FABBRICA FUTURO – Bari 2024

THREADDY:

"UNA PIATTAFORMA INNOVATIVA DI CONFIGURAZIONE E GESTIONE PRODOTTO, PER L'EVOLUZIONE VERSO UN MODELLO DI BUSINESS CIRCOLARE E SOSTENIBILE"

Vito Lazazzera
Innovation Director Automotive Division
MASMEC

Dilemma

Può l'umanità razionalmente e deliberatamente approcciare e mantenere la sostenibilità, attraverso una evoluzione tecnologica, economica e culturale continuativa?

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SEDE

Superficie totale:
44.000 mq

Superficie edificata:
20.000 mq

Capacità produttiva:
100 Mio EUR

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AUTOMAZIONE CUSTOM-MADE

Realizziamo sistemi automatici personalizzati di **assemblaggio e test di componenti automotive**.

Spaziamo da grandi linee per assemblaggi complessi a banchi di collaudo end of line, servendo principalmente il settore dei **veicoli ibridi ed elettrici**.

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Focus Industriale

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International Society for Industrial Ecology

Science for sustainability and circular economy

The International Society for Industrial Ecology (ISIE) promotes industrial ecology as a way to address sustainability challenges and achieve a circular economy. The science of industrial ecology applies a systems perspective to explore how material and energy are used by society to find solutions to complex environmental problems. The ISIE facilitates communication among scientists, engineers, policymakers, managers, and advocates who are interested in better integrating environmental concerns with economic activities.

The mission of the ISIE is to promote the use of industrial ecology in research, education, policy, community development, and industrial practices.

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History

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The origins of industrial ecology trace back to at least the late 18th century and to Thomas Malthus' study of the relationship between population growth and economic output. The literature developed in various ways during the next two centuries, notably including the Tragedy of the Commons, Spaceship Earth, The Limits to Growth, and Sustainable Development.

In 1989, Scientific American published what would prove to be a seminal article for the field of industrial ecology. The article by Robert Frosch and Nicholas Gallopoulos was titled "Strategies for Manufacturing" and suggested the need for "an industrial ecosystem" in which "the use of energies and materials is optimized, wastes and pollution are minimized, and there is an economically viable role for every product of a manufacturing process".

Frosch and Gallopoulos envisioned a more integrated model of industrial activity that would be environmentally sustainable on a global level. Their article was the catalyst for a Symposium held by the US National Academy of Sciences in the early 1990s that has been heralded as a founding event for the modern field of industrial ecology. At around this time, Graedel and Allenby published their seminal definition of industrial ecology:

> "Industrial ecology is the means by which humanity can deliberately and rationally approach and maintain sustainability, given continued economic, cultural, and technological evolution. The concept requires that an industrial ecosystem be viewed not in isolation from its surrounding system, but in concert with them. It is a systems view in which one seeks to optimize the total materials cycle from virgin material, to finished material, to component, to product, to obsolete product, and to ultimate disposal. Factors to be optimized are resources, energy and capital."

During the decade following the symposium, the US-based effort becoming known as industrial ecology joined with and built upon a substantial body of research, practice, and expertise already underway throughout the world, but especially in northern Europe. The field's growth was signaled by two Gordon Research Conferences in the United States as well as a number of special sessions at annual meetings and conferences of various professional and scientific organizations.

In the late 1990s the field gained increased international recognition through the creation of the Journal of Industrial Ecology - now a widely respected, scholarly, peer-reviewed journal. The journal is based at the Center for Industrial Ecology at Yale University and is edited in collaboration with the Norwegian University of Science and Technology (NTNU) and Tsinghua University.

In 2003, NTNU offered the first PhD program in Industrial Ecology, followed by a masters program the year after. In 2005, Leiden University and Delft University of Technology started offering a joint MSc degree in Industrial Ecology. Across the globe, industrial ecology is currently taught through individual courses or specializations, often within engineering programs or interdisciplinary degrees that focus on the environment.

In the 2010s, the circular economy became a leading concept in academic, industrial, and policy circles. The circular economy embodies many of the approaches and findings of industrial ecology, including its life cycle perspective, focus on closed-loop systems, design for the environment, and industrial symbiosis. Many circular economy efforts are supported or created by leading industrial ecologists. Moreover, circular economy businesses and other initiatives often employ graduates from industrial ecology programs.

Si, ma è arrivato il momento di avviare il passaggio verso un modello di:

"Industrial Ecology!"

