



UNIMORE

UNIVERSITÀ DEGLI STUDI DI
MODENA E REGGIO EMILIA



DIPI Lab

Distributed & Pervasive Intelligence
Laboratory

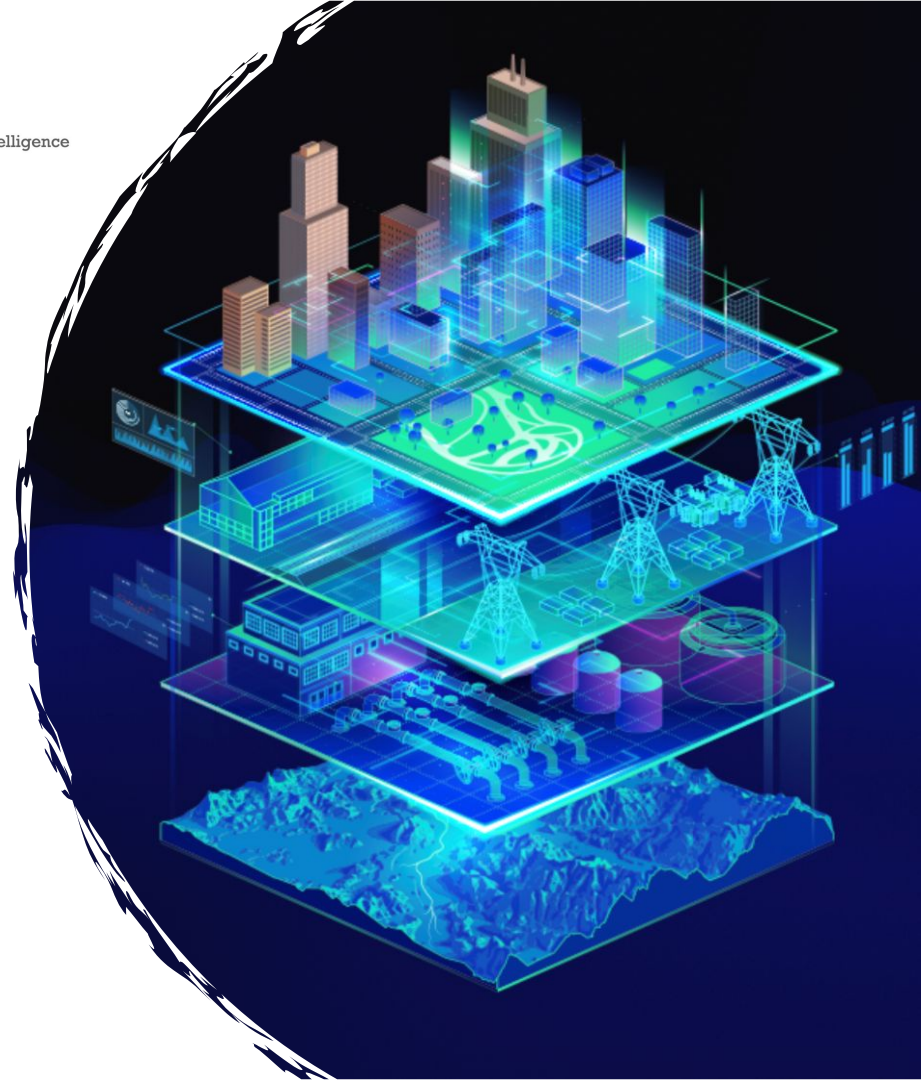
Intelligent Industrial Digital Twins



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<https://dipi.unimore.it>



DIPI Lab: *Industrial Digital Twins* Research Team



Prof. Marco Mamei

Research Focus on Pervasive Computing & Artificial Intelligence



Prof. Marco Picone

Research Focus on IoT & Digital Twins



Ph.D. Matteo Martinelli

Research Focus on Industrial Digital Twins



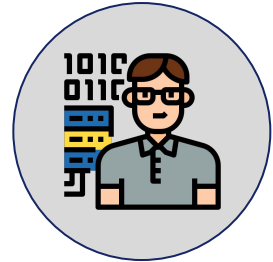
Ph.D. Candidate

*Computer Engineer
Research focus on Distributed Artificial Intelligence*



Ph.D. Candidate

*Computer Engineer
Research Focus on Real-Time Digital Twins*

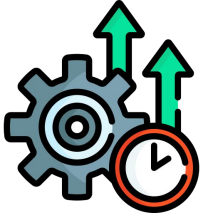


Research Assistant

*Computer Engineer
Research Focus on Industrial Digital Twins*

From Modern Industry to Intelligent Industry

Goals



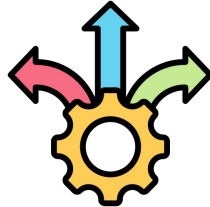
Increase
productivity



Reduce
costs

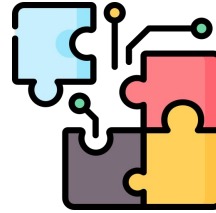


Increase
efficiency

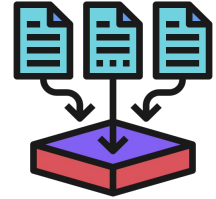


Improve
flexibility

Challenges



48%: integration
complexity



48%: **Data
Management**



43%: modernization
of existing plants



37%:
sustainability
management

Source: [Deloitte, Information-Services-Group](#)

Source: [Microsoft-How manufacturers prepare shopfloors for a future with AI](#)

