GLEAM
NETWORK

GLEAM presents

AI in Manufacturing and Engineering

Wednesday 28th January | 08:30-12:30

Bridge, 4 Edgewest Road, Lincoln, LN6 7EL, UK

Delivered by University of Lincoln BRIDGE Business Lincolnshire

Agenda

- 09:30: Welcome and Introduction from Dr Matthew Thornton, The Bridge & GLEAM
- 09:45: Beyond the Hype: Practical AI for Manufacturing & Engineering by David Regler, Business Lincolnshire
- 10:10: AI Adoption: A Defence Sector Perspective by Prof Fiona Strens, University of Lincoln
- 10:35: Coffee and Networking
- 11:00: Turning AI into Value for Your Business by Trevor Durant, Business Lincolnshire
- 11:25: Practical AI roadmap for manufacturers - From zero to AI pilot without burning cash by Scott Linfoot, Tekh
- 11:50: Digital Twinning and Smart Industrial IoT Technologies by Vili Panov, Siemens Energy
- 12:15: Close and Optional Tour of the Bridge

GLEAM NETWORK

Creating a Manufacturing Community

GLEAM
NETWORK

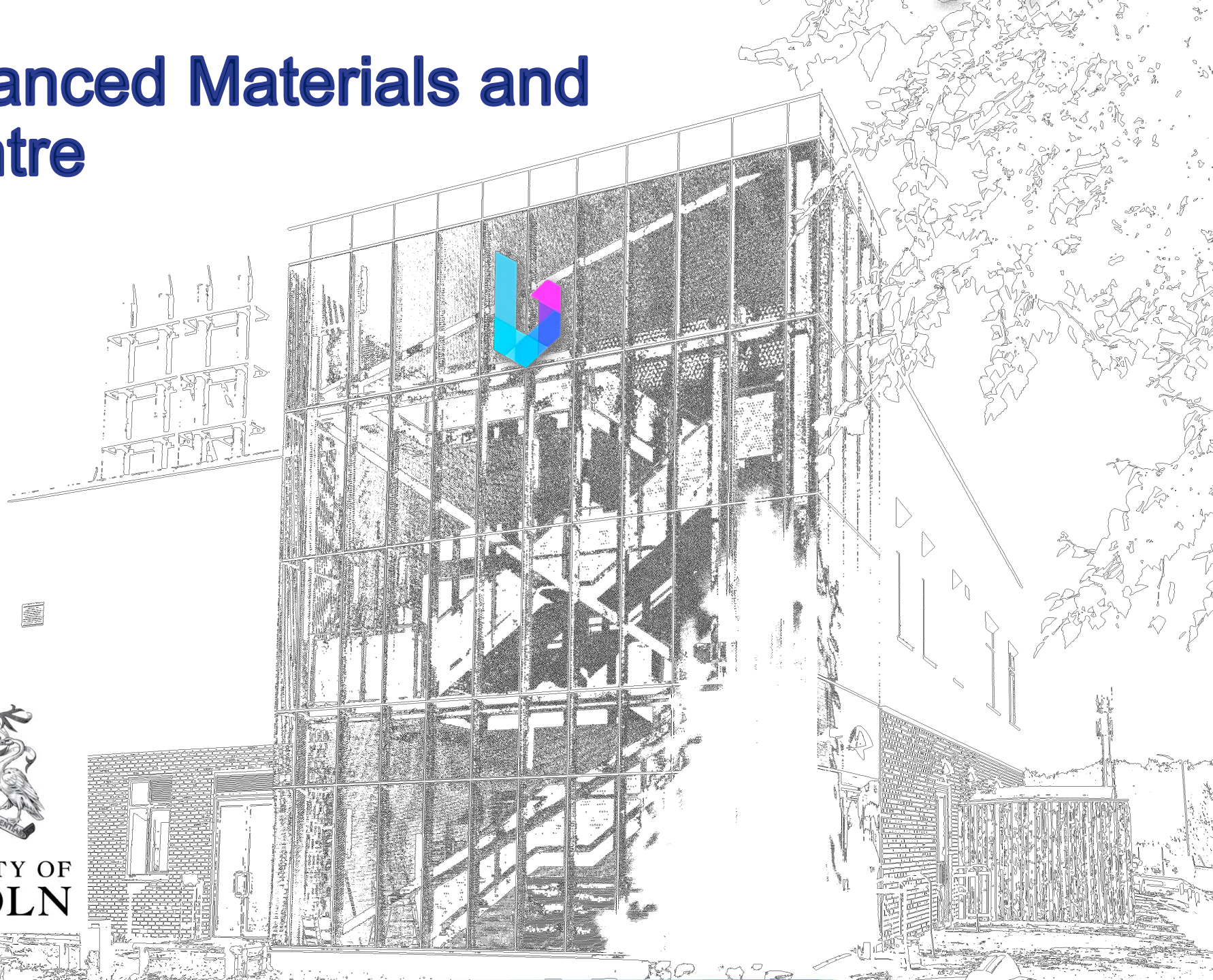
- The Greater Lincolnshire Engineering And Manufacturing (GLEAM) Network is an initiative founded by the University of Lincoln, Greater Lincolnshire Local Enterprise Partnership (GLLEP), and Business Lincolnshire and managed by the Bridge.
- GLEAM provides a knowledge-intensive business corridor locally at the heart of the manufacturing business in Greater Lincolnshire and is open to all manufacturing businesses in Greater Lincolnshire. Members are able to join free of charge and gain access to a range of benefits, including Affiliate Partner Membership with Make UK.

Make UK Affiliate Membership Benefit

- Join Make UK as an Affiliate Member
- Make UK Affiliate Membership is open to members of Make UK partner organisations. You'll receive industry information and insight, contribute to Make UK's policy positions and have access to events, guidance and support on issues affecting our sector.
- To register for Affiliate Membership just complete the form at: https://www.makeuk.org/affiliate-member-registration

The Bridge: Advanced Materials and Engineering Centre

Dr Matthew Thornton
Commercial Manager



BRIDGE

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BRIDGING BUSINESS WITH INNOVATION

- Bridge operates from the University of Lincoln and has a dedicated team of R&D project specialists working alongside the University's academic community.
- We help businesses access technologies and methods at the forefront of research to create R&D solutions, and drive innovation.

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European Union
European Regional Development Fund
Greater Lincolnshire Local Enterprise Partnership
In partnership with
MIDLANDS ENGINE
BRIDGE


BRIDGE

Bridge to…
Business Innovation

- With programmes designed to increase businesses' competitiveness, Bridge has delivered innovation to businesses and connected regional and international supply chains to cutting-edge materials science and engineering in the manufacturing and engineering sectors.
- Bridge has supported manufacturing businesses to access technologies at the forefront of research to deliver effective problem solving and to develop the workforce of tomorrow through accredited training.

BRIDGE


TELEDYNE
Teledyne Microwave UK
MinebeaMitsumi
Passion to Create Value through Difference
UK Atomic Energy Authority
microclean
QUALITY TODAY - INNOVATION TOMORROW
CATCH
SIEMENS energy
Poly materia™
QINETIQ
NHE
AFM WORKSHOP™
LUXUS LTD
Bringing new enhanced life to plastics
SHD composites
advanced composite materials
HHinnovations
mi
MURFITTS® INDUSTRIES
Fenner
PRECISION POLYMERS
A MICHELIN GROUP COMPANY
Eminox
YARA
ADITYA BIRLA
BIRLA CARBON
Wyatt Analytical Ltd.
B-hive
ALARIS
LINWAVE
reckitt
CLEAN TECH
A PLASTIPAK COMPANY
MICROMETRIC
Laser Processing, Cutting, Welding, Drilling, Marking +
Green Lizard
Technologies
Surepharm®
RootExtracts
Powered by B-hive
Puraffinity
DYNEX
Power through Innovation
iBOXiT
Singleton Birch
seneye
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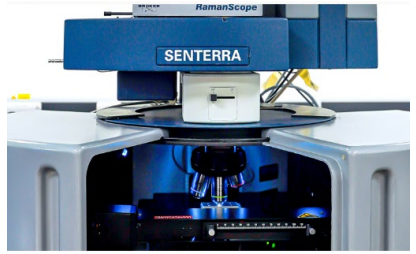
Industry Collaborations



CASE STUDY

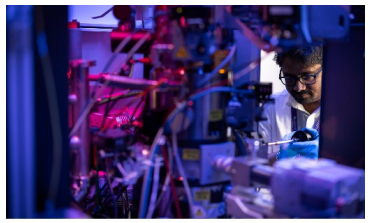
Microcapture

Microcapture use a novel micro-encapsulation technology to create a storage and delivery mechanism for a range of potential applications such as fragrance release and...

APPLICATION NOTE

Crystallinity of Plastics using NMR Spectroscopy

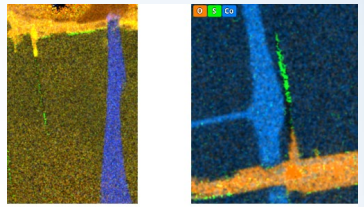
It has been demonstrated that solid-state NMR is an effective and efficient approach to determine the degree of crystallinity in plastic samples.



CASE STUDY

Murfitts Industries: Thermal and Microscopic Analysis of Recovered Carbon Black Material

There is a need to develop robust characterisation methods for rCB materials to guide their production and quality control during manufacture.



CASE STUDY

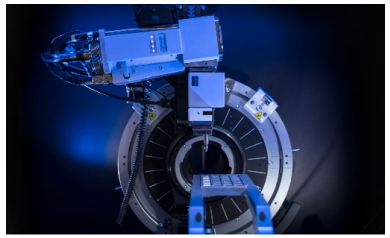
Siemens Energy: Analysis of environmentally assisted crack propagation in turbine blade superalloy

Siemens Energy have used advanced microscopy to understand how microcracks grow in samples thermally exposed to environmentally assisted crack test...

CASE STUDY

Microncleαn

Microncleαn are a leading global supplier of clean room equipment and garments based in Lincolnshire, UK. Due to the challenging and highly-regulated environments Microncleαn's...



CASE STUDY

Brigg Renewable Energy Plant

Brigg Renewable Energy Plant (BREP) is a power plant producing renewable energy using combustion of biomass. The process generates solid residues which can build-up...

APPLICATION NOTE

Ultra-low cost high throughput 3D printed NMR tube cleaner

Used NMR tubes present a problem in chemistry labs as they are difficult to clean effectively and can require substantial effort to clean in a time and resource effective way.

