Welcome to Capgemini's Innovation Day

Digitalizing the GSK value chain empowered by intelligent compliance

Tuesday, September 10th 2024

Capgemini

Agenda

10:30 — **WELCOME**

10:45 — **INTRODUCTION**
Marie-Caroline Saint-Ghislain
Véronique Mouton & Laetitia Soudanas

11:00 -12:15 — **INSIGHTFUL KEYNOTES**

- **GSK INNOVATION ROADMAP**
  Marie-Caroline Saint-Ghislain
- **HOW WILL GENERATIVE AI REVOLUTIONIZE THE LIFE SCIENCES INDUSTRY?**
  Virginie Marelli, Justin Melnick
- **LOOKING BEYOND SMART FACTORIES**
  Christophe Coléry, Daniel Coudriet

12:20 — **CONCLUSION**
TECH CORNERS PRESENTATION
Frédéric Burger

12:30 -14:00 — **NETWORKING LUNCH & TECHCORNERS**

Keynotes

Capgemini

TECH Day Intro Code

MC St Ghislain

Boostez votre quotidien avec l'intelligence artificielle (IA)

Objectif:

« Demain, j'utilise l'AI pour mes tâches du quotidien! »

Contact AI: **CoreTeamIA Vx-MfgQ-Belgique :** CoreTeamIA_Vx-MfgQ-Be@gsk.com

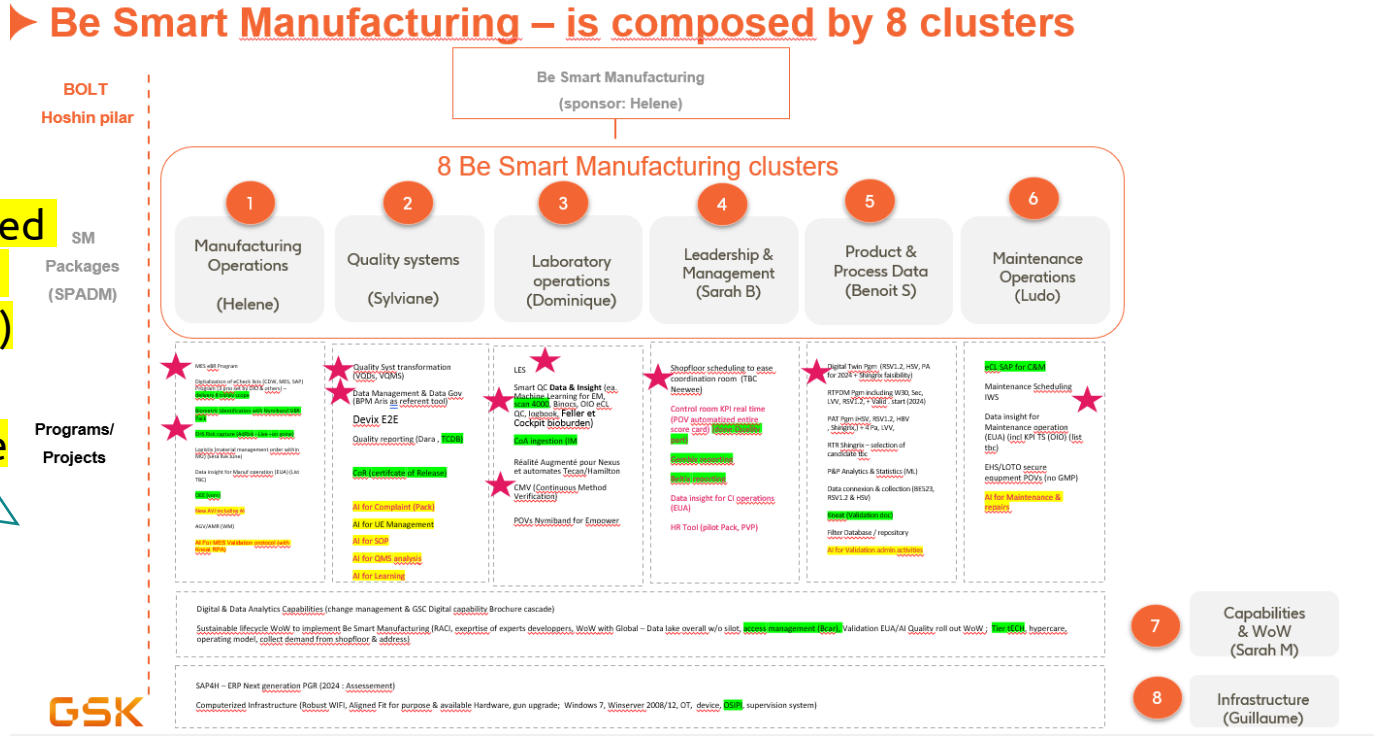
Contact Compétences Digitales: Sarah Belaïd

Toute initiative AI reste connectée avec notre Smart Manufacturing roadmap Belops/Q

O
Governance ensure alignment & communication for proper deployment (SPADM per cluster)

9 on-going AI initiatives injected per cluster Goal (cfr yellow ones)

All discovery collection - Gate



Le Saviez-vous en Belops/Quality?

1 Core Team AI en BelOps/Q mis en

Objectif: **Deployons la roadmap IA Site belge – suivie en Steerco Smart Manufacturing**

4

Delivery **prioritaires en** 2024

(ea. Gigi general awareness, Deviation Summary, MES AI Val Asssistant, CBL with AI) – Work 4h/Week with Core team

Un besoin/une idée?

Contactez votre Digital Officer (LMSAT: Sarah Belaïd/Marie-Caroline Saint-Ghislain depuis sept 2024) et/ou LBO des process associés pour confirmer la demande dans le pipeline Smart Manufacturing

Des experts à votre écoute

New! LSME AI BE = Pierre Louis
Duty Holder: Benoit Slegers
LBO DOC/QMS: Jordane Roekhaut
LBO Déviation: Marc Richard
LBO MES/MPMS/PPI: Fabian Kimplaire
…..

LBO eCC/Release: France Cassart
LBO Learning: Valérie Druart
LBO Maintenance, Val, C&M: Olivier De Suray
LBO WM/Cold chain/EM/Sample: Stéphanie Menegatti
P&P Data Analytics: Badiaa Bouzya

Be AI Core team

Marie-Caroline Saint-Ghislain, Danny Derudder, Darina Ivanova, Jordane Roekhaut, Valérie Druart, Olivier de Suray, Pierre Louis, Eric Lauwers, Denis Avrouin, Jean-Thierry Pycke, Badiaa Bouzya,, Leo Gerasimov, Virginie Marelli, Simon Delacroix, Roser Sens Espel, Julie Laudelout

1 Pt de contact pour **les compétences digitales**

Objectif: **Deployons la roadmap DDA Capability Site belge – suivie en Steerco Smart Manufacturing**

3

Populations cibles

(les users finaux, les leaders et les experts)

Besoin de developper votre équipe/département en digital?

Contactez votre Digital Officer et/ou Sarah Belaïd (DDA Capability Lead)

Informations importantes:

- Prochainement **l'heure digitale** sera lancée le 27 septembre pour Belops/Q
- Participez à la **culture week**

2024/09/10

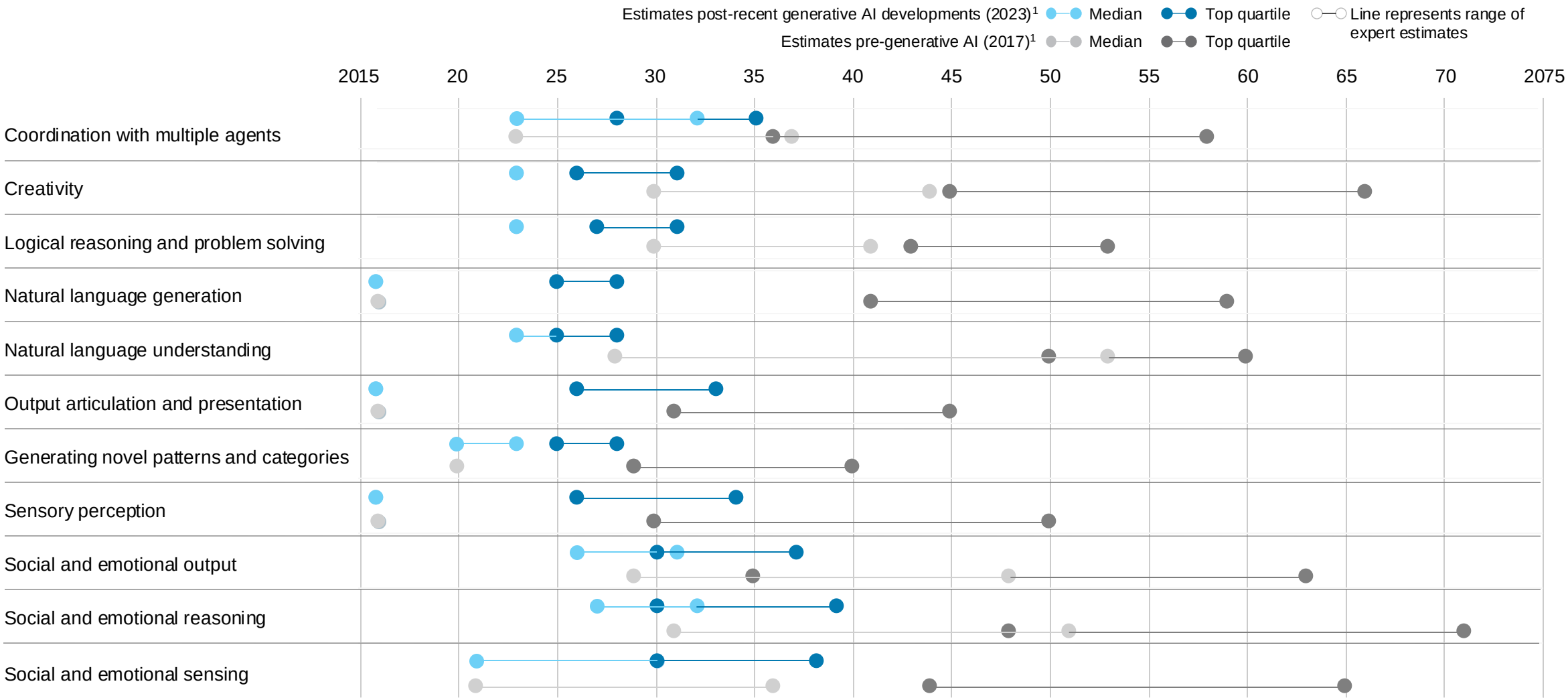
How will Generative AI revolutionize the life science industry?

Innovation Day

Virginie Marelli

Human level performance of AI (AGI) for tasks become achievable in the near future

Technical capabilities, level of human performance achievable by technology



1. Comparison made on the business-related tasks required from human workers. Please refer to technical appendix for detailed view of performance rating methodology.

Source: Expert interviews, MGI occupation data base


GSK

Unlock the power of Gen AI with AIGA

The AI Generation Accelerator

AI Governance

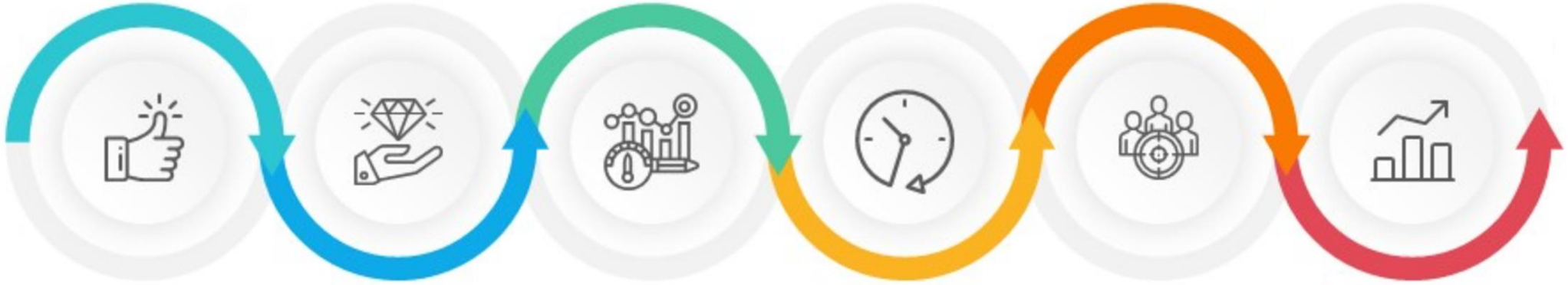
Compliant &
Ethical by **design**

Support

Learning from
feedback

Value driven

Focus on what
matters



From **Idea** to
Feasibility in 2 weeks!

Prototyping

Automated
Deployments

DevOps

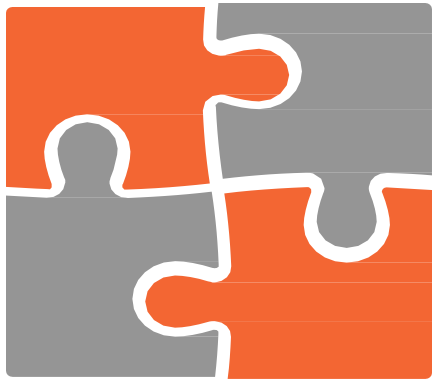
Fully **Custom** unified
User Experience

Personalised

GSK AI Principles

Our five key principles for AI at GSK are:

- Data ethics, privacy and security
- Robustness and reliability
- Fairness and representation
- Transparency and accountability
- Ethical innovation and positive impact



These principles are essential for how we use AI safely, responsibly and ethically.

