Microsoft

IoT in Action

#IoTinActionMS

Microsoft

Smart Infrastructure Technology Enablers

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IoT in Action

13%

of world’s GDP is related to the Built Environment spending, 9% in the UK

$57T

$57 trillion in infrastructure needed by 2030 (globally)

3M+

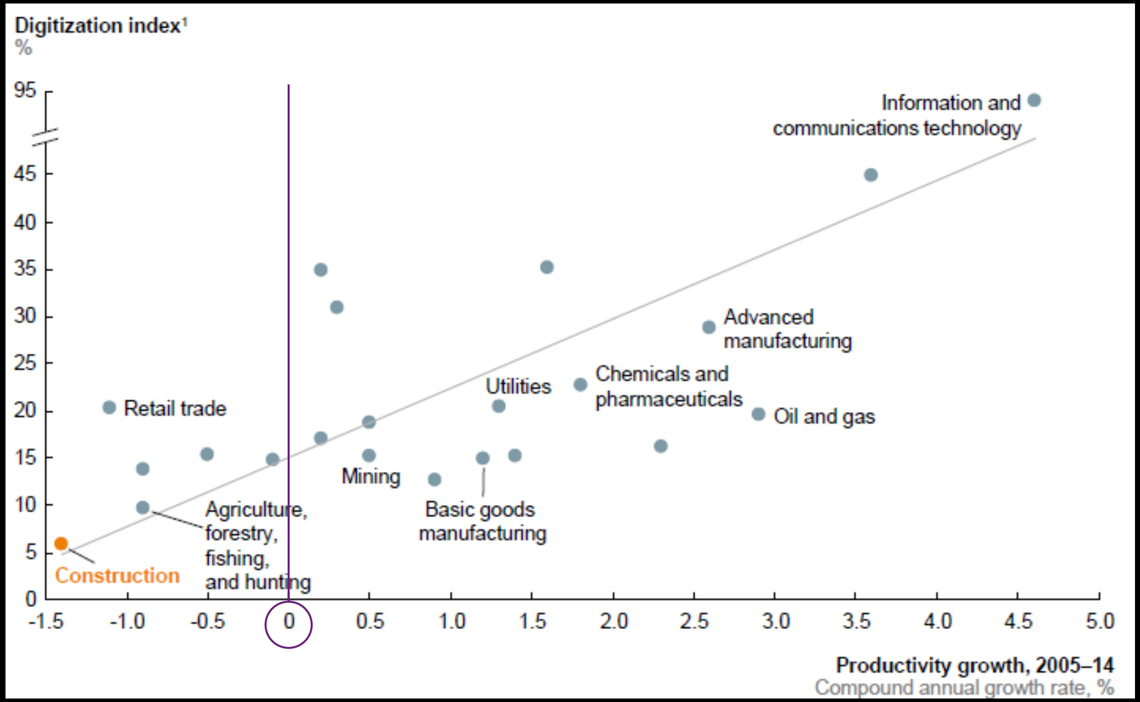
people work in construction in UK in over 280,000 businesses