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- Visit our website for a virtual walkthrough of the Bridge at https://www.thebridge-lincoln.org/

- Follow us on:
  - https://www.linkedin.com/company/thebridge-lincoln
  - https://twitter.com/thebridge_linc
  - https://www.instagram.com/bridge_lincoln/

- E. mthornton@lincoln.ac.uk

Thank You for Listening

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Beyond the Hype: Practical AI for Manufacturing & Engineering

- David Regler, Business Lincolnshire

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Funded by UK Government

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Beyond the Hype

Practical AI in Manufacturing & Engineering

Hello

David Regler

Digital Sector Growth Manager
& AI Adoption Lead

Business Lincolnshire

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The place to go for business growth

TECH • AI

Anthropic CEO warns AI could eliminate half of all entry-level white-collar jobs

By **Chris Morris**
Former Contributing Writer
May 28, 2025, 11:27 AM ET

Anthropic CEO Dario Amodei is warning that AI could be a job killer.
FABRICE COFFRINI/AFP VIA GETTY IMAGES

NEWSLETTERS • CFO DAILY

MIT report: 95% of generative AI pilots at companies are failing

By **Sheryl Estrada**
Senior Writer And Author Of CFO Daily

August 18, 2025, 6:54 AM ET

GETTY IMAGES

AI Use at Work

- Use AI every day - **6%**
- Several times a week - **11%**
- About once a week - **6%**
- Several times a month - **7%**
- Never - **44%**

Source: Ipsos 2025

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AI Terminology

Artificial Intelligence (AI)

Machine Learning

Generative AI

Large Language Models (LLMs)

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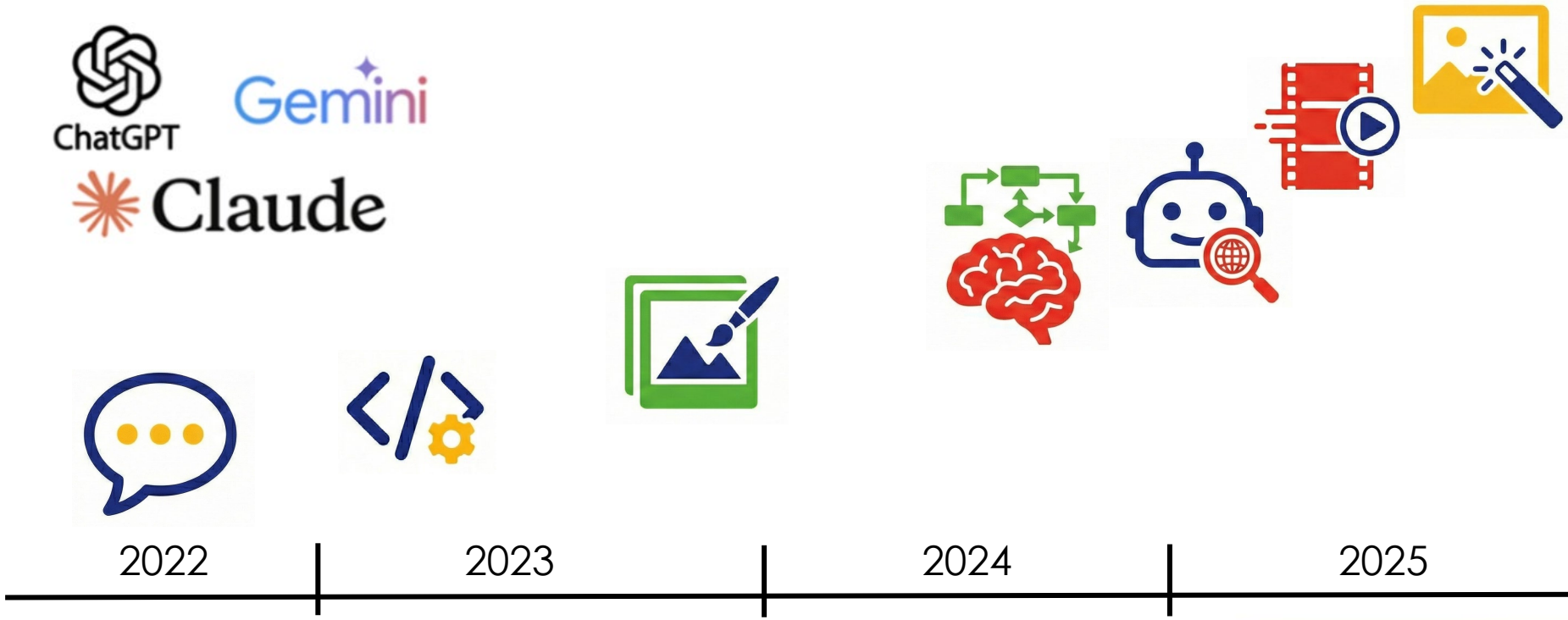
AI Timeline



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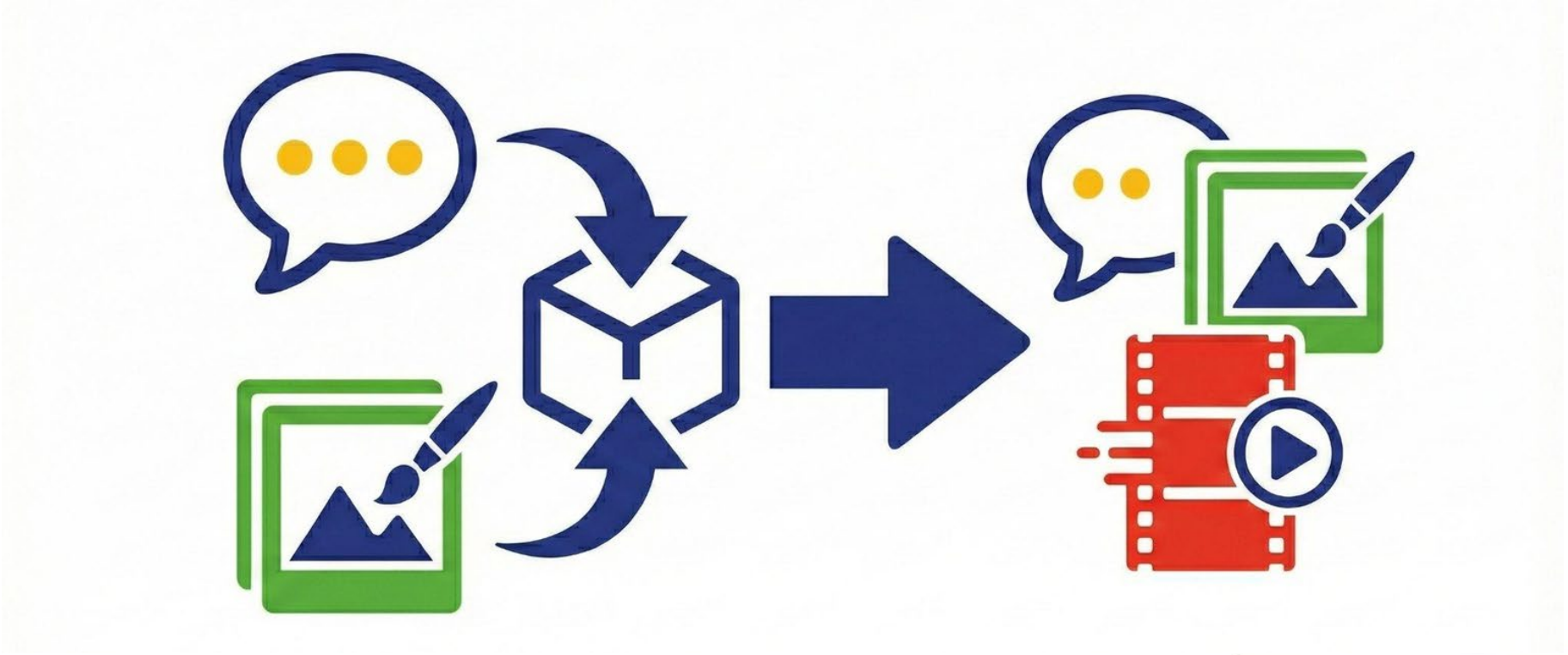
Multimodal Models



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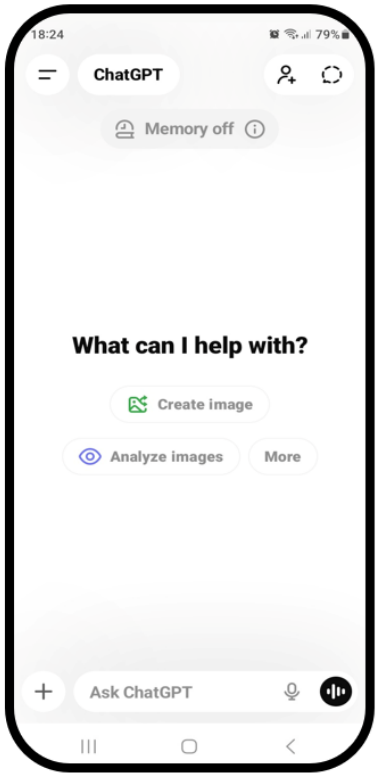
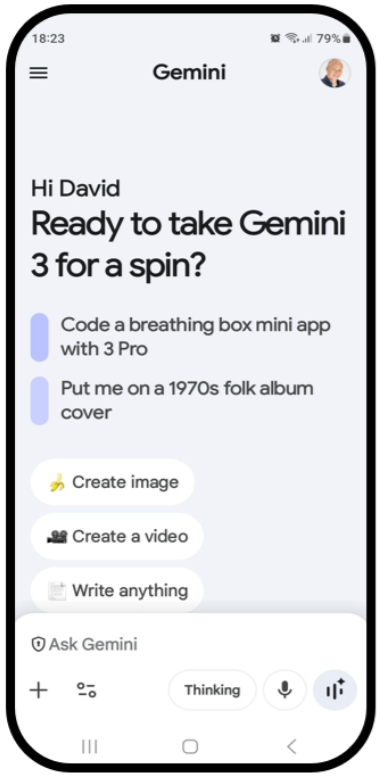
Mobile Apps





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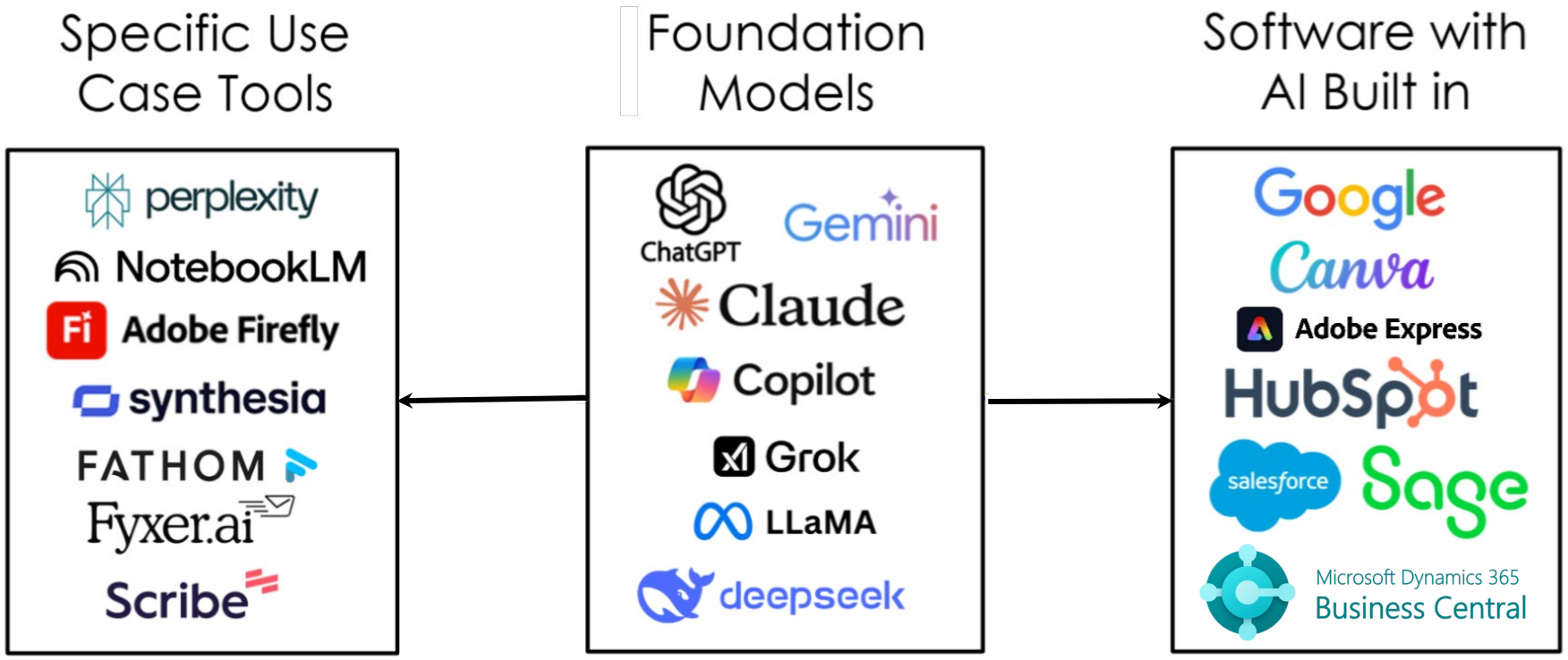
AI Tools



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AI Capabilities (LLMs)