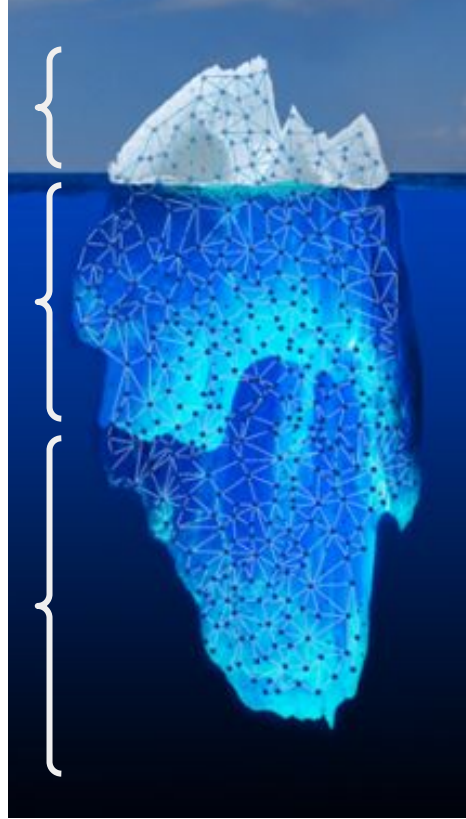


The *Dark Data* problem

12% of data is
Business Critical

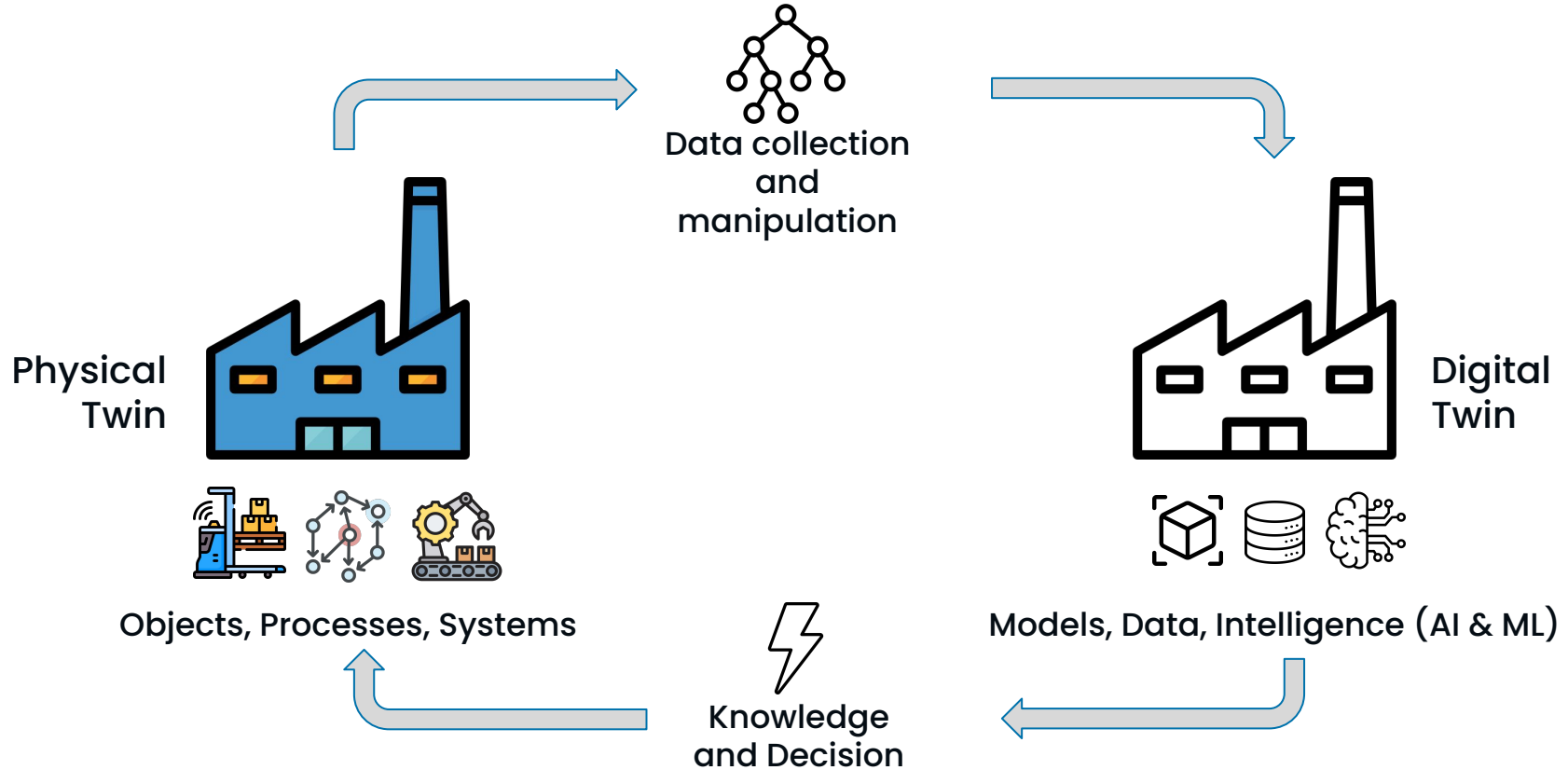
23% of data is
***redundant,
obsolete, trivial***

65% of data is
hidden in
***network,
machines,
between people.***



- **Underutilized:**
 - not used for decision making
 - not used for business intelligence
 - not used for value-added activities
- **Unstructured:**
 - can include unstructured data, such as *audio, video, images, documents, sensors and actuators.*
- **Difficult to access and use:**
 - Their format and complexity makes their access and use intricate.
- **Hidden or forgotten:**
 - Due to their difficulty of use leads them to be hidden and forgotten.

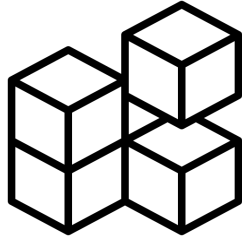
Industrial Digital Twins: our Vision



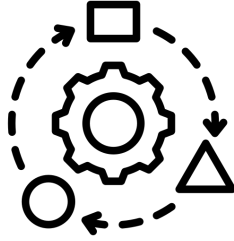
A new Approach

Functionalities

Digital Twins
are Modular



Digital Twins
are Adaptive



Digital Twins
are Active



Market Expectations

- +15% efficiency
- -12% operative costs
- +10% revenues
- +3% productivity

Source: [TEHA Group-Digital Twins for the Twin Transitions](#)

