

Cognitive Digital Twins

Applications in the Industry and Supply Chain

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INNOVATORS BY TRADITION

THE ENTREPRENEURIAL SPIRIT
WITH WHICH WE OVERCOME DAILY CHALLENGES

Solutions
for Public Administration,
Freelancers and Companies

Form more than 115 years our Company has always been attentive to the market and innovation



2,4 K employees



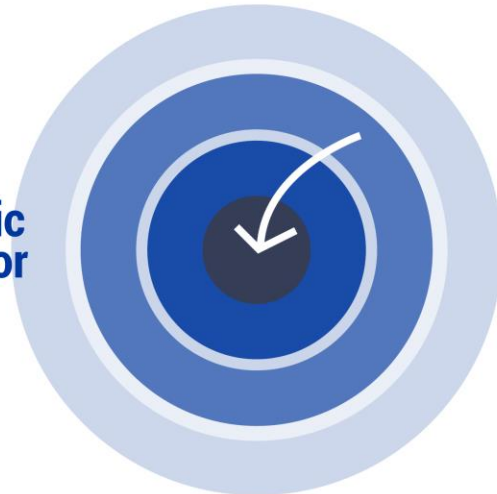
13 International branches

+70 Italian branches



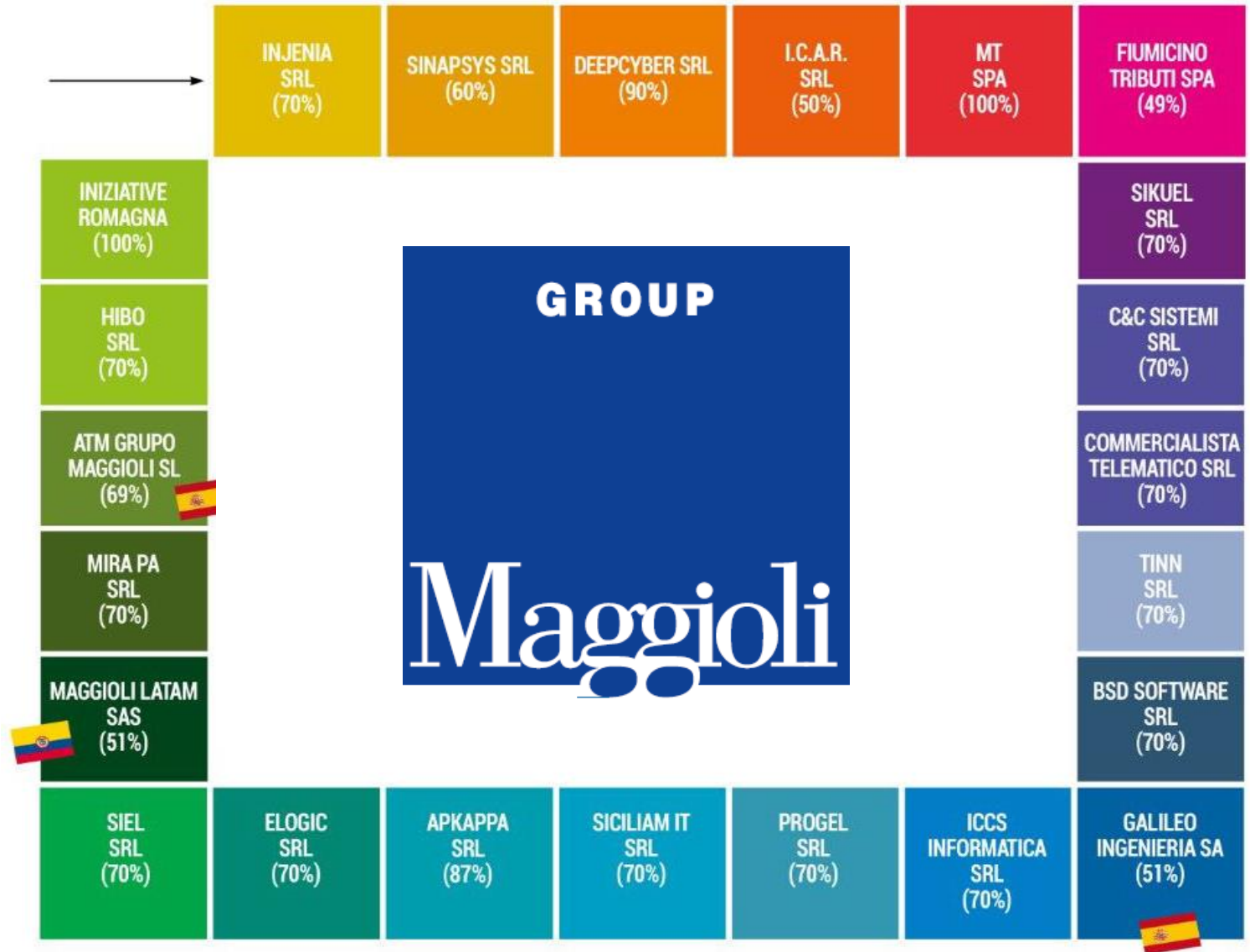
140 K clientes

75% public sector
25% private sector



160 MILLION € turnover in 2020
200 MILLION € turnover in 2021

Our Values



Why Cognitive Digital Twins?

The need

Circular Supply Chains

Product modularity, Personalization and circularity by design -
Product as a Platform

Source: *Harvard Business Review* ^[1]

Agility and Localization

Complex, flexible, connected and inter-dependent relationships, where knowledge flows

Source: *Deloitte* ^[3]

Acceleration of working automation

Increased investments are expected in automation once the coronavirus crisis passes (droids, auto-vehicles, etc.)

Source: *Adecco* ^[5]

Data Driven Supply Chains

