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bayern innovativ
Innovation leben.

AI's Transformative Impact on **Industry**

Leveraging Advanced Analytics, GenAI and IoT to Optimize Operations

Dr Bala Amavasai
CTO – Industry, Celebal Technologies
Internationales Forum Mechatronik, Cham, Germany
25-26th Sept 2024

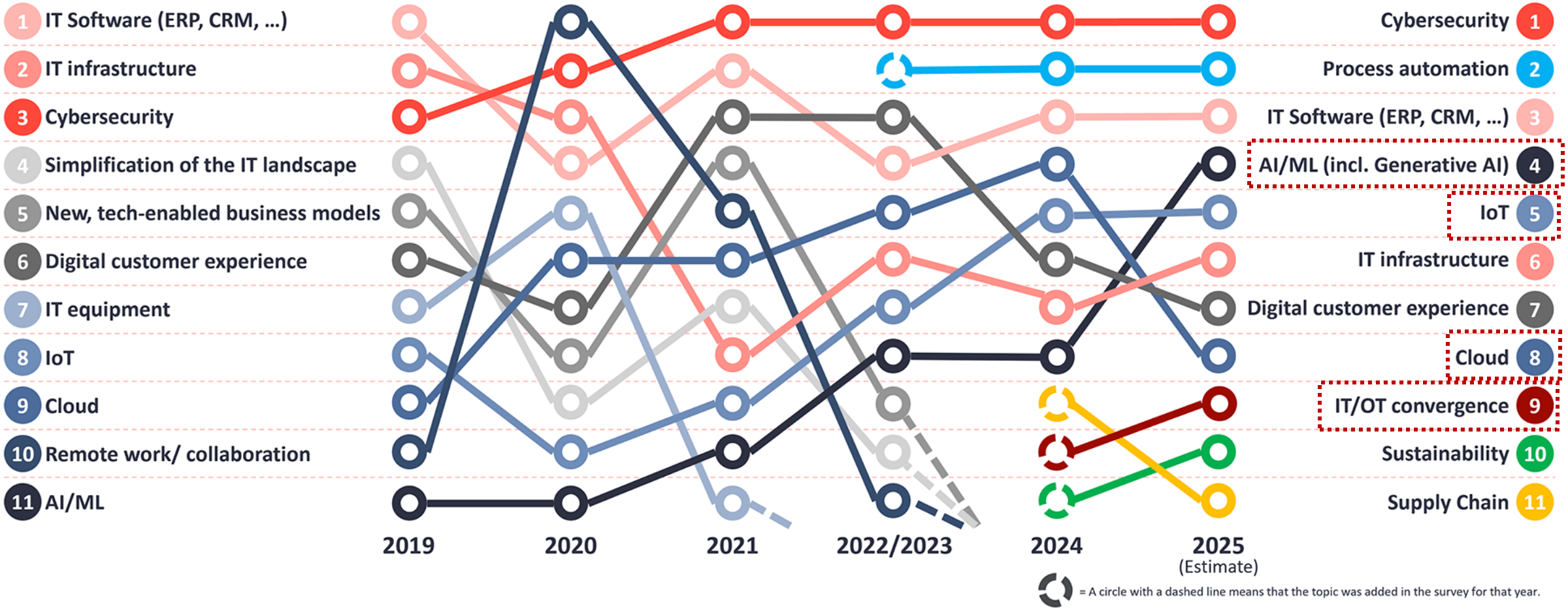
databricks Ventures
Partner Investment
September 2023

Microsoft
AI Partner
of the Year 2023
GLOBAL

databricks
DATA & AI
GOVERNANCE
Partner of the Year
2024

databricks
PARTNER
OF THE YEAR
Asia Pacific and Japan
3 YEARS IN A ROW

Shifting enterprise technology priorities 2019–2025



Note: Based on individual surveys between 2019 and 2024, each with n>100, targeting senior IT and digital decision makers in enterprises (with a focus on manufacturers and energy companies). Question asked: Please rank your organization's top 5 IT/Digital topics by priority in [respective year]
Source: IoT Analytics Research. We welcome republishing of images but ask for source citation with a link to the original post and company website.

Our Mission is to Propel Customers to Become Intelligent Enterprises

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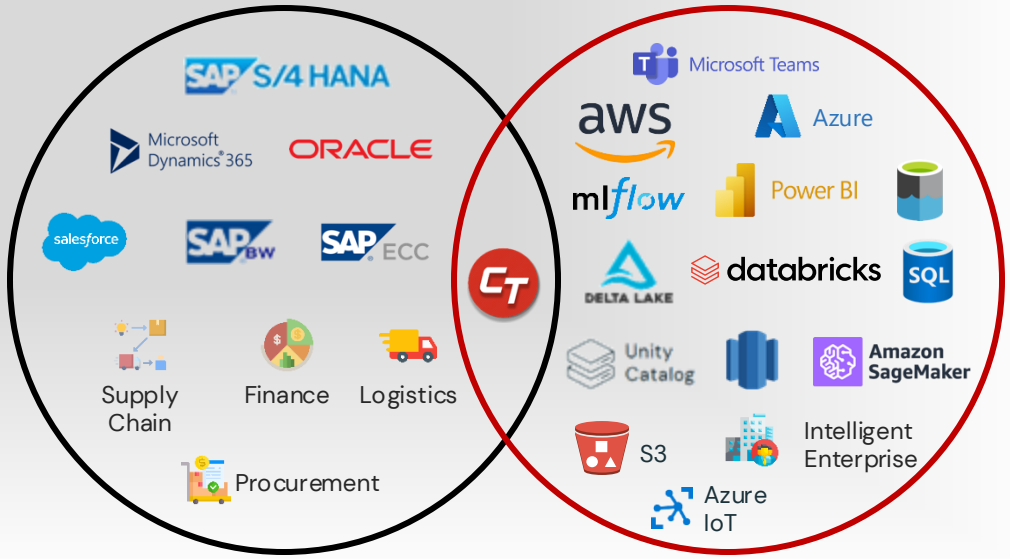

