World Manufacturing Forum 2023

New Business Models for the Manufacturing of the Future

The Industrial Metaverse Revolution: Shaping Future Business Models and Policies in Manufacturing

GELLIFY Metaverse beyond GELLIFY Factory Walls

28th Nov 2023, Bergamo

Lucia Chierchia Managing Partner & Chief of Open Innovation Ecosystems @ GELLIFY



Copyright © GELLIFY Group All rights reserved

HUMANS AND MACHINES

New technologies are profoundly changing industrial production and requires the establishment of **new interactions between humans and machines.**

Asimov's Laws have never been more relevant than now...



The Three Laws of Robotics

- 1. A robot may not injure a human being or, through inaction, allow a human being to come to harm;
- 2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law;
- 3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law

Isaac Asimov

from "I. Robot" 1950



WHY | Industrial Metaverse Potential

We need to **MAKE THE INVISIBLE VISIBLE** to drive sustainable growth, allowing decision makers to better **understand the past and forecast the future**.

MARKET POTENTIAL. Expectations for the industrial metaverse are high:

- The market potential for the industrial metaverse is expected to reach \$100 billion in 2030
- The market potential for the immersive collaboration techs is expected to reach \$30 billion in 2030

Industrial

Simulated machines, factories, transport networks, and other complex systems, enabling real-world problem solving in industry and manufacturing.

MARKET PROJECTIONS (ABI RESEARCH)



Enterprise

Technologies enabling immersive business collaboration, including productivity tools and virtual workspaces.





Source: MIT MANAGEMENT SLOAN SCHOOL

Gellify Factory Walls

WHAT | End-to-end, Real-world System

The Industrial Metaverse is a further **evolution** of discrete digital twin technologies that already exist today, but progressively extended to ultimately represent an **end-to-end**, **real**world industrial system, including external elements outside the company and the environment within which it operates.

The Industrial Metaverse thus provides a **transformative tool** to elevate the use of digital simulation technology to the level of **strategic decision-making**.



Getury Walls

WHAT | Evolution & Revolution

The Industrial Metaverse has elements of both evolution and revolution:

- evolution in terms of the potential for further stepwise penetration of Industry 4.0 technologies
- revolution in terms of how the convergence of these technologies has the potential to transform business productivity.



GRUFY Factory Walls

WHAT | Myths to bust

The Industrial Metaverse is **MORE THAN a 3D simulation**.

True metaverse **breaks the boundaries between the virtual and physical** worlds with the assistance of technologies like 'mixed reality'.

The metaverse **IS NOT about one specific technology**.

It's a new way of employing and **interconnecting multiple technologies** to completely alter the business landscape.

The Industrial Metaverse **IS NOT new**.

Computer-aided design (CAD) has been around since the 1950s. In 1982 author William Gibson coined '**cyberspace**' as a general term for the Internet environment, whereby the metaverse is envisioned as the next generation of the cyberspace we have today.

It is inaccurate, then, to say that this technology is without precedent. What is new, however, is the **linking of our digital and physical worlds**.



WHAT | Industrial Metaverse Use Cases



IMPROVED DESIGN AND ENGINEERING

Team members from different departments or locations can work in a **collaborative setting** and innovate without the need for costly and time-consuming travel or extensive physical prototyping. The ability to combine photorealistic environments with different simulations allows for more **extensive testing and validation**

of product designs or plant facilities in the virtual world, facilitating greater innovation.

VIRTUAL COMMISSIONING AND PLANT DESIGN

By using immersive digital twins, manufacturers can build out and commission their shop floors in the metaverse, ensuring **optimized operations and resiliency**. They can detect and correct errors without disrupting ongoing production or incurring unnecessary investment risks.



ENHANCING OPERATIONS

Through simulations and realtime data collection, manufacturers can garner **insights** used to **optimize equipment, minimize downtime, and predict and prevent failures**.



UPSKILLING EMPLOYEES

The metaverse gives employees remote **access to expert skills and virtual training** regardless of where they are physically located. Employees can receive in-depth, hands-on training on complex machinery in the virtual world without disrupting operations.

HOW | Digital Twin as a core building block

The digital twin is a core metaverse **BUILDING BLOCK**.

Virtual models can simulate real-world objects in detail. The next generation of digital twins will be

- Photorealistic
- Physics-based
- AI-enabled
- Linked in metaverse ecosystems

• The **DIGITAL TWIN MARKET** is expected to surge to \$183 billion by 2031 (Gartner)





Gellery Metaverse beyond Factory Walls

HOW | THE INTERSECTION NODE

The **Industrial Metaverse** works at the **intersection of three main transitions**:

- 1. the **Digital** Transition
- 2. the Human-centric Transition
- 3. the **Green** Transition

Therefore, we consider the Industrial Metaverse also as a **key driver for Sustainability.**

Getury Factory Walls

1. PHYGITAL DIMENSION

The **Digital Transition** implies a **convergence and seamless integration** of the **physical and digital** worlds, along different dimensions:

- Technologies: high rate of change
- **Competences**: beyond the **core**
- Business Models: towards servitization
- **Collaborative Models**: from open innovation to **venturing**

"The industrial metaverse links real and digital worlds, creating an **immersive environment** where manufacturing workers can **collaborate in real time** while **solving realworld business problems more easily and less expensively**." Barbara Humpton, Siemens USA CEO Getury Factory Walls

2. AUGMENTED HUMANS

Emerging Technologies can empower our manufacturing value chain, building the **Augmented Factory**.