Data driven supply chains with a value of \$100 billion in improved operations

Source: *World Economic Forum* ^[2]

New Logistics Delivery Models

On-demand and faster deliveries /
Cross-border logistics and information sharing

Source: *PostEurop* ^[4]

New Market potentials

Elder people will account for about 51% of urban consumption growth, which is equivalent to more than \$4 trillion” – *need for personalized services*

Source: *McKinsey* ^[6]

^[1] Products to platforms: making the leap, Harvard Business Review, 2016.

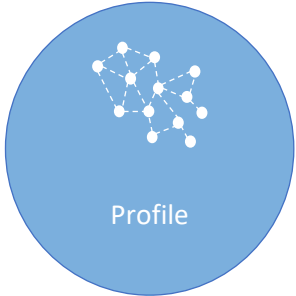
^[3] Deloitte University Press: Business Ecosystems come of age, 2017,
<https://documents.dupress.deloitte.com/BusinessTrends2015>^[5]
<https://www.adeccogroup.com/futuhreinsight/6-ways-covid-19-is-accelerating-the-future-of-work/>

^[2] Share to Gain: Unlocking Data Value in Manufacturing, WEF White Paper, Jan 2020,
<https://www.weforum.org/whitepapers/share-to-gain-unlocking-data-value-in-manufacturing>

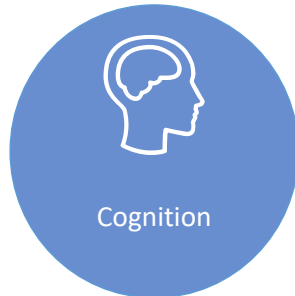
^[4] PostEurop Market Forum workshop (Ljubljana, Feb 2019 and Split, September 2019) in the context of COG-LO H2020 project (www.cog-lo.eu)

^[6] <https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/getting-to-know-urban-elderly-consumers>