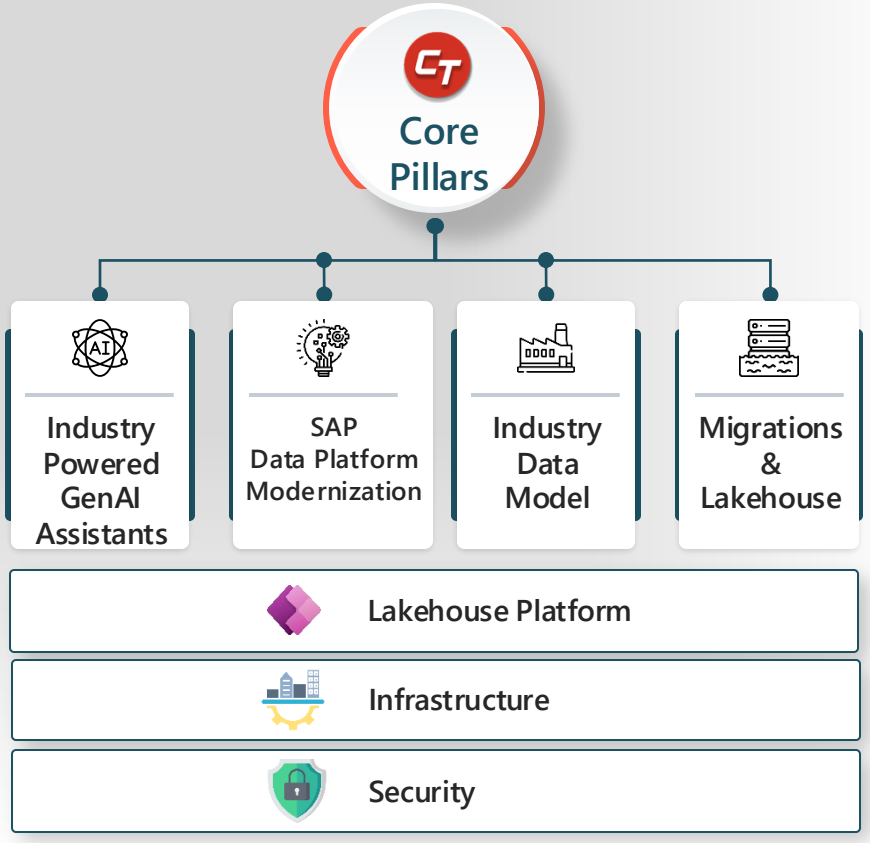

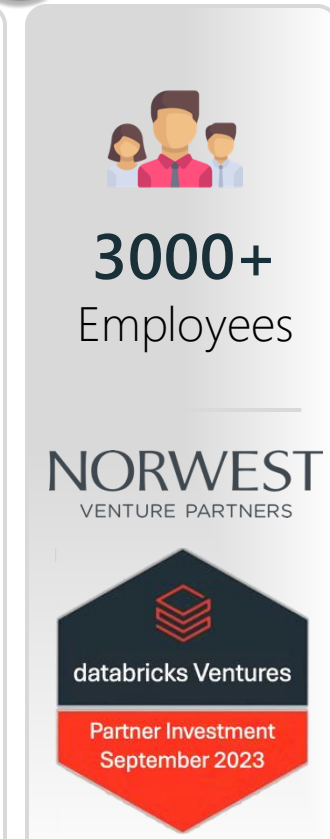

Locations USA | Europe | UAE | Canada | India | APJ | Australia

Partnerships aws PARTNER | SAP Silver Partner | Fivetran | BladeBridge | DataSwitch Connecting Data | Qlik Sense | Microsoft Solutions Partner | redhat READY BUSINESS PARTNER

Core Competencies

Enterprise Data Intelligence Platform

- Data Intelligence Platform
- Lakehouse
- Datastore, Governance & Security
- Data Landscape new Paradigms – Data Mesh

Industry Expertise

- Industry Data Models
- Industry solutions
- Streaming, batch and IT/OT data sources
- AI assistants for industry

Large Scale Migrations

- Strategy & Roadmap
- Prototyping & Tool Evaluation
- Data Integration, access & services
- Construction & Go-Live Enablement

Scalable AI Team

- Generative AI
- Data Engineering/ Streaming Services
- ML flow
- Lakehouse

data is the new oil

- Clive Humby

If data is the new oil, then artificial intelligence is the engine that powers the modern industry…

So the winner in every industry will be the data and AI companies

The Journey Towards Industry 4.0 and Beyond

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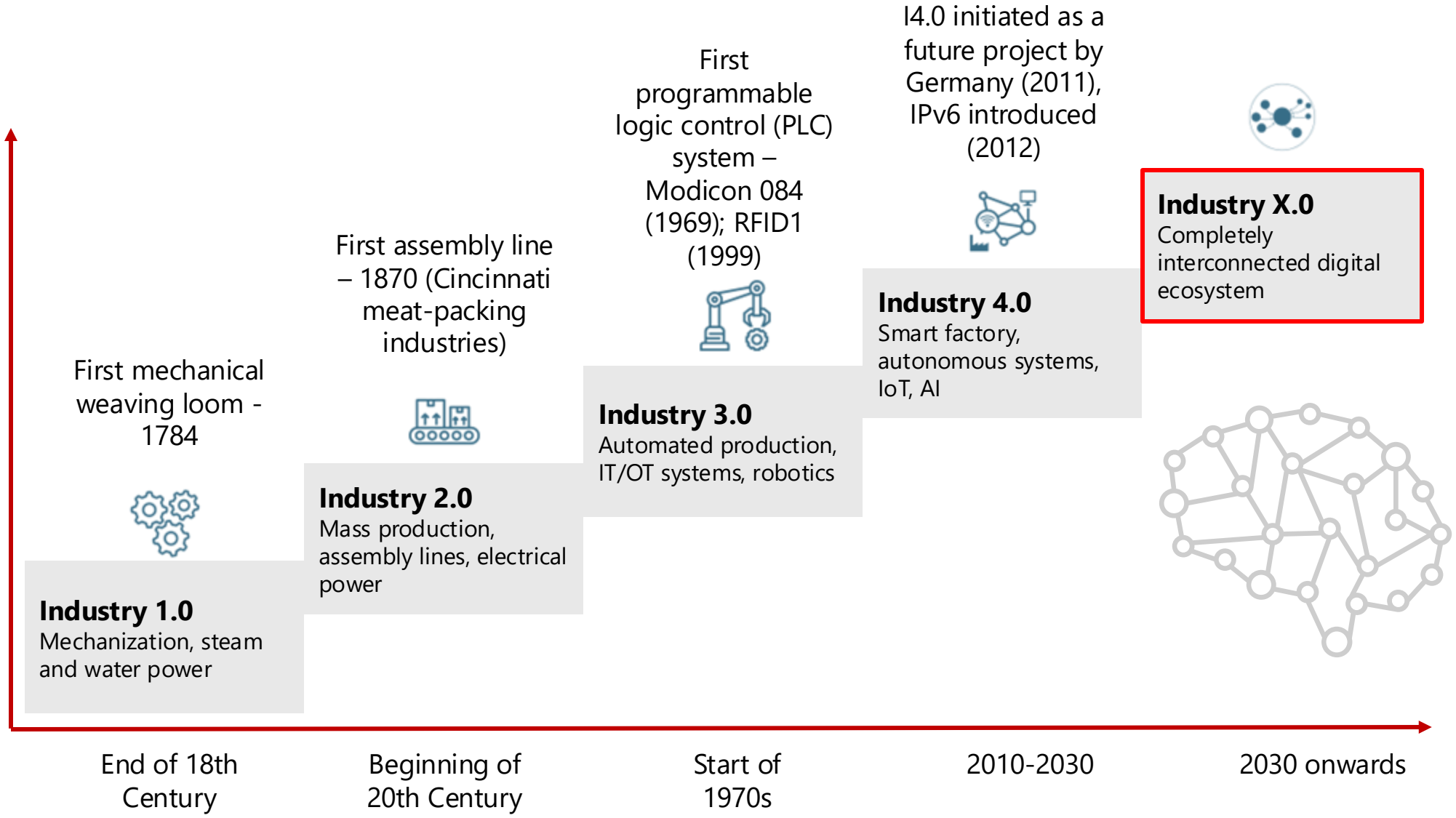
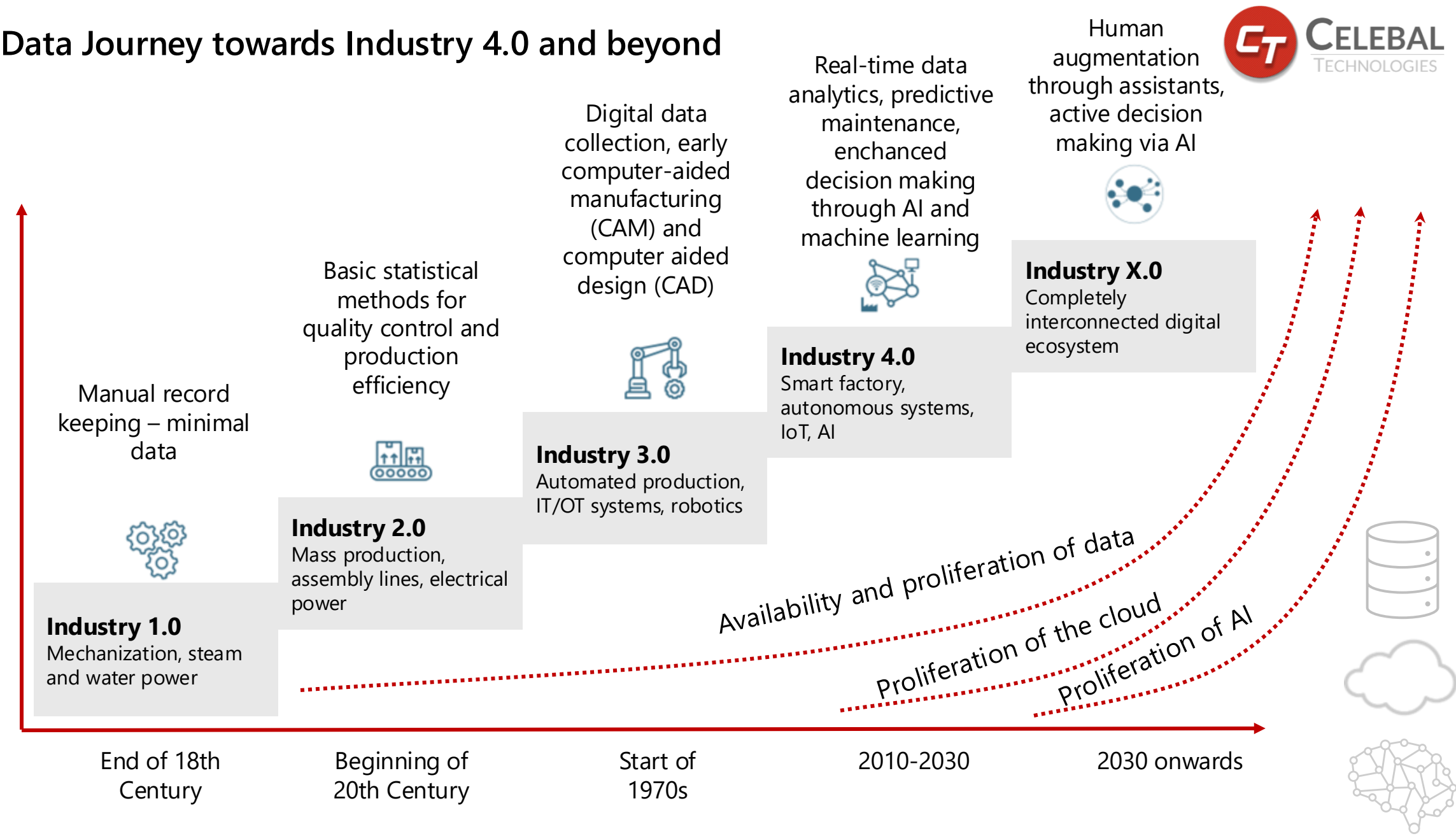