These principles are underpinned by maintaining human oversight in critical decision-making processes involving AI tools and systems, and avoiding fully autonomous AI solutions in areas with significant ethical and/or legal implications.

GSK

Pioneering Life Science with ARTIFICIAL INTELLIGENCE

How (gen)AI will revolutionize the life science industry – *A life scientist's perspective*

Justin Melnick – Life Sciences Transformation Partner

Capgemini

Nidia Diaz

Artificial Intelligence
Is not as new as you think it is

1949 Warren Weaver proposes the idea of statistical machine translation, which now forms the basis of most translation systems

1950 Alan Turing proposes framework for creating and evaluating intelligent machines

1955 Arthur Samuel creates a chequers system that **learns** to play and human equivalent level

1951 First Neural Network SNARC is built at MIT

1950s

1951 Chess and Chequers playing algorithms run for the first time

1956 Artificial Intelligence is coined as a term and academic interest explodes

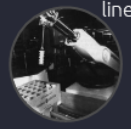
1974 MYCIN AI system used in medical diagnosis

1958 LISP programming language invented to support AI research

1959 MIT AI Lab is founded

1960s

1961 First Robot works on a production line



1963 Support Vector Machines invented

1965 First Expert System is produced

1965 Natural Language Processing able to understand and solve written problems, and have simple interactive conversations (ELIZA)

1970s Natural Language Processing performance increases dramatically

1973 Vision Controlled Robots perform complex tasks

1971 First Deep Learning Systems created

1975 Back-propagation kick-starts neural network application

1980s

1980 Neural networks used routinely on vision problems

1986 Autoencoders first used

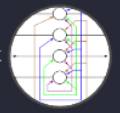
1986 Hinton et al refine use of backprop to achieve massive improvements

1969 Mobile Autonomous Robots combine together multiple AI systems

1989 Watkins demonstrates Q-Learning opening the door to practical use of reinforcement learning

1989 Yann LeCunn uses CNNs to perform character recognition

1982 Hopfield invents recurrent neural networks



1986 Decision trees invented

1986 First autonomous vehicles drive on the streets

1990s

1991 TD-Gammon uses reinforcement learning to create championship-level backgammon player

1993 1000 layer deep network used to solve grammar learning tasks

1994 AI becomes world champion at checkers

1995 Support Vector Machines with kernel trick

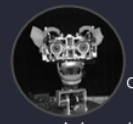
1995 Random Forests invented

1997 AI becomes world champion at chess

1998 Use of AI revolutionises web-search performance

2000s

2000 Kismet demonstrates emotional interactive interfaces



2002 Roomba becomes the first mainstream domestic AI device

2004 DARPA Grand Challenge catalyses huge progress in autonomous driving

2006 AI is 50 years old as an academic discipline

2009 Google Autonomous Car demonstrates human-equivalent performance

2012 Siri, Alexa and Google Assistant revolutionise our interaction with technology

2010s

2011 IBM Watson beats humans at Jeopardy

2014 Deep Learning allows image recognition systems to surpass human performance

2014 GANs catalyse a leap in generative AI by using competing networks.

2015 TensorFlow released by Google Brain

2015 AlphaGo becomes world champion at Go

2016 TPUs accelerate neural network training

2017 AlphaZero becomes world champion Go and Chess by playing only against itself.

2017 Transformer networks revolutionise language processing.

2017 Graph Convolutional Networks open up a new class of ML applications

2018 Deepfake technology demonstrates a sudden jump in generative methods

2020 GPT-3 produces human-like written language.

2020s

2020 Transformers adapted to vision tasks produce a step change in performance

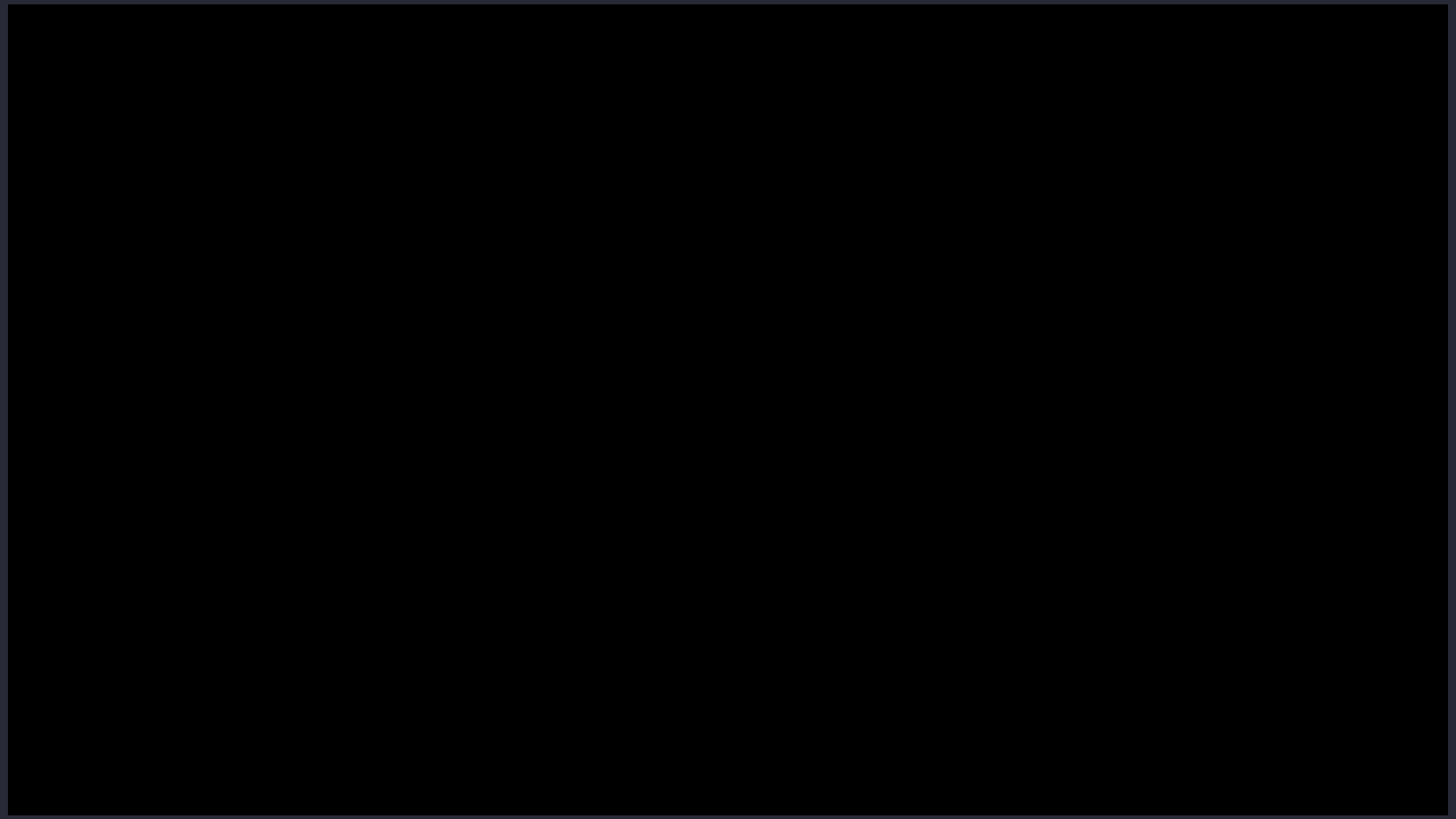
2022 DALL-E 2, Imagen and Stable Diffusion produces realistic images in response to text prompts.

2022 ChatGPT thrusts Generative AI into the mainstream

2023 LLMs every-where small and large with greater capability

2023 Language turns to structure 100s of millions of protein structures predicted at a click

Illustrating just how much computational power we now have access to.



Co-pilots

Multiscale modelling

Scientific foundation models

Hybrid modelling

Synthetic data

RL

AI surrogate models

Digital twins

Privacy enhancing technologies

Contextual AI

Generative design

Knowledge engineering

Physics informed NNs

Personalisation

Multi-agent systems

Advances in **digital tech** and **scientific innovation** are converging

Gene editing

4D printing

Robotic automation

Microbiome

Novel battery chemistries

Green chemistry

Biomaterials

Carbon capture

Spectral imaging

Hydrogen

Spatial multi-omics

Quantum computing

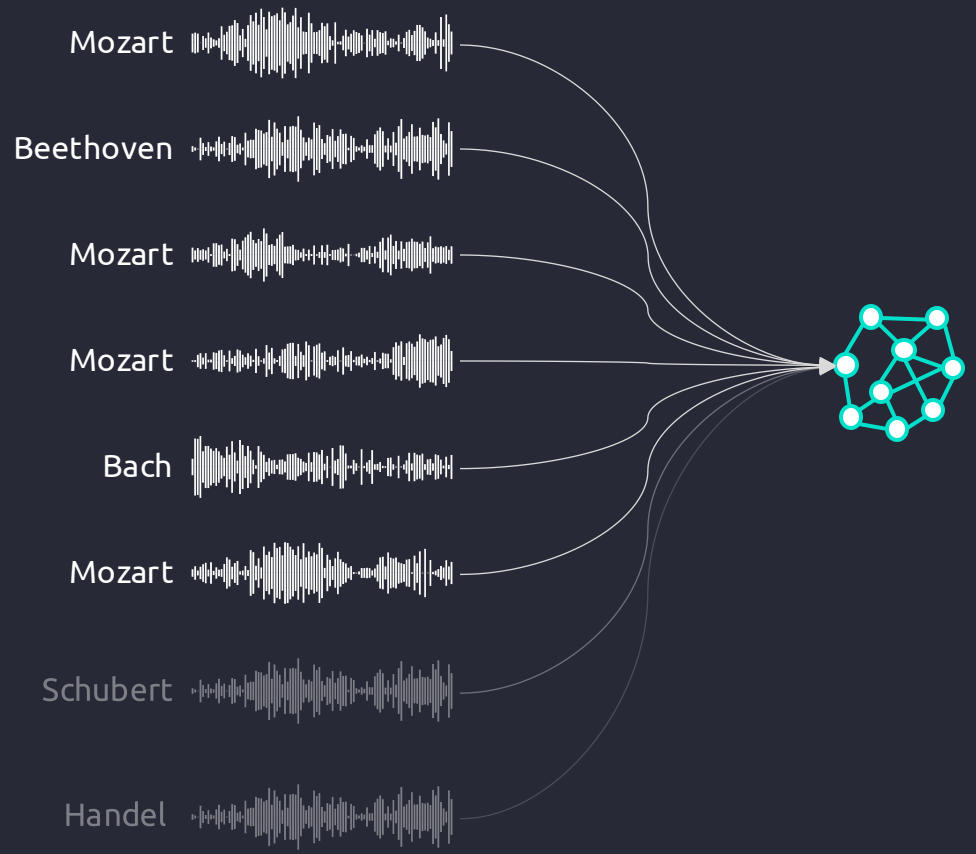
Synthetic biology

Organoids

Brain-computer interfaces

Connected systems

TRAINING

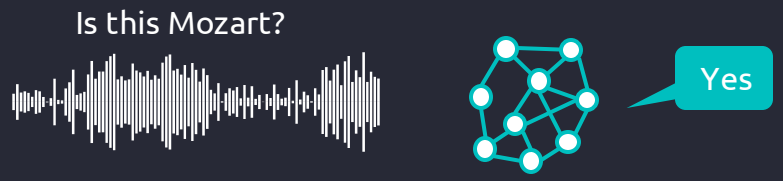


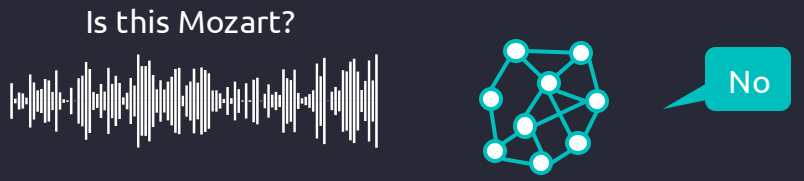
Dominated by text, and Foundation Large Language Models (LLMs) trained on 'the internet'.