Keywords:

- *Industrial ecology*
- *Sustainability*
- *Circular economy*
- *Industrial ecosystem*

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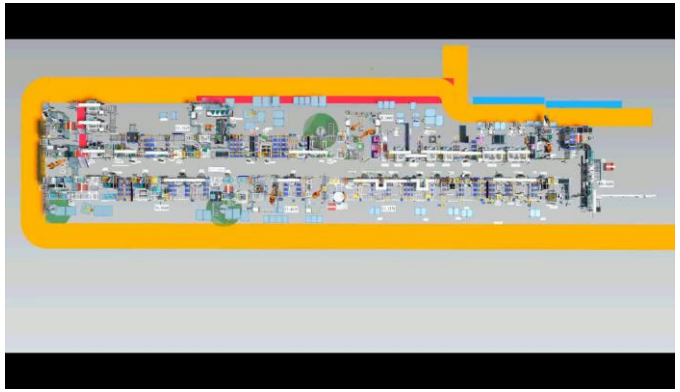
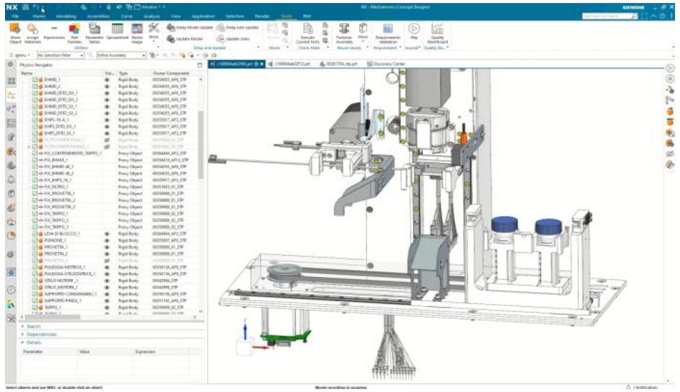
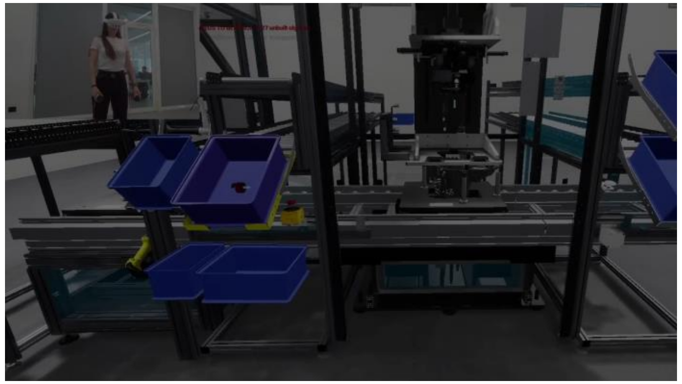
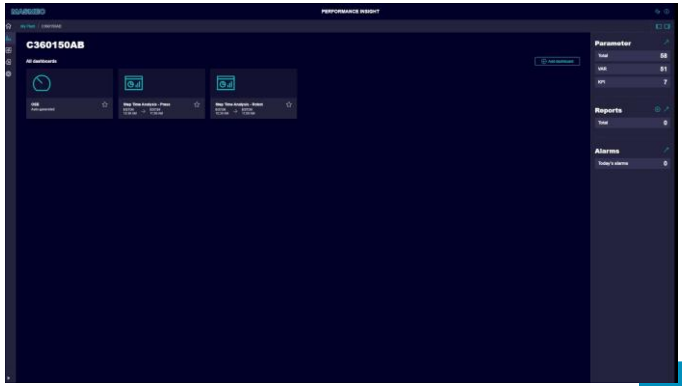
Technology Revolution

La rivoluzione tecnologica oggi passa attraverso:

- ***Il digital twin***
- ***La Virtual, Augmented e Mixed Reality***
- ***L'internet of things (IoT)***
- ***L'intelligenza artificiale (AI)***



Andrea Palladino, PhD • 1°
Senior Data scientist at GSK | PhD in Physics | Divulgatore scientifico per passi...
1s • Modificato •

Nell'immagine di sinistra viene mostrata un'opera dello scultore Giuliano Finelli, in cui è raffigurato il busto di Maria Barberini Duglioli.
L'opera, risalente a circa 400 anni fa, è esposta al museo Louvre di Parigi.

Nell'immagine di destra viene mostrata un'opera realizzata dall'intelligenza artificiale generativa.

Secondo voi, quale tra queste tecnologie avrà in ambito industriale nei prossimi anni lo sviluppo più dirompente?