The Data Journey towards Industry 4.0 and beyond



Industry X.0 – The Digital Reinvention of Industries

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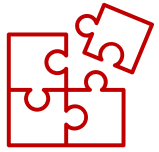
Advanced Technologies

Utilizes AI, IoT, 5G, Robotics, and Digital Twins to transform products, services, and operations



Business Model Innovation

Reimagines business models for new value creation and hyper-personalized customer experiences.

Connectivity

Integrates machines, people, and processes for data-driven decision-making and real-time optimization

Intelligent Products

Embeds intelligence for smarter, adaptable products and services.

Efficiency and Growth

Accelerates efficiency, growth, and innovation across the value chain.

Key challenges towards Industry X.0 acceleration

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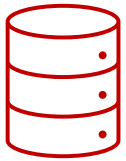
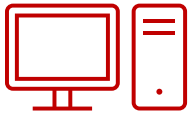


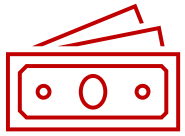
Massive siloed data volumes

Real-time processing

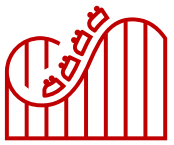
Talent gap



Legacy systems



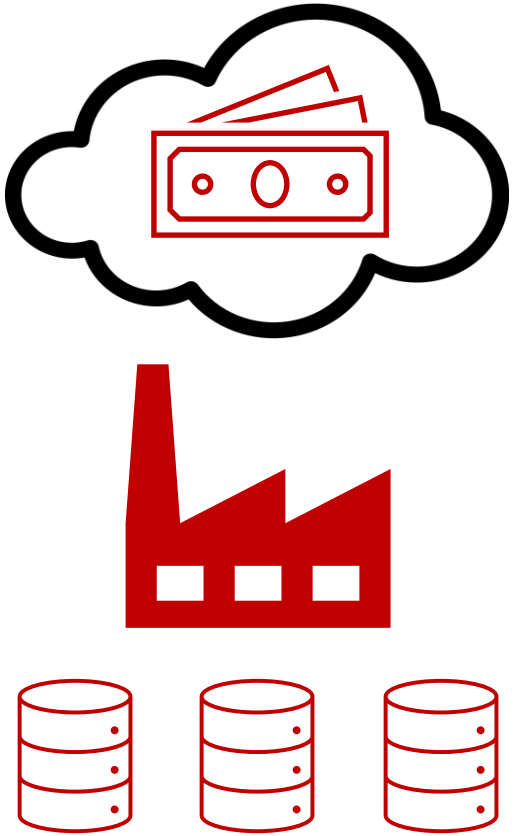
Cost of implementation



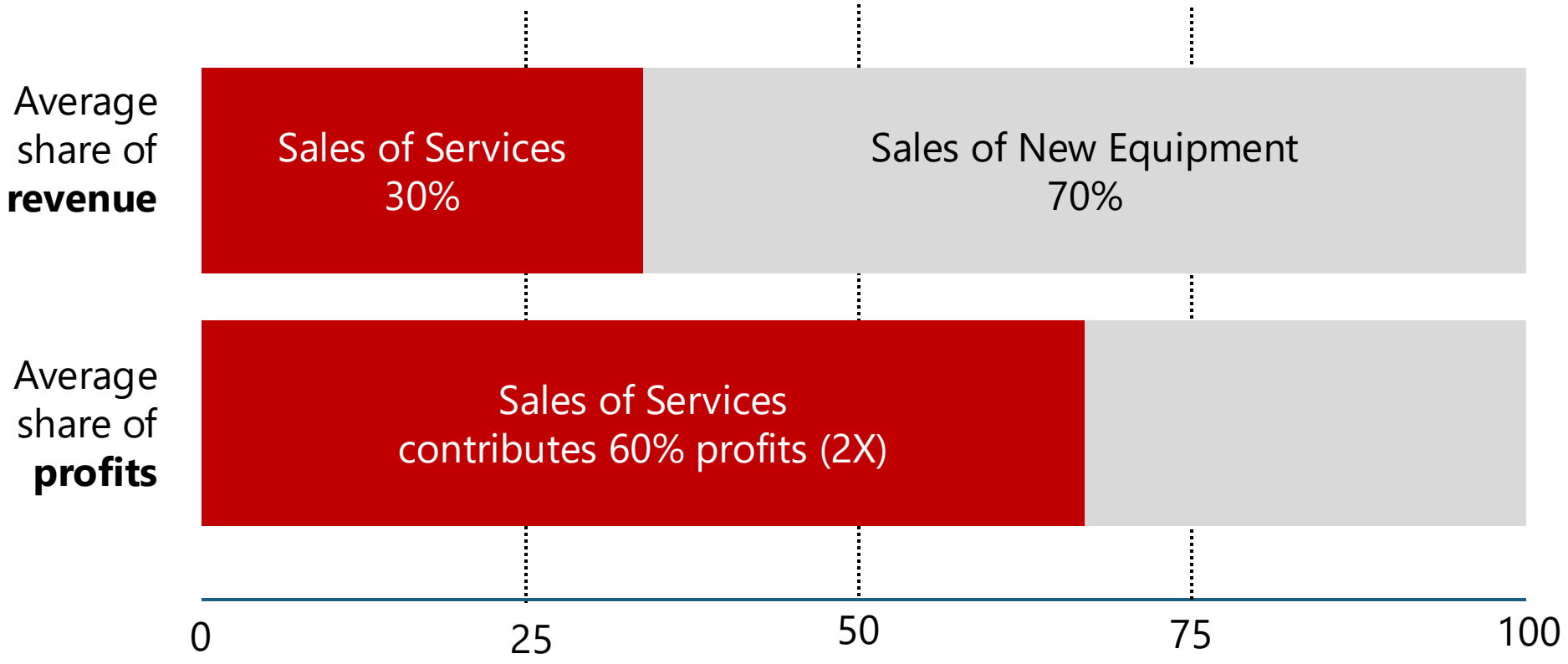
Change management

Remaining competitive

- Average manufacturing costs is ~40% of the product price
  - Cost depends on high value (higher margins) vs high quantity (lower margins) manufacturing
  - Includes costs of materials, labour and overhead
- Production costs include fixed costs (rents, advertising, business equipment etc.)
  - Operating margins in manufacturing are typically 5% (low), 10% (average), and 20% (high -target)
- Labour costs are significant in Manufacturing
  - Eliminate overscheduling, adopt automation technology, lean and optimised production
- To remain competitive
  - Lower cost, increase quality, reduce product development cycle time