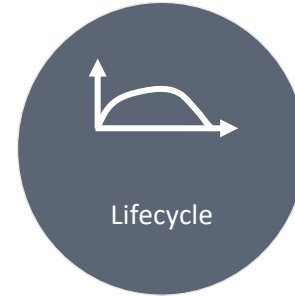
Cognitive Digital Twins Enablers



Knowledge Graphs,
3d models,
Specifications



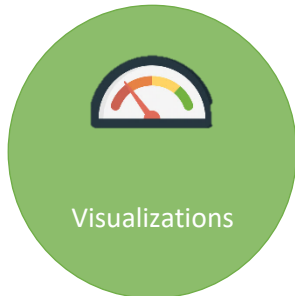
Understand,
reason, predict
and optimize



Design, create, operate,
end, recycle



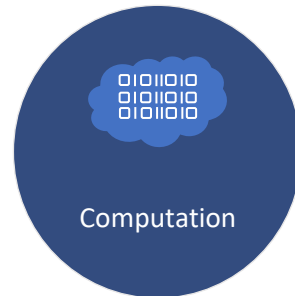
CDT with
Physical asset
CDT with other CDTs



Dashboards,
VR, MR, AR

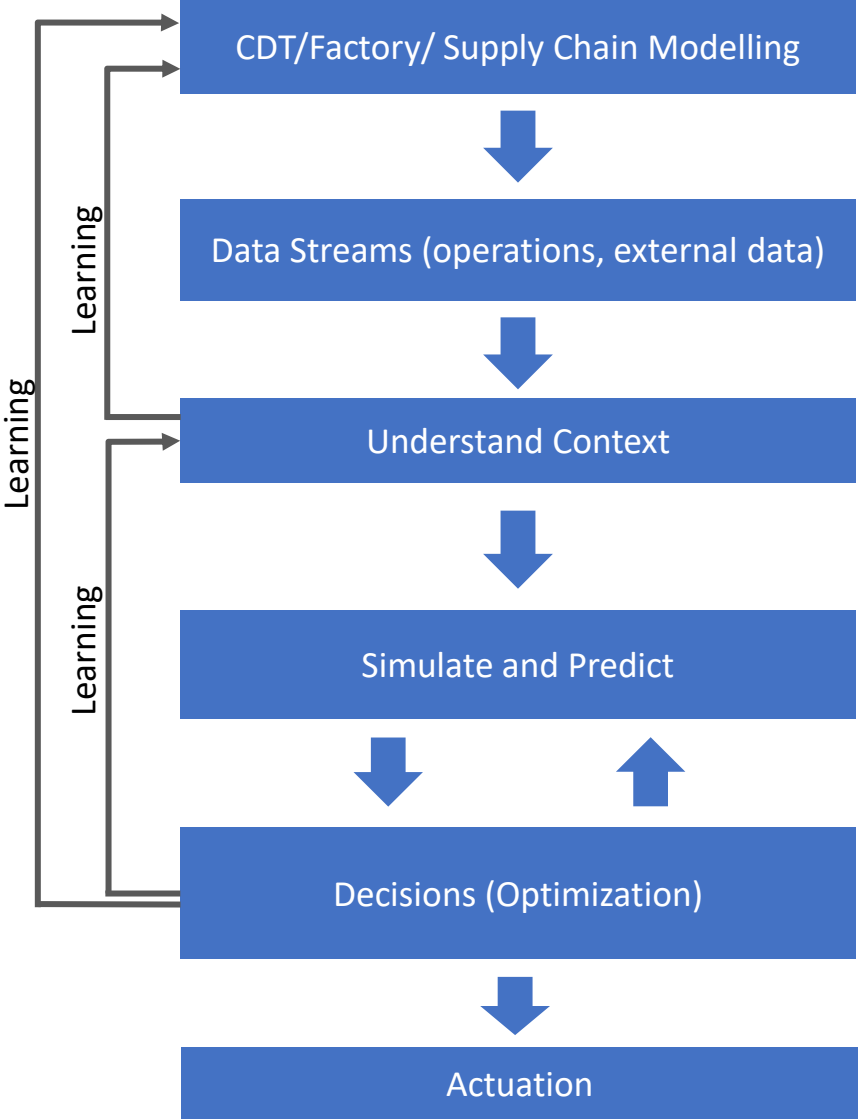


Governance



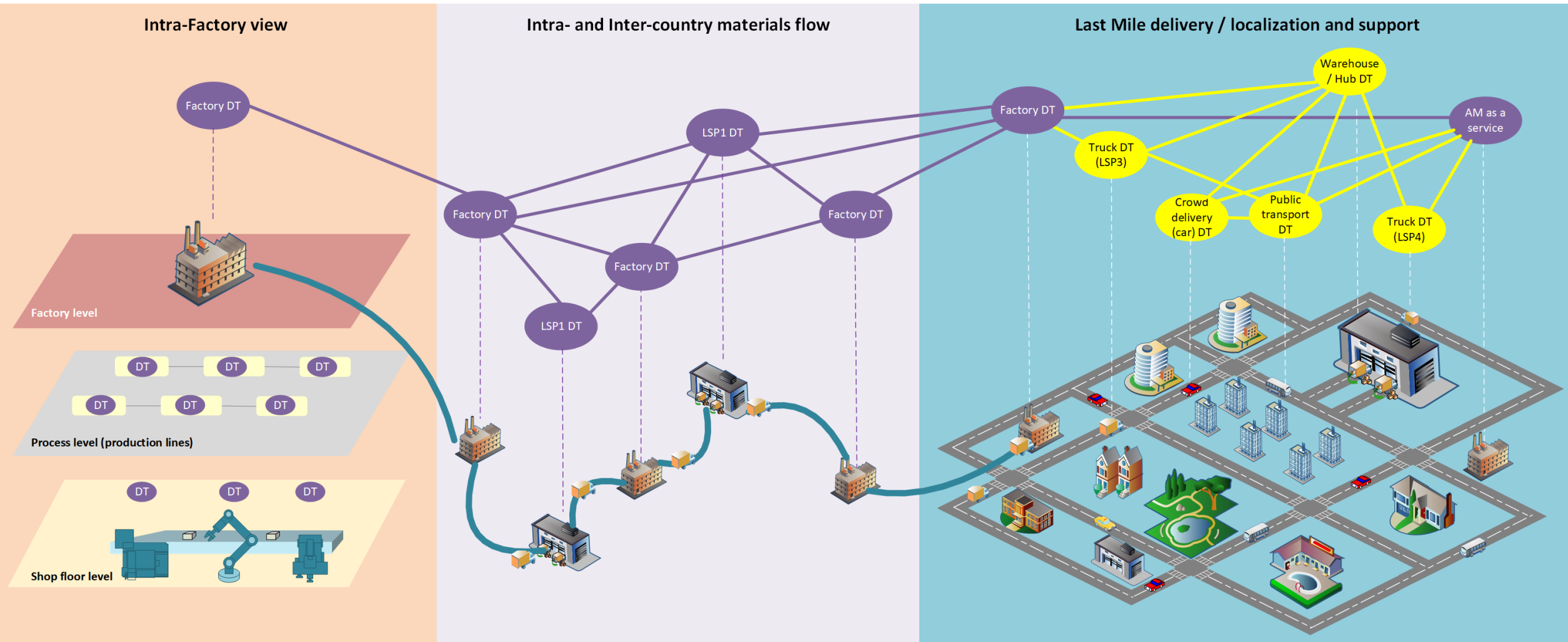