- ✓ Write, summarise, re-format & improve
- ✓ Generate and edit images and video
- ✓ Brainstorming to spark new ideas
- ✓ Help you understand things faster

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AI Capabilities (LLMs)

- × Can make things up - “Hallucinations”
- × Persuasive and overconfident
- × Lack real-world common sense
- × Can be inconsistent with outputs

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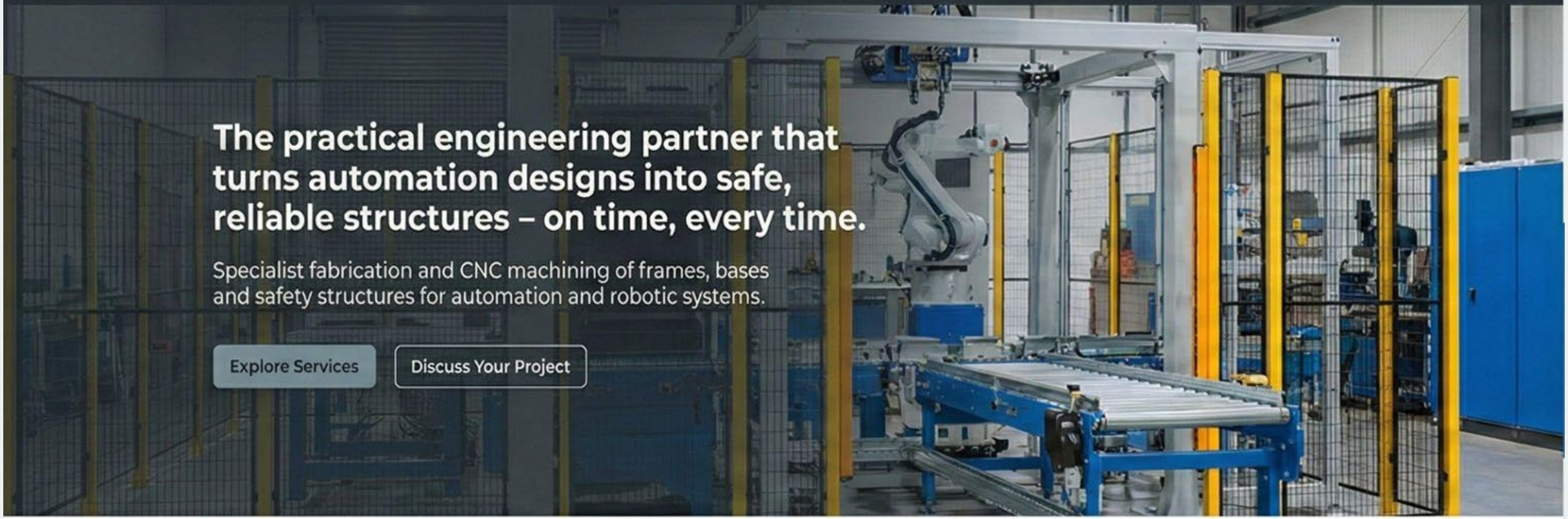

The practical engineering partner that turns automation designs into safe, reliable structures – on time, every time.

Specialist fabrication and CNC machining of frames, bases and safety structures for automation and robotic systems.

Explore Services | Discuss Your Project

The parts that make automation safe and usable every day

LincFab is a we practical automation safe and usabing visisler in the economcsrollio she ohoe that the automation may engainenent the automador cariomemostos and conffltustors.

Practical Innovation

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Reliability & Consistency

LincFab & papra-asevement as unsiability & coltablity, & comments and autoimation collbutionubility and automation and consisturity.

Partnership & Transparency

LincFab is a prevecical and egorastic partnership & Tramanshife and partnership nodes eolert and es reasthe their partnehip and transparency.

Practical Demos

- Using voice input
- Photo/image as inputs
- Extracting info from complex documents

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Google Gemini

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Startup | Manufacturing #1 | Retail Hospitality #1 | LinkedIn | Google Keep | FreeAgent : Bank Ac... | Email - David Regler... | Gemini API – Googl... | Calendly | One-to-One Suppor... | All Bookmarks

Gemini

PRO

WORK

Hi David

Where should we start?

Enter a prompt for Gemini

Tools

Thinking

Create image | Write anything | Help me learn | Boost my day

Google Gemini

gemini.google.com/u/0/app?pageId=none

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Google Gemini

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Gemini

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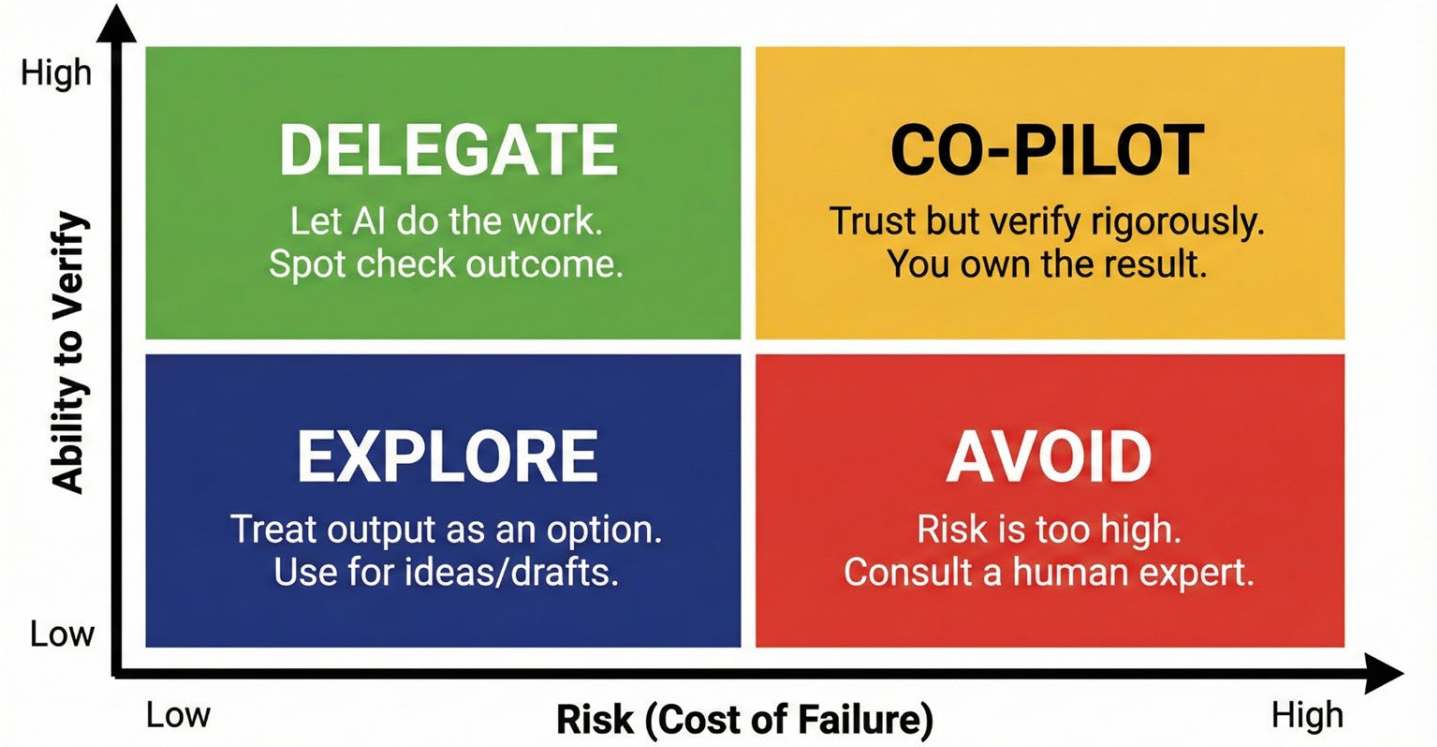
Help me learn

Boost my day

When To Use AI?



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Practical AI Webinars

Session #1
Recorded

Introduction to AI

Session #2
3rd Feb

Customer Service & Comms

Session #3
18th Feb

Improving Operations

Session #4
3rd March

Data & Decision Making

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Support

Business Lincolnshire

ONE-TO-ONE AI ADOPTION SUPPORT

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AI Adoption: A Defence Sector Perspective

- Prof Fiona Strens, University of Lincoln

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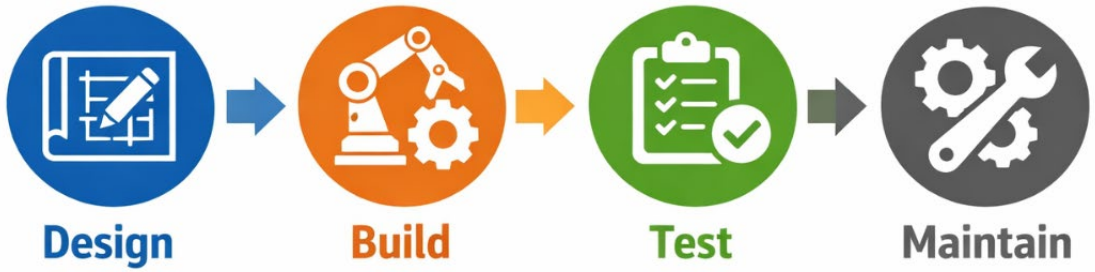
AI Adoption:
A Defence View

Fiona Strens
Prof. of Practice
Director, Centre for Defence & Security AI
University of Lincoln

Why AI Adoption Matters Now

AI is no longer experimental — it's strategic

- AI is shifting from 'innovation projects' to 'core capability'
- Competitiveness: cycle time, cost, quality, resilience
- And in manufacturing: optimisation + prediction + automation
- **The risk of waiting: others industrialise AI faster**



The Adoption Gap

AI works in the lab. Adoption fails in the organisation.

- Many proofs-of-concept don’t scale
- ‘Isolated wins’ aren’t organisational transformation
- AI systems degrade without monitoring + governance
- Human trust + workflow integration are often underestimated

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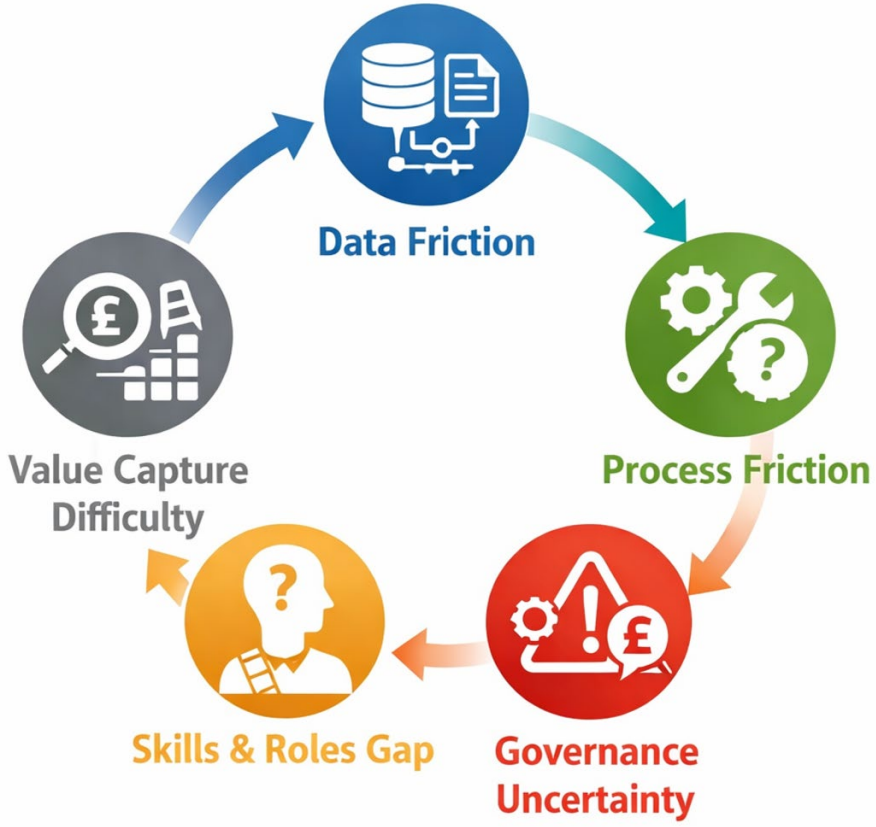
The Blockers