*Per me sarà l'**Industrial Internet of Things (IIoT)***

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Perché l'IIoT?

Use case: settore automotive

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27th CIRP Design 2017

Integrated data model and structure for the asset administration shell in Industrie 4.0

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Abstract

The increasing demand for highly customized products in connection with shortened product life cycles requires the manufacturing industry to be eminently flexible, whereas low production costs are crucial to persist in the competition of the global markets. To meet this requirements, cyber-physical systems (CPS) are applied into the production process, aiming for interconnected and self-managing smart factories, which can incorporate external and internal conditions for the autonomous adaptation to gain optimized results. This is achieved through a bi-directional information flow between all important components such as machines, products, control programs and off-site assets. Therefore it is essential to standardize communication interfaces and enhance interoperability between CPS of all variations. This paper presents an approach to combine the specification of the World Wide Web Consortium (W3C) with the guidelines of the Plattform Industrie 4.0 (I4.0), thus obtaining a uniform structure for industrial CPS. Based on the recommended asset administration shell for I4.0-components, the required functionality is identified and allocated to different segments. The five main segments include the functionality for security, representation, communication to external CPS, communication to internal assets and a section for additional applications to enhance the capabilities. By using a standardized protocol for the configuration and representation based on the object memory model of the W3C, a significant interoperability between I4.0-components and conventional Internet-of-Things can be realized. The proposed structure is applied in a use case to simulate the adaptation and remote maintenance of a production robot.

Peer-review under responsibility of the scientific committee of the 27th CIRP Design Conference

Keywords: Cyber-Physical Systems; Industrial Internet; Industrie 4.0; Internet of Things; Remote Maintenance

1. Introduction

A significant research subject of the past century was the development of new methods to manage increased lot-sizes in the production process. This subject pervaded through the decades, changing the production structure from former hand-crafted products to fully automated production lines, thus increasing the affordability and expanding the customer circle. The developed methods furthermore had to consider the continuously decreasing product life cycles (PLC), which require an appropriate degree of flexibility to adapt to recent developments and integrate new technologies into the production [1,2]. Thereby flexibility was primarily determined by the time-to-volume, which measures the necessary time and efforts for the alteration of a mass production system to integrate new technologies. In recent years the customer demands have increasingly shifted from mass products to personalized devices. Automotive manufacturers for instance have to offer a huge amount of specifications and optional features which can be chosen and changed by the customer. This leads to a tremendous expansion of the product variety. In combination with the lean-production methods designed to avoid inventory, the result is a significant reduction of lot-sizes. The final stage of this process is a production system which is continuously adapting to every new order, while the value stream is constantly changing. To remain a high productivity, the adaptation itself has to be automated, thus individual orders can be processed seamless within the production system. The

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Keywords:

- *Continuous adapting*
- *High productivity*
- *Processed seamless*

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IIoT

Associazioni e consorzi stanno cooperando a livello globale per rilasciare nuovi protocolli standard di interoperabilità interna ed esterna alle organizzazioni.

