Digital Twin

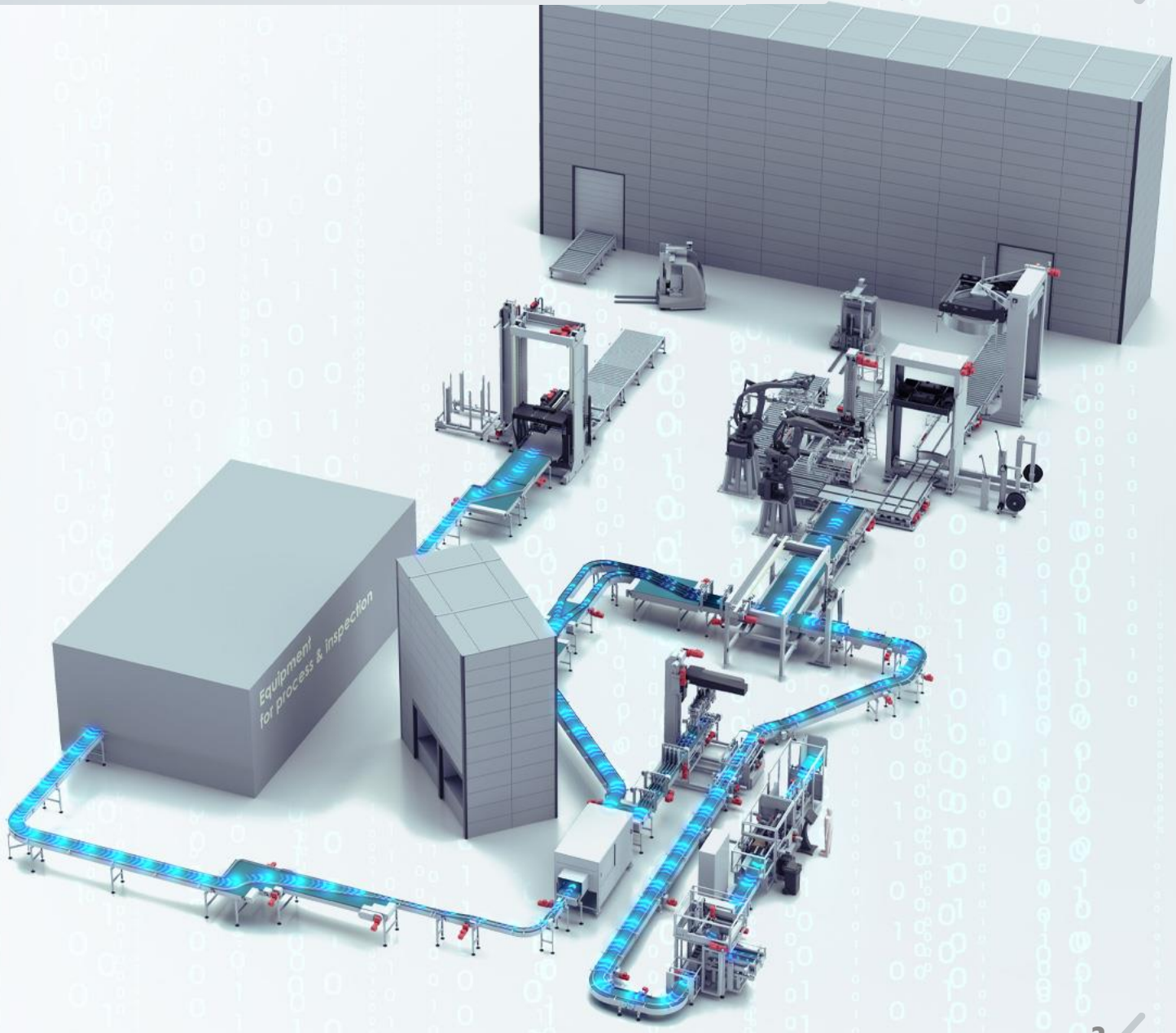
Carmine Di Sciullo May 16th, 2022

EMS displaces, transports, organizes goods in manufacturing processes

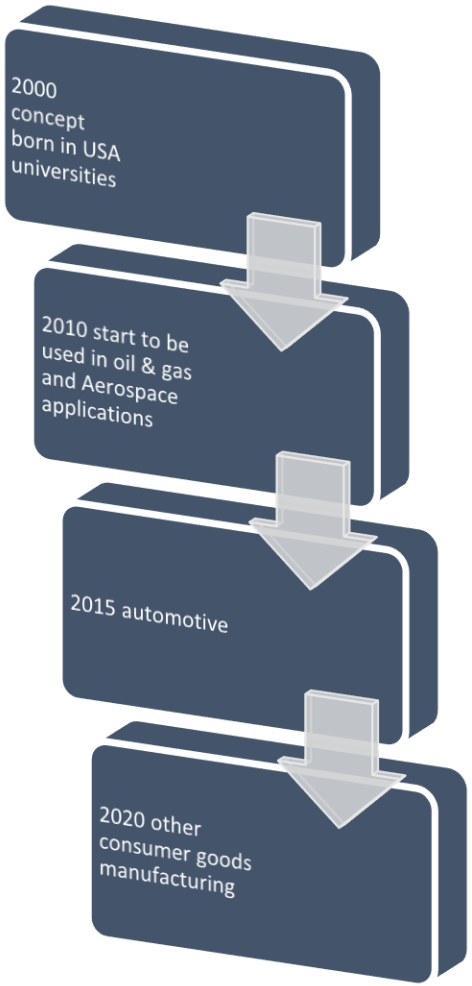