Music, text, pictures, audio, video, code, designs, events, geometry, materials, chemicals, …

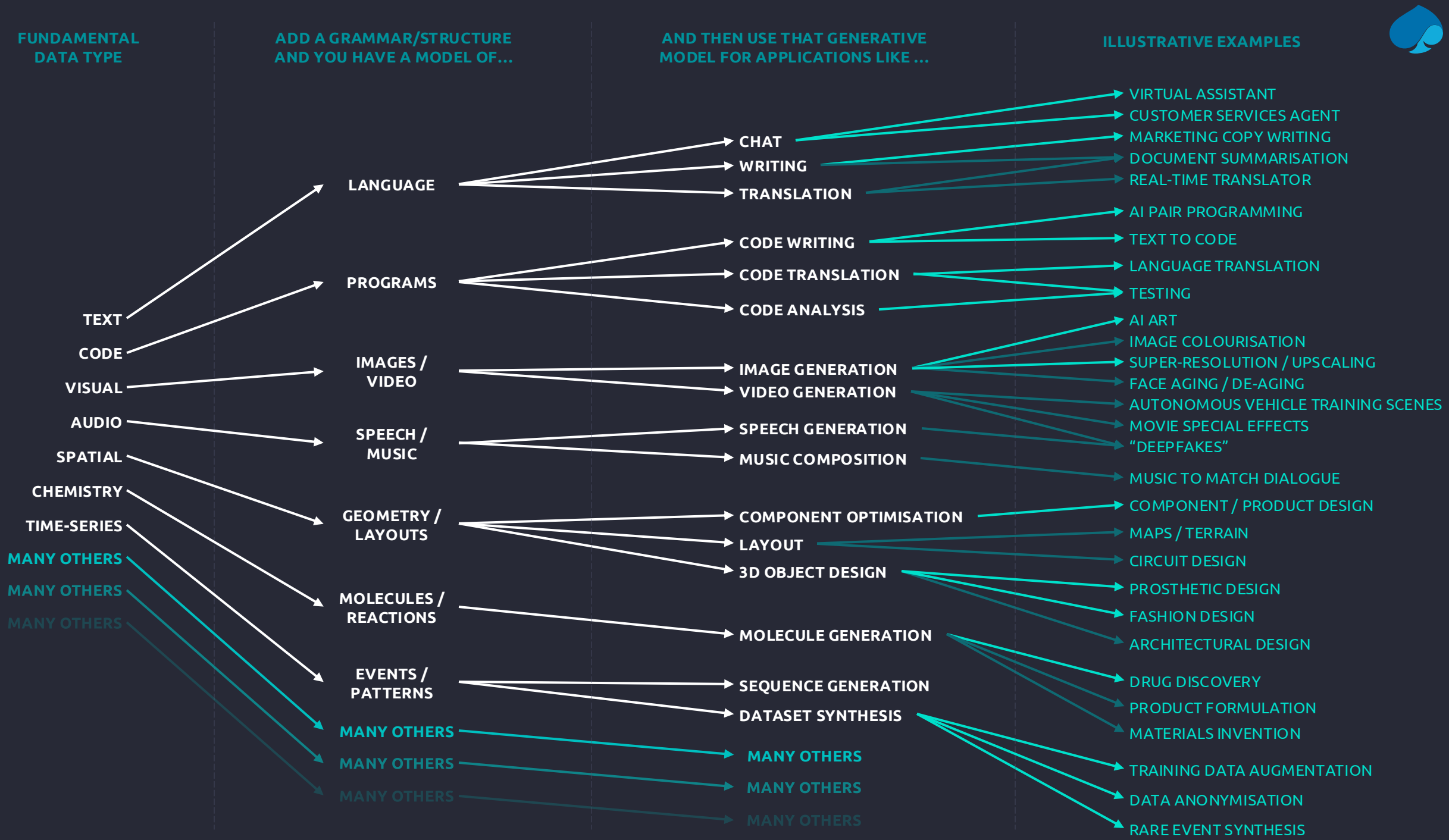
The quality of any kind of AI System is heavily dependent on the quality of its training data.

CLASSICAL AI USAGE





GENERATIVE AI USAGE


FUNDAMENTAL DATA TYPE
ADD A GRAMMAR/STRUCTURE AND YOU HAVE A MODEL OF...
AND THEN USE THAT GENERATIVE MODEL FOR APPLICATIONS LIKE ...
ILLUSTRATIVE EXAMPLES
TEXT
CODE
VISUAL
AUDIO
SPATIAL
CHEMISTRY
TIME-SERIES
MANY OTHERS
MANY OTHERS
MANY OTHERS
LANGUAGE
PROGRAMS
IMAGES / VIDEO
SPEECH / MUSIC
GEOMETRY / LAYOUTS
MOLECULES / REACTIONS
EVENTS / PATTERNS
MANY OTHERS
MANY OTHERS
MANY OTHERS
CHAT
WRITING
TRANSLATION
CODE WRITING
CODE TRANSLATION
CODE ANALYSIS
IMAGE GENERATION
VIDEO GENERATION
SPEECH GENERATION
MUSIC COMPOSITION
COMPONENT OPTIMISATION
LAYOUT
3D OBJECT DESIGN
MOLECULE GENERATION
SEQUENCE GENERATION
DATASET SYNTHESIS
MANY OTHERS
MANY OTHERS
MANY OTHERS
VIRTUAL ASSISTANT
CUSTOMER SERVICES AGENT
MARKETING COPY WRITING
DOCUMENT SUMMARISATION
REAL-TIME TRANSLATOR
AI PAIR PROGRAMMING
TEXT TO CODE
LANGUAGE TRANSLATION
TESTING
AI ART
IMAGE COLOURISATION
SUPER-RESOLUTION / UPSCALING
FACE AGING / DE-AGING
AUTONOMOUS VEHICLE TRAINING SCENES
MOVIE SPECIAL EFFECTS
“DEEPFAKES”
MUSIC TO MATCH DIALOGUE
COMPONENT / PRODUCT DESIGN
MAPS / TERRAIN
CIRCUIT DESIGN
PROSTHETIC DESIGN
FASHION DESIGN
ARCHITECTURAL DESIGN
DRUG DISCOVERY
PRODUCT FORMULATION
MATERIALS INVENTION
TRAINING DATA AUGMENTATION
DATA ANONYMISATION
RARE EVENT SYNTHESIS

How will generative AI impact the life science industry?

NOW (24-25)	• Accelerate screening • Drafting of regulatory documentation	• Streamlining processes and amplifying insights • Design novel molecules • Synthetic data for clinical trials • Content creation	• Catalyst for innovation • Reduce cycle times and time to market • Agility that enhances productivity
NEXT (25-27)	• Accelerate move to personalized medicine • Analyze multimodal data sets and infer	• Personalized medicine and precision targeting • Identify patient sub-types • Drug repurposing • Targeted therapies	• Paradigm shift to personalized medicine • Access to individual patient level analysis • Customization of treatment regimes
NEW (28+)	• AI designs drugs from scratch • New classes of drugs • Help untreatable conditions	• Reimagining healthcare with AI-driven solutions • AI-powered diagnostics • Virtual assistants for Healthcare • Drug discovery ecosystems	• Era of predictive medicine • Forecast disease trajectory for better intervention • Proactive healthcare paradigm

Generative AI has the Potential to Shape The Life science industry

NOW (2024-25)

CREATING CAPABILITY

Use case banks exist, proof of concepts completed and learning loop being introduced with aim to build our core GenAI capabilities.

Summarization and language techniques unlocking insights (e.g. genomics, LIMS data, new sensor data)

New **Operating Models** at enterprise

NEXT (2025-27)

AUGMENTATION

Generative AI combined with Conversational AI and Predictive AI everywhere

Co-Pilots and AI Assistants across the value chain, using custom and area-specific Multimodal Generative AI

Reengineering of key processes, incl., in molecule design and biomanufacturing

NEW (2028+)

RE-INVENTION

Augmentation to **re-invention**

Next-Generative context-aware AI-assistants fused with physical, capturing knowledge and using it experiment and enable decisions, together with people.

Fully automated labs, factories, supply nodes and customer eco-systems

Facets of Trust in AI

What do people need to see before they have confidence in an AI system?

Dependability
(Will always produce an output, in the required timeframe)

Stability
(performance will not unknowingly drift over time)

Robustness
(Will handle unusual or malicious inputs well)

Sensibility
(Makes decisions in line with how the world / nature / physics / culture works)

Proven Ability / Accuracy
(Is it good at solving the problem, as measured by tests?)

Humility
(Refusing to answer, or at least reporting when it doesn't know something)

Sustainability
(Impact of training and ongoing use is not harmful)

Extrapolates Sensibly
(will do something sensible when confronted with unseen data beyond the bounds of what it was trained on)

Fairness
(Output is not biased against any sub-groups)

Privacy
(will not leak sensitive data it was trained on)

Explainability
(Can it explain/justify how it solved the problem?)

Fails Gracefully
(If it fails, will it fail in a safe & sensible way?)

- AI THAT WORKS
- AI THAT WORKS RELIABLY
- AI THAT WORKS IN PEOPLE'S BEST INTERESTS
- AI THAT'S ALIGNED WITH HUMAN EXPECTATIONS

Confidence in AI Playbook

Principled deployment – perfect delivery of desired value

With principled DEPLOYMENT, CHANGING THE DNA OF WORK AT YOUR ORGANIZATION

AUGMENTATION

There is huge power but also limitations of Gen AI.
it augments knowledge workers it does not replace them.

FLOW

GenAI output is not guaranteed to be correct, so must be placed inside an end-2-end engineering process to maximise the flow of value & minimise waste.

INDUSTRY

Gen AI is 'not magic', it does not have domain understanding,
We need to supplement to bring value to a specific domain, with knowledge of the base science or engineering.

INTEGRITY

Basic engineering principles apply to manage key attributes (quality, security, safety, standards), and the issues of bias and sufficiency of training data.

SUSTAINABILITY

We aim for cheaper and focused models which are more performant and energy efficient.

Some Key Considerations and Best practice for Adoption and scale

TACKLE TALENT EARLY

Create the right team and talent to secure the scalability, e.g. PE

TAKE THE ORGANIZATION ALONG

Develop Communication and training on developing and adopting generative AI in a responsible way.

SET UP FIT FOR PURPOSE DATA & PLATFORMS

Build a right toolkit and platforms to build secure, privacy protecting and reliable high-scale Generative solutions

PICK THE RIGHT MODEL FROM THE START

LLMs are costly
Pick the model and hosting that gives you the best cost at intended scale

You will likely build a stable of models

BUILD GOVERNANCE TO USE EXISTING AND NEW CAPABILITIES

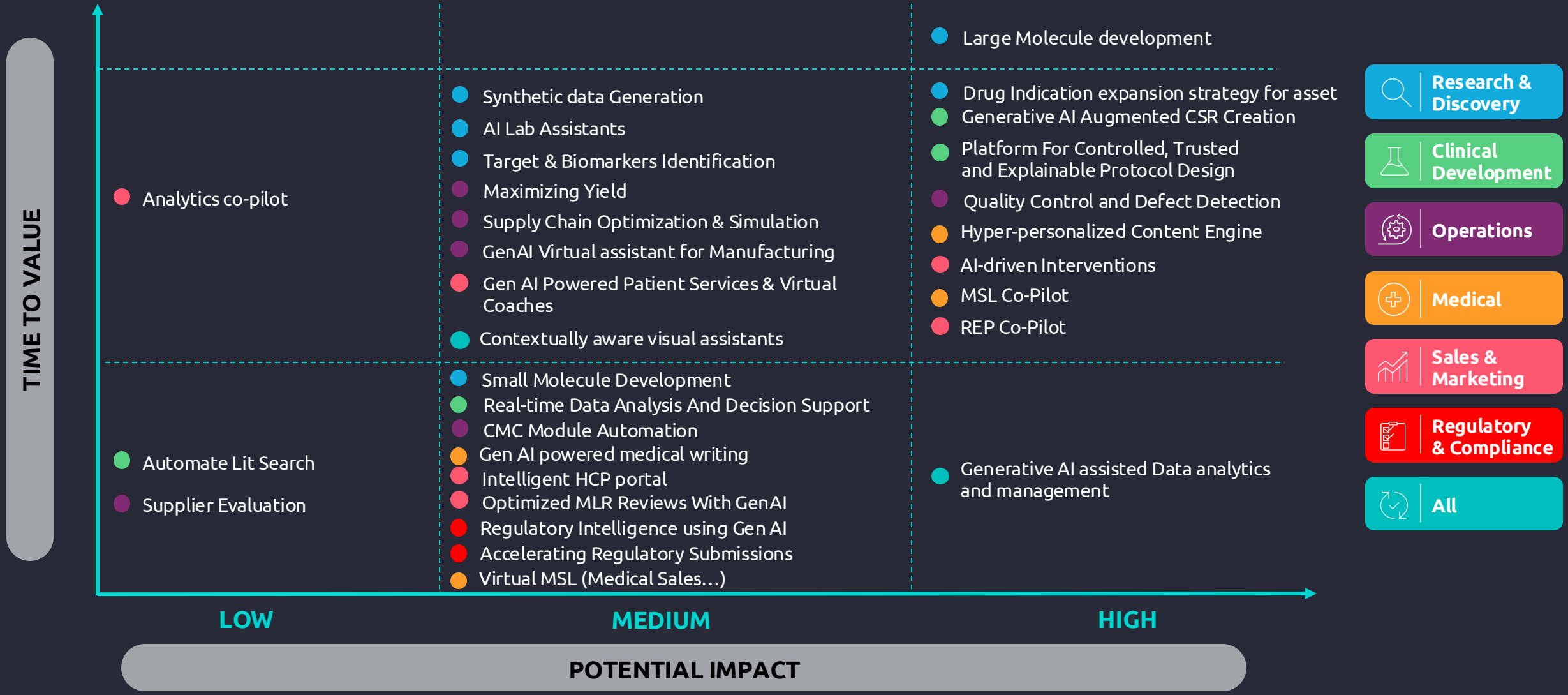
Manage portfolio of business roadmap
Triage between IT and specialist teams

PREPARE COMPLIANCE WITH AI ACT AND FDA REQUIREMENTS

Many uses will qualify as high risk
Leverage supporting tools and define required processes, e.g., on traceability

Our perspective on Prioritized Generative AI Use cases along the Pharma value chain

MAPPING IMPACT AND ADAPTATION TIMELINE



The GenAI use cases can be categorized in different families based on their core functionality to facilitate the reusability