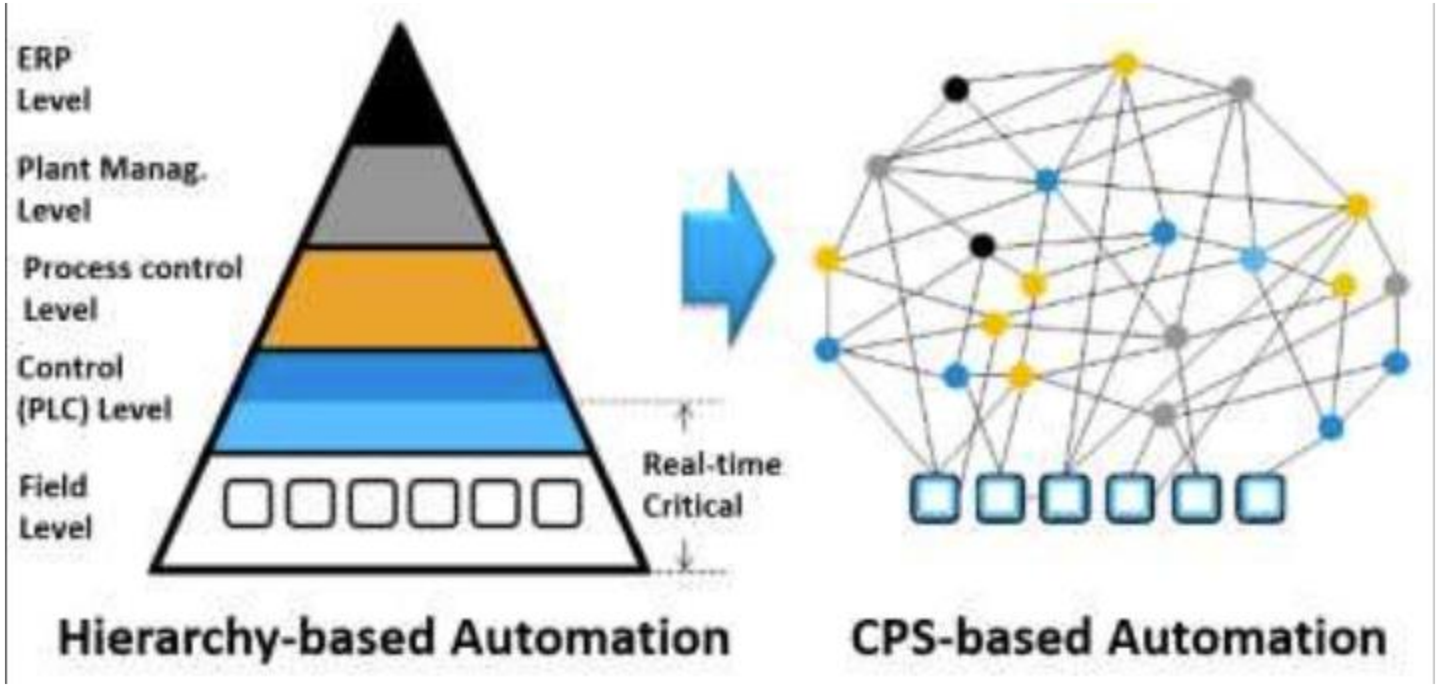
*Per l'interoperabilità interna si stanno affermando sempre più le **Asset Administration Shell** (AAS) (Standard CEI EN IEC 63278)*

*Per l'interoperabilità esterna si parla di **Dataspaces Protocols & Platforms***

CYBER PHYSICAL SYSTEM

*Tali standard si basano non più su gerarchie piramidali aziendali stand alone, ma su **sistemi cyberfisici** (CPS) interconnessi, collegati tra loro in un network assimilabile all'attuale web:*

In tal modo la cooperazione si può espandere internamente o esternamente ad una organizzazione, globalmente.



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Data Spaces in a circular economy industrial model