APPROACH

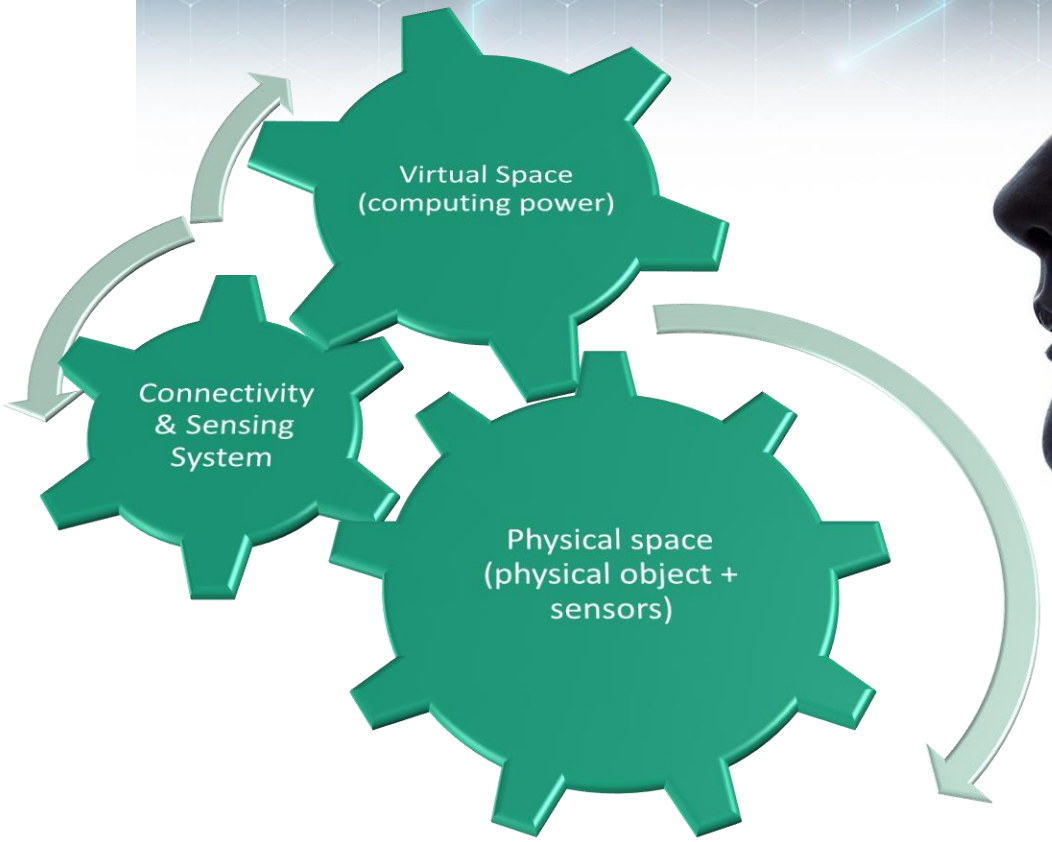
NEXT GENERATION FACTORY

A fully integrated organizational and production model, digitized and optimized for value creation.