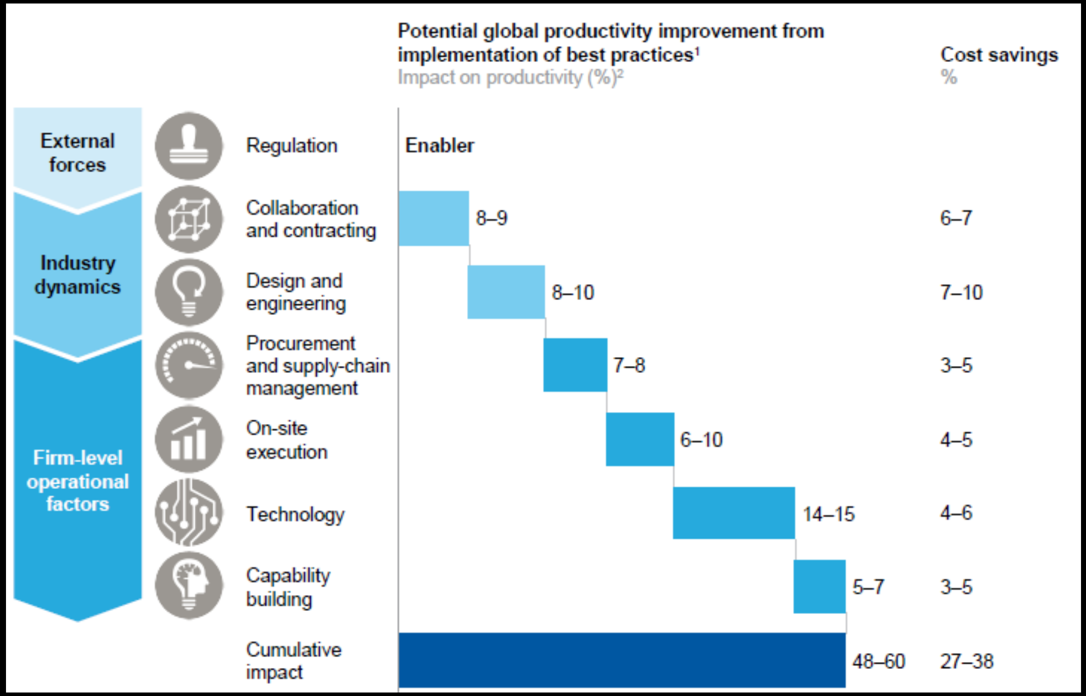
The state of the nation

1% industry annual productivity growth over the past 20 years

30% of the work performed is rework

35% of construction professionals time spent on non-productive activities





Source: McKinsey studies.

The UK government strategy

The goals

Lower costs

33%

reduction in the initial cost of construction and the whole life cost of built assets

Lower emissions

50%

reduction in greenhouse gas emissions in the built environment

Faster delivery

50%

reduction in the overall time, from inception to competion, for newbuild and refurbished assets

Improvement in exports

50%

reduction in the trade gap between total exports and total imports for construction products and materials

The enablers

Digital technology

In all the design and construction phases and industry collaboration across the entire lifecycle to improve safety, quality and productivity