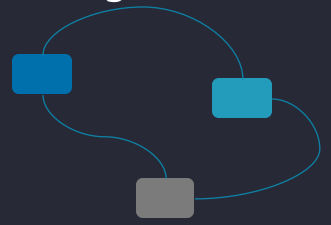
	KNOWLEDGE EXTRACTION, AGGREGATION AND INSIGHT GENERATION	HIGHLY SPECIALIZED AGENTS	CONTROLLED TRUSTED DOCUMENT GENERATION	GENERATIVE MODELS ACTING AS ORCHESTRATORS	CREATIVE CONTENT GENERATION
Research & discovery	• Automate Lit Search • Drug Indication expansion strategy for asset • Target & Biomarkers Identification	• AI Lab Assistants		• Large Molecule development • Small Molecule Development	• Synthetic data Generation
Clinical development	• Real-time Data Analysis And Decision Support		• GenAI Augmented CSR Creation • Platform for controlled, trusted & explainable protocol design		
Operations	• Supplier Evaluation • Supply Chain Optimization & Simulation	• GenAI Virtual assistant for Manufacturing	• CMC Module Automation	• Maximizing Yield • Quality Control and Defect Detection	
Medical		• MSL co-pilot • Virtual MSL (Medical sales)	• Gen AI powered medical writing		• Hyper-personalized Content Engine
Sales & marketing	• AI-driven Interventions • Intelligent HCP portal	• Analytics co-pilot • REP co-pilot	• Optimized MLR Reviews With GenAI	• GenAI Powered Patient Services & Virtual Coaches	
Regulatory & compliance	• Regulatory Intelligence using Gen AI		• Accelerating Regulatory Submissions		
All	• Generative AI assisted Data analytics & management	• Contextually aware virtual assistants			• Hyper-personalized Content Engine

Many Gen AI use cases are built in an isolated way: Reusability of Core functionality and technical infrastructure is key to scale

Purely illustrative – not representative of fully functional services

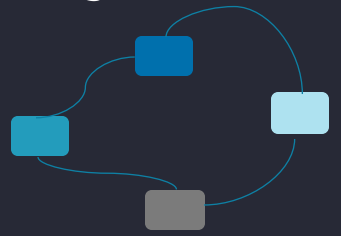
Use Case 1

Authoring clinical trial protocol



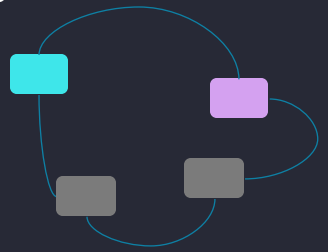
Use Case 2

Authoring adverse event summary



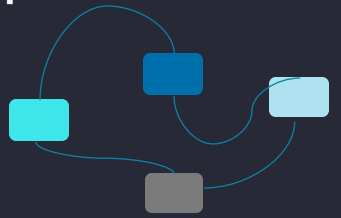
Use Case 3

Synthetic data Generation



Use Case 4

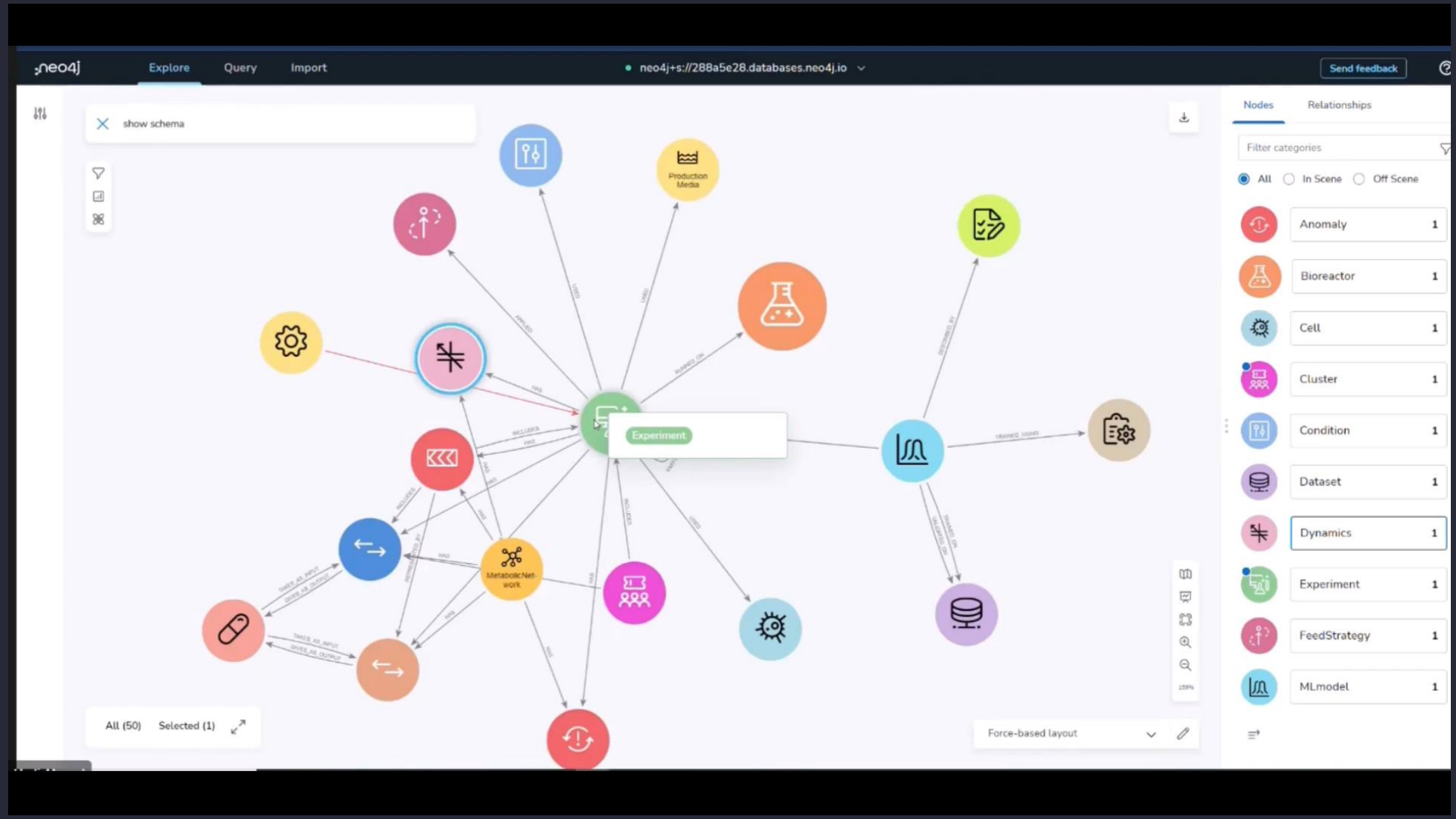
Hyper-personalized creative content



- Core functionality (utilizing algorithms and models to generate tailored output)
- Core functionality (ingesting and analyzing and interpreting complex medical data)
- Generic technical infrastructure (e.g. open-source models)
- Generic technical infrastructure (e.g. Commercial API)
- Other componentes

Evidence Integration in a knowledge graph data base

Generative AI-query layer



About Capgemini

Capgemini is a global leader in partnering with companies to transform and manage their business by harnessing the power of technology. The Group is guided everyday by its purpose of unleashing human energy through technology for an inclusive and sustainable future. It is a responsible and diverse organization of nearly 350,000 team members in more than 50 countries. With its strong 55-year heritage and deep industry expertise, Capgemini is trusted by its clients to address the entire breadth of their business needs, from strategy and design to operations, fueled by the fast evolving and innovative world of cloud, data, AI, connectivity, software, digital engineering and platforms. The Group reported in 2022 global revenues of €22 billion.

Get the future you want | www.capgemini.com


Q&A

Beyond Smart Factories

Cross industry autonomous operations journeys insights

D. Coudriet | July 2024

Capgemini

Agenda

01 **A case for yet smarter factories**

02 **Key considerations to make it happen**

03 **Cross-industry examples**

- Aerospace: Digital twins for end-2-end supply-chain ⇔ manufacturing operations integration
- Automotive: MES driven autonomous operations
- Multi-industry: Intelligent control tower

04 **Wrap-up**

Empower your Smart Factory through real-time data processing, event-driven operations and smart agents to pave the way towards more autonomous operations. Discover how to leverage advanced use cases & technologies (end-to-end Control Tower, Digital Twin, augmented Smart Agents, Next Gen MES, predictive analytics, smart assets, people orchestration) to boost your operations.

Albeit different, most industry sectors face varying disruptions & challenges, driving the need for revamp operations models

AUTOMOTIVE	**Embrace the new Electrical Vehicle requirements & needs**
LIFE SCIENCE	**From one size fits all to personalized drugs and continuous monitoring compliant with regulatory requirements**
CONSUMER PRODUCTS	**From mass production to mass customization and connected services**
SEMI CONDUCTORS	**New Chips generation technologies - Ramp up & acceleration**
AEROSPACE AND DEFENSE	**From product to performance contract management**
ENERGY & UTILITIES	**From centralized mono-energy to distributed multi-energy model**

There is a huge value to realize from digital technologies in manufacturing to enable the physical world..

+20%

Increase in throughput due to better visibility and availability of assets

+10%

Increase in process yield thanks to ai/ml enabled process control

+40%

Increase in labour productivity due to smart automation and paperless operations

+20%

Increase in fulfillment Kpis due to better demand visibility and more flexible production

Some examples of data driven digital manufacturing applications are ..

Real time Performance visibility
To allow faster response

On-line quality control
To reduce scrap

Energy management
To save consumption

Closed-loop operations
To optimize use of resources

Smart maintenance
To optimize the availability/maintenance cost ratio

Predictive performance
To improve yield & throughput

Enhanced operator
To augment competencies

Intelligent automation
To automate repetitive tasks

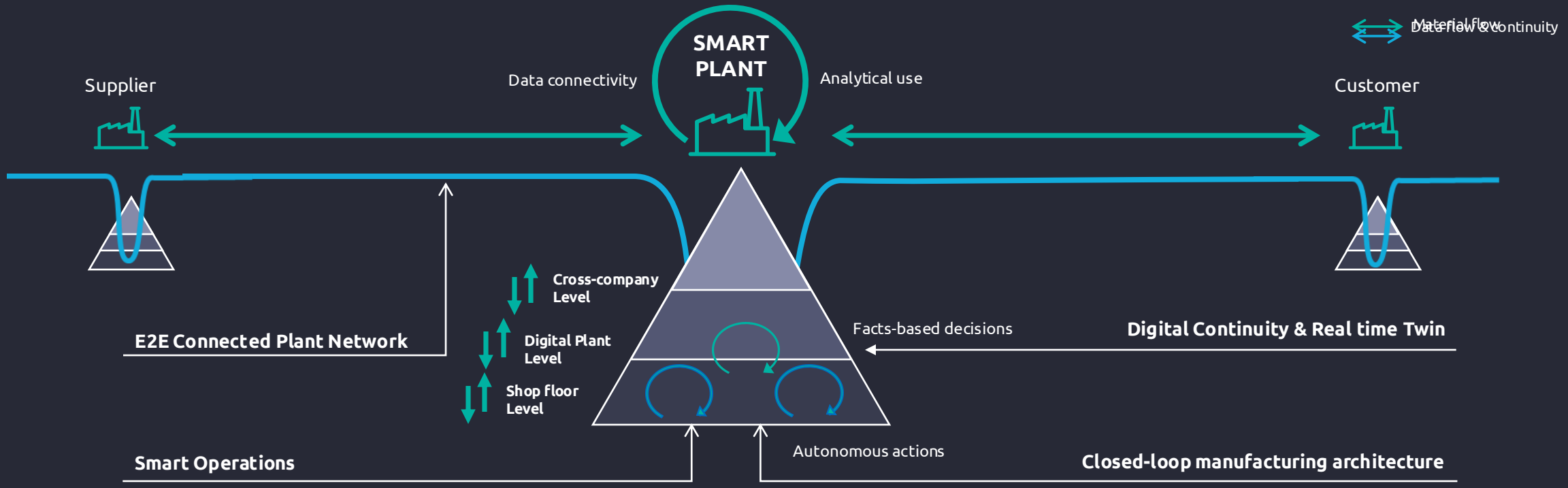
Digital is Lean 4.0: a new set of tools to go beyond traditional lean limitations