Edge/ Fog/ Cloud

The Cognition Process



CDTs in supply chain

Supply chain as a network of inter-connected CDTs

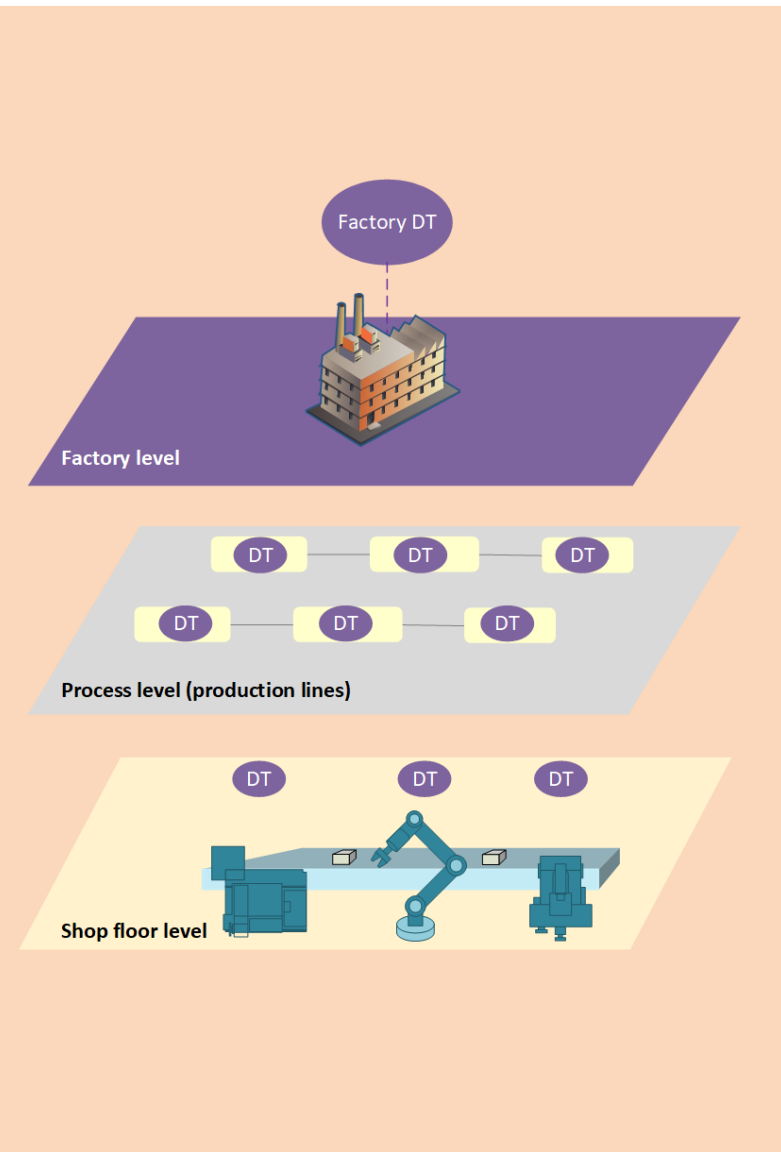


Factory as network of CDTs