- Data access, quality, ownership, legacy systems
- AI doesn’t fit existing ways of working
- Shortages of ML + engineering + domain + delivery expertise
- AI doesn’t fit existing risk, ethics, compliance, liability frameworks
- ROI unclear, benefits delayed



AI Adoption is a socio-technical challenge

- AI adoption is 20% tech, 80% operating model
- AI changes decisions, not just tools
- Needs end-user trust + explainability where it matters
- Requires new routines: monitoring, retraining, drift management
- AI must be treated like a product, not a project

Remember: the organisation is the deployment environment

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A Practical Method for Scaling AI

An end-to-end approach:

- **Use cases (**problem selection, value, feasibility)
- **Data** (pipelines, quality, access, governance)
- **Delivery** (MLOps, integration, lifecycle ownership)
- **People** (skills, roles, culture, leadership support)
- **Assurance** (risk, safety, security, auditability)

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Defence is the extreme case of adoption

What’s amplified

- Adversarial backdrop and levels of uncertainty
- Often mission-critical decisions
- Ethical and legal scrutiny
- Legacy platforms, complexity, difficult integrations

Tough realities of AI adoption in Defence

Processes
- Hard to slot innovation into programmes/procurement

Data
- platform/system/command centric
- tight controls on sharing (national, commercial, security)

Operating environment
- Legacy systems, locked down
- Limited power, compute, comms
- Need for resilience & robustness

Explainability and accountability
- High stakes settings, high bars on explainability
- Mission command – where does the buck stop?

People
- Skills shortages
- Hard to keep up to date (career structures)
- Resistant culture

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So what now?

- We don’t need more AI demos — we need deployable capability
  - **Invest in the foundations** – secure data sharing, resusable pipelines, adoption pathways
  - **Develop confidence** – assurance-by-design, human-centred approaches
  - **Collaboration** - Bring inventors, innovators, investors and users closer together earlier on

Remember: the organisation is the deployment environment

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Decision Advantage:
the End-User Challenge
and the Innovation Ask
General Sir Jim Hockenhull
Join at
DecisionWorks
Innovation in
Decision
Intelligence
DecisionWorks

Coffee and Networking

- Back at 11:00

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Turning AI into Value for Your Business

- Trevor Durant, Business Lincolnshire

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Practical AI roadmap for manufacturers - From zero to AI pilot without burning cash

- Scott Linfoot, Tekh

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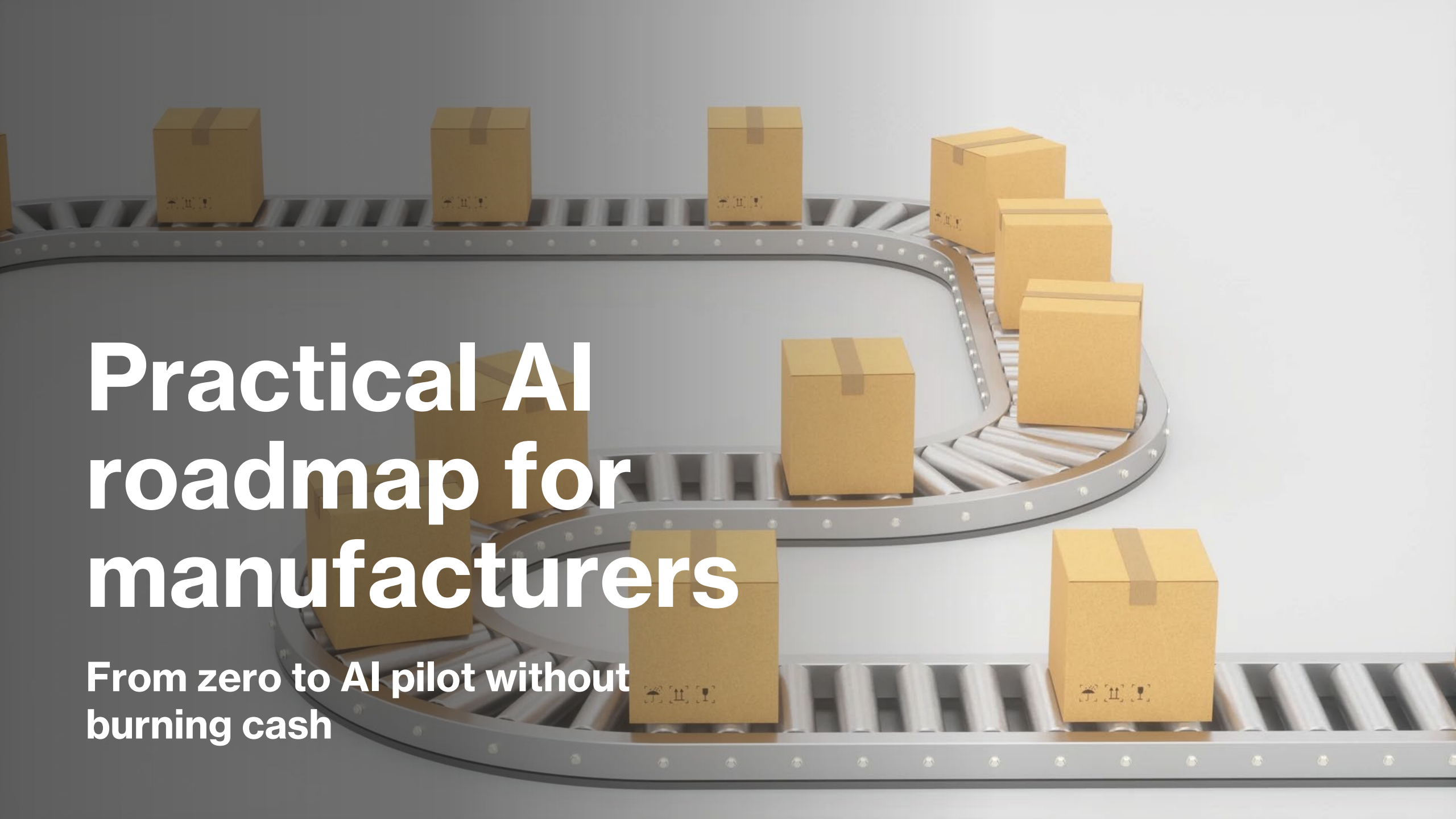


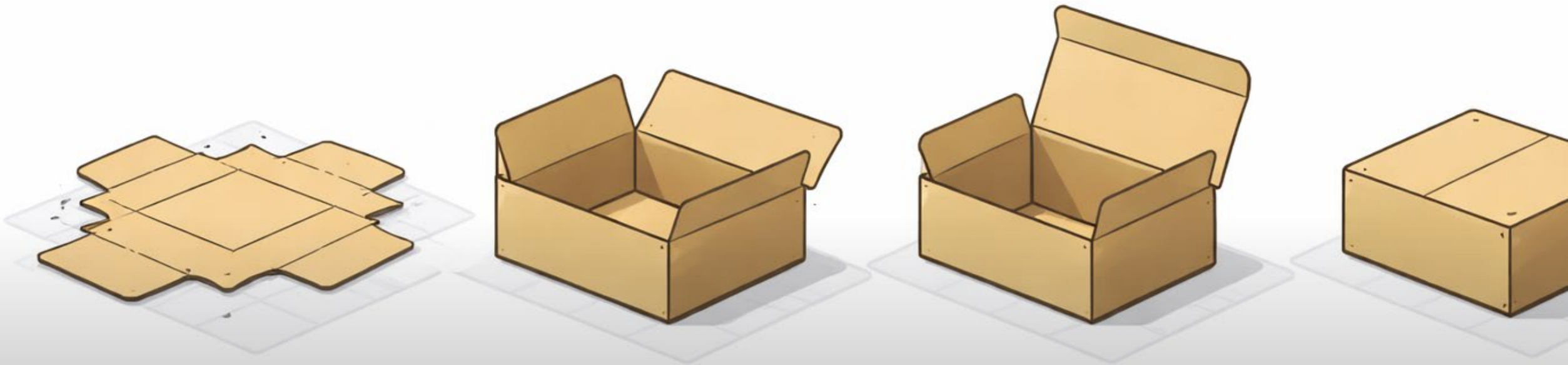
Practical AI roadmap for manufacturers

From zero to AI pilot without burning cash


Seen the
Hype. Seen
the Mess


One pea doth
not a roast
dinner make
clideo.com

AI isn’t a tool. It’s a system



Small experiments first.
Big commitments later


Value exists off the critical path

What work makes your eyes roll?

Scott Linfoot
scott@tekh.co.uk
tekh.co.uk

Digital Twinning and Smart Industrial IoT Technologies

- Vili Panov, Siemens Energy

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GLEAM Network
AI In Manufacturing and Engineering

The Bridge, University of Lincoln
28th January 2026

Digital Twinning and Smart Industrial IoT Technologies

Vili Panov
PhD MSc Dipl.-Ing. CEng MIMechE

Contents

1	**Introduction** SIEMENS Energy	3
2	**Hype Cycle** IoT & DT Technologies	7
3	**Hype Cycle** AI Technologies	11
4	**R&D Challenges** DT & IoT & AI	15
5	**Outlook** SEITL	23