Offsite manufacturing

To minimize wastage, inefficiencies and delays

Asset lifecycle performance

Focus shift from Construction cost to TOTEX

The opportunity

New Infrastructure

600Bn

New pipeline for public and private infrastructure for the next 10 years

Apprenticeships

25,000

In the sector

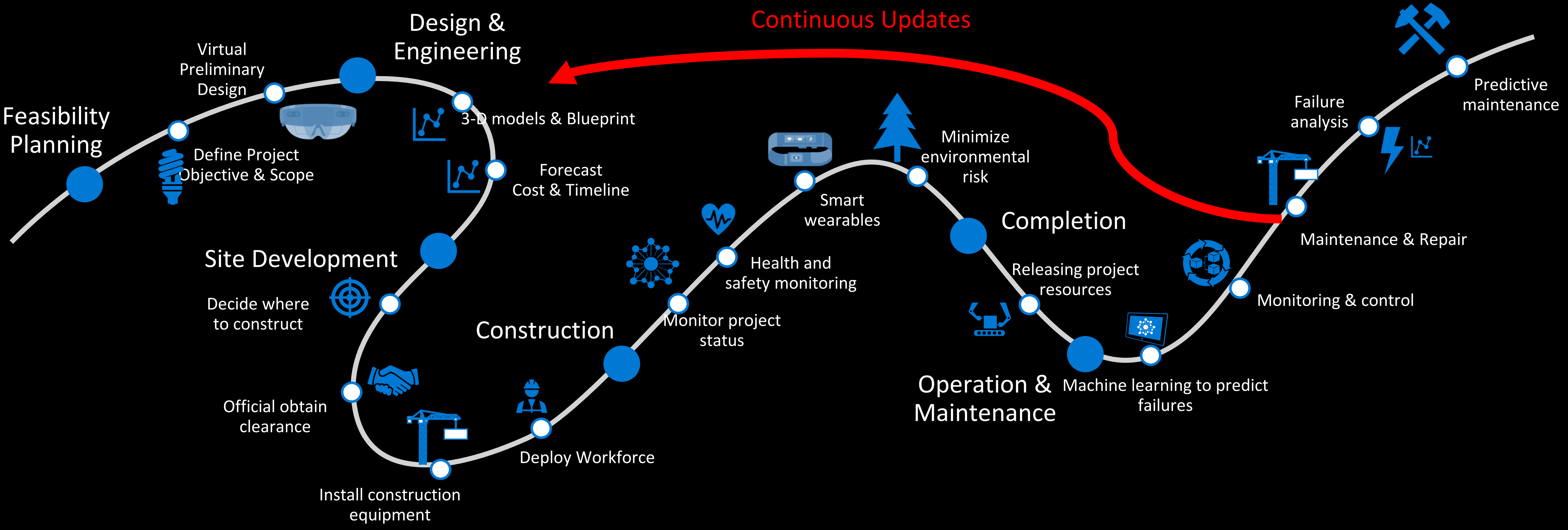
Innovation investment

420M

From tech, sector and government to support innovation in the sector

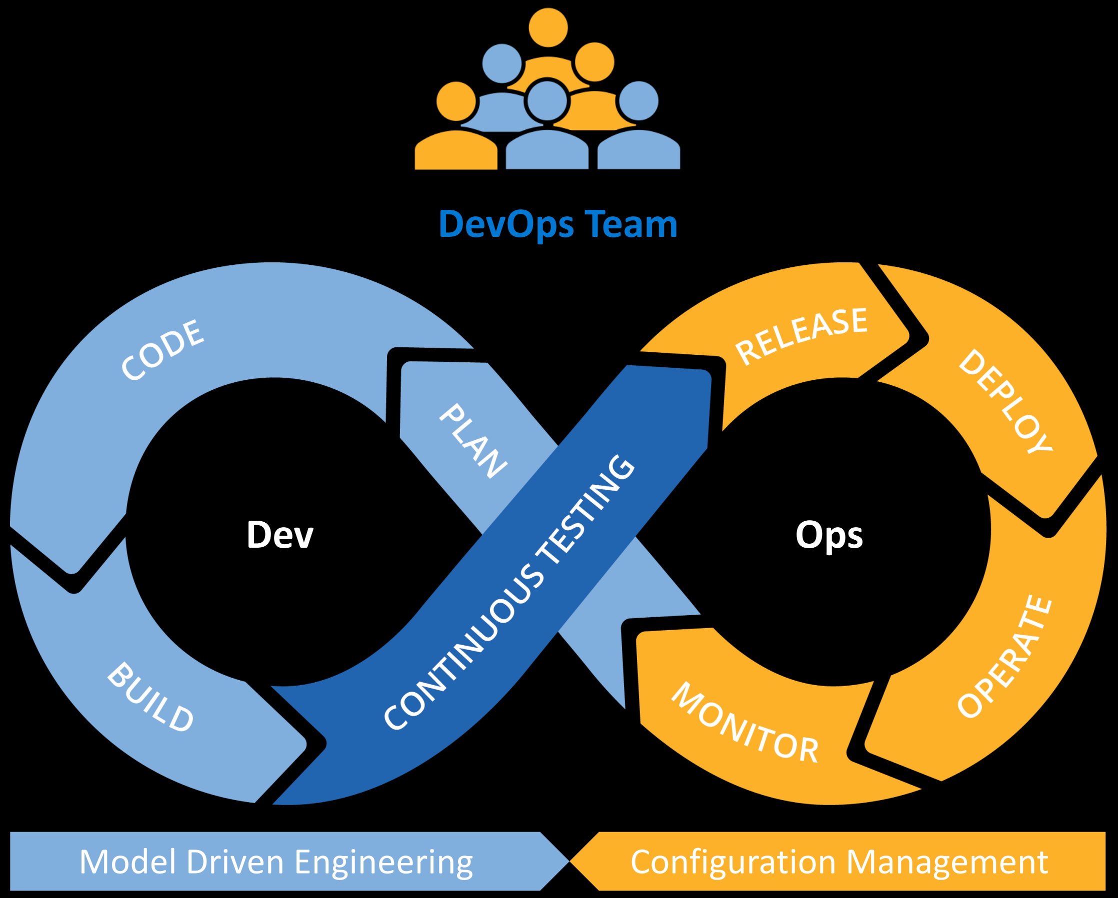
Source: UK Government Construction Sector Deal.