New/next(?) high level of plant operations automation required

Sustainable by design

Cyber-secured by design

Human-centric by design



EMBEDDED AI

5G & HIGH WIRELESS CAPACITY NETWORKS

ROBOTS COBOTS

PROCESS ORCHESTRATION

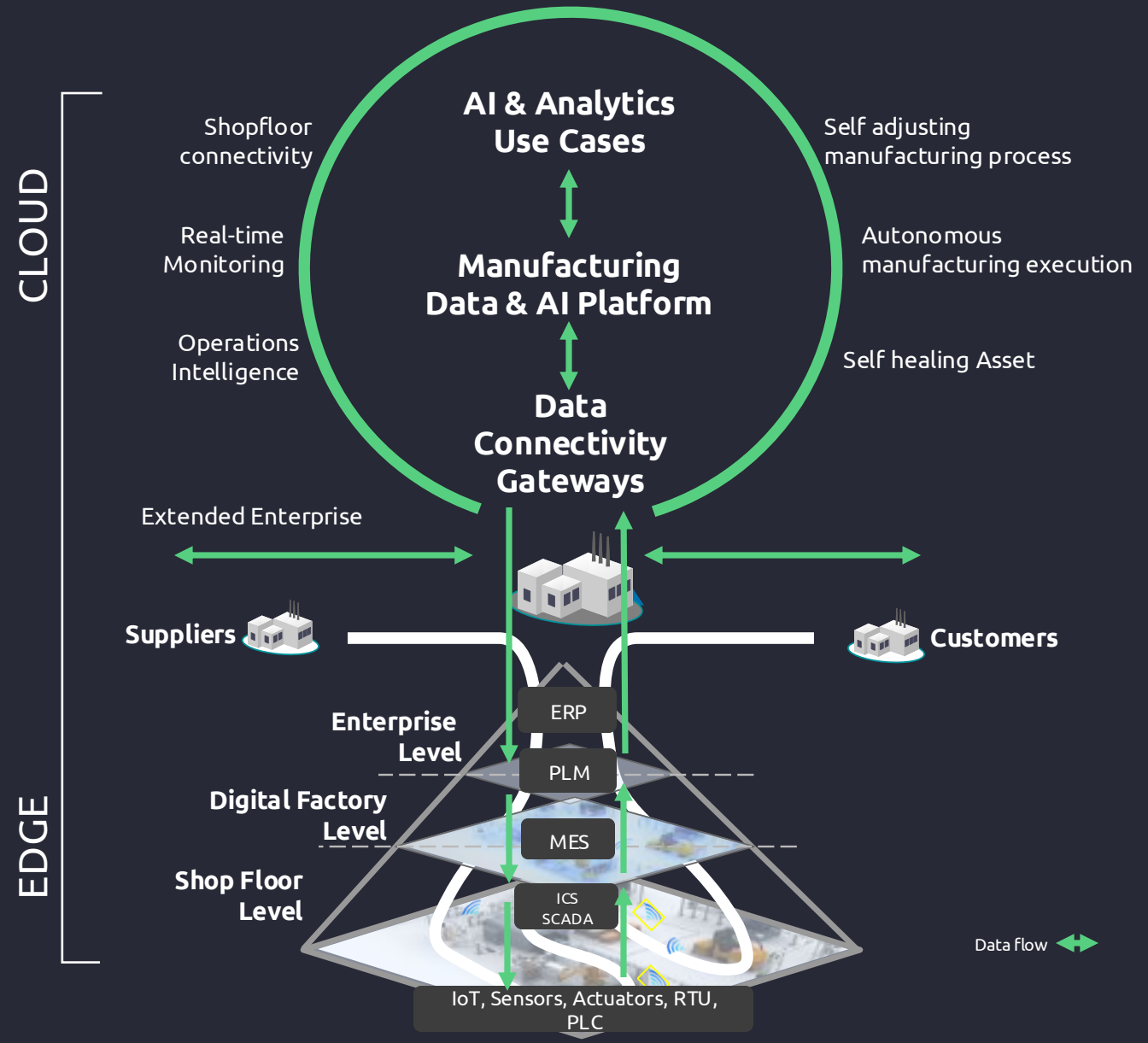
BLOCKCHAIN

ENHANCED OPERATOR

A next gen factory

IS A PRODUCTION FACILITY THAT IS HIGHLY AUTOMATED, REQUIRING LITTLE INTERACTION TO RUN AND DELIVER SERVICE OUTCOMES…

…. the journey to more autonomous manufacturing relies on the implementation and validation of foundational industry 4.0 concepts and technologies (Data and automation as enablers) across different levels of maturity



Agenda

01 A case for yet smarter factories

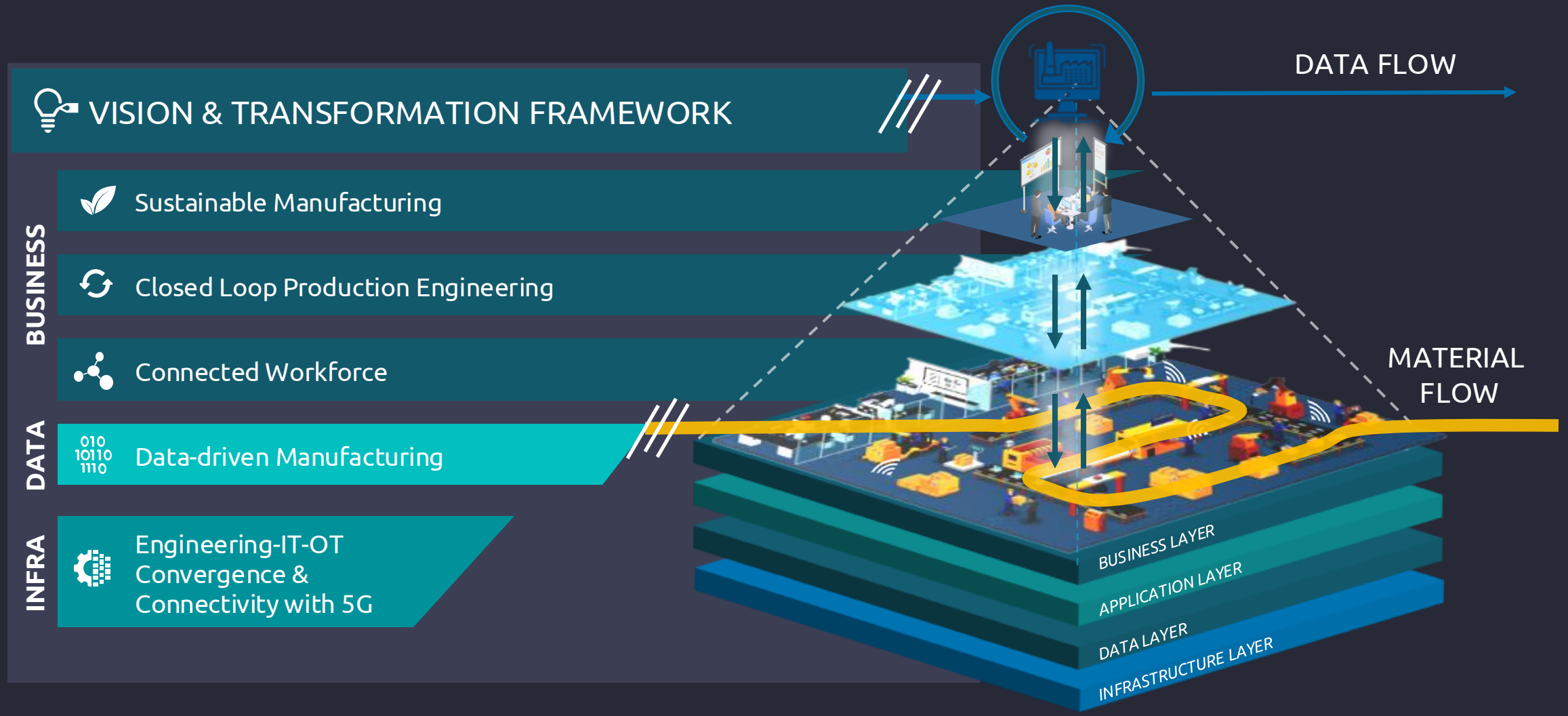
02 Key considerations to make it happen

03 Cross-industry examples

- Aerospace: Digital twins for end-2-end supply-chain ⇔ manufacturing operations integration
- Automotive: MES driven autonomous operations
- Multi-industry: Intelligent control tower

04 Wrap-up

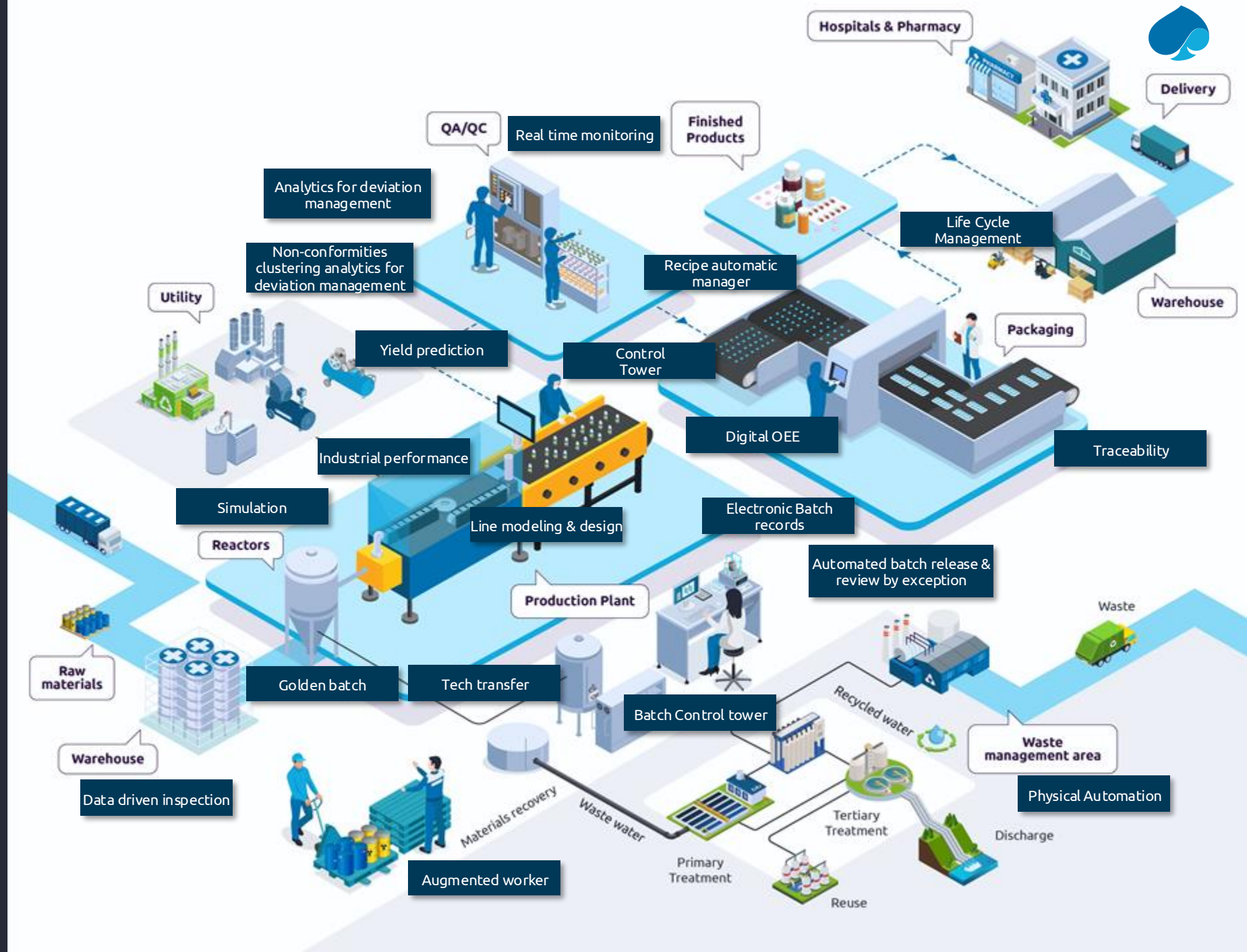
Smart Plant is the foundation of adaptability & certainty – automotive & aerospace lead the way



Next generation factories

Factory of the future ambition is based on multiple **digital use cases**

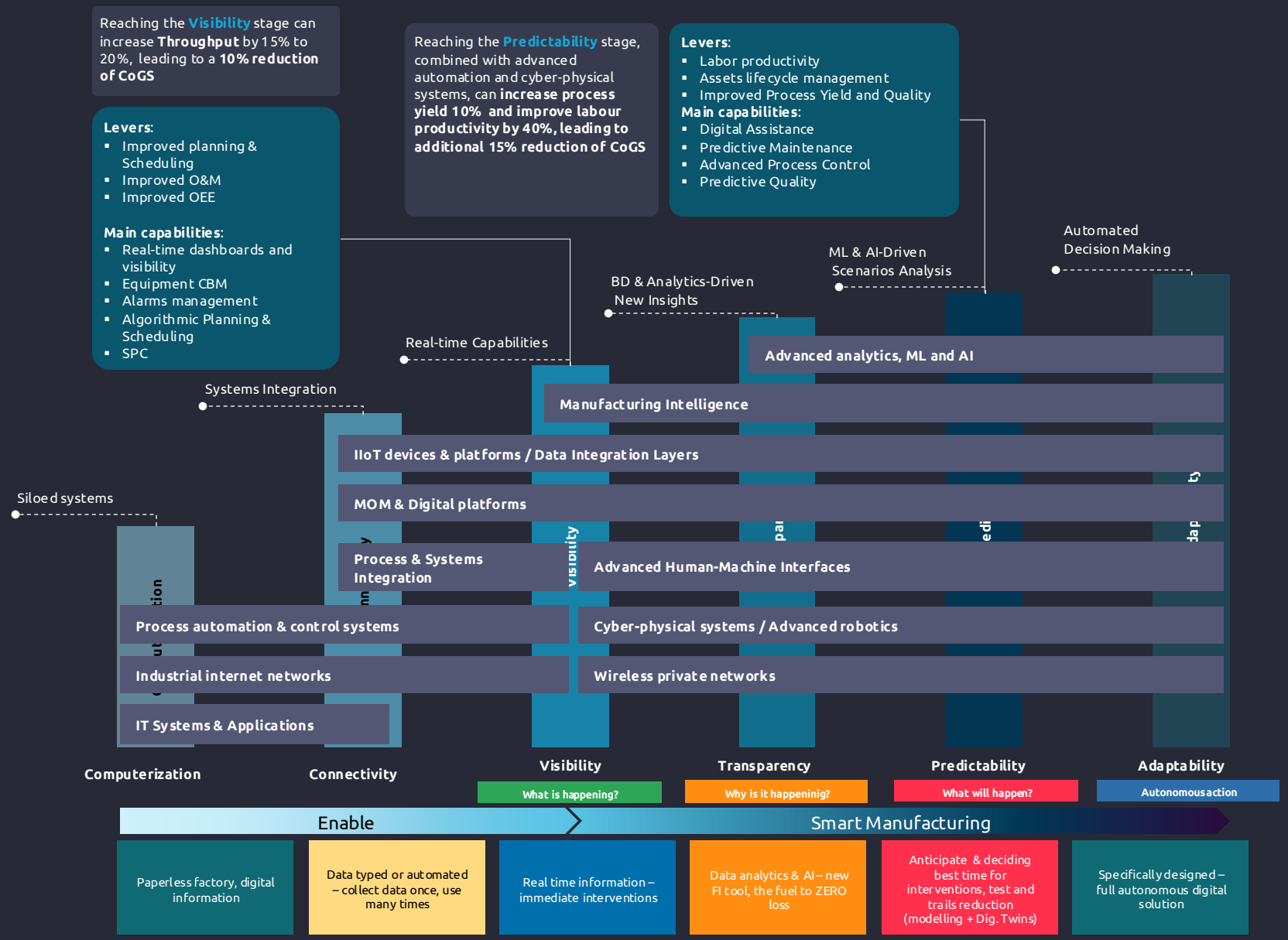
Key is to define a focused roadmap to address business priorities in a **staged and value driven approach**