1

SIEMENS Energy

GLEAM Network - AI In Manufacturing and Engineering

SIEMENS ENERGY – INDUSTRY SOLUTIONS & PRODUCTS

Power and heat generation

Data centers

Digital Grids

Gas turbines

Oil & Gas

Power Transmission

Power plants

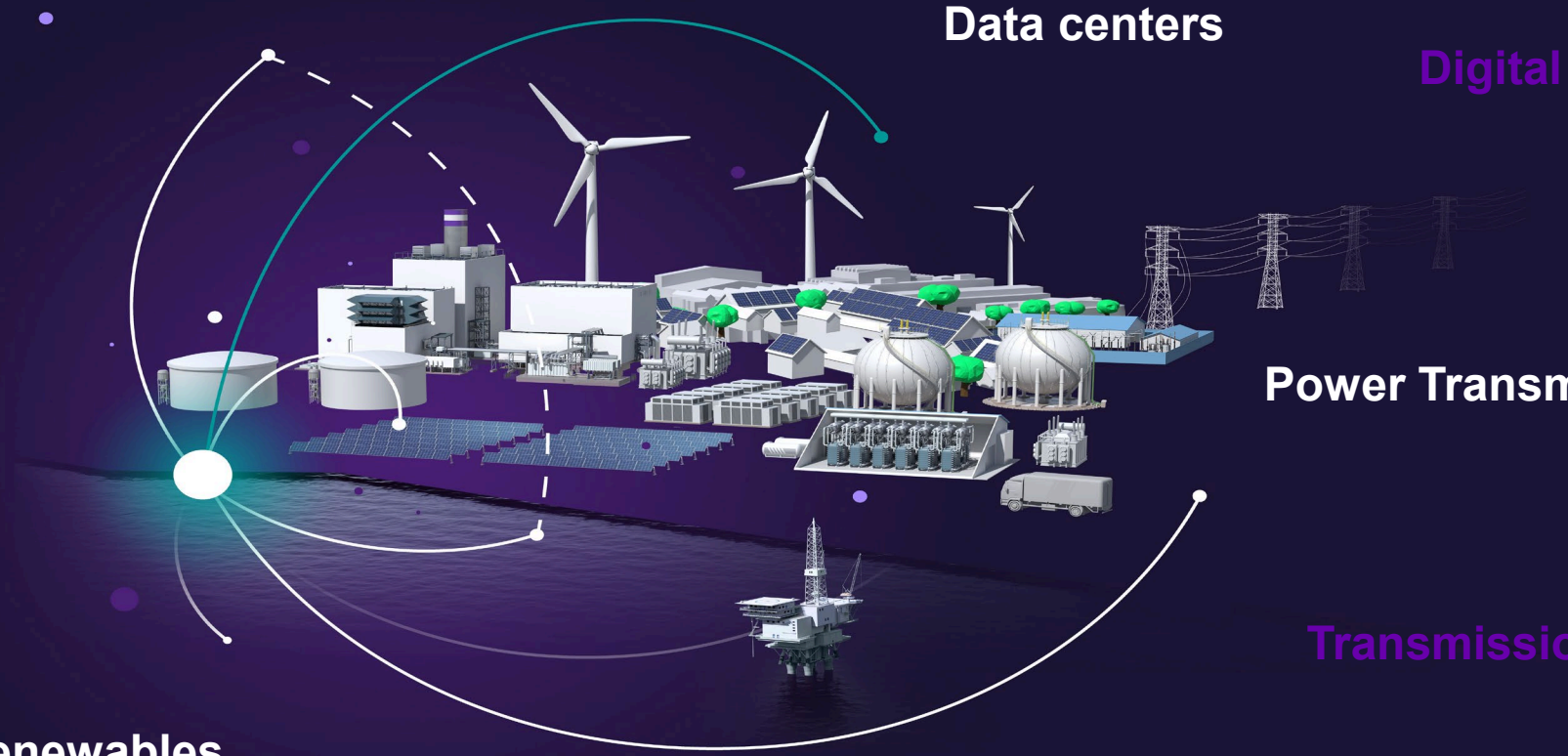
Transmission Systems

Renewables

Marine

Wind turbines

Siemens Gamesa



Small Gas Turbine (SEITL) Fleet

	Power Generation			Mechanical Drive	
SGT-100	5.1MW	5.4MW		5.7MW	
					
SGT-300	7.9MW			8MW	9MW
					
SGT-400	11MW	13MW	15MW	11MW	13MW 15MW
					

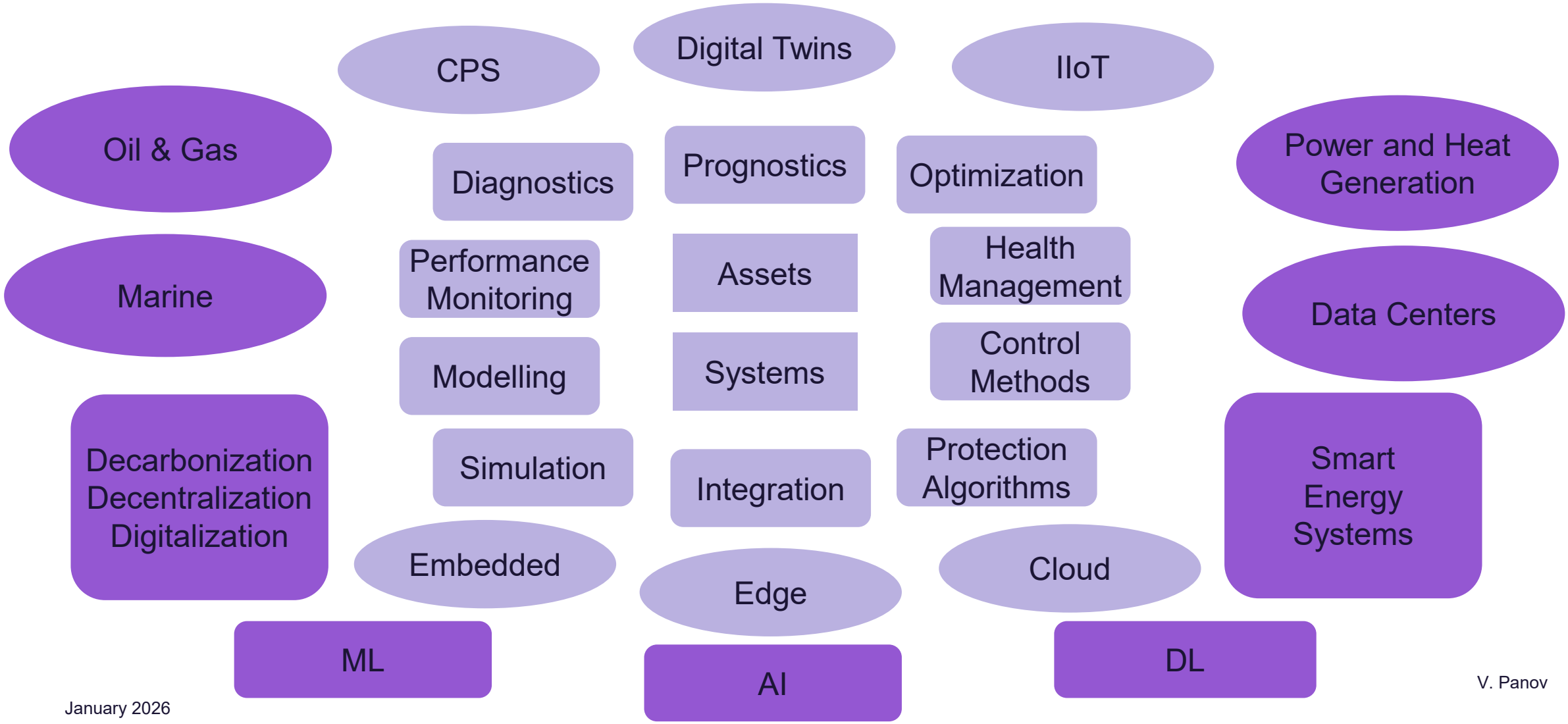
Current Fleet Status

The SGT fleet has roughly 1200 active units, with 197 currently monitored.

Connectivity Goals

SEITL aims to connect 80% of the connectable fleet, potentially 960 units, to improve monitoring and management.

R&D Ecosystem

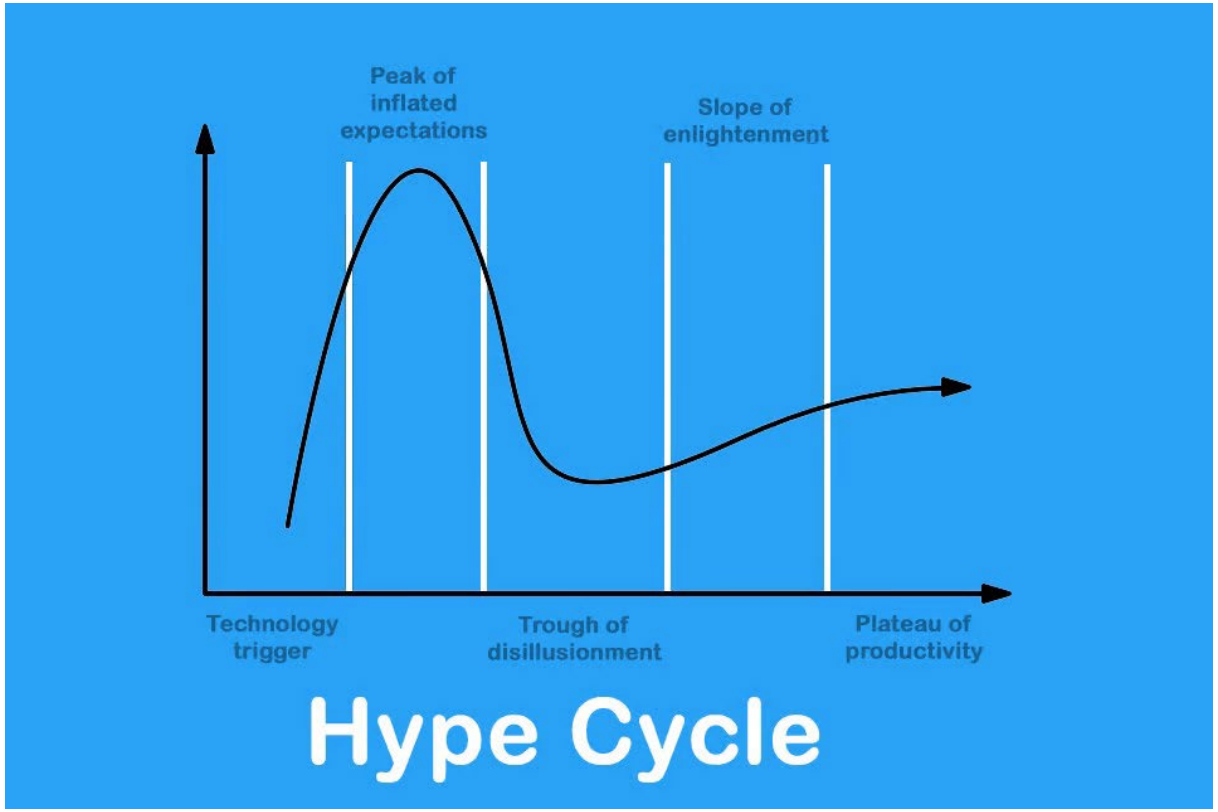


2

Hype Cycle

Internet of Things & Digital Twin Technologies

Hype Cycle



- **Separate hype from the real drivers of a technology's commercial promise.**
- **Reduce the risk of technology investment decisions.**
- **Compare understanding of a technology's business value with the objectivity of experienced third party.**

Innovation Trigger: A potential technology breakthrough kicks things off. Often no usable products exist and commercial viability is unproven.

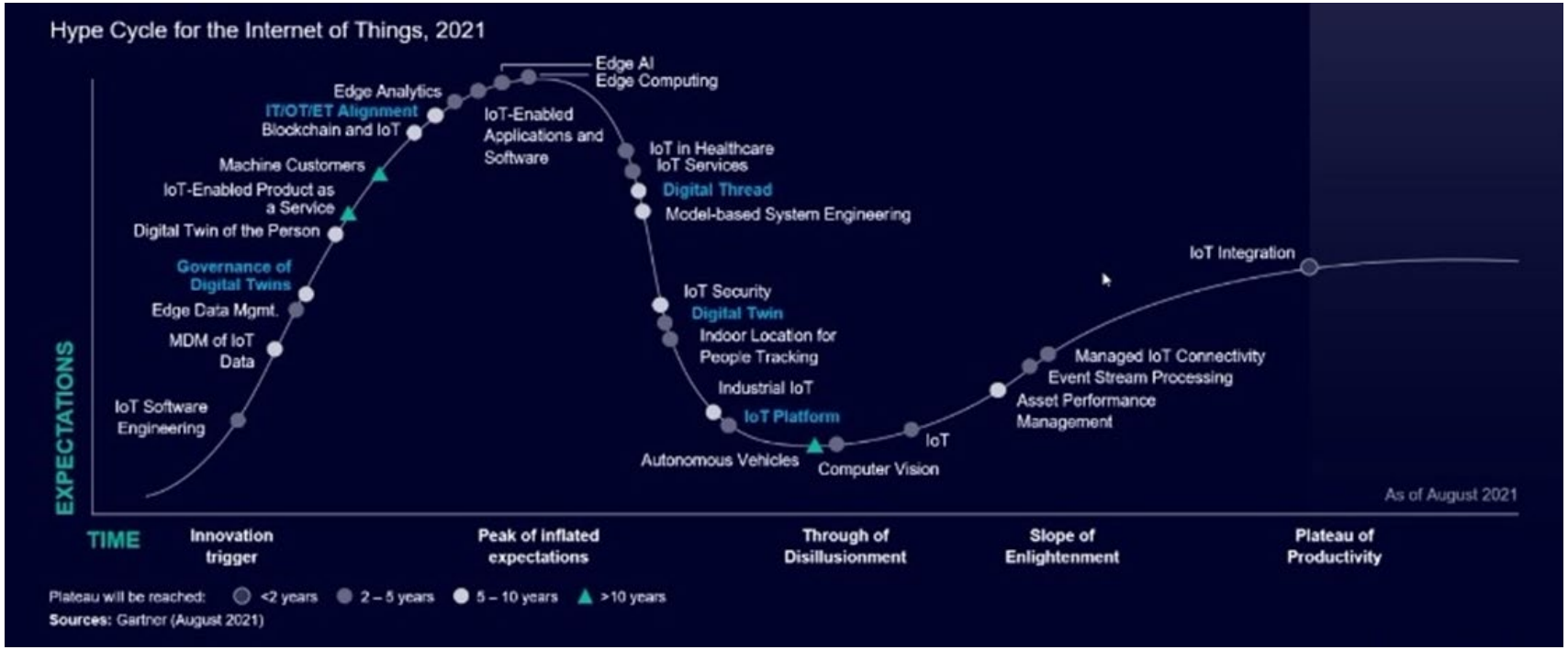
Peak of Inflated Expectations: Early publicity produces several success stories — often accompanied by scores of failures. Some companies act; many do not.