Remaining competitive – the Rise of New Business Models



Bain services benchmarking study, 2020

Remaining competitive – the Rise of New Business Models

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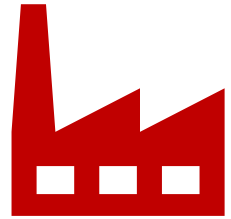
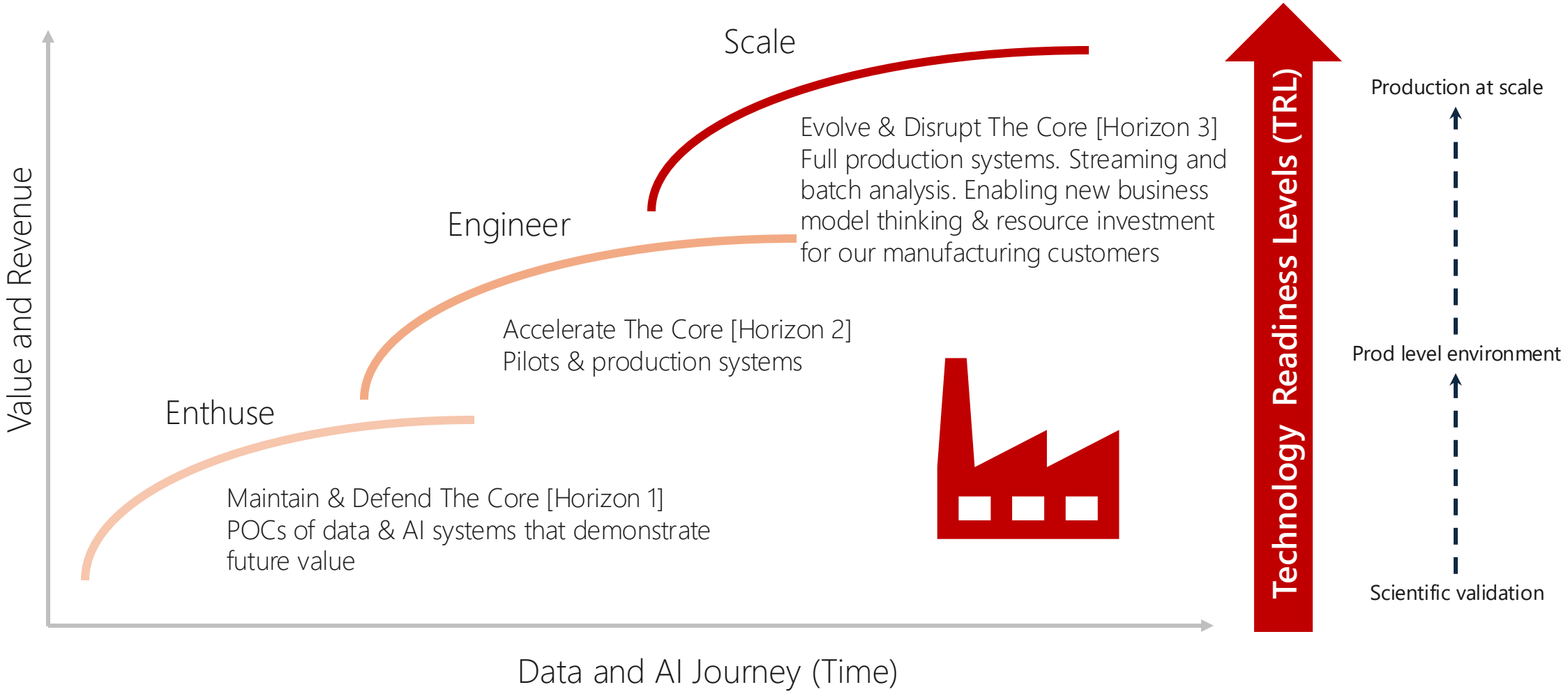


Sales of Services contributes 60% profits (2X)

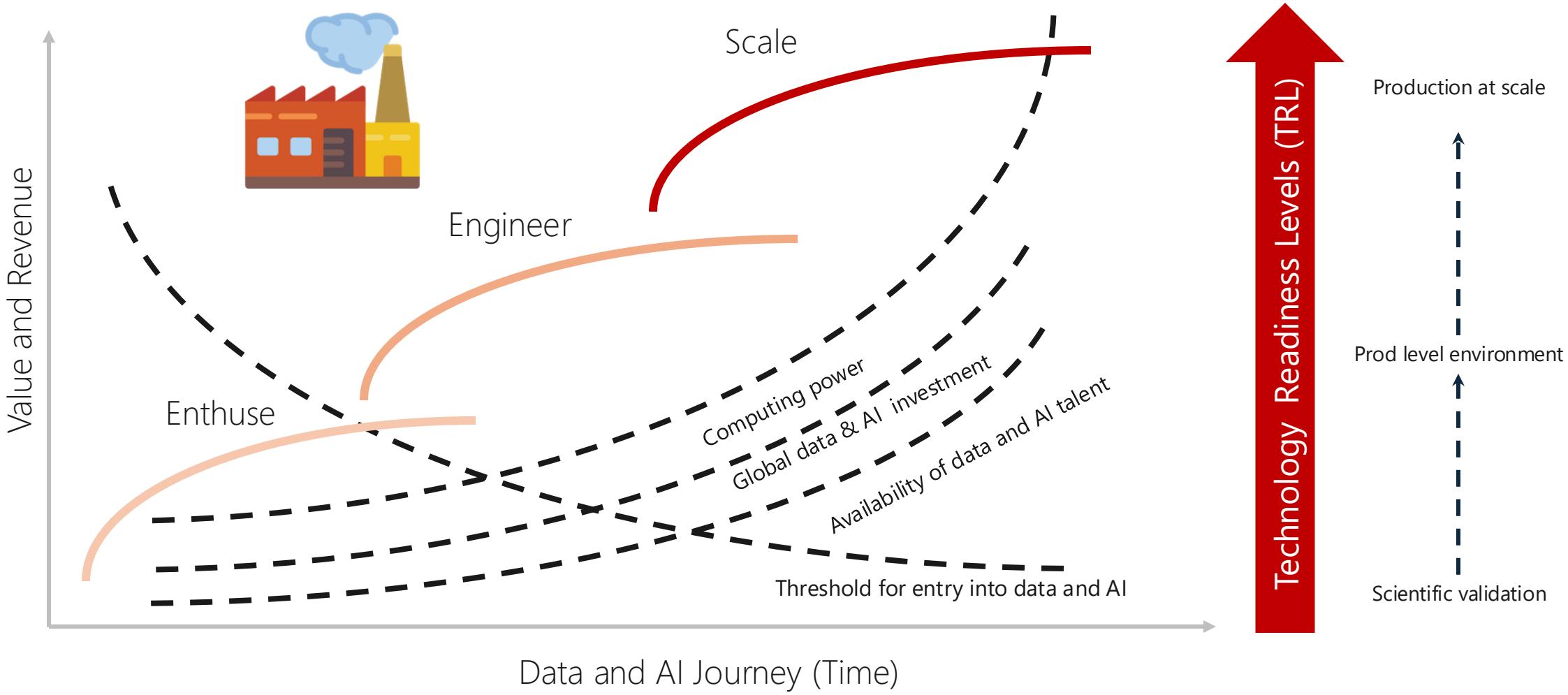
- Personalised product recommendation
- Remote monitoring and support
- AI-powered predictive maintenance
- Automated QC/QA
- Optimised energy management
- Supply chain optimisation
- GenAI based field engineering support
- Generative design