Life Science manufacturers face several challenges that prevent scaled adoption of data driven approaches

The journey towards smart manufacturing

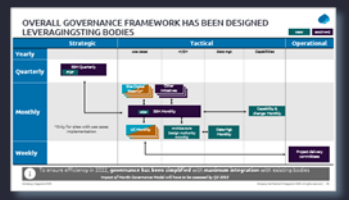
The next generation of factories will be hyper connected, smart and autonomous. They will also be characterized by high adaptability and optimal resource utilization. While collaboration between man and machine will call for greater flexibility and adaptability, it also offers people the prospect of better, more fulfilling jobs



To enable deployment at scale, Smart Manufacturing readiness will require not just technology, but a broader framework

1 Governance

- Overall program governance model best practices sharing (ambition definition, bodies, local / central), incl.:
- Use cases elicitation and UC portfolio management
- Design authority, IT-OT governance
- Benefits realization tracking (v. ambition)

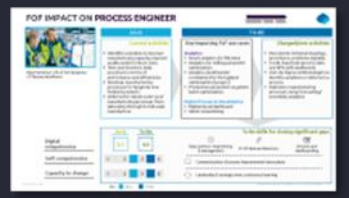


2 IT-OT architecture

- 12 main criterions to assess the IT-OT environment digital manufacturing readiness
- Ranging from standards, to scalability to data driven
- Framework including 30+ real-world benchmarks

4 People & Organization

- A framework which includes a library of 60+ use cases illustrating best digital manufacturing practices
- A digitalization heat map is devised to reflect the level of digitalization of the business processes



3 Processes

- A framework which includes a library of 60+ use cases illustrating best digital manufacturing practices
- A digitalization heat map is devised to reflect the level of digitalization of the business processes

Operating Model

Smart manufacturing logical architecture

Real-time processing, analytical & event-driven capabilities, & digital continuity have to rely on a digital IT/OT architecture proper foundations

Business applications

Digital twin

A virtual representation of the plant spanning across its lifecycle, is updated from real-time data, and uses simulation, machine learning and reasoning to help decision-making

PLM

Convergence between Physical Plant & Virtual Plant for virtual commissioning, complex modeling, supervision, PPR variability management, agile production scheduling

LIMS

LIMS allows you to effectively manage samples and associated data. Your lab can automate workflows, integrate instruments, and manage samples and associated information

ERP

ERP manages enterprise processes, supply chain processes and manufacturing processes

Manufacturing operations Management

MOM platform manages manufacturing processes: Operations – Quality – Maintenance – Logistics

Data platform

Data platform standardizes data (assets and processes data) and leverages analytics/AI potential for data drive use cases

Data ingestion | Data transformation | Data storage

Semantic layer

Will provide a single enterprise data model to be used by all systems and will ensure that all this information Is aggregated and accessible using a single unified terminology

Virtual shopfloor

Virtualization of PLC / assets for simulation needs to play scenario for processes / products optimization, virtual commissioning, …

Edge automation

Real-time analytics-based operations are at the edge of the equipment (smart cameras, auto-adaptive process…) to leverage close loop functions

Shopfloor data collection

A connectivity layer to manage all OT communication flows

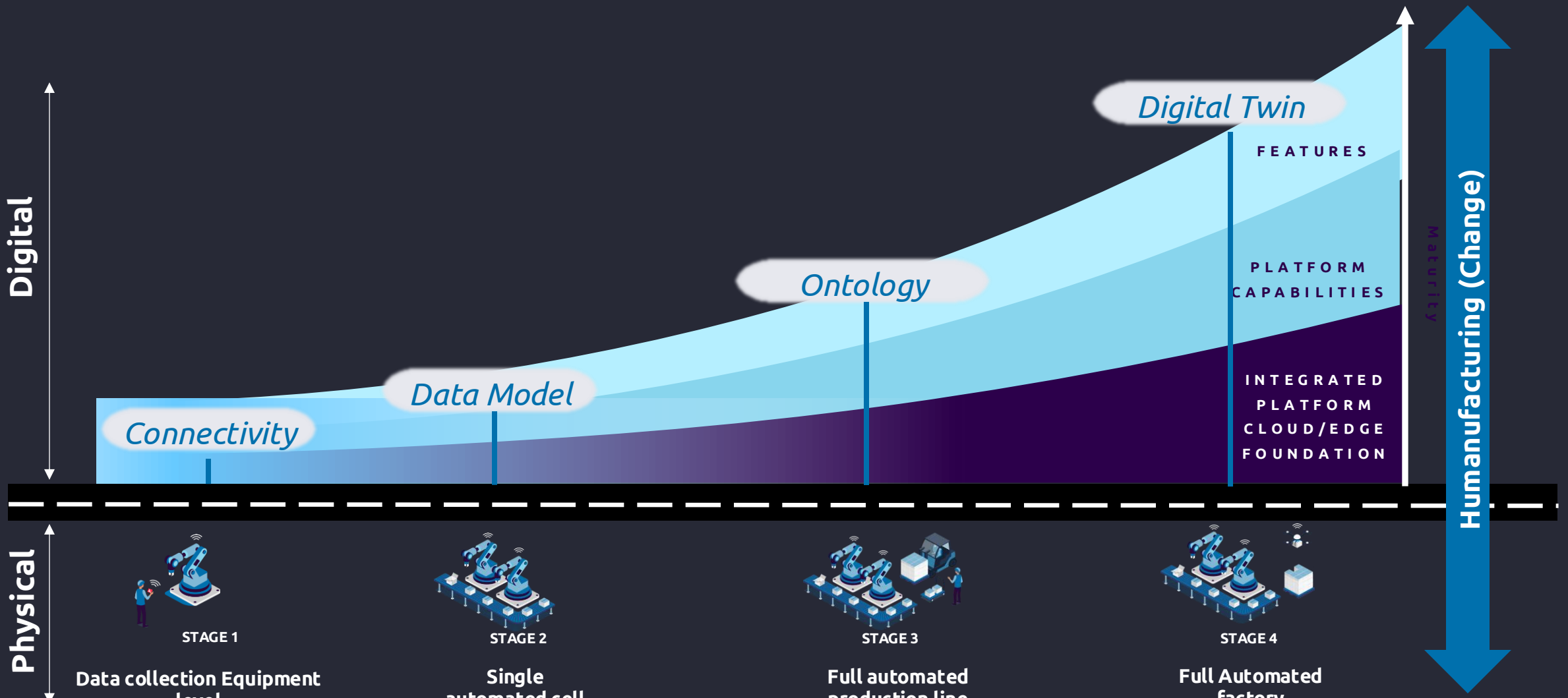
Sensor | Robot | IPC | Edge Device | PLC | Camera | Tool

Mobility layer

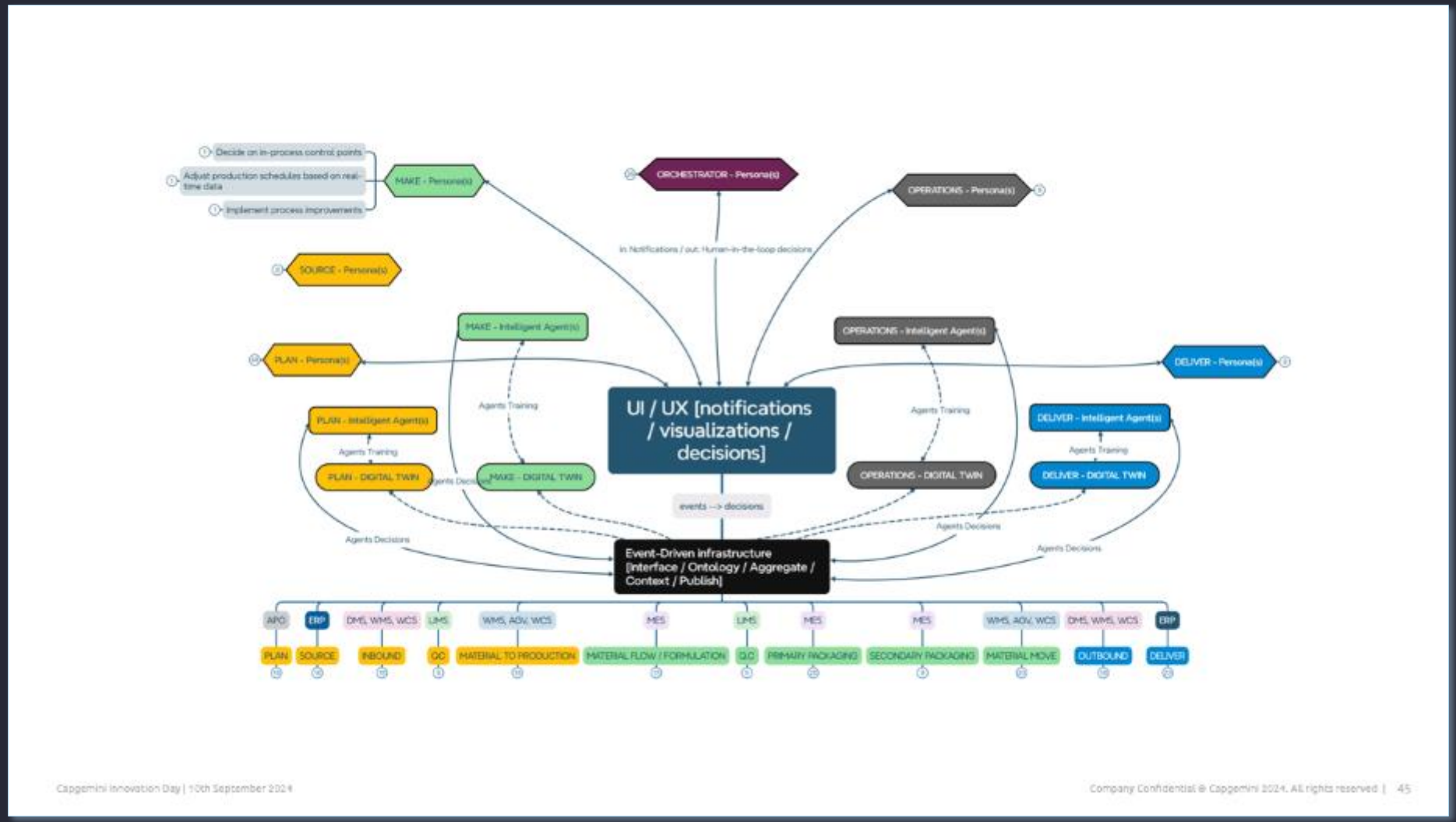
A mobility layer to manage all wireless flows (LPWAN, 4G/5G, WIFI …)

Data- & event-driven | Cost-efficient | Modular | Scalable | Secure | Device agnostic

Autonomous operations roadmap: a 4-stage journey



An agent-based, scalable event driven architecture pattern allowing a seamless transition to more autonomous operations



Agenda

01 **A case for yet smarter factories**

02 **Key considerations to make it happen**

03 **Cross-industry examples**

- **Aerospace:** Digital twins for end-2-end supply-chain ⇔ manufacturing operations integration
- **Automotive**: MES driven autonomous operations
- **Multi-industry:** Intelligent control tower

04 **Wrap-up**

Aerospace OEM - Intelligent Plant

- Industry 4.0 *IS* being successfully deployed into the aerospace sector
- Barriers to entry are high, pilot Purgatory still exists
- Digital twins are now being used for rate adaptation

Industrial Digital Twin Context

Industrial Digital Mock-Up

Virtual replication of a product, physical asset, system, process

CATIA
DELMIA

- De-risk clash between product / jigs/ building
- Provide immediate feedback to engineering
- Ensure parts Point of Delivery availability
- Increase H&S and Ergonomics

Shop floor connectivity

Shop floor performance monitoring data
from executions systems and IOT

SIEMENS
aws
thingworx
Quuppa

- Provide shop floor visibility and production transparency
- Track & Trace critical components