Value

From invisible
to visible



Visibility drives
action



Augmentation for
Physical
Intelligence



Intelligence for
Decision-Making and
Actuation

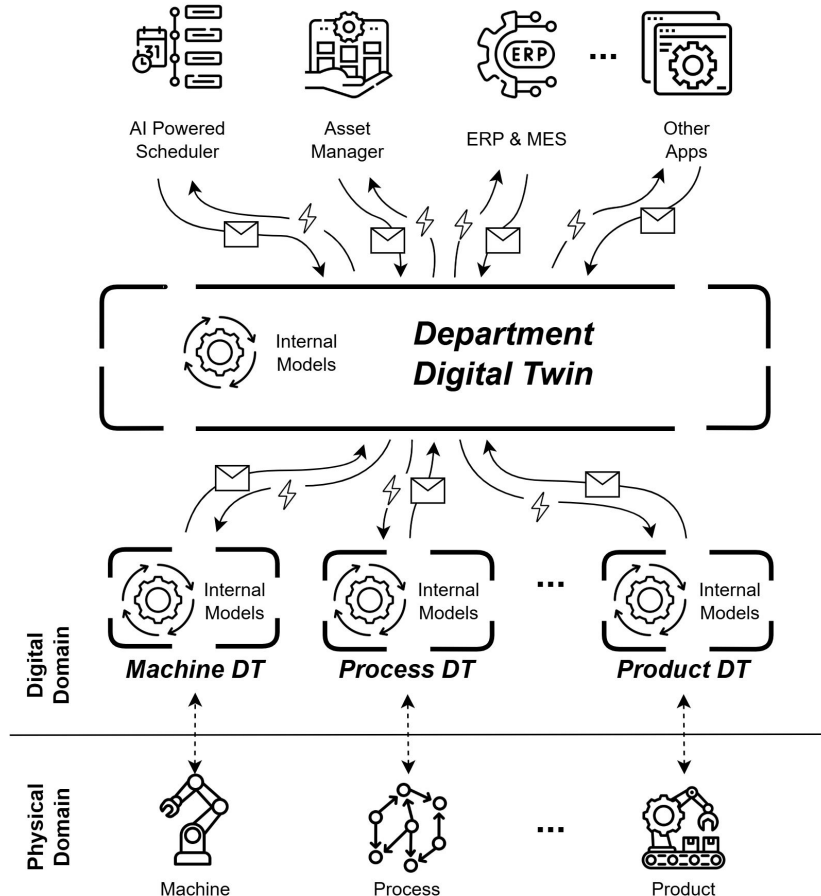


Data & Knowledge

Augmentation

Intelligence

Intelligent Industrial Ecosystem



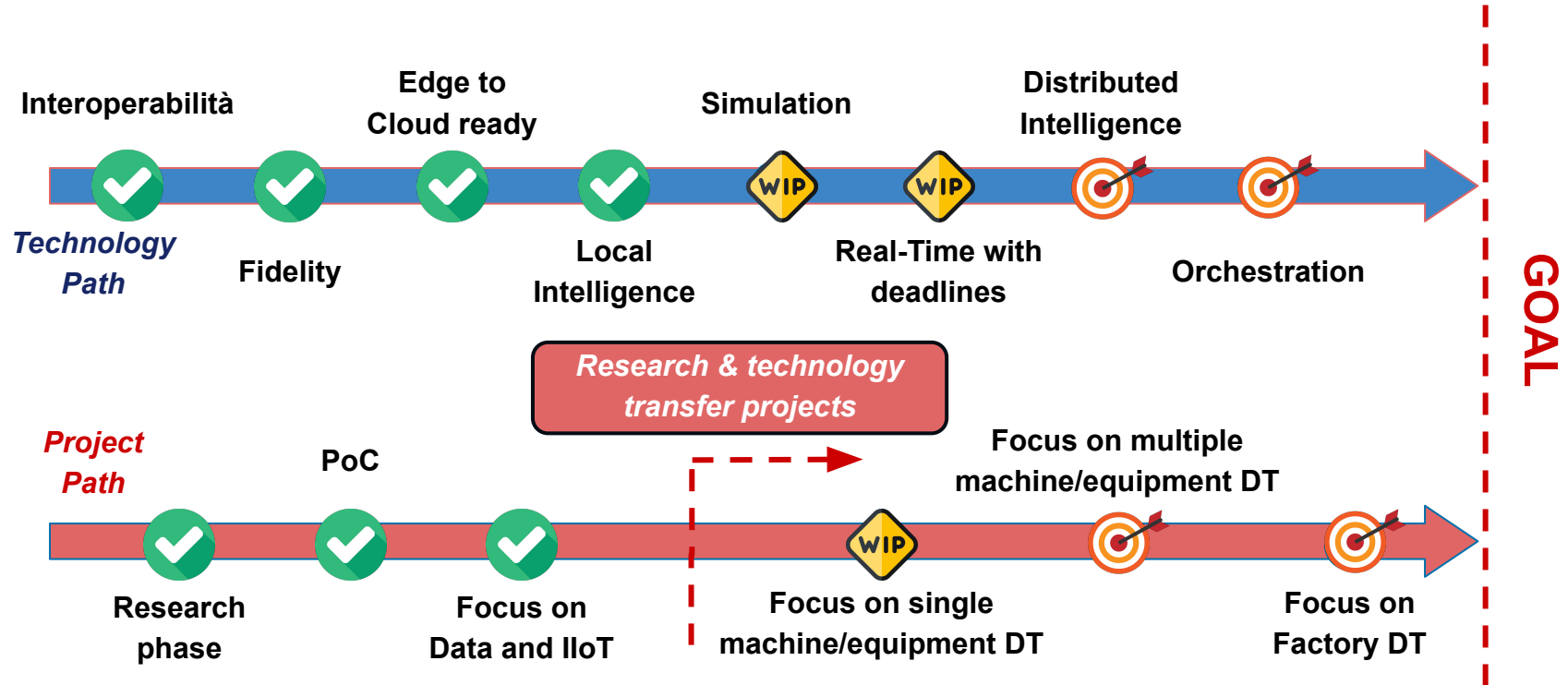
- **Integrate, organize and use system data, to:**
 - **Monitor your behavior and *enable new capabilities*:**
 - *Dynamic bottlenecks tracking in real-time*
 - *Performance and Cost-Tracking in real-time*
 - *Data integration between design, industrialization and production*
 - *Energy consumption tracking in real-time*
 - **Optimize the system with runtime actions or industrial architectural insights**
 - **Integrate intelligence (AI & ML)**
 - **Enable simulation and virtual commissioning**