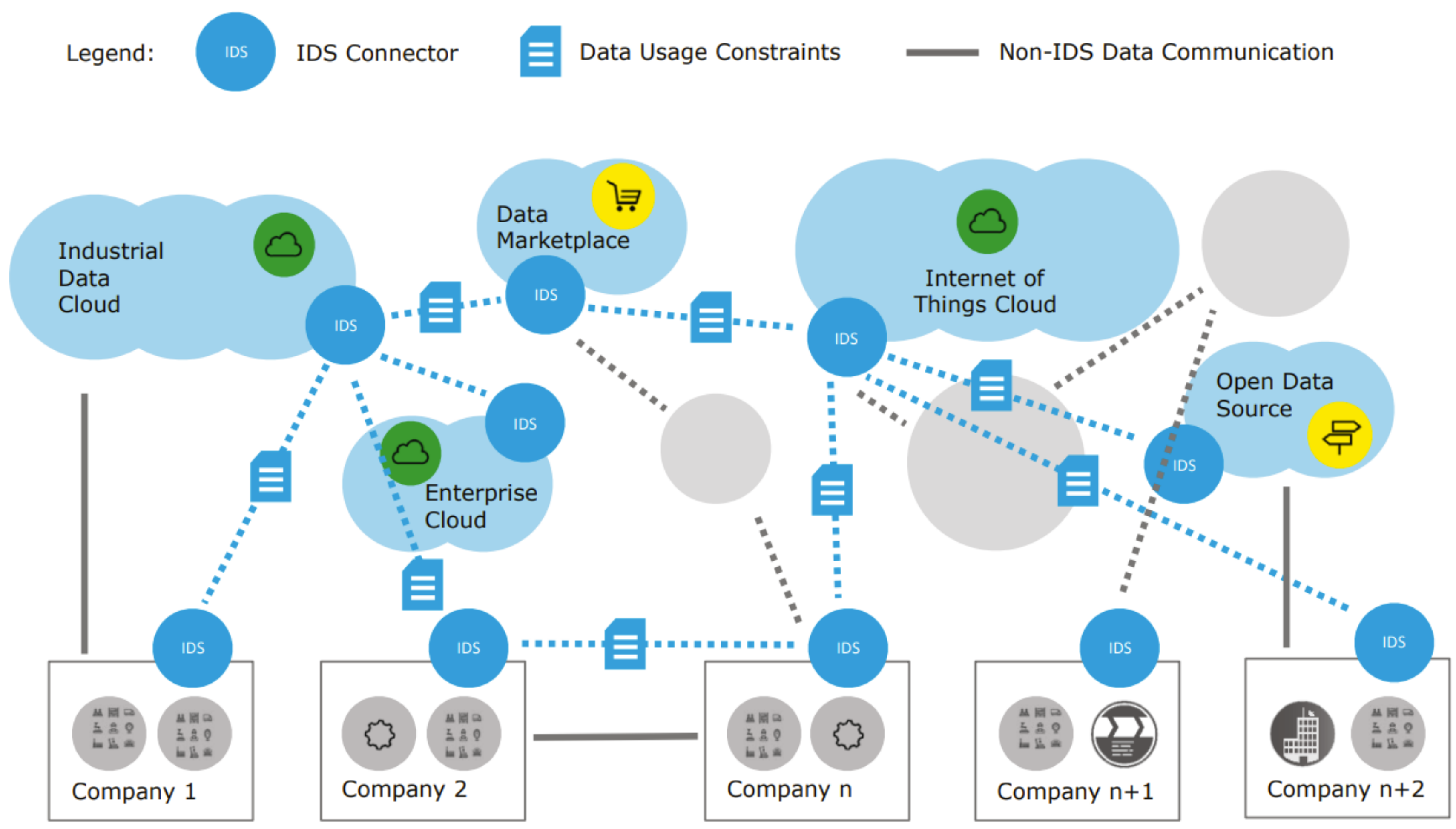
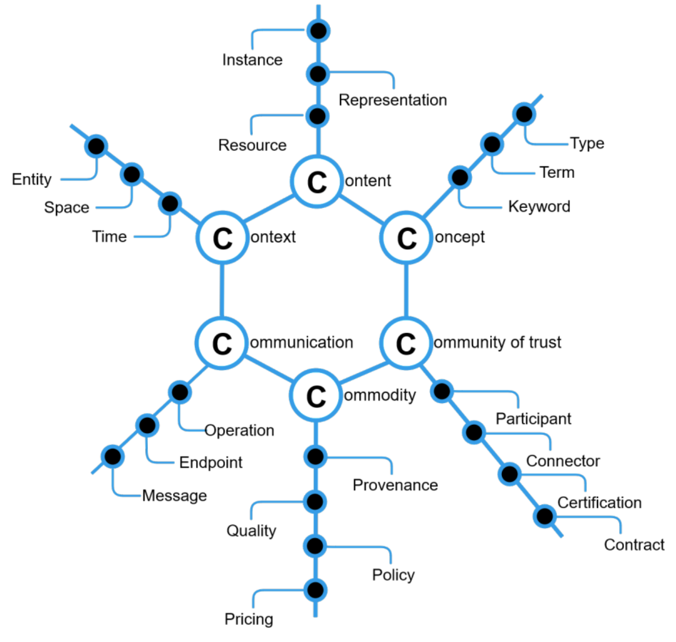


Figure 2.6: International Data Spaces connecting different cloud platforms



CONCEPTUAL REPRESENTATION OF A DIGITAL RESOURCE IN THE IDS

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Mechatronics-oriented Digital Thread Ready Platform for process optimization

Made in MASMEC

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MISSIONE 4
ISTRUZIONE
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THREADDY è il nome che abbiamo dato ad un progetto di ricerca aziendale, finanziato dal ***Ministero dell'Università e della Ricerca*** *(utilizzante fondi resi disponibili dall'Unione europea con il programma NextGenerationEU) tramite il Piano Nazionale di Ripresa e Resilienza, attraverso il Partenariato Esteso* ***«Made in Italy Circolare e Sostenibile – MICS»***

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Prevede lo sviluppo di una piattaforma di ''Digital Thread'' ossia una piattaforma in cui tutti i dati di gestione progetto vengono archiviati e resi disponibili dalla fase di avvio del rapporto con il cliente, sino a quando il prodotto viene dismesso, quindi per tutto il suo ciclo di vita, interna (presso Masmec) o esterna che sia la sua geolocalizzazione (presso il plant di destinazione).

