From Digital to Intelligent: Transforming the Future of Manufacturing

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AIM-NET

LMS
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EFFRA
EUROPEAN FACTORIES OF THE FUTURE RESEARCH ASSOCIATION

European Manufacturing: beyond digitalisation

towards intelligent, adaptive and AI-enabled production systems

TODAY

INCREASING AUTONOMY & ADAPTIVITY

2040

Digitalisation

CONNECT · COLLECT · MONITOR

- Connected machines & sensors
- Data acquisition & integration
- MES / ERP / PLM systems
- Descriptive digital twins
- Pre-programmed automation

BEYOND DIGITALISATION

Intelligent

PERCEIVE · REASON · DECIDE

- AI-driven quality & process control
- Cognitive, skill-learning robots
- Generative AI for design, engineering & planning
- Predictive & prescriptive analytics

Adaptive

RECONFIGURE · SELF-OPTIMISE

- Modular, plug-and-produce lines
- Cooperating & mobile robots
- Digital twins steering real-time reconfiguration
- Resilient to demand & supply shocks
- Mass personalisation at scale

AI-enabled Production

ORCHESTRATE · TEAM UP · SUSTAIN

- Autonomous, agent-based orchestration across the value chain
- Human–AI teaming that empowers workers
- Closed-loop, circular & energy-aware operation
- Trusted, sovereign AI & industrial data spaces

Human-centric · Resilient · Sustainable · Sovereign

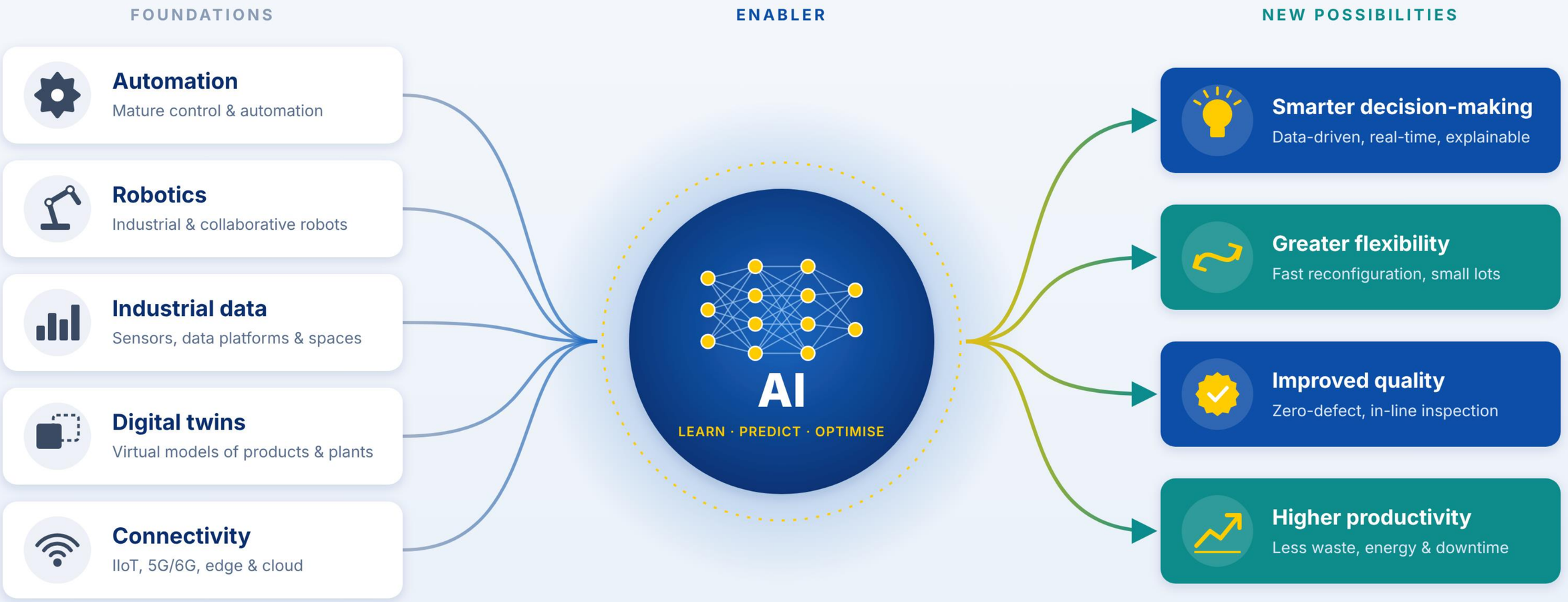
STRENGTHENING THE CAPABILITIES OF EUROPE'S

Manufacturers | Machine tool makers | Software developers | Research organisations

AI: building on Europe's industrial foundations

opening new possibilities for smarter, more flexible and more productive manufacturing

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Building on advances in automation, robotics, data, digital twins & connectivity → **AI opens new possibilities**