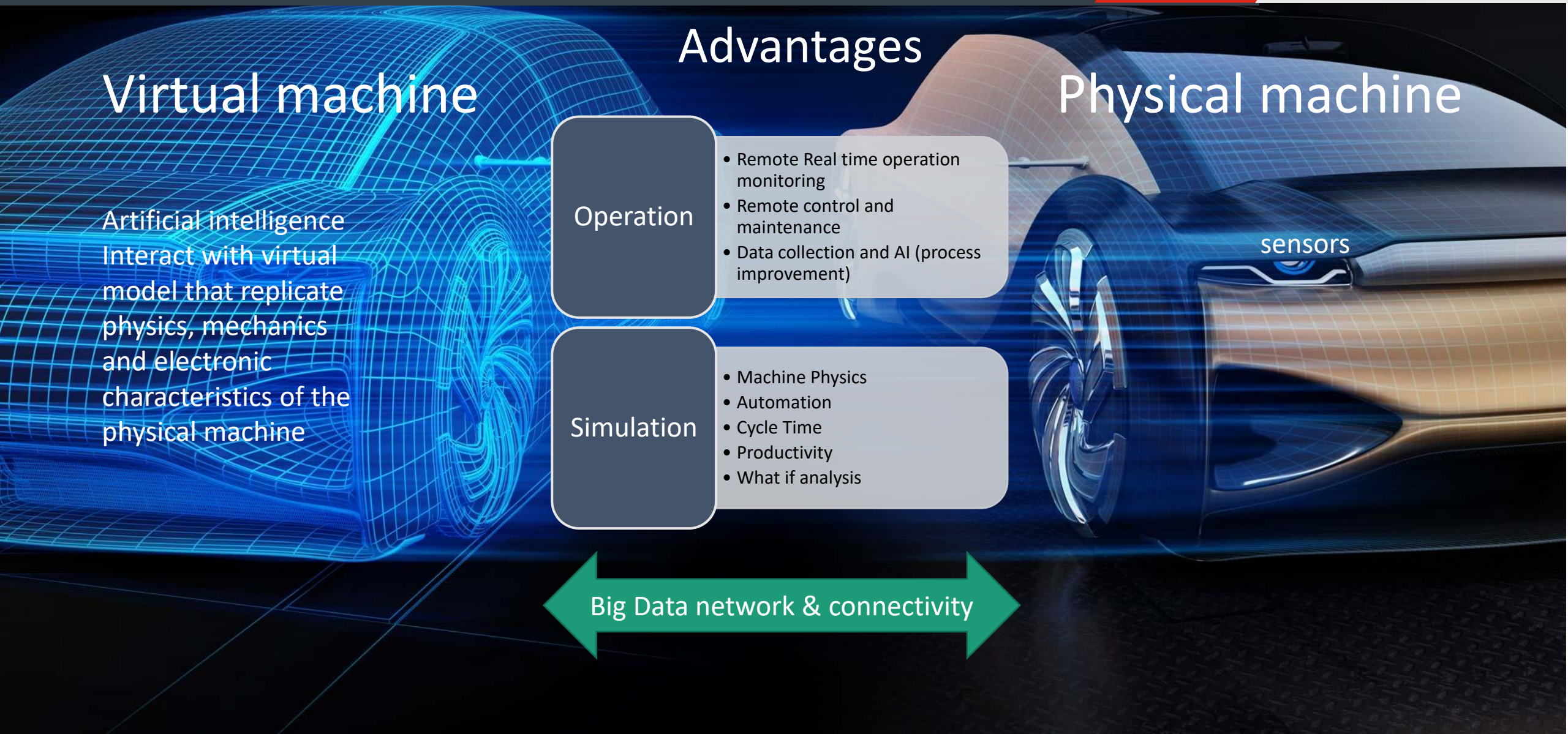


Digital Twin background elements





Digital Twin: conventional use



Virtual machine

Artificial intelligence
Interact with virtual model that replicate physics, mechanics and electronic characteristics of the physical machine