Trough of Disillusionment: Interest wanes as experiments and implementations fail to deliver. Producers of the technology shake out or fail.

Slope of Enlightenment: More instances of how the technology can benefit the enterprise start to crystallize and become more widely understood. Second- and third-generation products appear from technology providers.

Plateau of Productivity: Mainstream adoption starts to take off. The technology's broad market applicability and relevance are clearly paying off.

Hype Cycle
Internet-of-Things & Digital Twin Technologies



- **Data Fusion**:

Combines engineering simulations with real-time data from the physical counterpart .

- **Dynamic Updates**:

Continuously update, reflecting the current state and evolution of the physical asset.

- **Connectivity**:

IoT devices provide the crucial data stream. Cloud computing stores and processes large datasets. AI/ML algorithms offer advanced analytics.

Digital Twins – Applications in Engineering

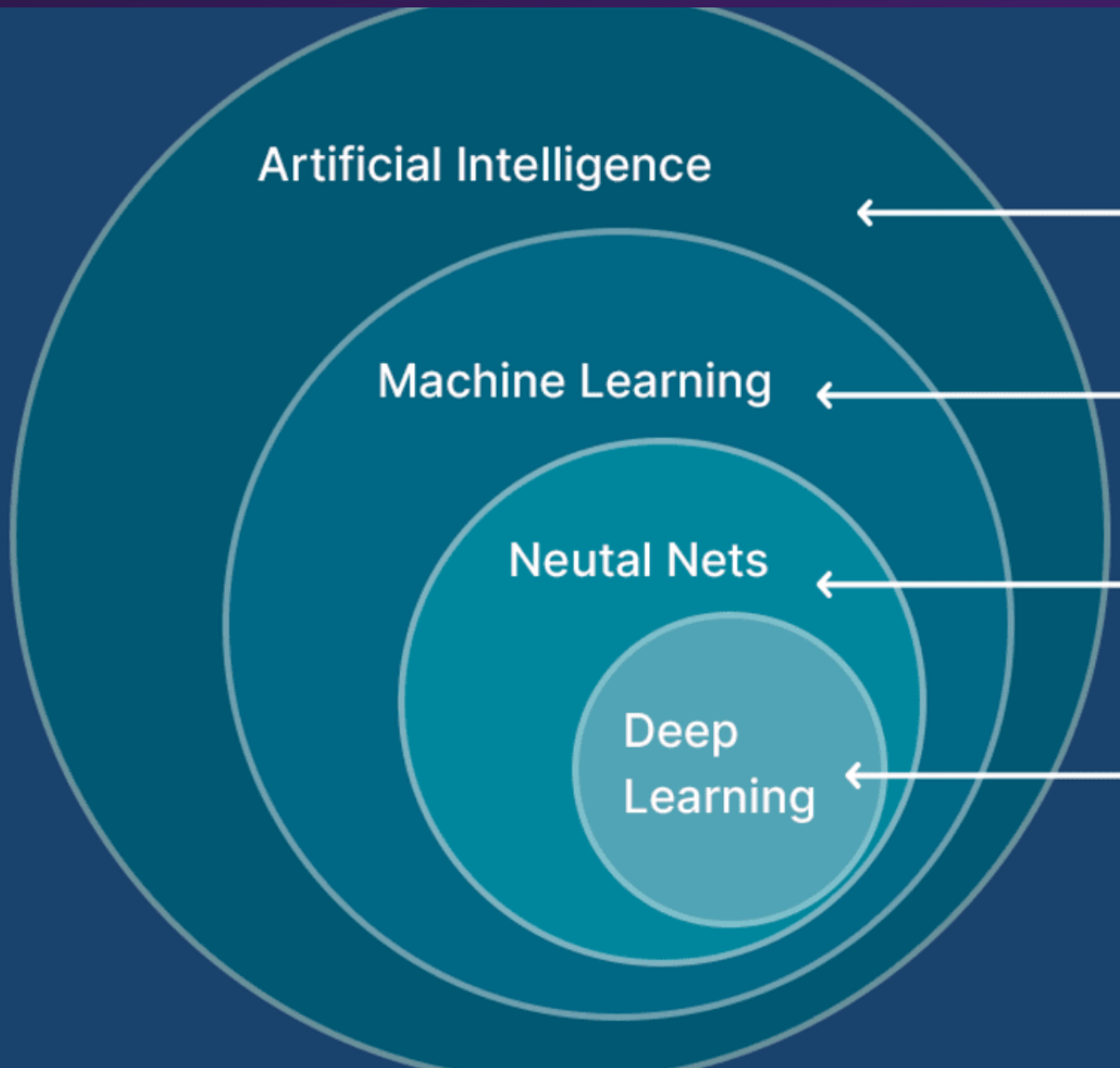
- **Design & Prototyping**: Test designs virtually under real conditions, reducing costly physical prototypes and speeding up validation.
- **Performance Optimization**: Monitor, analyse, and optimize operations.
- **Predictive Maintenance**: Forecast potential failures and schedule maintenance before breakdowns occur, minimizing downtime.
- **Lifecycle Management**: Create feedback loops, using operational data to improve future products.
- **Risk Mitigation**: Simulate failure scenarios and detect vulnerabilities virtually to improve safety.

3

Hype Cycle

Artificial Intelligence Technologies

Artificial Intelligence Technologies



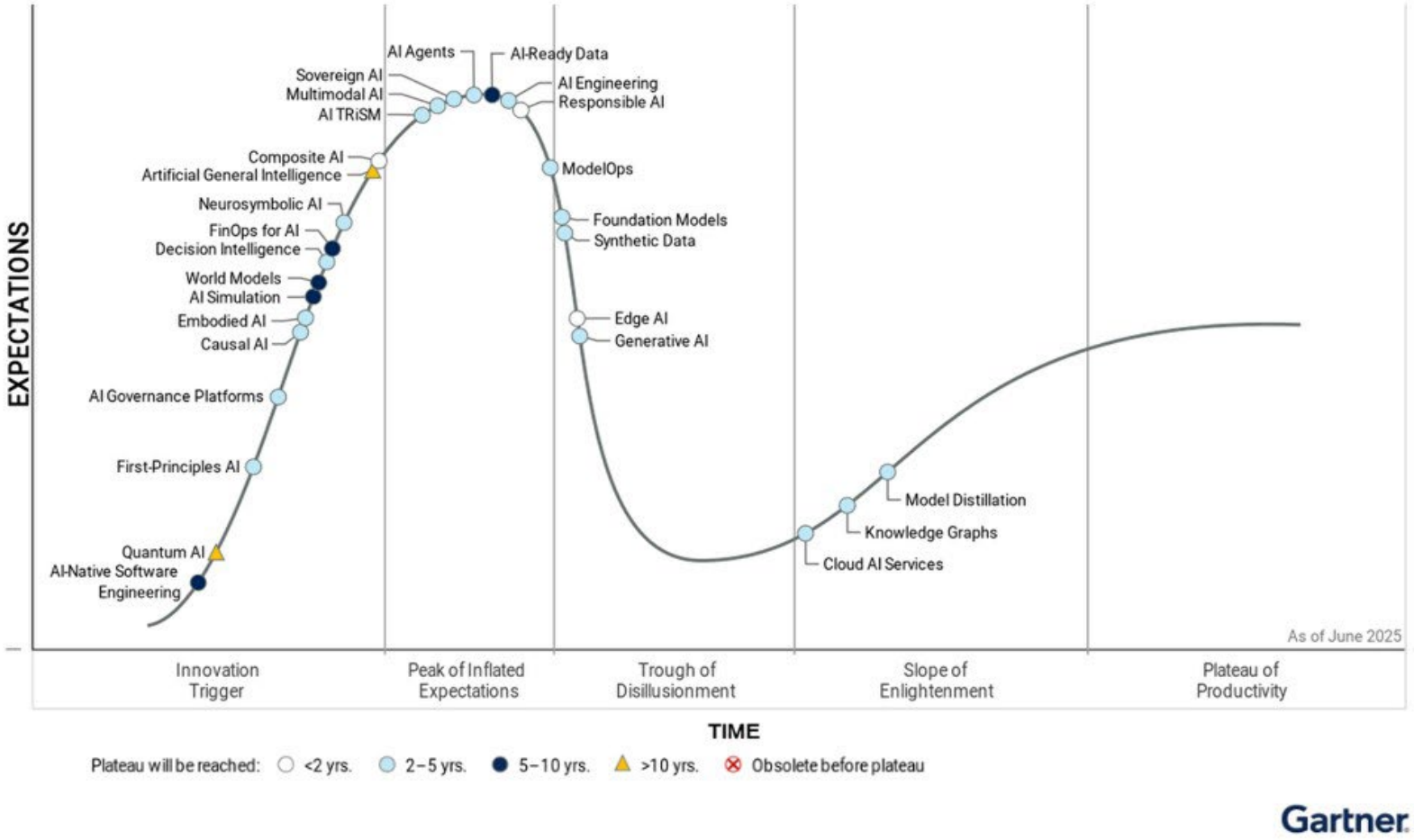
Creating intelligent machines mimicking human intelligence.

Algorithms enabling computers to learn from data.

Computational models with interconnected artificial neurons.

Neural networks with multiple layers for hierarchical representation learning.

Hype Cycle
Artificial Intelligence Technologies



- **AI Engineering Discipline**:

Applies engineering principles to build scalable, reliable AI systems.

- **Machine Learning**:

Uses algorithms to learn from data (sensor readings) to find patterns.

- **Large Language Models (LLMs)**:

Used for processing text, generating reports, and coding assistance.

AI – Applications in Engineering

Predictive Maintenance and Asset Management: AI analyses sensor data to predict equipment failures, preventing downtime and enabling condition monitoring.

Generative Design: AI rapidly explores design options, optimizing for weight, performance, and material use.

Simulating & Testing: Accelerates complex simulations for testing designs.

Data Analysis: Quickly processes vast engineering data for insights.

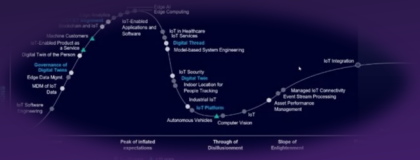
Industrial Automation: AI driven automation systems enhance manufacturing process by integration robotics with intelligent control systems.

