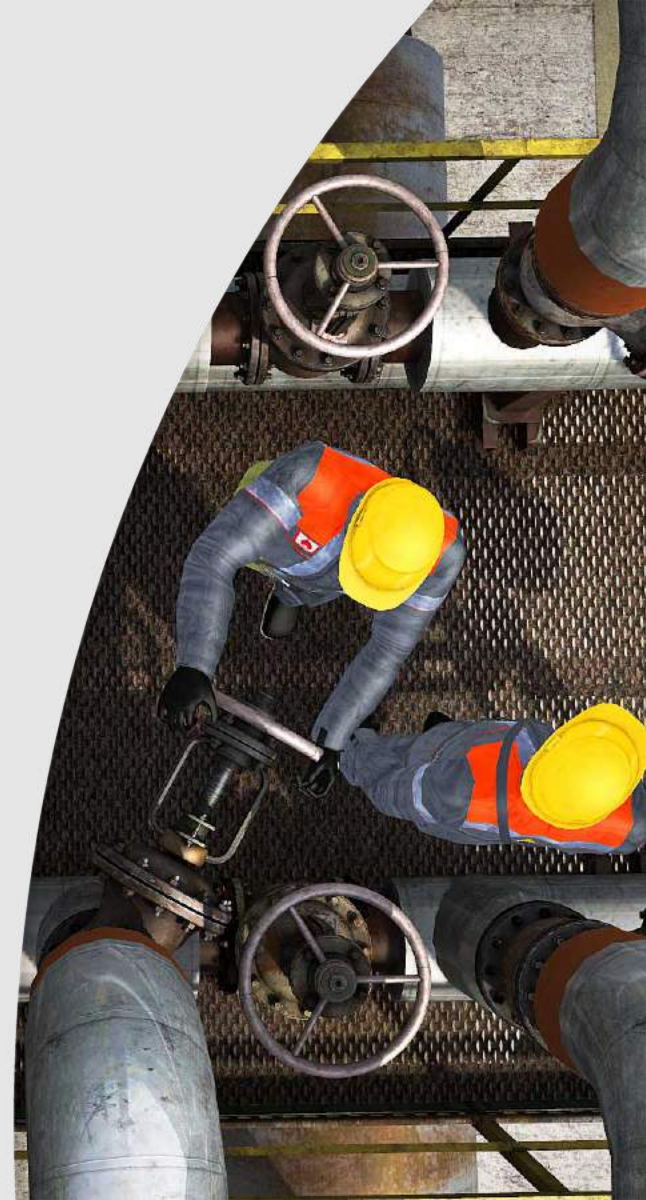
IMMERSIVITY AND STEREOSCOPY

Photo-realistic virtual reality simulation is enhanced by immersive and stereoscopic solutions. VR-Star can scale from 3D Active glasses, to Oculus Rift, to cave solutions
Immersive training delivers better training results in terms of task completions: lower average time needed to complete tasks and lower average number of mistakes done



FIELD OPERATORS' ROLE MANAGEMENT AND SELECTION

Possibility to define and manage specific field operators' types, each one with his role and his characteristics (Personal Protective Equipment, work tools ...). Trainees can select the specific roles and perform training missions with dedicated tasks and procedures. Training is more effective and precise



SOLUTIONS FOR THE 4.0 FACTORY ... VR-STAR®

WHY WE ARE A STEP FORWARD



SELF TRAINING AND TEAM TRAINING

Users / operators can train using 2 different scenarios:

- the Self Training scenario
- the Team Training scenario, where events are driven by the Instructor and managed by the different Team Members in real time