Advantages

Operation

- Remote Real time operation monitoring
- Remote control and maintenance
- Data collection and AI (process improvement)

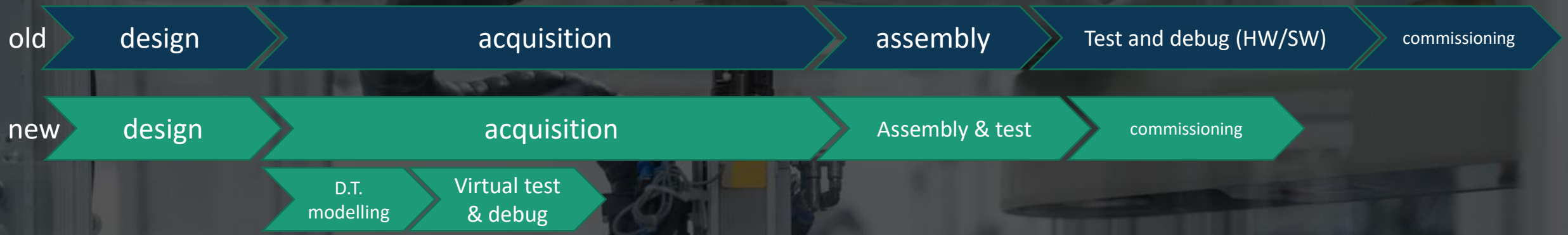
Simulation

- Machine Physics
- Automation
- Cycle Time
- Productivity
- What if analysis

Physical machine

sensors

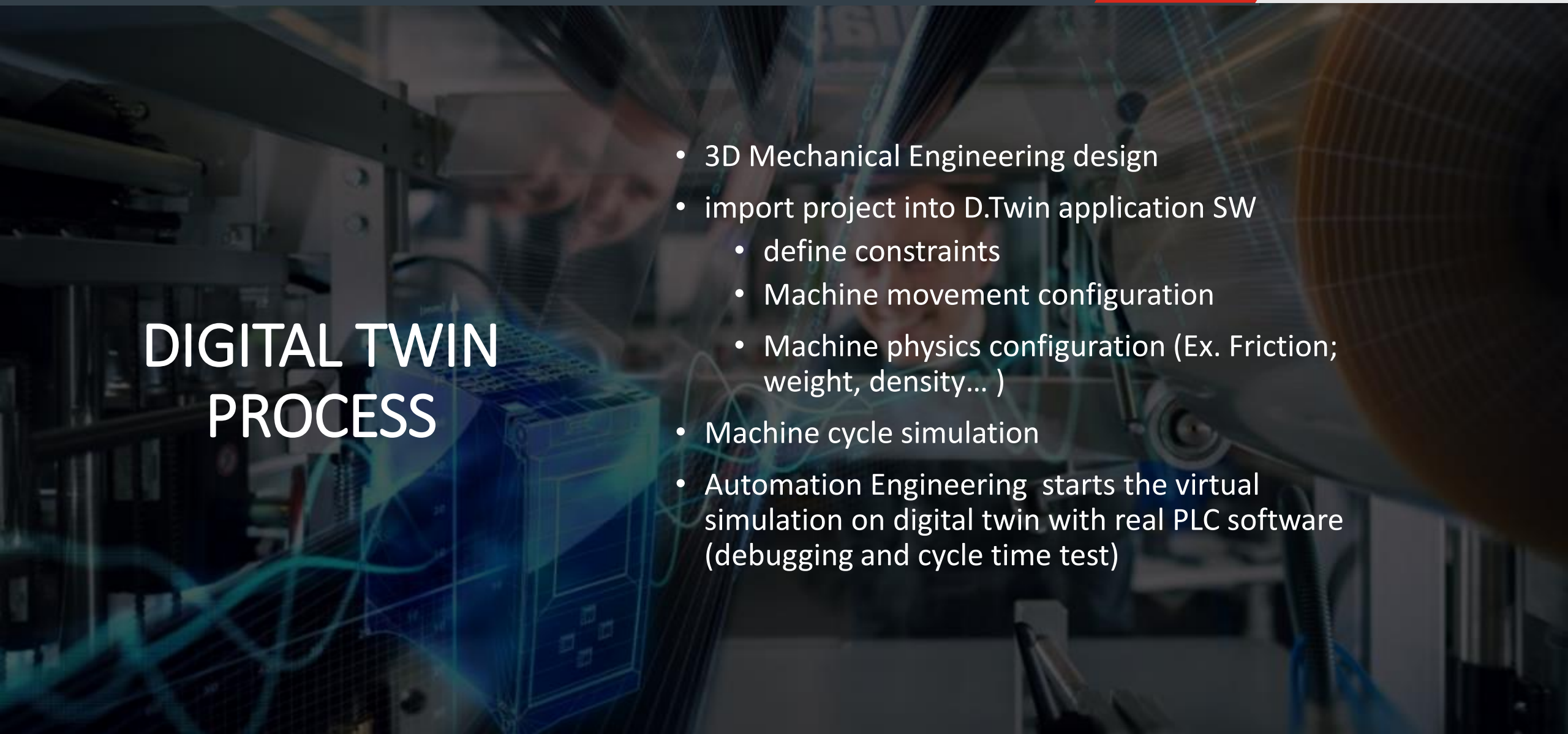
Big Data network & connectivity



D. Twin unconventional use