Following the **Human-Centric Transition** model, we can design new experiences for the Augmented Humans.

"Humans will interact with digital content and with each other to form an ecosystem, in a fusion of technology that blurs the frontier between the physical, the biological, and the digital world."

Landry Signe, Executive Director, Thunderbird School of Global Management Getury Factory Walls

3. SUSTAINABILITY

The potential of the industrial metaverse to drive the **Green Transition** is great.

Optimization of processes will result in substantial **reductions in wasted energy and physical resources**.

Moreover, in a digital world, organizations can **experiment with new materials and processes** without using any physical resources.

> "Information is a replacement for wasting physical resources." Michael Grieves, Executive Director and Chief Scientist, Digital Twin Institute



Gelley Metaverse beyond Factory Walls

THE STARTUPS' POTENTIAL

Startups can offer not only **solutions** to make companies **more competitive**, but also grasp an entrepreneurial **mindset** that forces us to open our minds towards **new business opportunities.**

Companies have understood that they can go **beyond pilot projects**, making those technologies scale within all company functions, through an **agile and high-impact process**.



Gellery Metaverse beyond Factory Walls

Case AI & MACHINE LEARNING

Artificial Intelligence refers to capability of digital computer or computercontrolled robot to **simulate intelligent human behavior**.

It refers to **cognitive processes**, including **learning**, **reasoning** and **problem solving** and **self-correction**.

Case AI & MACHINE LEARNING



DESIGN & ENGINEERING Optimization of Design of Components



Automotive Components -15% Wheel Mass

PRODUCTION CAPACITY Optimization of Production Planning & Scheduling



Call Centers: +8% Plant Productivity

Case INTERNET OF THINGS

The Internet of Things (IoT) is a **network of connected devices**, endowed with unique identifiers and able to transfer data.

It is the combination of two dimensions: **the network of "things"** and the **computing system**.

"Things" can be any **device with a digital identity and the capacity to exchange data** (e.g. wearable devices, manufacturing sensors, home appliances, cameras,...).

Case INTERNET OF THINGS

POGGIPOLINI



Digital SaaS Platform that leverage data from sensing bolts.

A spinoff from a mechanical company.

SENS-IN®

SENS-IN® Bolt

Sens-in is solution to turn a fastener into an **intelligent device** capable of communicating mechanical data in real time.





Getury Walls

Case VIRTUAL & AUGMENTED REALITY

Virtual reality places the user inside a completely digital environment, immersing human sensing completely in a world that only exists in the digital real.

Augmented Reality adds digital information and contents upon real world, taking the present real world and projecting digital imagery and sound into it.

Case VIRTUAL & AUGMENTED REALITY

ENDYMION

Augmented Reality (AR) is a very promising technology but its potential in the Industry 4.0 is nowadays limited because **the development of AR applications is complex, time-consuming, and requires a wide spectrum of skills.**

ENDYMION APP simplifies and speeds up the creation of AR applications starting from simple web pages

Endymion wants to enable corporates and developers to create AR applications using only web pages without learning anything new, reducing the cost and time of developing environments in AR





General Metaverse beyond General Factory Walls

ECOSYSTEM VALUE CHAIN

Partnerships will be essential.

Bringing the industrial metaverse to life will require substantial **cross-industry collaborations** on standards and infrastructure.

Organizations may partner with suppliers, competitors, and customers to assemble the complex technology stacks undergirding metaverse participation. Metaverse players ranging from established companies to startups and from governments to individual enthusiasts will bring new ideas and voices into the industrial metaverse.

Partners

CO-INVESTING IN THE METAVERSE



Forward Factory is an **acceleration program** focused on **digital innovative startups in the manufacturing domain**.

It's an **innovation ecosystem initiative** that brings together Italian leaders who invest, operate in manufacturing, and support startups' growth.

Its purpose is to encourage and develop effective, sustainable innovative projects and enable **evolution of manufacturing sector.**



Ecosystem





Gellery Metaverse beyond Gellery Factory Walls

EXPLORING THE METAVERSE

Phygital HUB

GELLIFY Phygital HUB is a **technology showcase to stimulate and facilitate the discovery of new emerging technologies**, built together with innovative start-ups and global tech corporates.

The heart of the Phygital HUB beats around **innovative technology islands** where you can experience augmented human capabilities, unconventional interactions between humans and machines, and advanced digital solutions to create the "**factory of the future**".

THE PURPLE WAY DOWNLOAD NOW

"The Manufacturing Trilogy:

a journey through Operational Excellence, Servitization and Sustainability"











See you soon in the Industrial Metaverse

lucia.chierchia@gellify.com