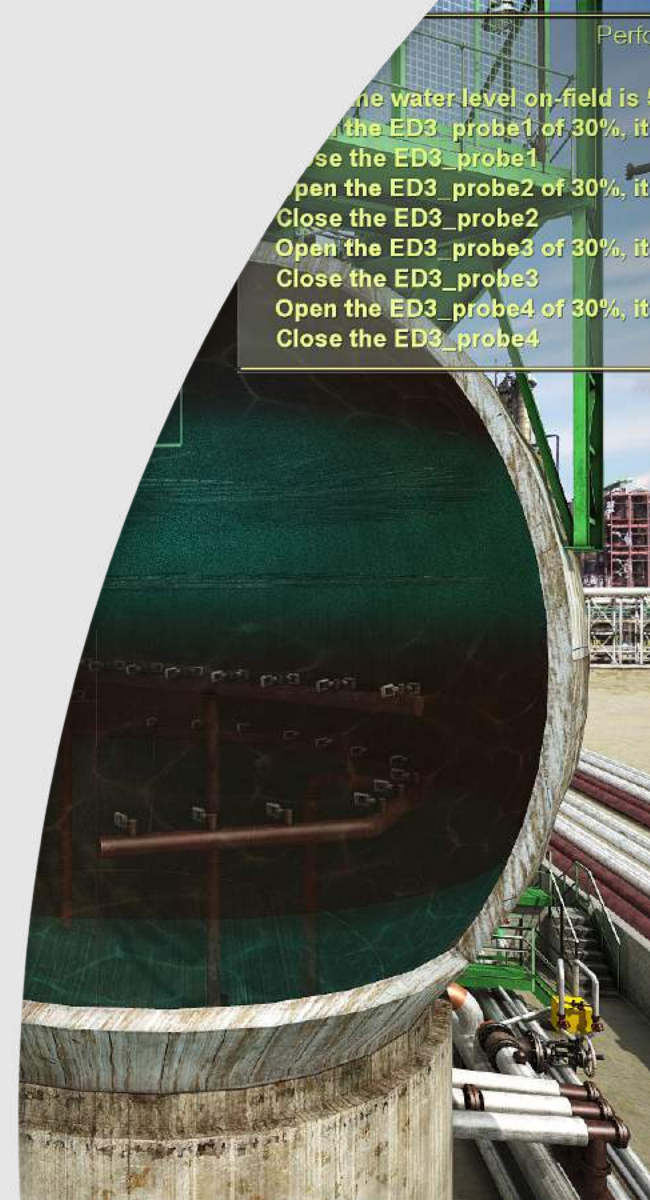
OPERATIONAL PROCEDURES AND HAZARDOUS SITUATIONS

All important and mission critical procedures and situations can be mapped in VR-Star with all details. Operators can train and learn the specific activities and tasks that they have to manage or that are not possible to reproduce in reality



AFTER ACTION REVIEW

VR-Star allows review and follow-up on training sessions in order to reach higher efficacy levels



Perfo
the water level on-field is
the ED3_probe1 of 30%, it
se the ED3_probe1
pen the ED3_probe2 of 30%, it
Close the ED3_probe2
Open the ED3_probe3 of 30%, it
Close the ED3_probe3
Open the ED3_probe4 of 30%, it
Close the ED3_probe4



SOLUTIONS FOR THE 4.0 FACTORY ... VR-STAR®

WHY WE ARE A STEP FORWARD



TECH DELIVERY MODEL

Our solution is available for delivery model that most fits the Clients' objective and policy:

ON PREMISES | CLOUD | MULTI TENANTS | PAY PER USE (soon) |

VR-Star is also available through **Web browser interface**



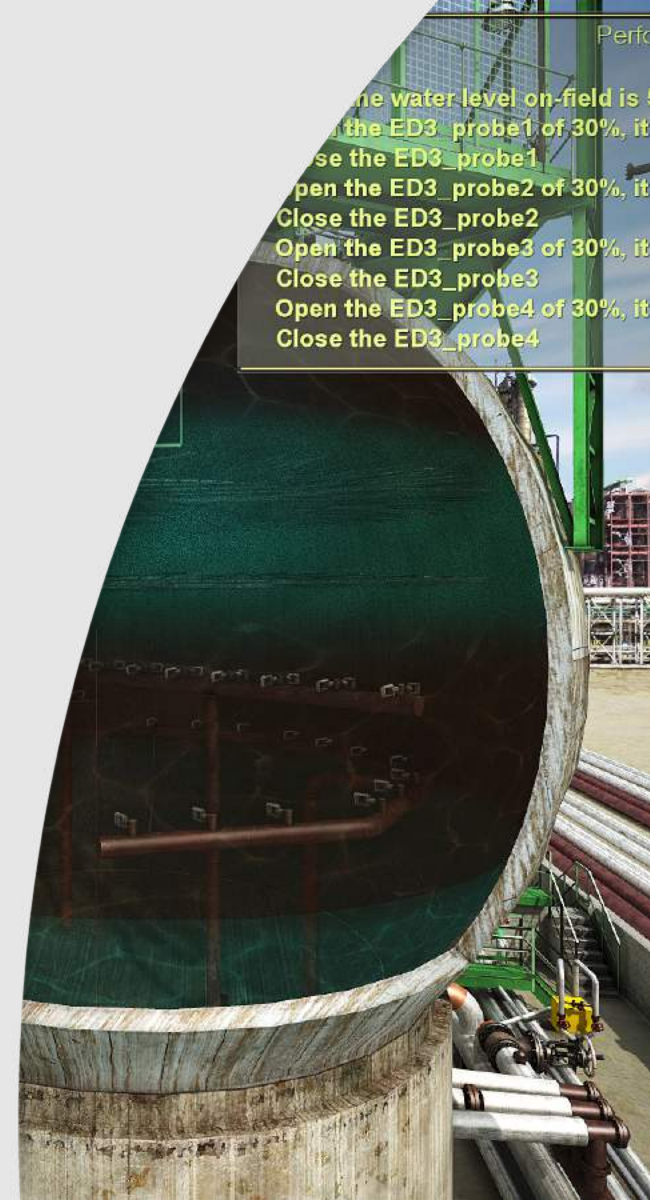
EASY TO USE PROCEDURE EDITOR / EASY TO USE OBJECT EDITOR

Final Clients can use user-friendly features to maintain, configure and evolve features and content directly and autonomously. No need to rely on vendors or programmers