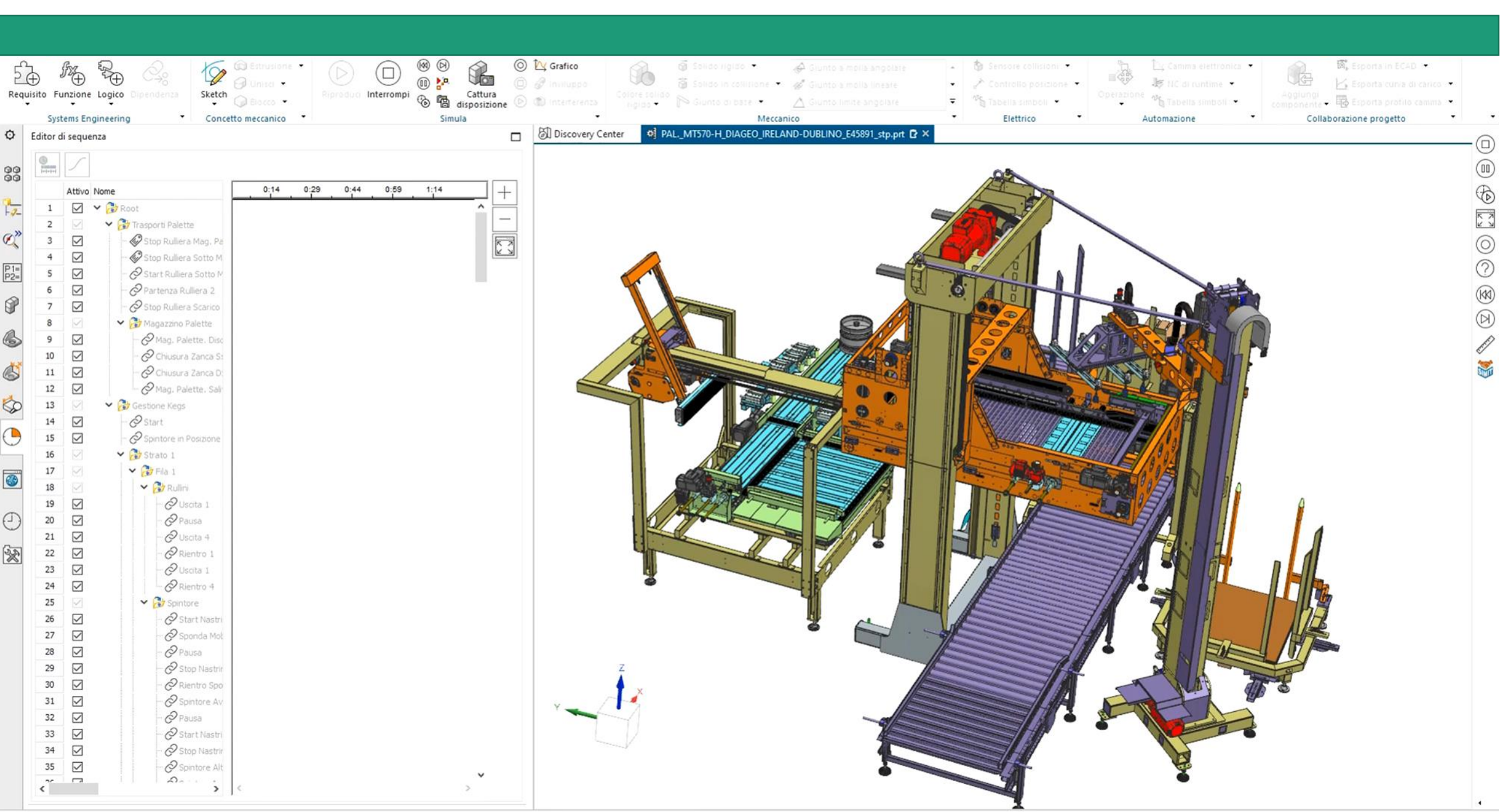
- Put machine in simulation before physical machine existence (evaluate risks and constraints)
- Optimize cycle time and operations sequence without being in real production
- Early SW development and debug on virtual machine
- Customers can see the purchased machine in action long before the physical one is ready
- Increased physical machine value (the twin can be sold as part of the physical machine)