The end to end Built Environment digital twin



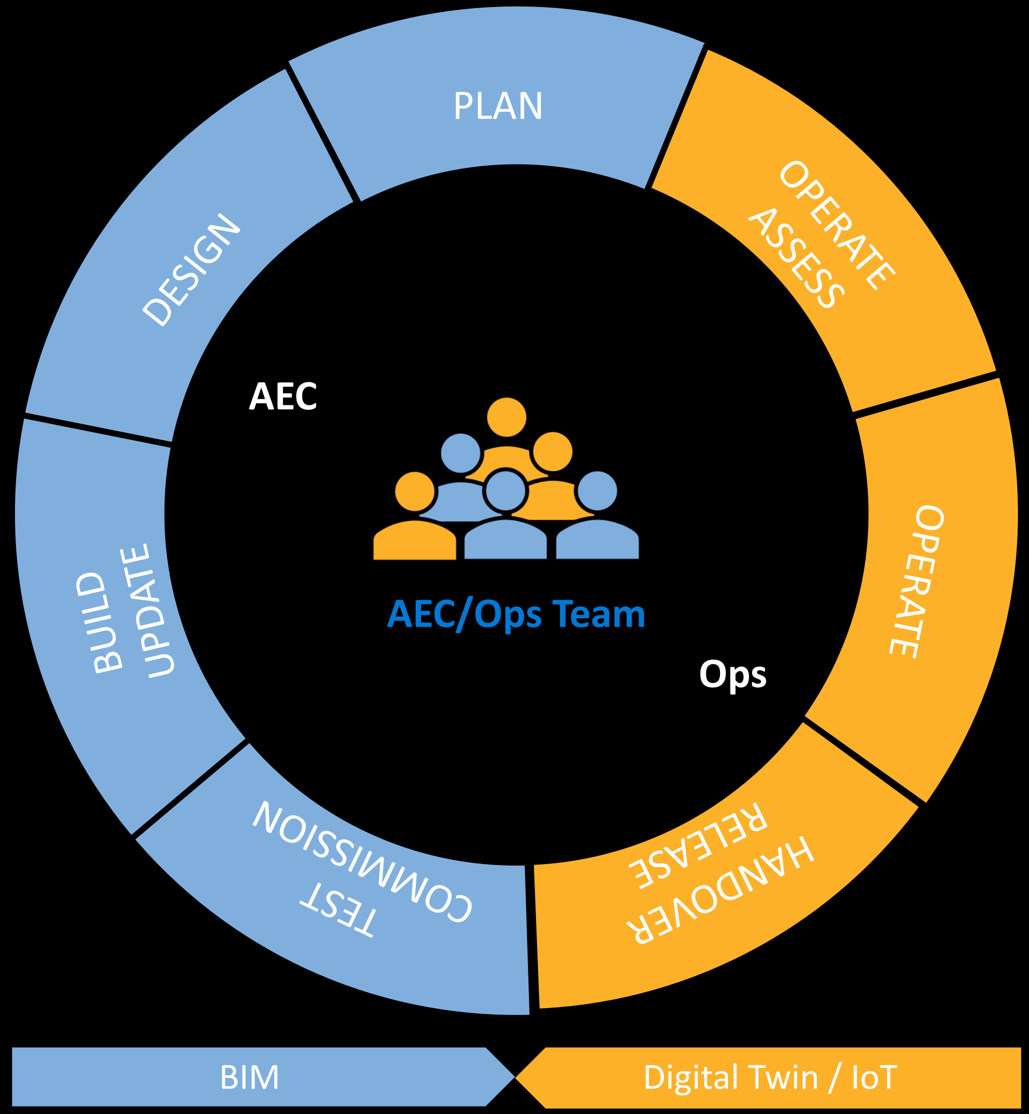
DevOps and software development

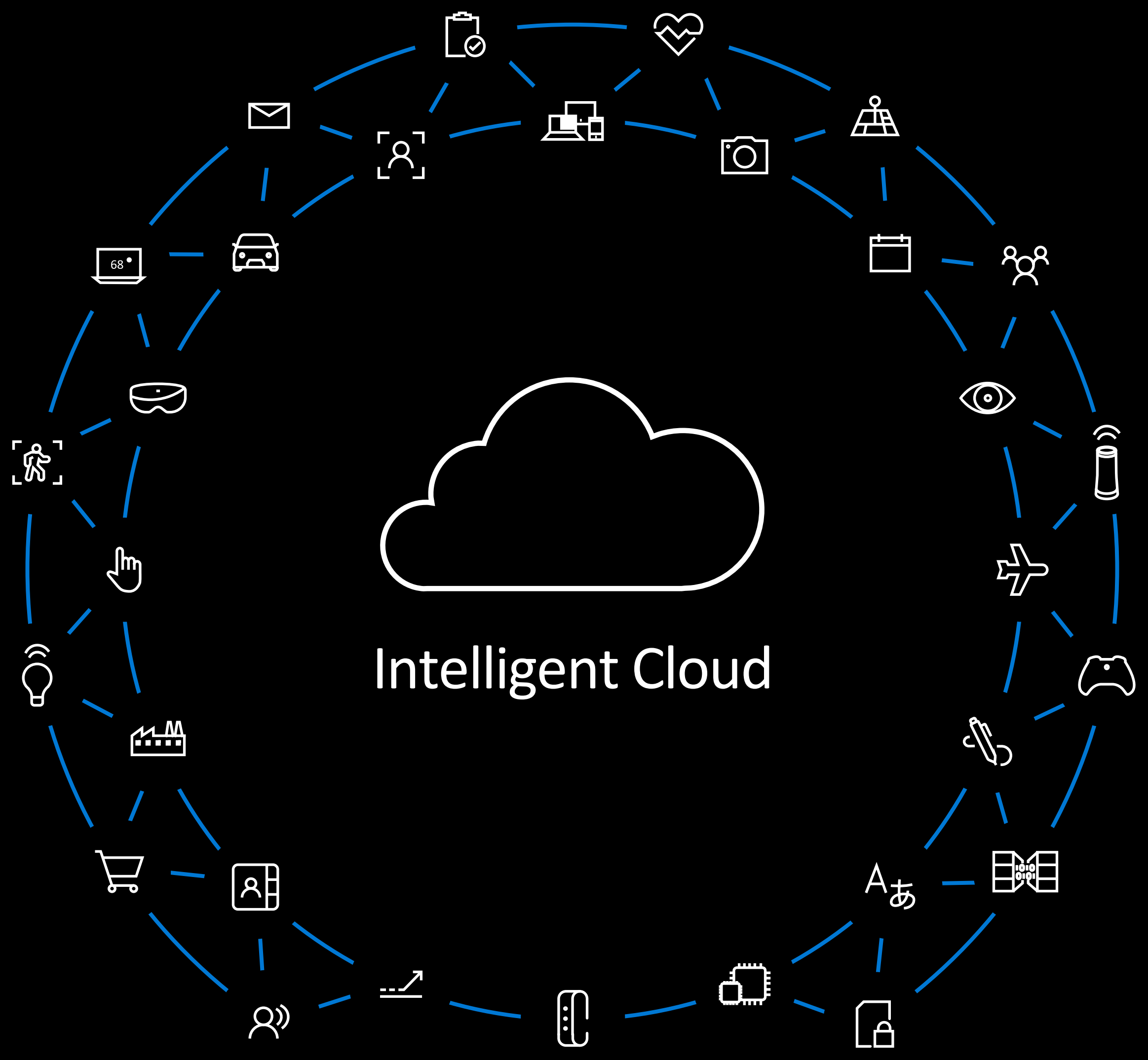
- **Benefits**
  - Shortened time to deploy changes
  - Higher Quality - Less re-work
  - Continuous improvement
  - Predictability
- **Challenges**
  - Integrating teams
  - Building trust
  - Culture change
  - Skills and Training
- **Business/Technology Change**
  - Automation – Testing and Deployment
  - Integrated ToolChains
  - Infrastructure as Code
  - Software Defined Networks
  - Cloud Services



DevOps for the Built Environment

- **Benefits**
  - BIM reflects built Assets
  - Shortened time to deploy changes
  - Less re-work
  - Continuous improvement
- **Challenges**
  - Integrating teams and the supply-chain
  - Building trust
  - Culture change
- **Business/Technology Change**
  - Common Data Environment (CDE)
  - Common data formats