Agile connected manufacturing chains

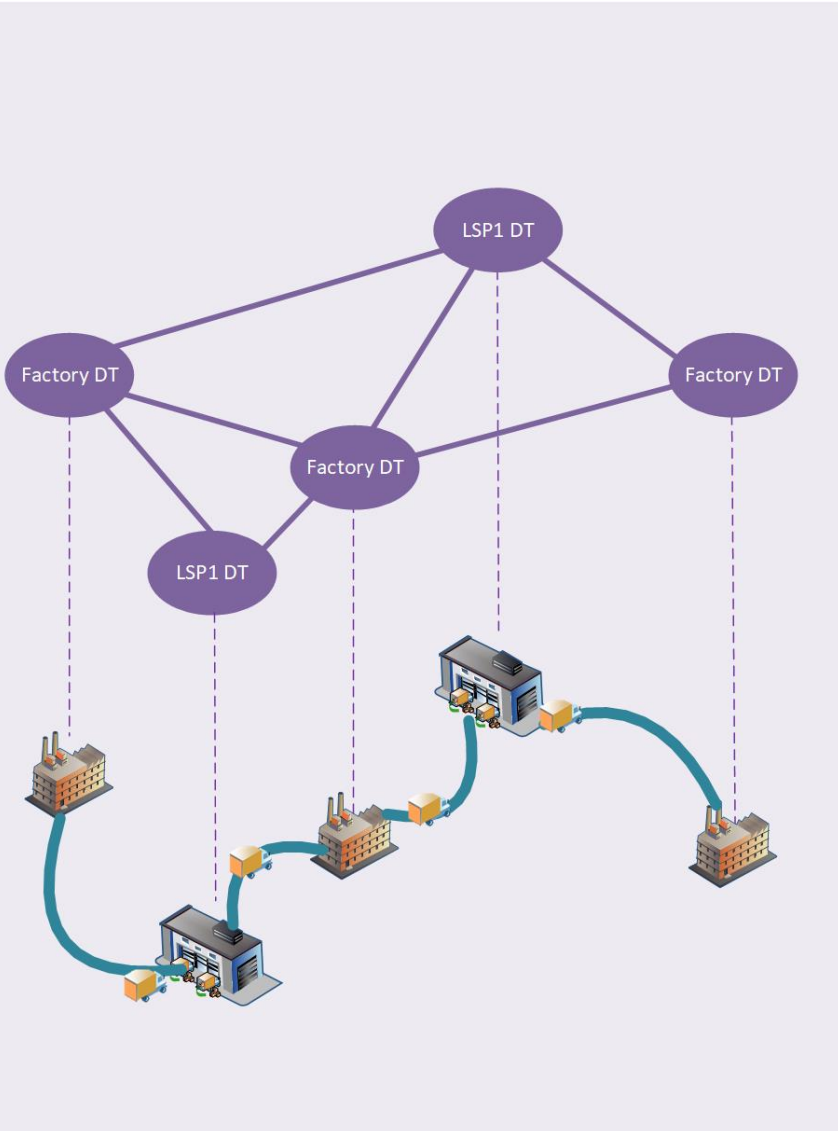
Collaborative networks of local producers/LSPs

Intra-Factory view



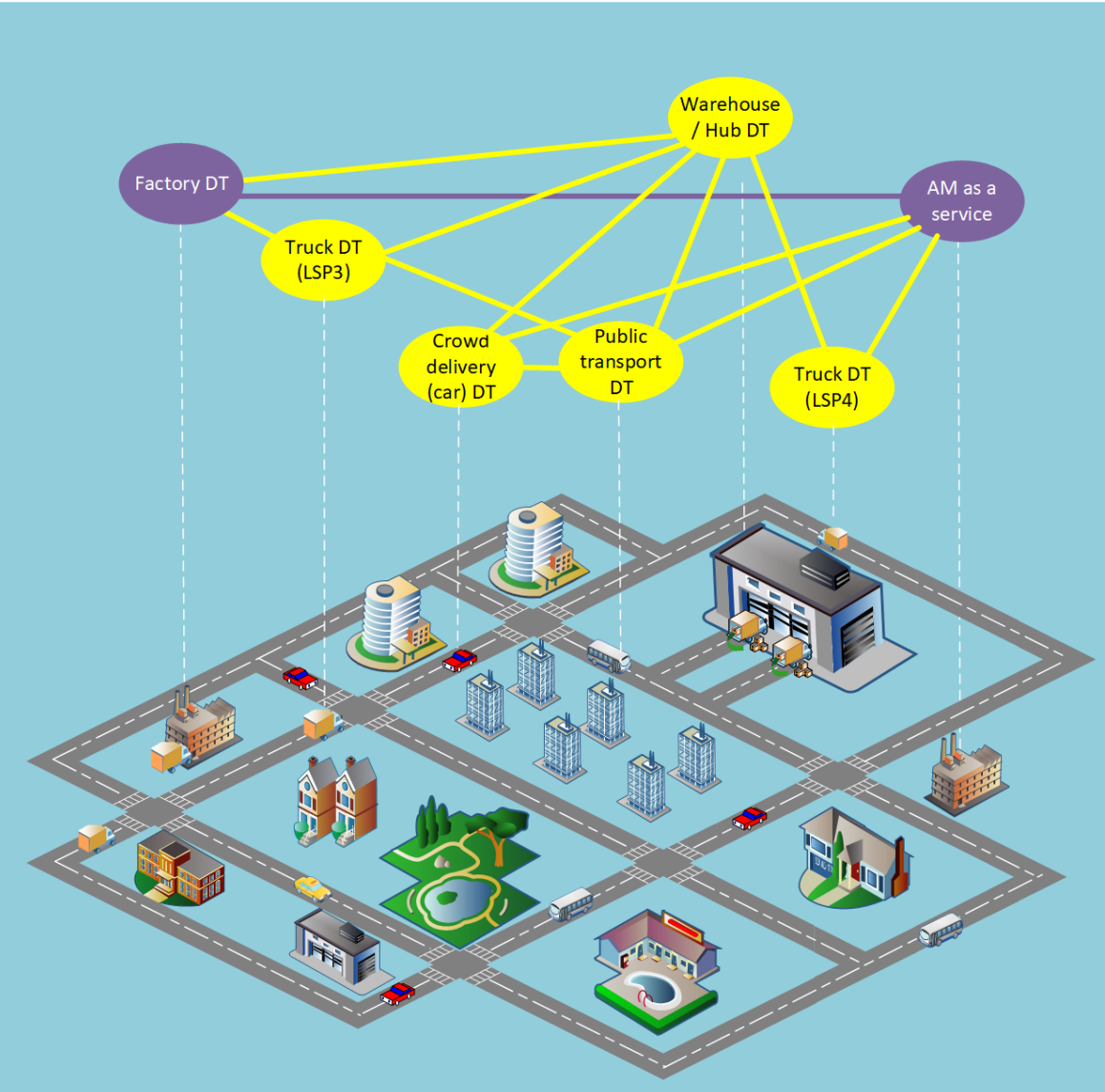
- Aligned predictive maintenance/ production scheduling at factory level
- Energy-aware machines (self identification of optimal model of operation)
- Self-configurable production lines and machines
- Proactive behavior to risk management (e.g. Hazard analysis)