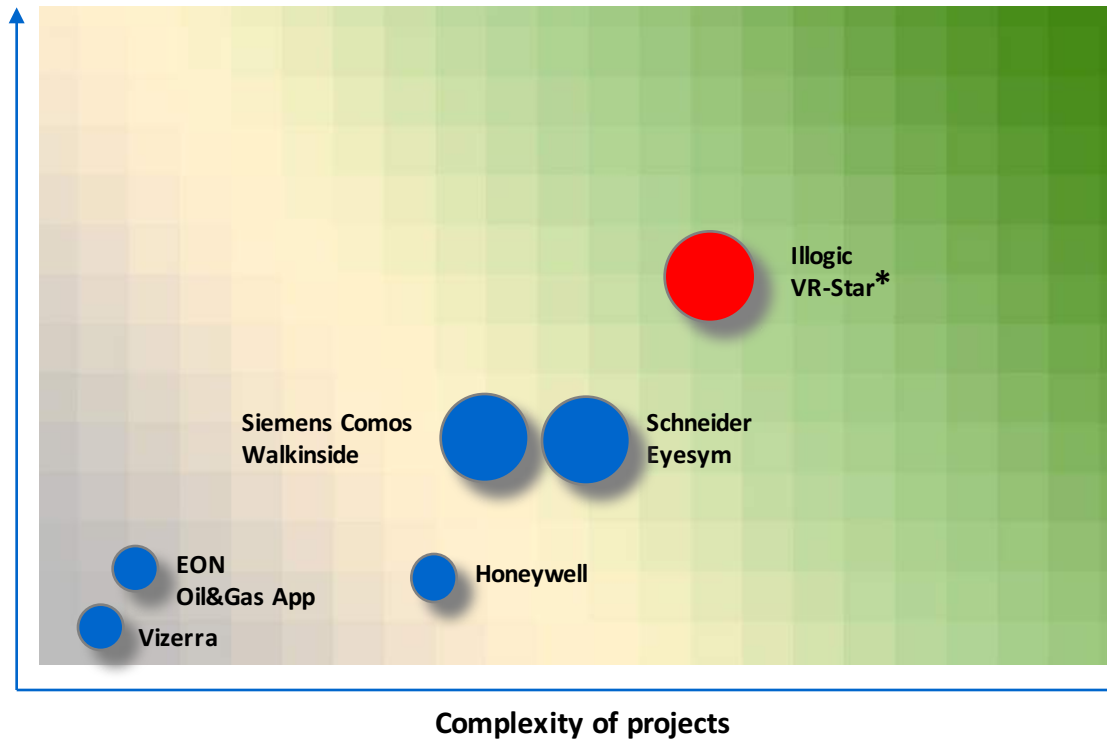
POLY-TRANSFORMATIONS

Our solution allows fast management of CAD files due to a faster conversion of the input files in a 3D real time environment thanks to an automated process and pipeline



MAIN COMPETITORS FOR VIRTUAL REALITY SIMULATIONS IN THE DISCRETE MANUFACTURING AND PROCESS INDUSTRY

Completeness of
technologies and
features



3 "Seal of Excellence
Certificate"
Horizon 2020 European
Commission

3D virtual immersive training systems (ITS) for Rosneft Oil Company (Ryazan Refinery)

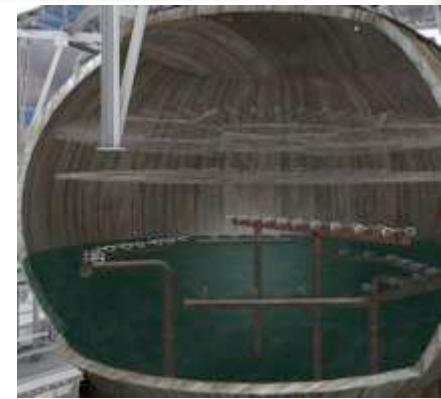
Development of a state-of-the-art, real-time, high-fidelity dynamic simulator with operator training systems and 3D virtual immersive training systems (ITS) for 3 equipment (for a total of five training procedures)

Ryazan personnel uses our immersive training system for:

- Empowering human safety in the ambit of “HSE” policies
- Reduce downtime and maximize the efficiency of plant maintenance
- Enhancing the effectiveness of training



**ELECTRICAL
DESALTER**
Water Level
Recovery



**CENTRIFUGAL
PUMP**
Start up
Maintenance
Shutdown



HEAT EXCHANGER
Planned
Shutdown
Emergency
Shutdown



Ryazan Refinery

The 3D virtual immersive training systems for Rosneft “Ryazan Refinery” was delivered in July 2014. It has been operated by CDU-4 personnel ever since

In 2014-2015 all Unit Personnel was trained using the application

Since the delivery, **Ryazan Refinery CDU-4 Unit** reached these results:

- **100% of Operators** completed the training and reached the expert level knowledge about the Unit / Equipment
- **All new Operators** are trained using the application

“We consider the VR-Star 3D Virtual Reality simulation application as the best way for training Senior and Junior Operators and very effective for the Unit / Equipment risk-mitigation actions and purposes

It would be of considerable importance having other Units supported by this application”





For the **DEPARTMENT OF ENERGY OF UNITED STATES (DOE)**, we have implemented a **state-of-the-art, real-time, high-fidelity dynamic simulators with operator training systems and 3D virtual immersive training systems (ITS)** into an integrated energy plant and control room environment for IGCC power plant