From technology to industrial impact at scale

bridging the gap between successful pilots and widespread deployment

TODAY

Technological developments

AI · robotics · data · digital twins

GOAL

Industrial impact at scale

across sectors, SMEs & value chains

SCALING UP

FROM SUCCESSFUL PILOTS → TO WIDESPREAD DEPLOYMENT

Successful pilots

labs, testbeds, lighthouse factories

Interoperability & data sharing

Open standards, data spaces

Skills

Reskilling & upskilling

Trust & cybersecurity

Secure, trustworthy AI & systems

Investment

Capital for SMEs & scale-up

Regulation

Clear, coherent & enabling rules

- Competitiveness
- Resilience
- Sustainability
- Quality jobs

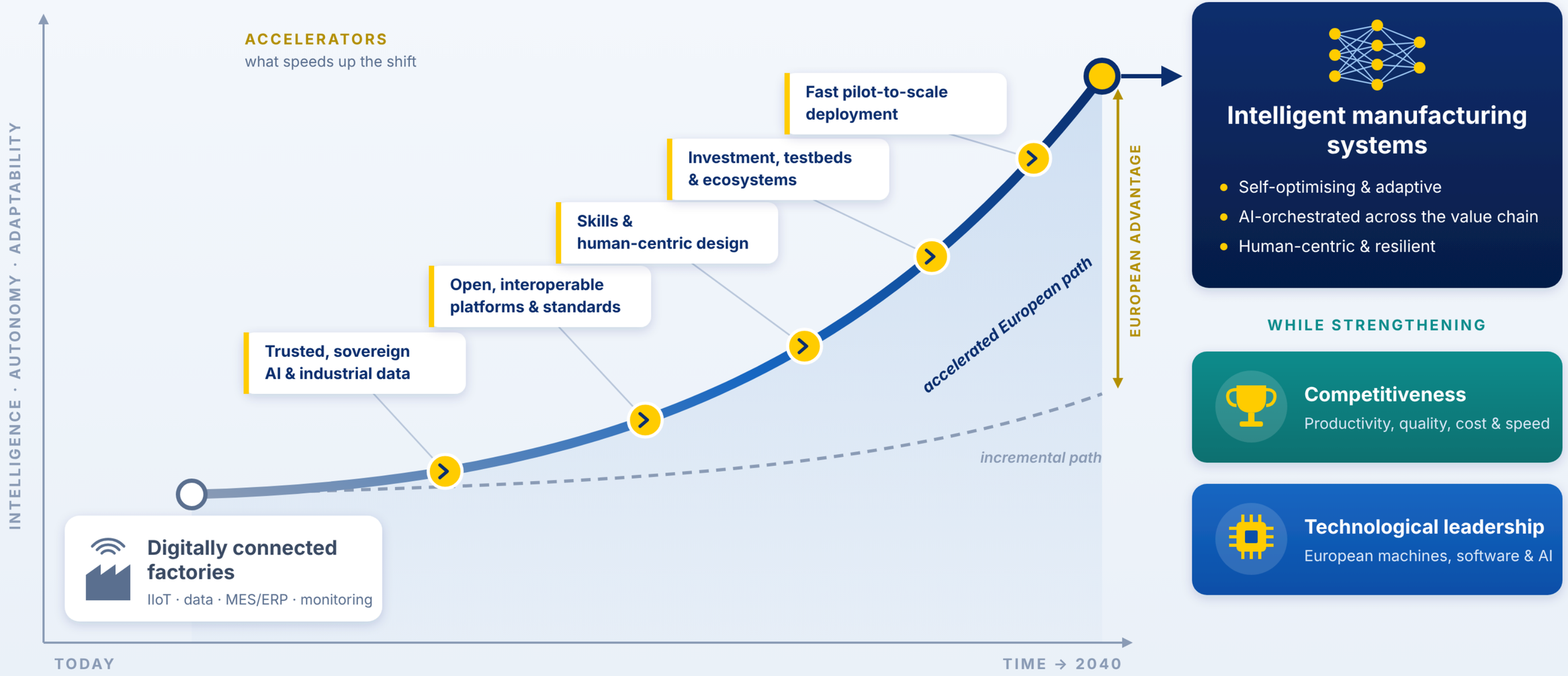
THE PILOT-TO-SCALE GAP

The challenge now: translating technological developments into industrial impact at scale

Accelerating Europe's shift to intelligent manufacturing

from digitally connected factories to intelligent manufacturing systems, strengthening competitiveness and leadership

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Intelligent manufacturing systems

- Self-optimising & adaptive
- AI-orchestrated across the value chain
- Human-centric & resilient

WHILE STRENGTHENING

Competitiveness
Productivity, quality, cost & speed

Technological leadership
European machines, software & AI

The question: how can Europe accelerate this shift and lead, not follow?