Agile Manufacturing Chains



- Connected circular supply chains
- Aligned predictive maintenance/ production scheduling at supply chain level
- Merging deliveries/ On the fly collaborations in response to ad-hoc events/requests
- Proactive behavior to risk management (e.g. Hazard analysis)

Last mile delivery/ localization and support



- Connected circular supply chains
- Merging deliveries/ On the fly collaborations in response to ad-hoc events/requests
- Localization: ad-hoc or constant collaborations with local manufacturers

Industrial cases

Improved load factor in backbone logistics operations

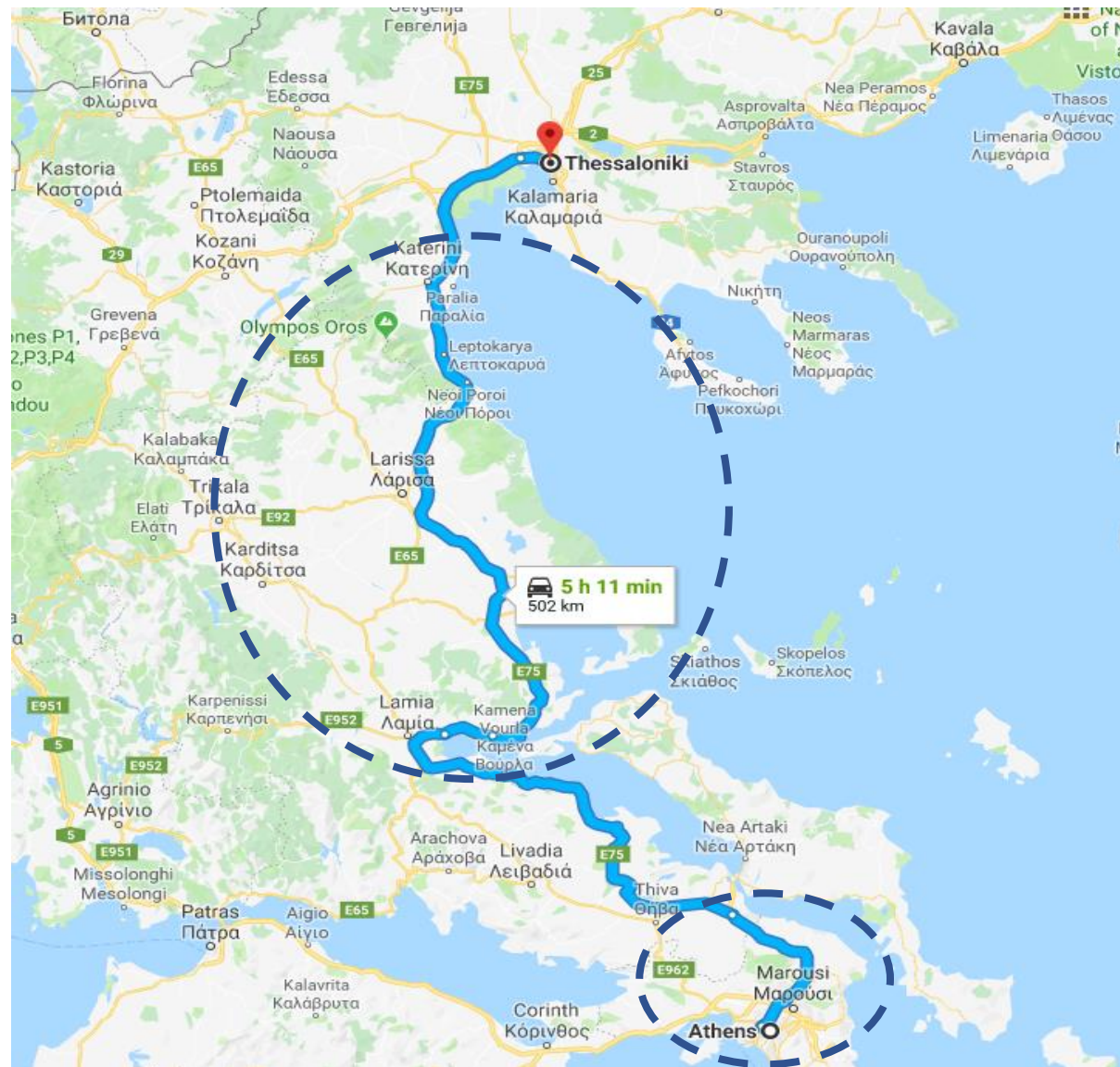
Location: Athens->Thessaloniki, Greece

Backbone logistics:

- Shuttle van picking up ad-hoc requests for same day delivery
- Load factor optimization

Urban Logistics

- Improve response to ad-hoc events
- Real-time optimization and routing
- New collaborative models (retail,...)



Virtual Production Line

Location: Timisoara, Romania

- Digital twin of the assembly line production and robot DT
- Predictive analytics on machine malfunction (predictive maintenance)
- Increase (optimize) machine availability/ OEE
- LCA assessment
- Aligned production schedule and predictive maintenance
- Optimized production scheduling/ maintenance considering energy consumption



Optimized production scheduling in spinning machine (fabric factory)

Location: Piacenza, Italy

- Digital twin of a spinning machine
- Production scheduling optimization based on energy consumption
- Focus on optimizing idle status of the machine (currently 30% energy wasted due to inefficient scheduling)



DOW Terneuzen (Netherlands)



- Cooling Tower Blow Down Reuse
- Site Condensate Reuse

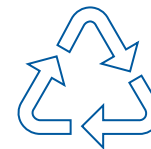


Reduce Water by Reuse:
Fresh water intake reduction by 20 %

DOW Böhlen (Germany)



- Cooling Tower Blow Down Reuse
- Site Condensate Reuse
- Raw Water Treatment improvement



Reduce Water by improved Treatment & Reuse:
Fresh water intake reduction by 20%

Demo