Data and AI-driven

From NPD to Production



From NPD to Production



The Data and AI Transformation Journey

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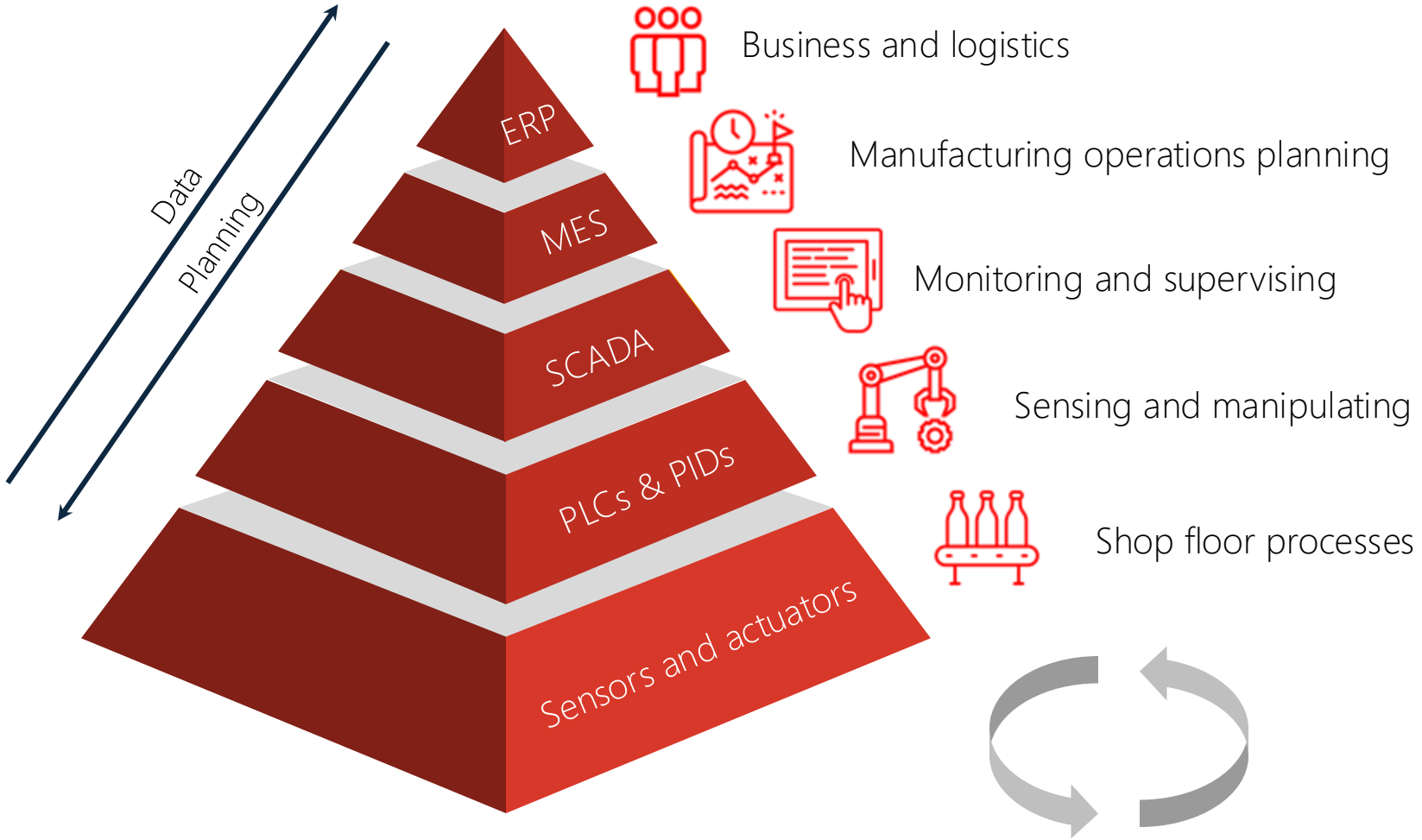
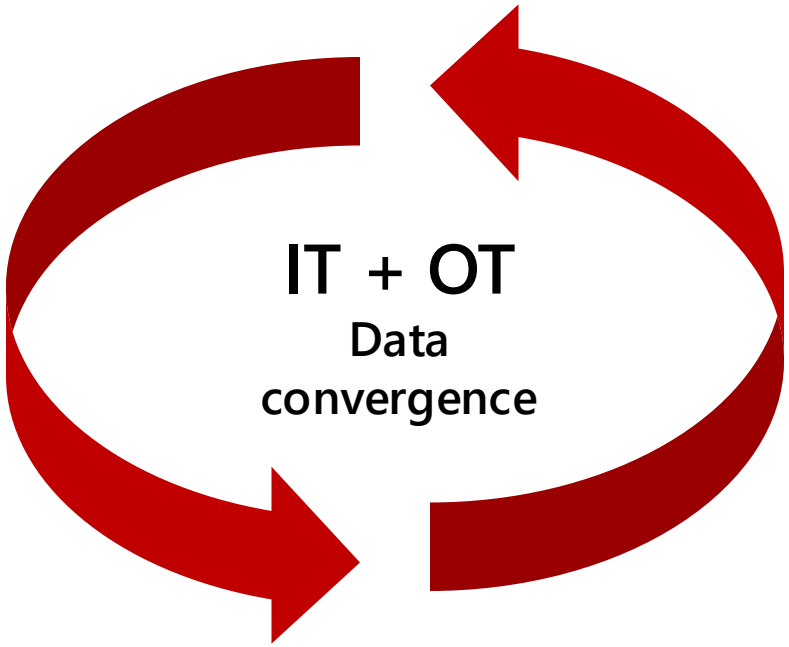
Initial (Ad-hoc)	Developing (Opportunistic)	Defined (Structured)	Managed (Quantifiable)	Optimizing (Innovating)
• Experimental AI • Data is siloed • Manual processes • No governance	• Isolated AI projects • Early consolidation of data • First steps into a more structured data collection system	• AI projects achieving limited goals • Established data management practices • Working towards ROI	• Data and AI are integrated into business and manufacturing processes • Data-driven decision making • Mature governances • Data and AI ethics	• Data and AI are strategic assets • Innovation driven by data insights • Predictive and prescriptive analytics

Enthuse **Engineer** **Scale**

The Data and AI Transformation Journey



IT-OT Convergence Unlocks Business Value



Data from ERP, MES, SCADA, PLCs & Sensors

Monitoring and Analytics

Data Products

Data democratization unlocks business value

Asset & Operations Optimization
- Predictive Maintenance with Logistics
- Production Line Optimization
- Overall Equipment Effectiveness
- Digital Twin

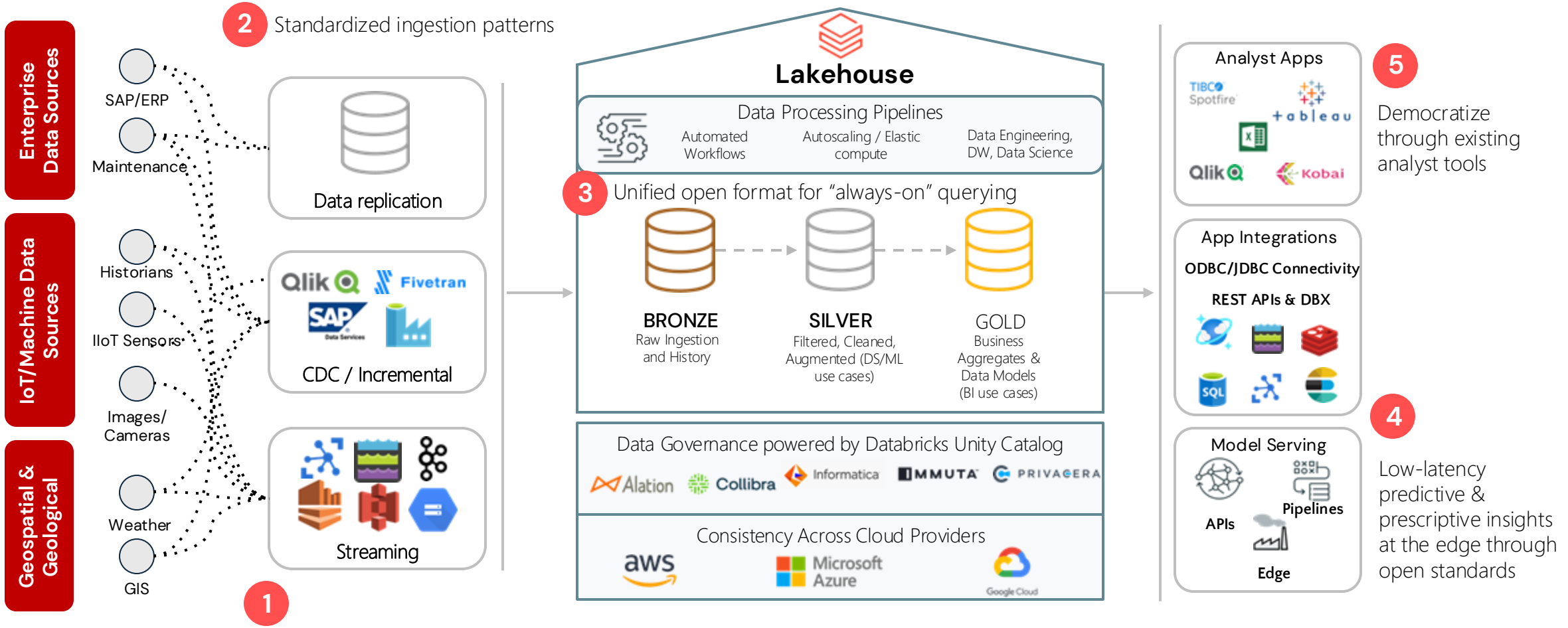
Production Control
- Yield Optimization
- Automated Quality Control
- Automated Visual Inspection
- Process Control