Digital Twin: is mainly a mechanical engineering job



DIGITAL TWIN PROCESS

- 3D Mechanical Engineering design
- import project into D.Twin application SW
  - define constraints
  - Machine movement configuration
  - Machine physics configuration (Ex. Friction; weight, density…)
- Machine cycle simulation
- Automation Engineering starts the virtual simulation on digital twin with real PLC software (debugging and cycle time test)


Requisito
Funzione
Logico
Dipendenza
Systems Engineering
Sketch
Estrusione
Unisci
Blocco
Concetto meccanico
Riproduci
Interrompi
Cattura disposizione
Grafico
Inviluppo
Interferenza
Simula
Colore solido rigido
Solido rigido
Solido in collisione
Giunto di base
Giunto a molla angolare
Giunto a molla lineare
Giunto limite angolare
Meccanico
Sensore collisioni
Controllo posizione
Tabella simboli
Elettrico
Operazione
Camma elettronica
NC di runtime
Tabella simboli
Automazione
Aggiungi componente
Esporta in ECAD
Esporta curva di carico
Esporta profilo camma
Collaborazione progetto
Editor di sequenza
Attivo
Nome
0:14
0:29
0:44
0:59
1:14
Root
Trasporti Palette
Stop Rulliera Mag. Pa
Stop Rulliera Sotto M
Start Rulliera Sotto M
Partenza Rulliera 2
Stop Rulliera Scarico
Magazzino Palette
Mag. Palette. Disc
Chiusura Zanca S
Chiusura Zanca D
Mag. Palette. Sali
Gestione Kegs
Start
Spintore in Posizione
Strato 1
Fila 1
Rullini
Uscita 1
Pausa
Uscita 4
Rientro 1
Uscita 1
Rientro 4
Spintore
Start Nastri
Sponda Mob
Pausa
Stop Nastri
Rientro Spo
Spintore Av
Pausa
Start Nastri
Stop Nastri
Spintore Alt
Discovery Center
PAL._MT570-H_DIAGEO_IRELAND-DUBLINO_E45891_stp.prt
Z
X
Y

STRENGTHS

- Development of cycles on complex machines
- Great optimizations of machines cycles
- Mechanical interferences check
- Earlier SW debugging

WEAKNESSES

- Additional Effort required in mechanical engineering department
- Requested high computing power (3-5 x pc)
- SW not always compatible with all electrical components and brand available on the market

EMS Group S.p.A.
Via G. Galilei, 29 - 42027 Montecchio Emilia (RE) ITALY
Tel.: +39 0522 861911
emsgroup.com
ems@emsgroup.com