Finanziato dall'Unione europea NextGenerationEU
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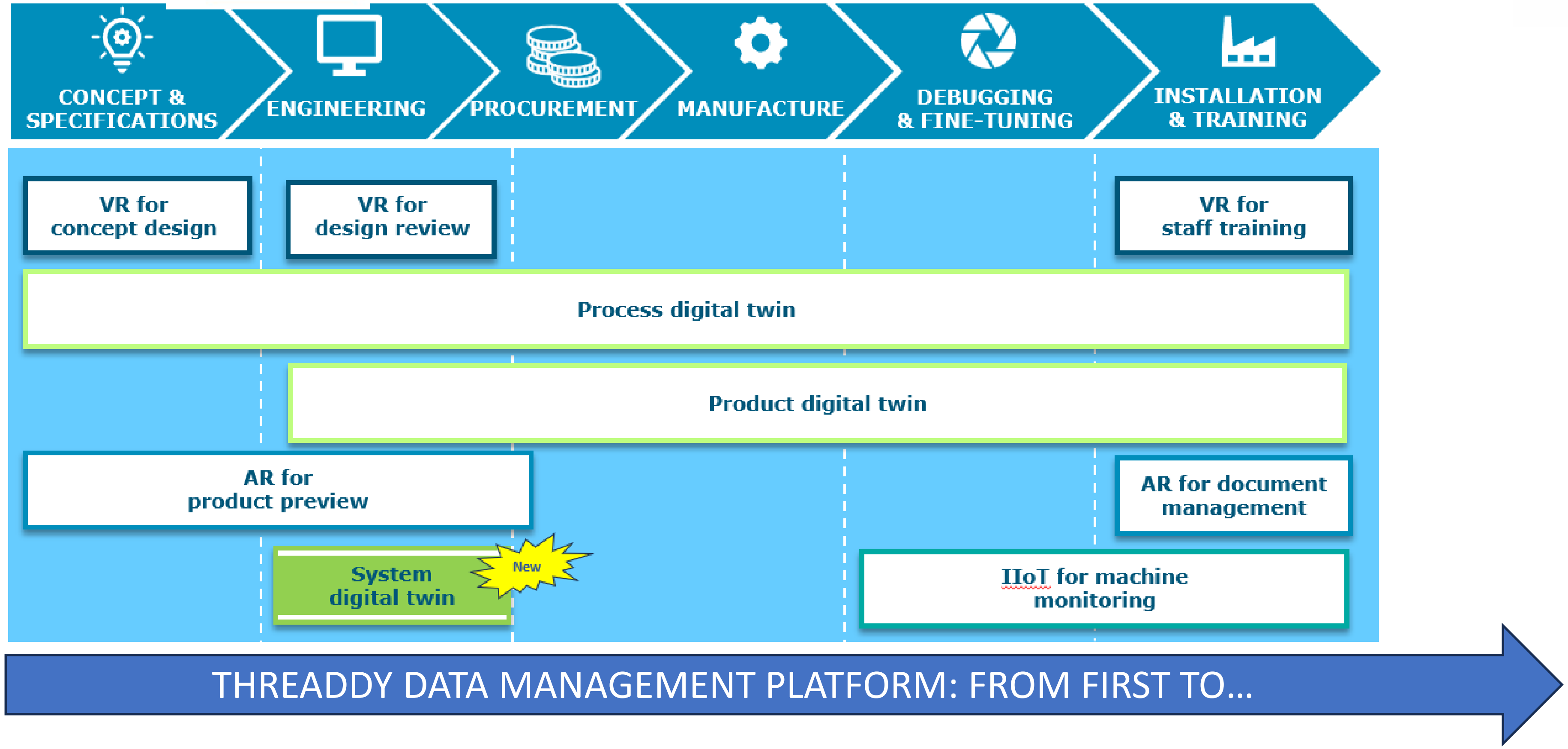
MASMEC FIRST LIFE CYCLE PRODUCT MANAGEMENT



SECOND LIFE

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CONCLUSIONI

Lo sviluppo di nuove tecnologie, architetture e pradigmi digitali oltre all'affermarsi di nuovi standard di interoperabilità, lasciano uno spiraglio di ottimismo nel pensare ad un futuro sostenibile del pianeta.

Per passare ad una vera evoluzione tecnologica ed economica, serve però una maggiore consapevolezza culturale, per strutturare logiche di economia circolare anche in ambito industriale, contesto oggi più tirato dalla produzione e dal consumo delle materie prime, che da una gestione efficiente delle 3R delle materie seconde.

GRAZIE PER L’ATTENZIONE!

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