Supply Chain & Inventory Management
- Inventory Planning & Optimization
- Material Tracking
- Part Forecasting
- Supply Chain Visibility

Demand Planning
- Demand Forecasting
- Demand Sensing
- Inventory Optimization

Finance
- Reporting: P&L, Profitability, Balance Sheet
- Forecasting: Revenue, Cashflow

The Rise of Modern Architectures - The Lakehouse



Celebal's Vision – Simplifying I4.0 Insights through GenAI and AI Assistants

Reimagining the industry with the alchemy of GenAI: creating a more sustainable and innovative future.

Physical Asset

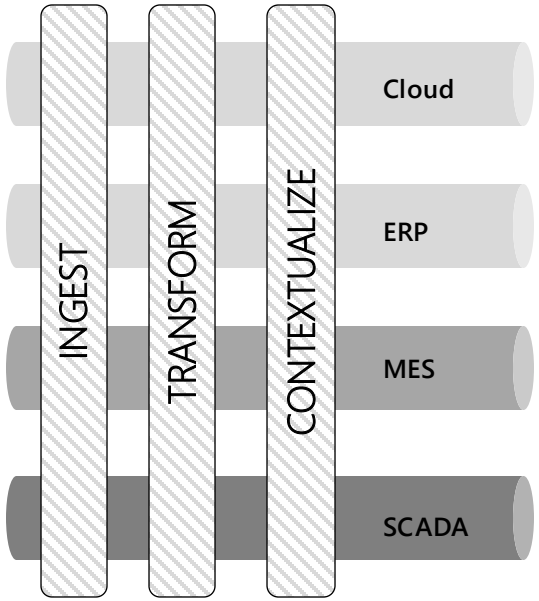
Logical & Supporting Assets

Edge/ Gateway

Batch Data

Cloud Broker

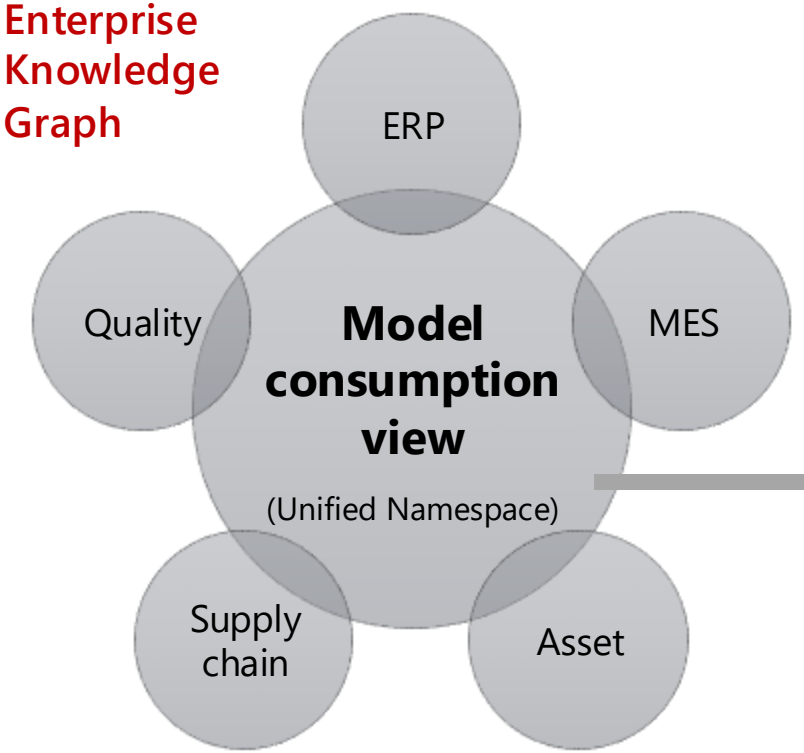
Data Ops Pipeline



Common metadata tooling
- Metadata catalogue
- Governance model
- Audibility and lineage Tracking

Lakehouse

Enterprise Knowledge Graph



Capability

Digital Collaboration

Metaverse

Advanced Analytics

Digital Twin

Low code/Pro dev

Business Analytics

AI Assistants

- Industry insights
- Business insights
- IT/OT convergence
- Consolidated data-driven decisioning
- Knowledge augmentation
- Domain adaptation
- Multi-model generation

Use Cases

- Operations KPI's
- Asset Management & Maintenance
- Supply Chain Control Towers
- Enterprise Data Driven Use Cases
- Gen AI Use Cases

The Rise of GenAI and LLMs

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Effort / Cost

< $20

Shared Models

Use public models and prompt engineer these models to produce the desired outcome

< $100

Reuse Models

Use an off-the-shelf foundation model that can retrieve knowledge from a vector database

< $2,000

Adapt models

Augment the knowledge in your models by fine-tuning it and/or teach it to perform specific tasks

> $100,000

Train models

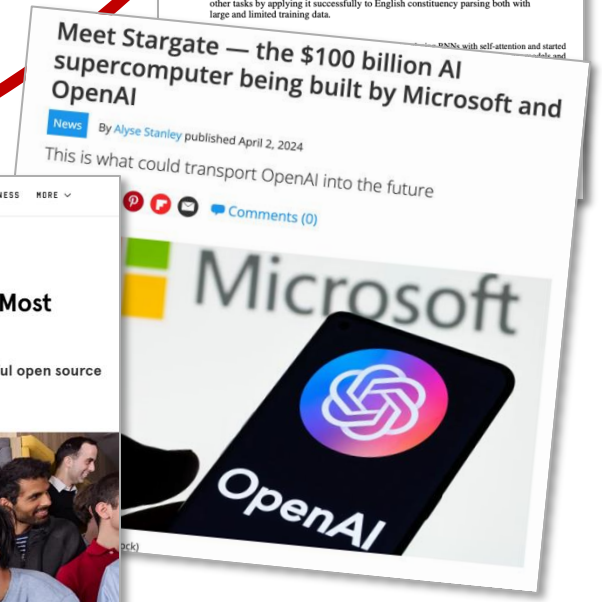
Create custom models that are able to solve complex problems in your domain


Attention Is All You Need

Ashish Vaswani* Google Brain avaswani@google.com
Noam Shazeer* Google Brain noam@google.com
Niki Parmar* Google Research nikip@google.com
Jakob Uszkoreit* Google Research usz@google.com
Llion Jones* Google Research llion@google.com
Aidan N. Gomez* † University of Toronto aidan@cs.toronto.edu
Łukasz Kaiser* Google Brain lukaszkaiser@google.com
Illia Polosukhin* ‡ illia.polosukhin@gmail.com

Abstract

The dominant sequence transduction models are based on complex recurrent or convolutional neural networks that include an encoder and a decoder. The best performing models also connect the encoder and decoder through an attention mechanism. We propose a new simple network architecture, the Transformer, based solely on attention mechanisms, dispensing with recurrence and convolutions entirely. Experiments on two machine translation tasks show these models to be superior in quality while being more parallelizable and requiring significantly less time to train. Our model achieves 28.4 BLEU on the WMT 2014 English-to-German translation task, improving over the existing best results, including ensembles, by over 2 BLEU. On the WMT 2014 English-to-French translation task, our model establishes a new single-model state-of-the-art BLEU score of 41.8 after training for 3.5 days on eight GPUs, a small fraction of the training costs of the best models from the literature. We show that the Transformer generalizes well to other tasks by applying it successfully to English constituency parsing both with large and limited training data.