Rate Simulation & Capacity management

« Ground based » scenarios
testing & simulation

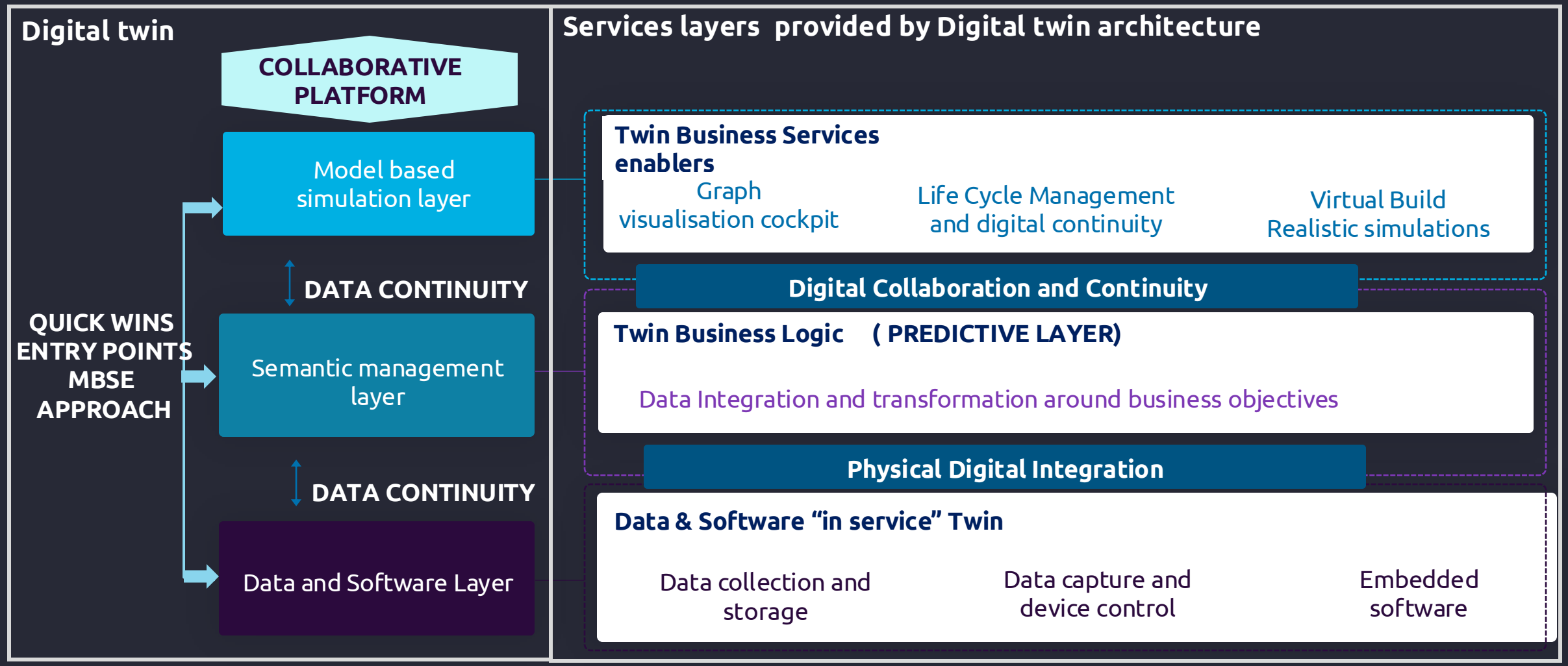
CONTROLBUILD
anylogic

- Identify process dependencies
- Identify bottlenecks
- Secure S&OP
- Validate New Line or Building Concept

Model Based Systems Engineering

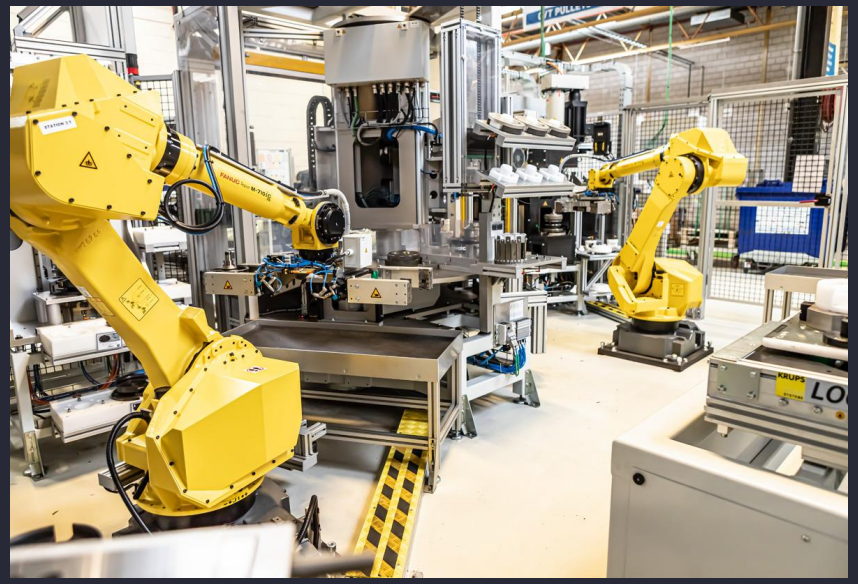
Reduced Ramp-up time
Reduced Takt time
Increased Production Rate
Enhanced safety
Enhanced Quality
Improved team availability

High level Digital twin architecture



Industry: Automotive

Design, deployment & maintain of a manufacturing execution system in a greenfield



Challenges / Context

Context

- The two companies are jointly launching a new production plant to manufacture and assemble a new type of gearbox.
- Capgemini was awarded to design the Manufacturing Execution System during the gearbox design, company and work organization and plant implementation and ramp up phase (OT and IT).

Objective

Design, deploy and maintain a scalable and replicable solution,

- integrated with all industrial and company systems
- focused on close end-to-end execution, strong productivity and traceability issues
- data driven to enable future 4.0 use cases,

by wave to secure a constrained schedule and adapt to a highly product and process evolving context

Approach / Realization

Three Phases :

- Specification & Design
- Build – Metz (France) then Mirafiori (Italy)
- 2 sites deployment

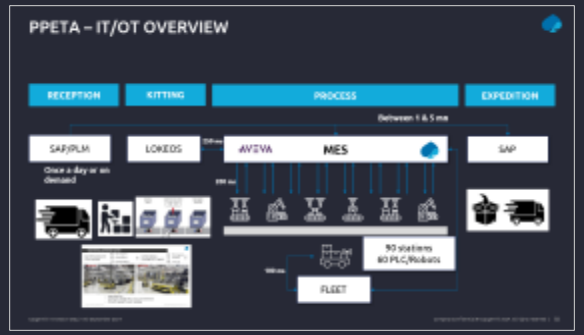
Agile practices

- Maintenance support (24/24 – 7/7) – **OTSM practices**
- Consulting services (Lean, ….) to reach production ramp-up objectives

Main Results

- Design Build, Roll out and maintain 2 new Industrial system on two sites (France & Italy) bringing agility :
  - Product diversity
  - Traceability
- Support the ramp-up of production
  - From 0 to 1000+ Transmissions per day per site (in progress… The final goal is 2000 per day per site).
- 24 hours 7/7 production line supports based on OTSM best practices

Solution



PPETA – IT/OT OVERVIEW

RECEPTION | **KITTING** | **PROCESS** | **EXPEDITION**

Between 1 & 5 mn

SAP/PLM

Once a day or on demand

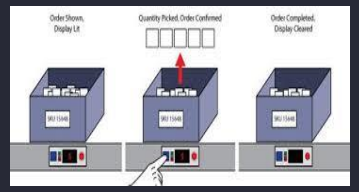
LOKEOS

250 ms

AVEVA **MES**

SAP

200 ms



100 ms

90 stations
60 PLC/Robots

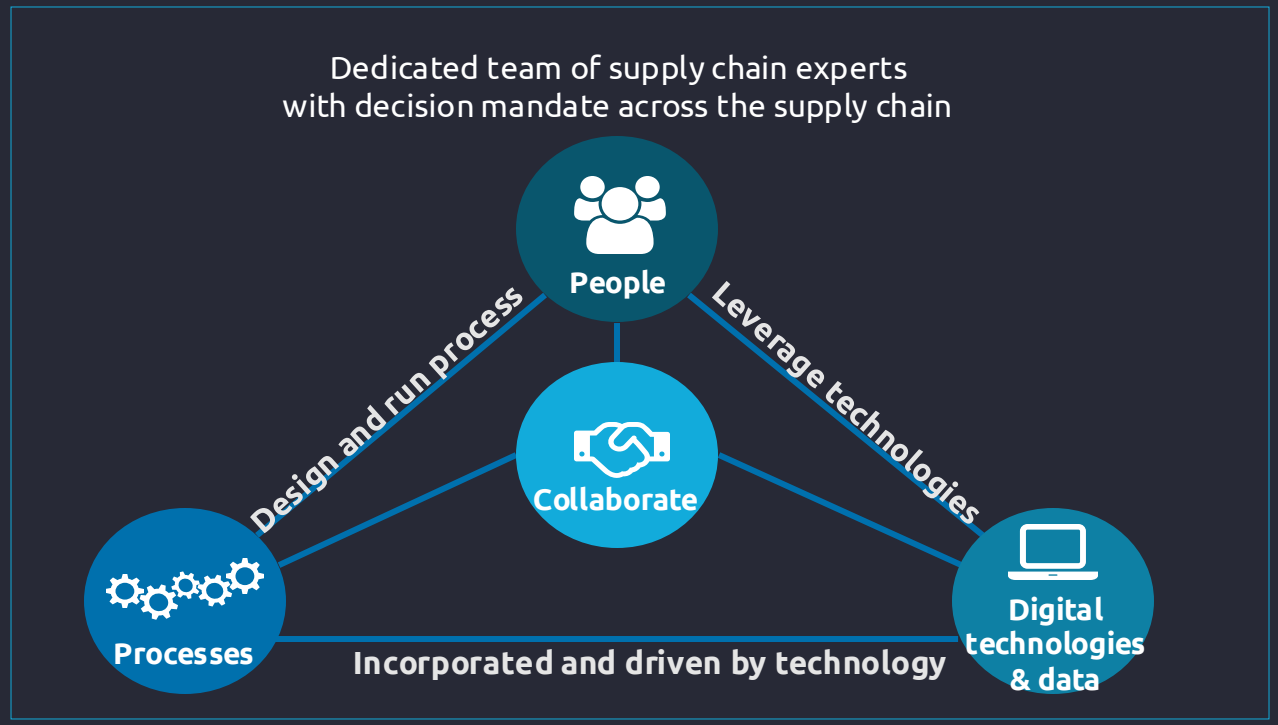
FLEET

What is a control tower | control tower can help in achieving your mission and strategic priorities

A Control Tower is an **end-to-end enterprise capability** which allows GSK to **solve** specific **business issues** and delivers **measurable benefits** through:

- right-time data **visibility**,
- proactive **alerts**,
- prescriptive **insights**,
- **self-driving** execution,

enabled by **advanced analytics**



Exception Management Mindset

An insights and decision support platform that monitors transactional data from internal and external sources and automatically separates issues from the mass

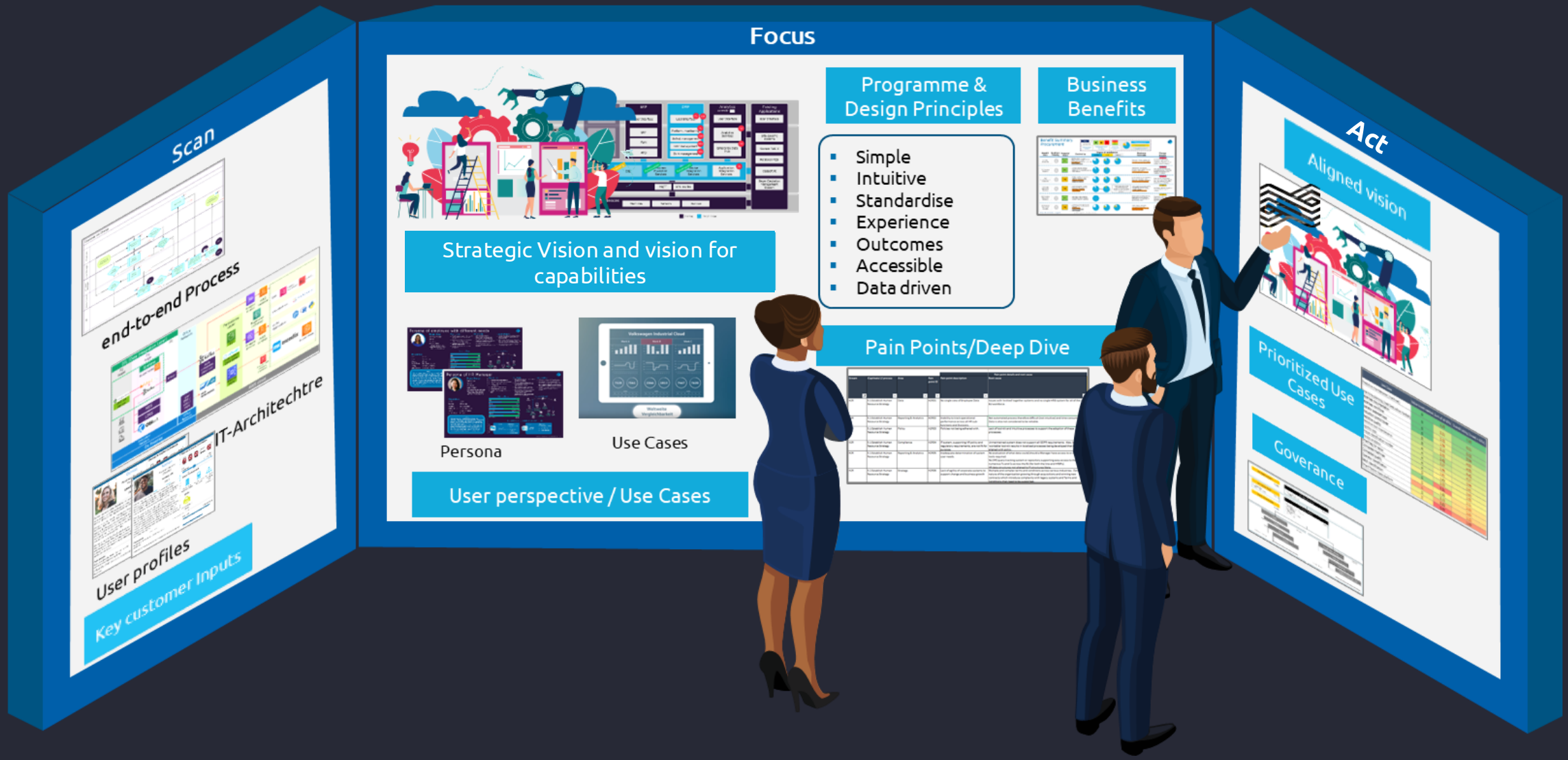
When to Act

- Lack of visibility in the supply chain
- 'Firefighting' in the organization
- Lack of end-to-end orchestration
- Difficulty to generate insights from data sets