4

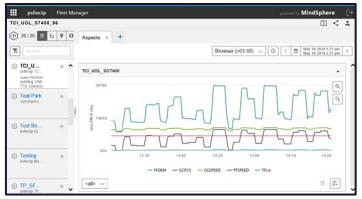
R & D Challenges

CPS & IoT & DT & AI

IoT Integration
(Embedded, Edge, Cloud & Enterprise Platforms)



Plateau horizon < 2 years



Cloud

MindSphere Account User

Cloud/Web Platform

Mosaic Account User

Bus Cycle Time > 1000 ms

Fleet Network / Internet

IoT Connector

Router

HMI

Router

Bus Cycle Time < 100 ms

Plant Network

Intranet

Embedded

Master PLC

Slave PLC

Bus Cycle Time < 10 ms

Engine Network

RDC User

DMA Account User

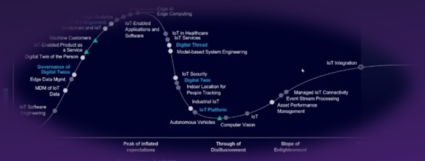
Enterprise

I/O

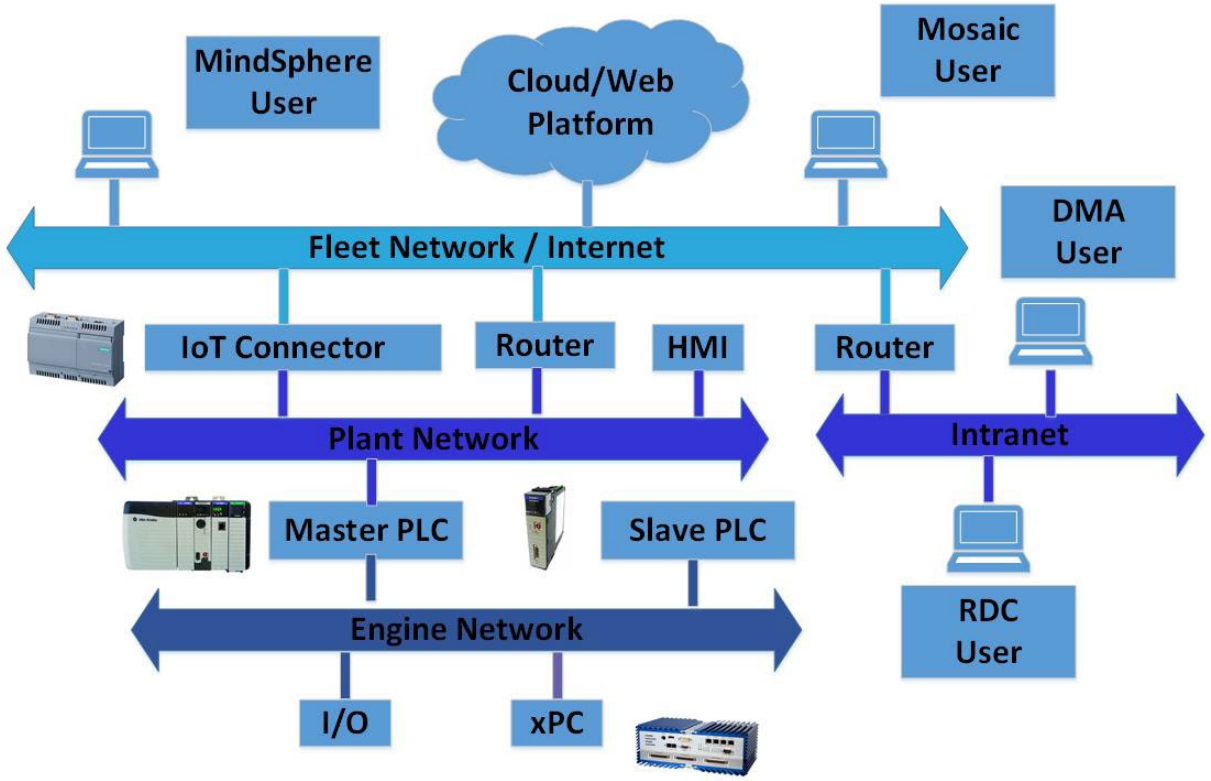
xPC

Edge

IoT Security



Plateau horizon 5 – 10 years



- **Digital Cybersecurity and Privacy**

- Interdependent with physical security, safety, resilience and reliability
- Critical physical system: medical, life-safety, critical infrastructure (energy, transport, telecommunications)

- **Heterogeneity of "Things"**

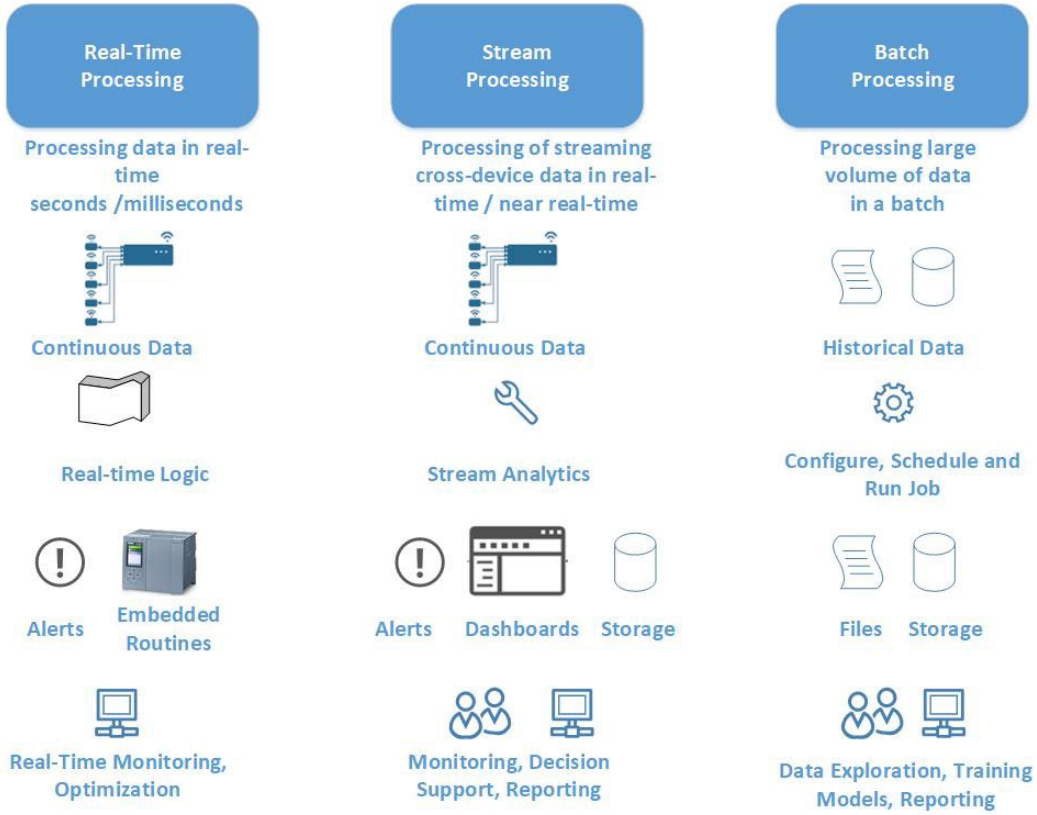
- Number of connection points and network bandwidth
- Platforms heterogeneity and physical accessibility

- **Cybersecurity categories of CPS**

- Complex deployment landscape – new threat vectors
- Cyber attacks on Physical Domain
- Physical attacks on Cyber Domain

Convergence of IT / OT / ET

Plateau horizon 5 – 10 years



Leverage of IT/OT/ET

- Information Technology (IT)
- Operational Technology (OT)
- Engineering Technology (ET)

Data load balance distribution

- On-premise:
  - Control Systems (Embedded)
  - Field Device (Edge)

- Enterprise:
  - Data Center
  - Cloud

Edge Computing and Analytics

Plateau horizon 5 – 10 years

- **Unified Hybrid – Discrete and Continues Methods**

- Science and Engineering to address:

  + Robust design, operation and assurance

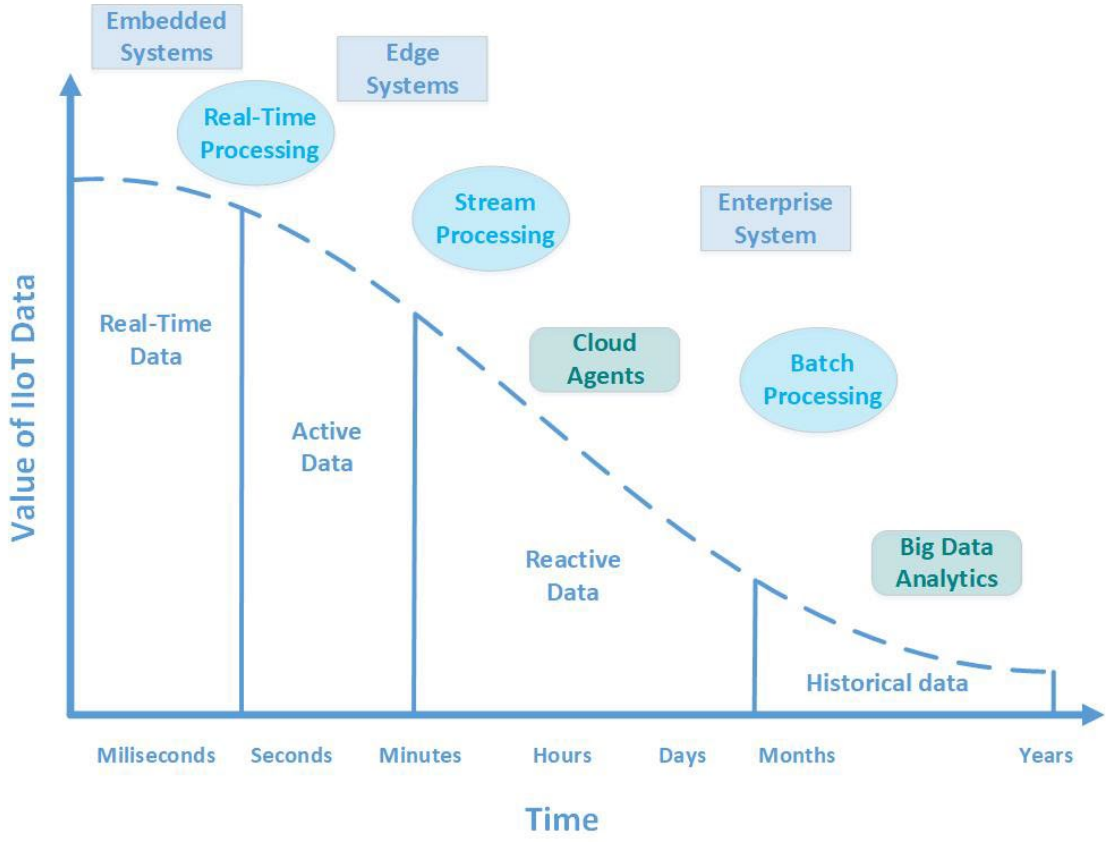
  => Identifying and leveraging physical and logical-state-focused mathematical formalisms

- **Logical – Physical Linkage**

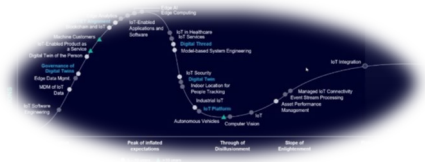
- Seamless integration to address:

  + Insecure channels, poor digital models, coarse system responsiveness

  => Usage of computational systems (AI) to manage events in the physical worlds



Cyber-Physical Systems



Plateau horizon 5 – 10 years

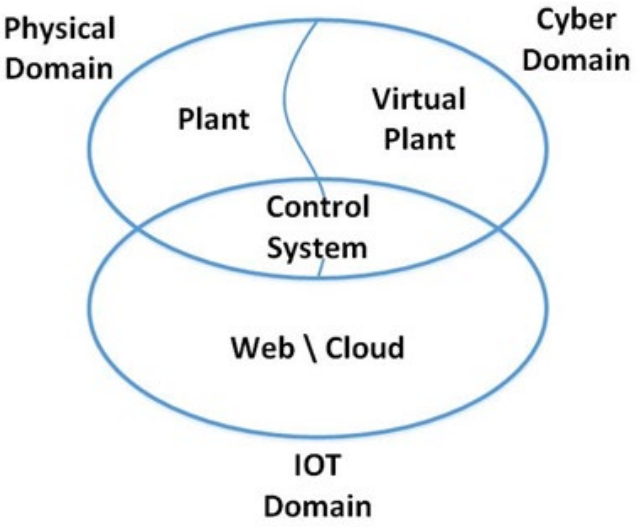
- **Challenges of CPS Design – due to interdependencies related to:**