Meet Stargate — the $100 billion AI supercomputer being built by Microsoft and OpenAI

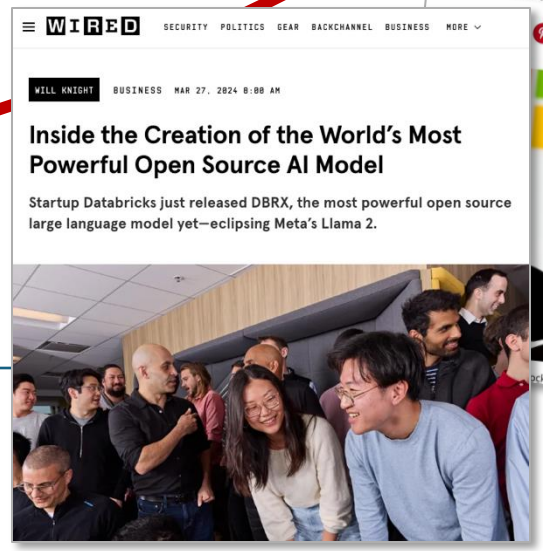
News By Alyse Stanley published April 2, 2024

This is what could transport OpenAI into the future

Comments (0)

Microsoft

OpenAI


WIRED SECURITY POLITICS GEAR BACKCHANNEL BUSINESS MORE

WILL KNIGHT BUSINESS MAR 27, 2024 8:00 AM

Inside the Creation of the World's Most Powerful Open Source AI Model

Startup Databricks just released DBRX, the most powerful open source large language model yet—eclipsing Meta's Llama 2.

Benefits / Customization

Generative AI: Areas with most Impact

OPERTIONS AND MANUFACTURING
- Remote Worker Assistance
- Production Planning Co-Pilot
- KPI Bot for Executive Governance

R&D
- Market and Competitive Analysis
- Research Archive Summarization
- Entity Compound Relation Extraction
- Simulation and Testing

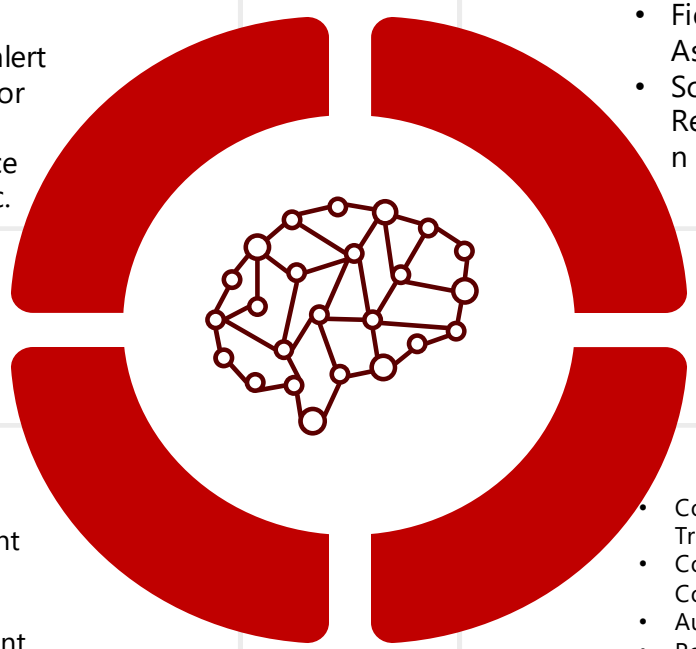
IT
- IT Inventory management
- IT Helpdesk Automation

MARKETING
- Automatic Marketing Emails
- News and Trends - Mining the web content for latest news and trends.
- Marketing Content Generation

QUALITY ASSURANCE AND TESTING
- Quality Control Automation
- Root Cause Analysis

FINANCE
- Financial ERP Co-Pilot
- Investor Relations Co-pilot
- Financial alert assistant for deadlines, compliance breach etc.

SALES
- Contact Centre Analytics
- Field Sales Assistant
- Scheme Recommendation Engine



- Demand Sensing
- Procurement Co-Pilot
- Inventory Management Assistant

SUPPLY CHAIN AND LOGISTICS

- Compliance Training
- Consumer Complaint Analysis
- Audit Support
- Regulation Content Versioning

REGULATORY COMPLIANCE

LEGAL AND COMPLIANCE
- Legal document generator
- Document search
- Document summarisation
- Summarise audio transcripts

SUSTAINABILITY AND ENVIRONMENTAL INITIATIVES
- Carbon Footprint Analysis
- Energy Optimization
- Supply Chain Sustainability
- Social Reporting

HR
- Employee Onboarding Copilot
- Talent Acquisition Copilot
- Employee Engagement and Feedback

TRAINING AND DEVELOPMENT
- Personalized Training
- Skill Assessment and Gap Analysis
- Chatbots for On-Demand Support

PUBLIC RELATIONS
- Media Monitoring and Analysis
- Media Outreach Recommendations
- Content Creation

GenAI: Multilingual Knowledge Extraction for Digital Twins

Background

The second largest Japanese power generation company, wished to build a knowledge extraction tool to allow for easy access to the relevant information regarding for maintenance, troubleshooting and education knowledge about power plants

Value Delivered

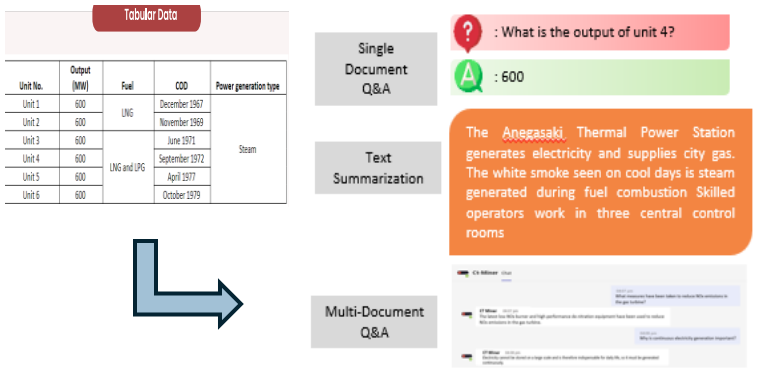
50%
Reduction in time to gather information

50%
Reduced unplanned downtime, resulting in cost savings

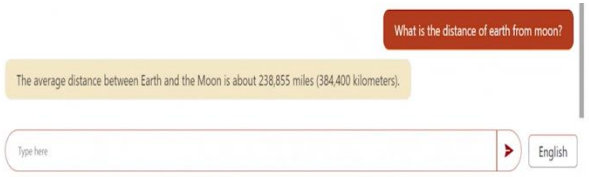
97%
Accuracy in text extraction & translation to provide support for Japanese & English

85%
Accuracy in answers generated for nested, conditional, multi-documents follow up or simple queries