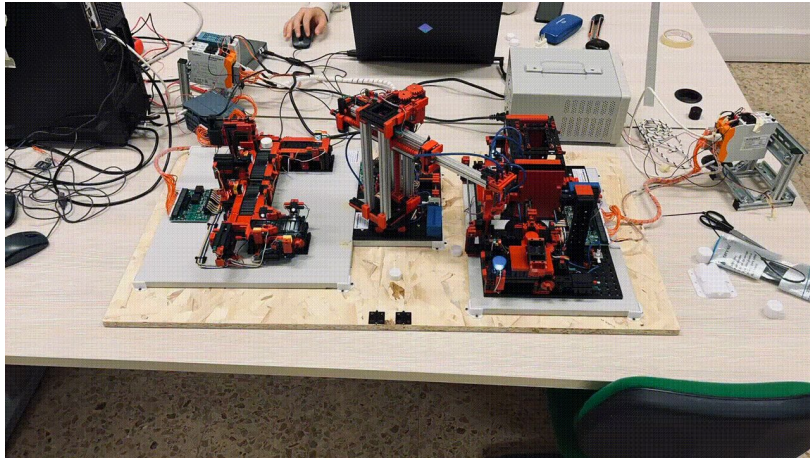
Project Road Map

Technology Path

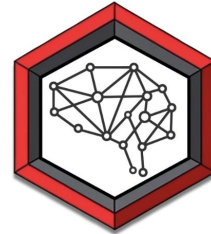
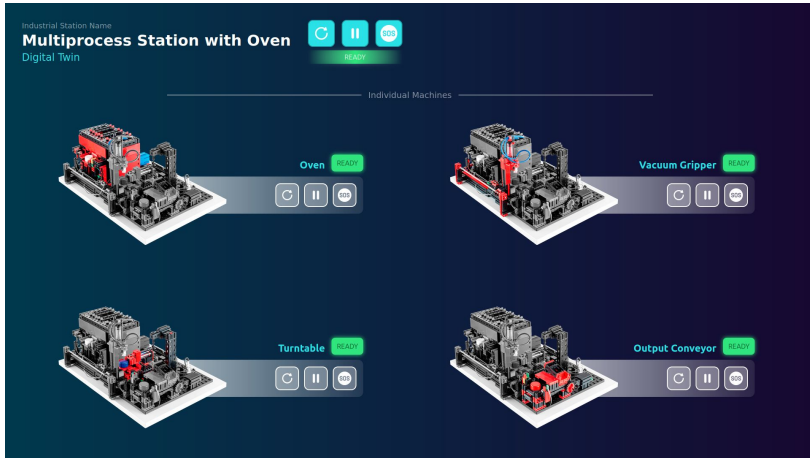
Project Path

*Industrial Digital
Twin Ecosystem*





Want to know more? Contact us!



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