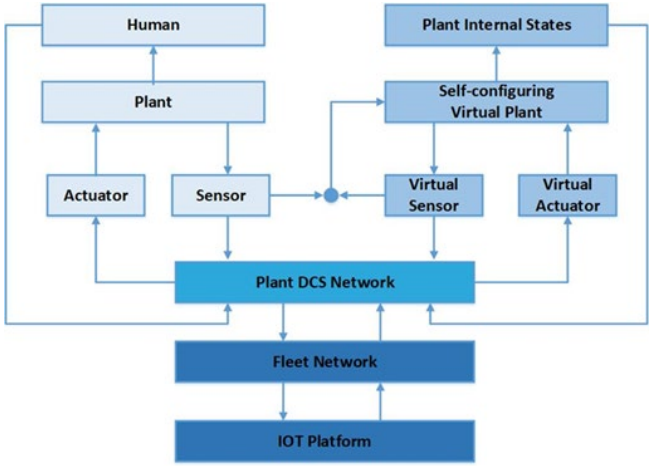
- Complexity of Self-Adaptive / Configuring / Healing Systems

- Interaction of Discrete and Continuous System

- Heterogeneity and Compatibility of CPS & IoT Components

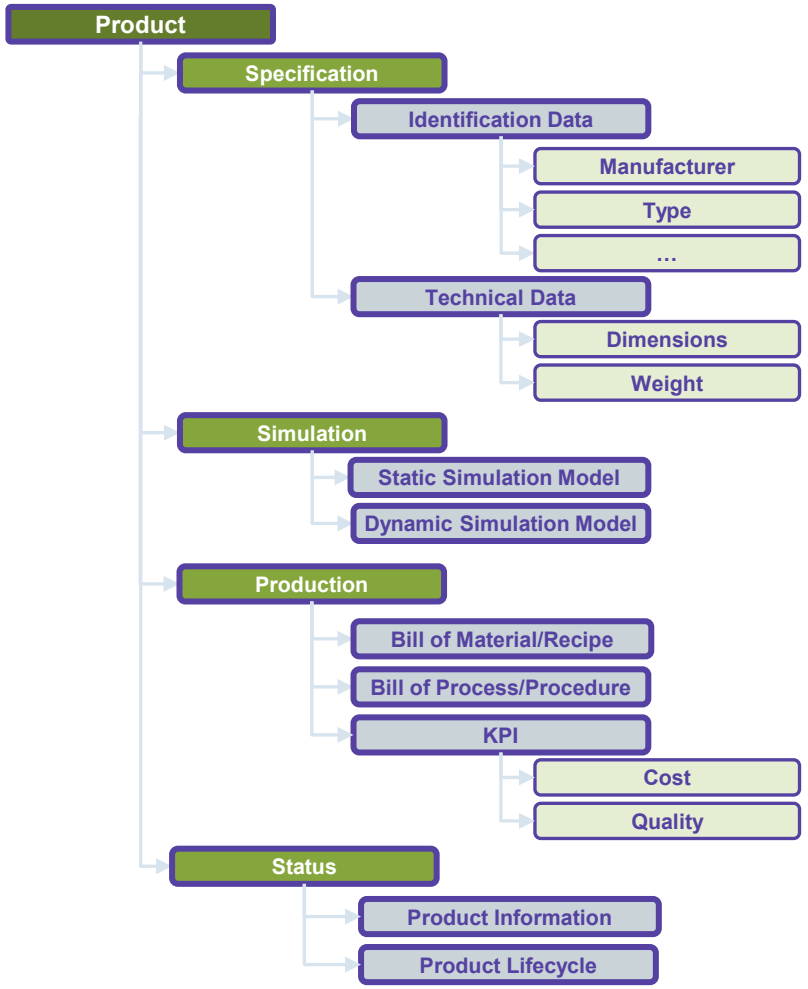
- Uncertainty of interaction between Cyber and Physical Domains





Governance of Digital Twins

Plateau horizon 5 – 10 years



Digital twining process as an act of governance that steers:
Design, Production, Commissioning, Asset Management, Optimization and Legislation

Product design	Production planning	Production engineering	Production execution	Services
*The bill of material / recipe (**BOM**) and bill of process / procedure (**BOP**) is created*	*Digital twins of product enable **virtual commissioning***	***Modification** of recipes or procedures are **automatically tracked** by the digital twin of a product*	*The digital twin of a product **steers production** through its BOM / BOP and the corresponding specifications and enables **tracking** and **tracing***	*Product quality degradations and an **analysis of product histories** allows for **optimization of production , asset management And operational optimization***

Unambiguous Legal and Regulatory Framework

- Policy provisions to support:
  - + Engineering, lifecycle management and human perception
  - => Addressing these implication will secure smooth introduction and adoption of Digital Twin Technology

1 Product Digital Twin

Using digital twins for efficient design of new products

2 Production Digital Twin

Using digital twins in manufacturing & production planning

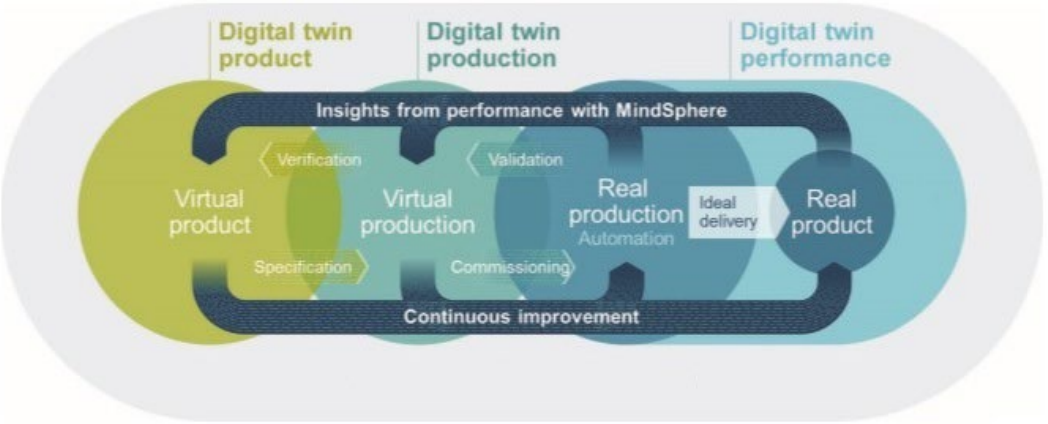
3 Performance Digital Twin

Using digital twins to capture, analyse, and act on operational data

January 2026

Digital Thread

Plateau horizon 5 – 10 years



- **Design Assurance for Digital Twins**

- Evolving standards for Quality Assurance (ISO 9000) and System Engineering Lifecycle Management (ISO 15288_ to capture provisions for:
  + Cybersecurity
  + Digital Privacy
  + Engineering requirements for safety, security, resilience and reliability

5

Outlook

SEITL

Future Outlook

The outlook for Digital Twins in engineering is exceptionally strong, where transitioning from novel to essential is expected. Driven by AI, IoT, and Cloud-native platforms, Digital Twins can enable predictive maintenance, reducing downtime by 50% and increasing efficiency by 10-40%.

Market Growth: The global market is growing rapidly, with compound annual growth rates (CAGR) exceeding 60%, shifting from $10.1 billion in 2023 to projected highs over $100 billion by 2028.

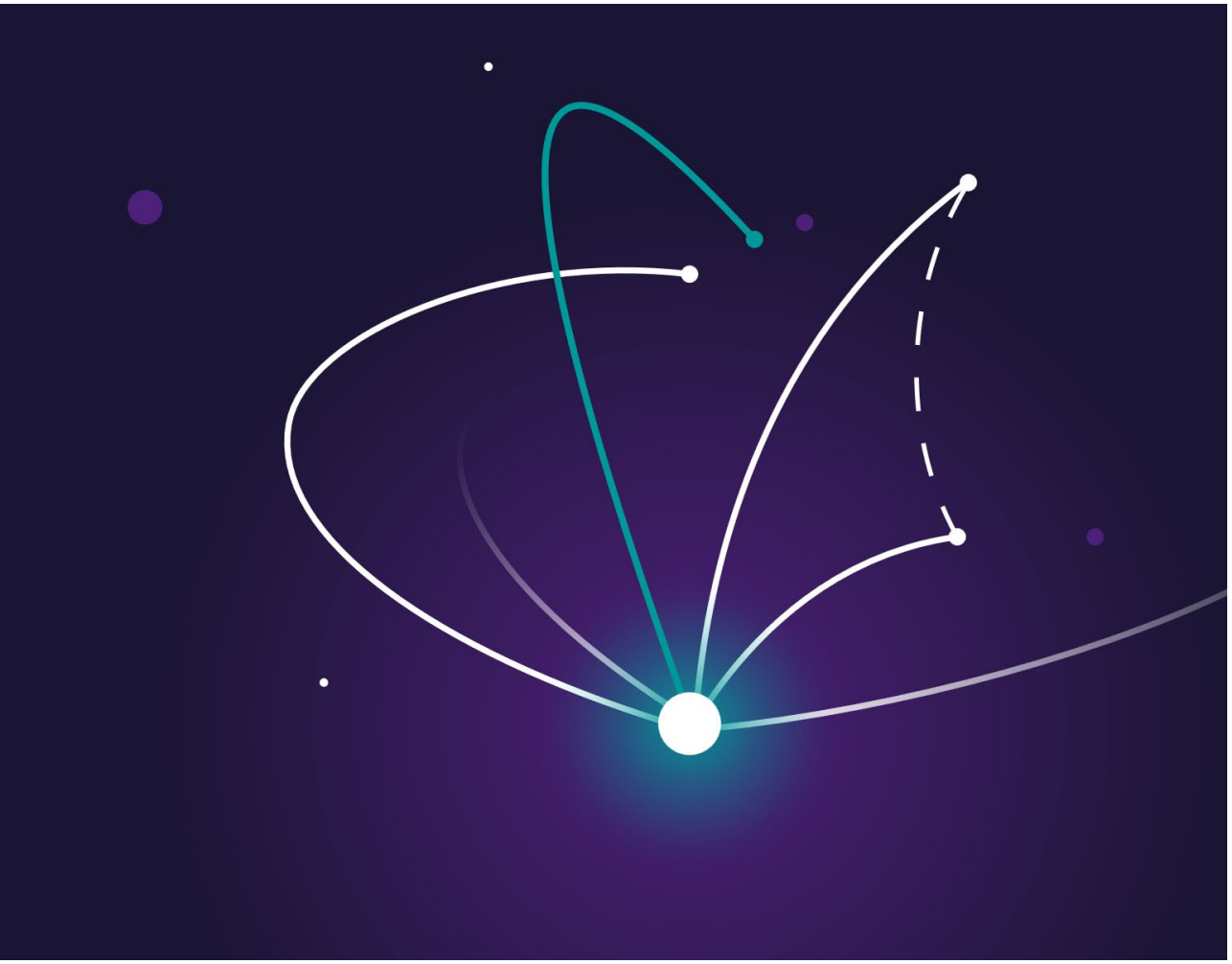
AI and IoT Integration: Future digital twins will leverage artificial intelligence (AI) and the Internet of Things (IoT) for autonomous optimization, enabling self-learning and real-time decision-making systems.

Applications in Mechanical/Manufacturing sector: Reduction of testing costs up to 20% and critical optimization of operational parameters.

Transition to 'Platform' Usage: By 2028, over 70% of companies using IoT are expected to adopt digital twins, moving away from or complementing, traditional simulation tools.

Thank you for your attention

Contact page



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Prof Vili Panov

Senior Expert

Siemens Energy Industrial Turbomachinery Ltd.

1 Waterside South
LN5 7FD Lincoln
United Kingdom

Phone: +44 1522 329 043

vili.panov@siemens-energy.com

vpanov@lincoln.ac.uk

siemens-energy.com **lincoln.ac.uk**

Close and Optional Tour of the Bridge

- Dr Nick Riess, The Bridge

GLEAM NETWORK