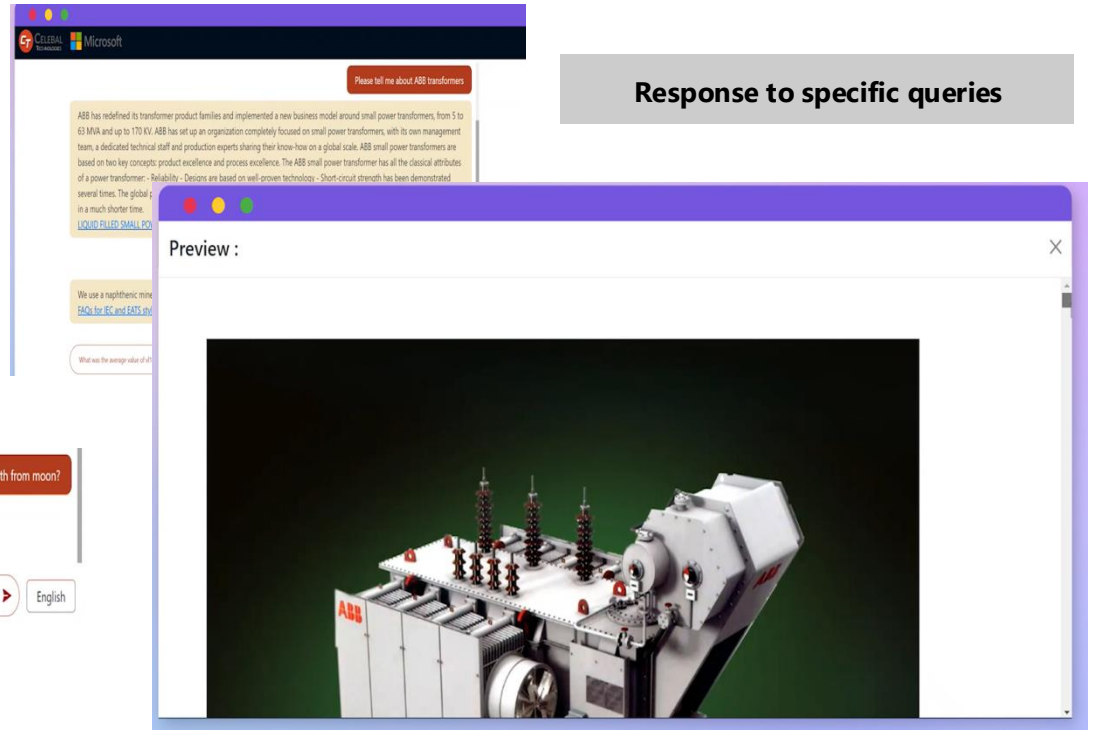
Knowledge extraction from document



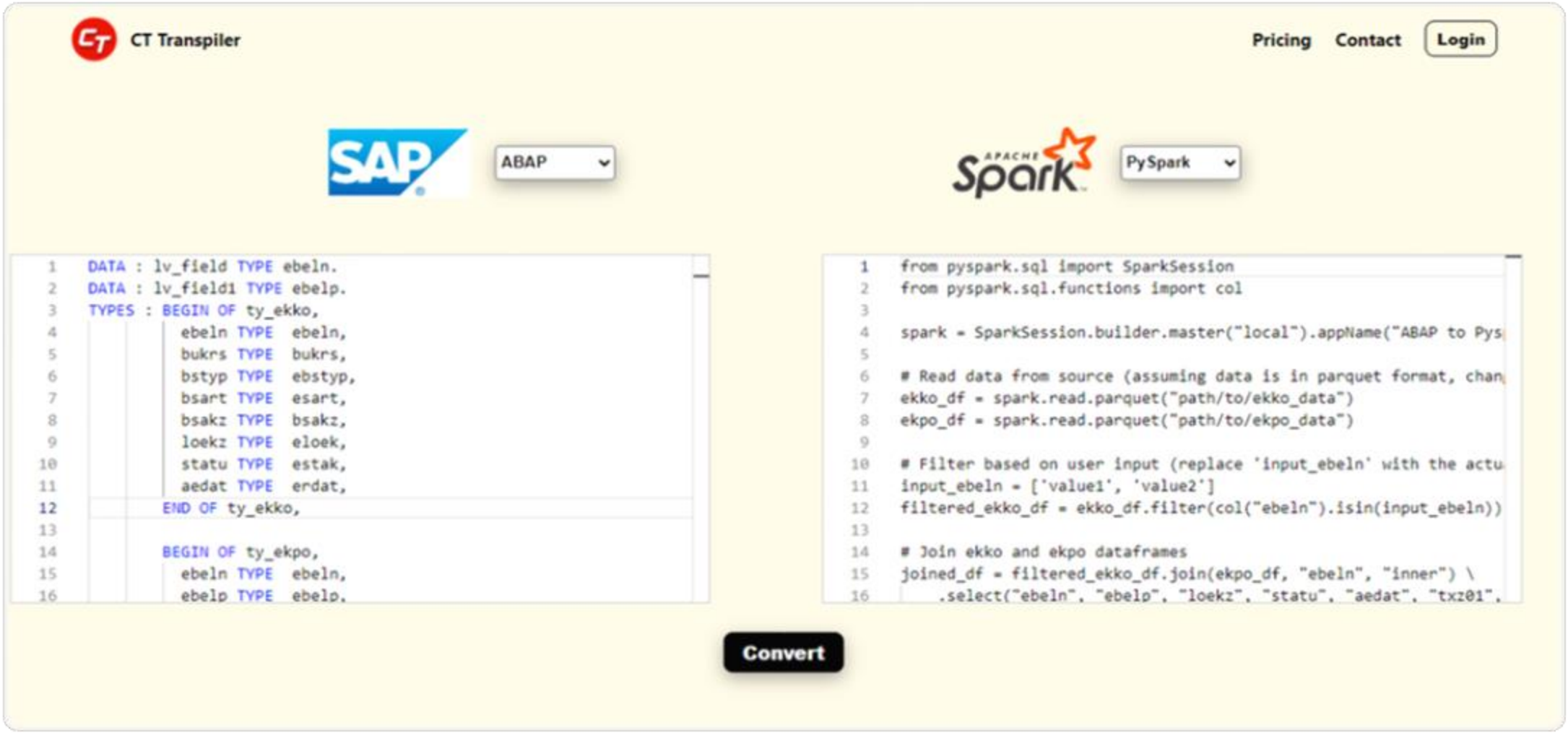
Response to general queries



Response to specific queries



Using GenAI to translate "Ancient Code"



Watchouts

Manufacturing is physical

Challenges remain on how well training data for LLMs can best represent the physical world. While LLMs are good at taking a macro view of the training data, it is less good at helping to augment fine grained decision making. These include things like plotting a trajectory for collision avoidance etc.

Decision validation and verification requirement

Safety is perhaps the most important KPI for manufacturing. . Automated decision-making is not new to manufacturing and can lead to a reduction in risk and errors. However traditional models are simple and explainable. LLMs introduces a whole new level of risk due to its complexity. It does not lend itself to simple validation.

Integration with existing workforce and processes

The existing workforce needs to be reskilled to work with LLMs. This includes the need for training in “prompt engineering” and to make overriding decisions when necessary. Where LLMs form the “brain” of an automated system, there needs to be a standardization of interfaces that allows communication between systems.

The Future of Work

Work model: how to create a sustainable operating model that responsibly applies AI and automation?

Talent model: how to develop a pipeline of talent that is progressive for your manufacturing organization?

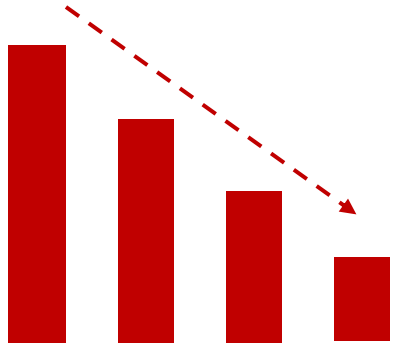
Future skills: how to continuously upskill and reskill the workforce?

Change management: how to develop a culture of perpetual reinvention within your manufacturing organization?

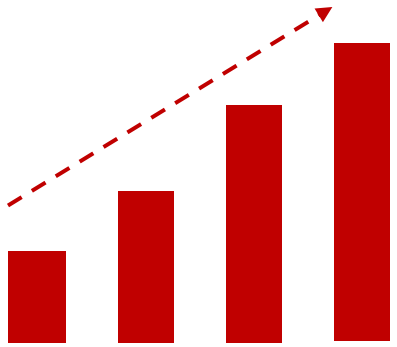
https://www.weforum.org/agenda/2023/04/how-companies-should-navigate-generative-ai-in-future-of-work/

On technological unemployment: “this means unemployment due to our discovery of means of economising the use of labour outrunning the pace at which we can find new uses for labour.”

– John Maynard Keynes , 1933



"The core mistake that automation-kills-jobs doomers keep making is called the Lump Of Labour Fallacy [David Schloss, 1891]. This fallacy is the incorrect notion that there is a fixed amount of labour to be done in the economy at any given time, and either machines do it or people do it – and if machines do it, there will be no work for people to do."



– Marc Andreessen, "Why AI Will Save the World", 6 June 2023

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Thank You

bala.amavasai@celebaltech.com