IGCC Orientation for Engineers and Managers

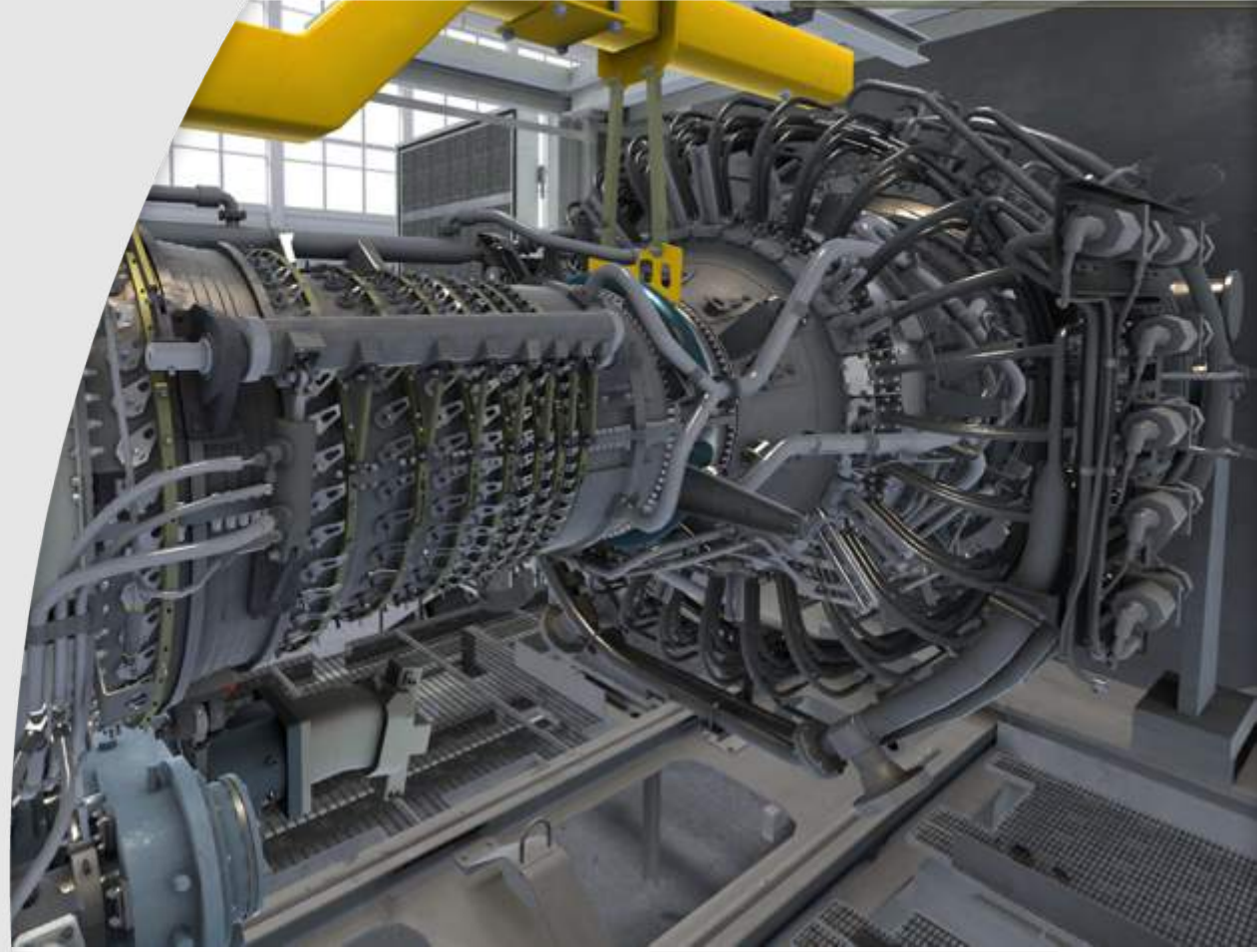
"The courses introduces trainees to the IGCC simulator, process, and controls. Trainees startup and shutdown the simulated unit in an integrated manner and are exposed to simple and complex unit malfunctions in the control room and in the field. Trainees spend 40% of the time in the classroom and 60% of the time interacting with the operation and immersive training simulators."





For **GE OIL&GAS** we delivered a **3D virtual immersive simulations of 2 complex equipment for training and maintenance purposes:**

- The **turbine** (gas generator) for the Customer Training department to support a better training of final Clients on maintenance, repair and operation activities
- The **luboil console** for the GE Academy for internal training purposes



REFERENCES ...

We successfully acquired the following clients:



GE Oil & Gas



... GROWING DAY BY DAY ...

PARTNERS



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