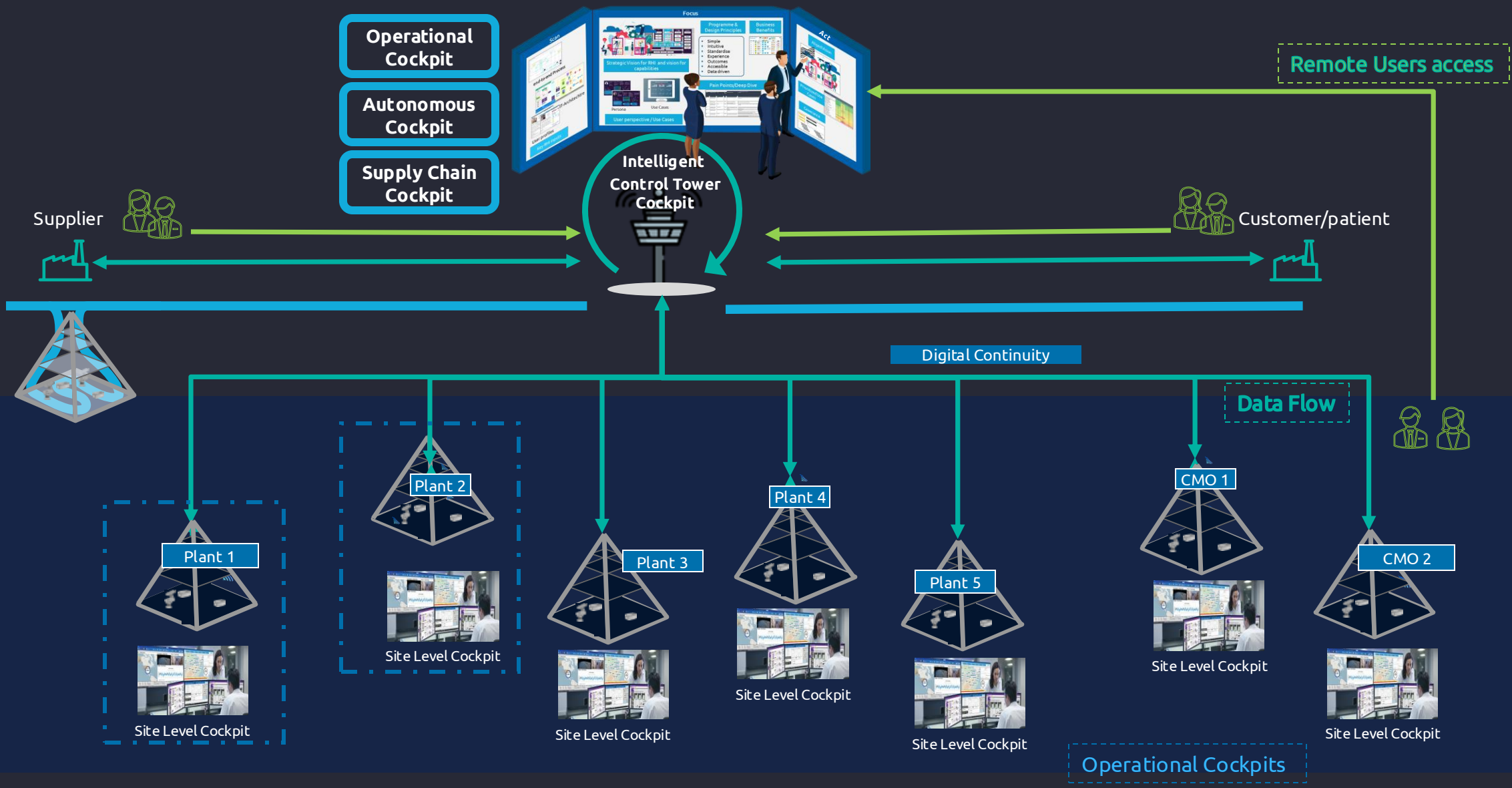
Benefits

- Increase revenues
- Lowered cost through cost avoidance
- Reduced risk through increased compliance
- Reduced capital

Our “scan, focus, act” approach has successfully delivered targeted business results

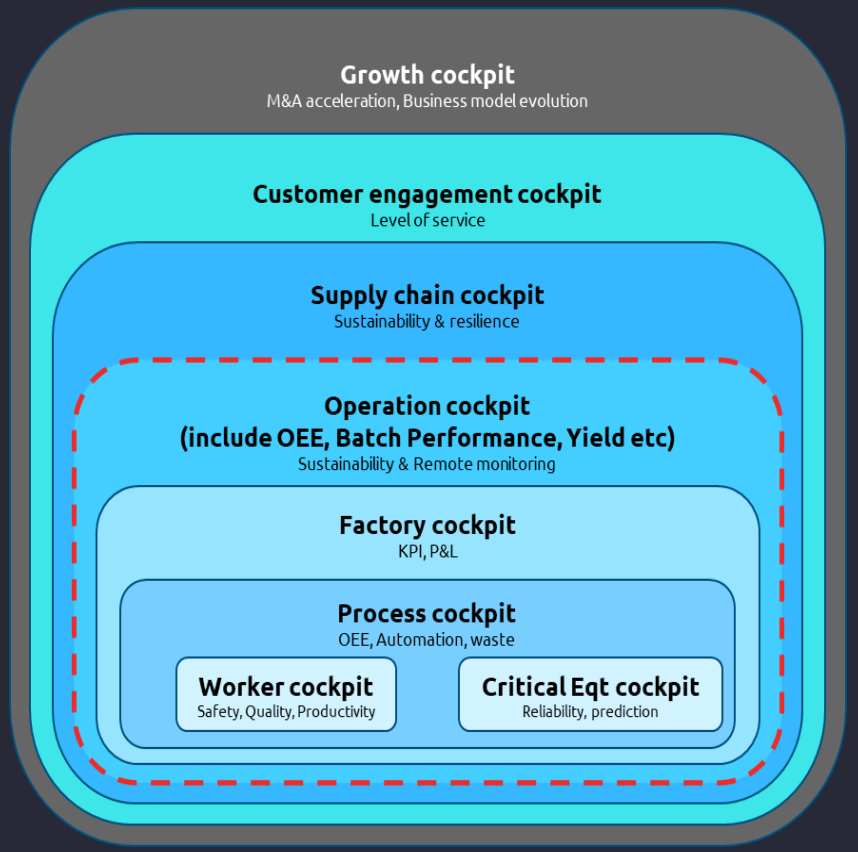


Intelligent operations across the ecosystem



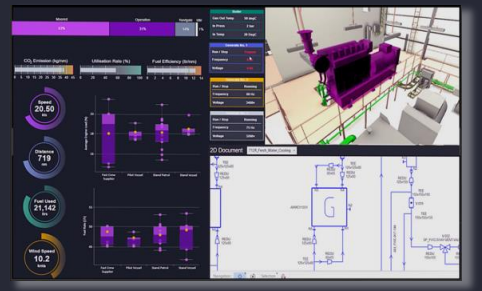
Example | Multilayer Intelligent Operations Tower distinguishes itself by different cockpits

Cockpit Arrangement



Dashboard and Analytics Visuals

Enterprise



Site

Operational

Agenda

01 A case for yet smarter factories

02 Key considerations to make it happen

03 Cross-industry examples

- Aerospace: Digital twins for end-2-end supply-chain ⇔ manufacturing operations integration
- Automotive: MES driven autonomous operations
- Multi-industry: Intelligent control tower

04 Wrap-up

Key takeaways and next steps

Food for thought & Path forward

- Data foundations and ontologies are key to end-2-end integration and leveraging digital twins
  - …
- Scalable, event driven architectures are the corner stone of autonomous operations and can be deployed progressively
  - …
- Introducing (smart) agents in the event driven architecture will pave the way to autonomous operations
  - …
- …
  - …

About Capgemini

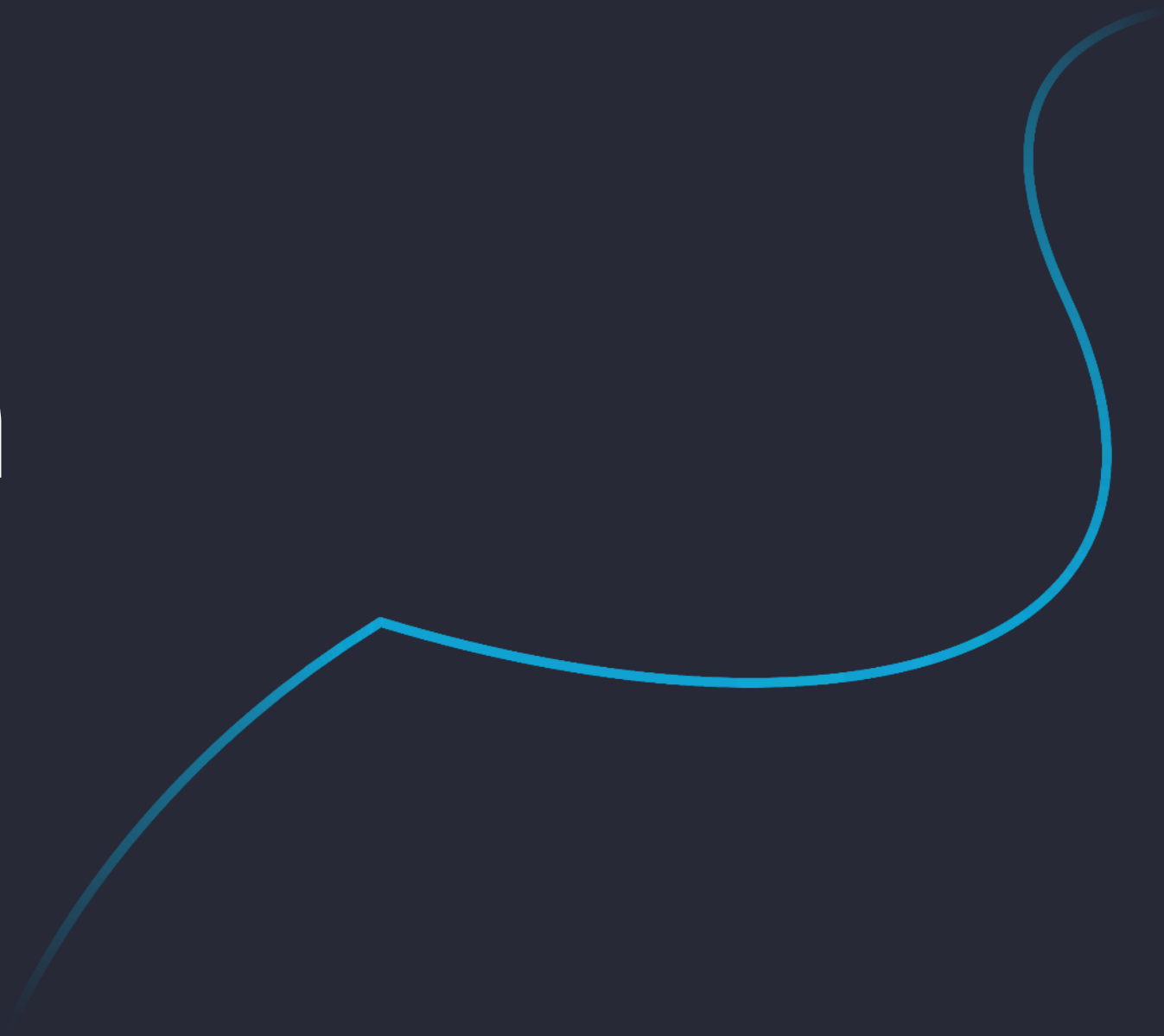
Capgemini is a global business and technology transformation partner, helping organizations to accelerate their dual transition to a digital and sustainable world, while creating tangible impact for enterprises and society. It is a responsible and diverse group of 340,000 team members in more than 50 countries. With its strong over 55-year heritage, Capgemini is trusted by its clients to unlock the value of technology to address the entire breadth of their business needs. It delivers end-to-end services and solutions leveraging strengths from strategy and design to engineering, all fueled by its market leading capabilities in AI, cloud and data, combined with its deep industry expertise and partner ecosystem. The Group reported 2023 global revenues of €22.5 billion.

Get the future you want | www.capgemini.com

Capgemini


Q&A

Conclusion



Capgemini

Techcorners – Meet the Experts

(Gen) AI and analytics in R&D and operations

Transforming the way we bring new therapies to market through AI

Justin Melnick

Smart manufacturing

Connecting the physical and digital worlds of modern manufacturing for operations excellence.

Daniel Coudriet

Intelligent compliance

Leveraging innovation and Generative AI to boost compliance activities

Frédéric Burger

GEN AI at workspace

Leveraging advanced tools (LLMs, Copilot….) to get real-time insights and automate repetitive tasks to enable to next gen workspace from Project Manager to Quality officer.

Christophe Oudot

Lejo John

Sustainability

Reconciling Life Sciences & sustainability: Innovation as the key to a successful transition for a more sustainable sector

Arnold Coppieters

Pieter De Cocker