  - New roles and processes
  - Agile approach





Intelligent Edge

A history of physical and digital interaction

R&D & ENGINEERING

MANUFACTURING OPERATIONS, SERVICES

NEW SERVICES DRIVEN BUSINESS MODELS

Information mirroring* model

- Powerful modeling and analysis
- R&D and engineering focus

1985-2002
(18 years)

Simulation and 3D printing

- Digital design, virtual assembly, and simulation
- 3D printing mainstream

2003–2014
(12 years)

Connected IoT services

- Unified physical and virtual data
- Rapid feedback across design, manufacturing, and operations

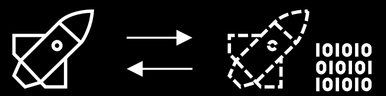
2015–2017
(3 years)

End-to-end innovation

- Humans and device collaboration
- Spatial awareness and intelligence
- Mixed Reality experience

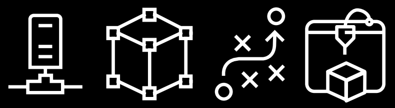
2018 - …
(the future is now)

Digital Twin evolution

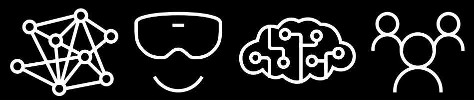


Real Object

Virtual Object



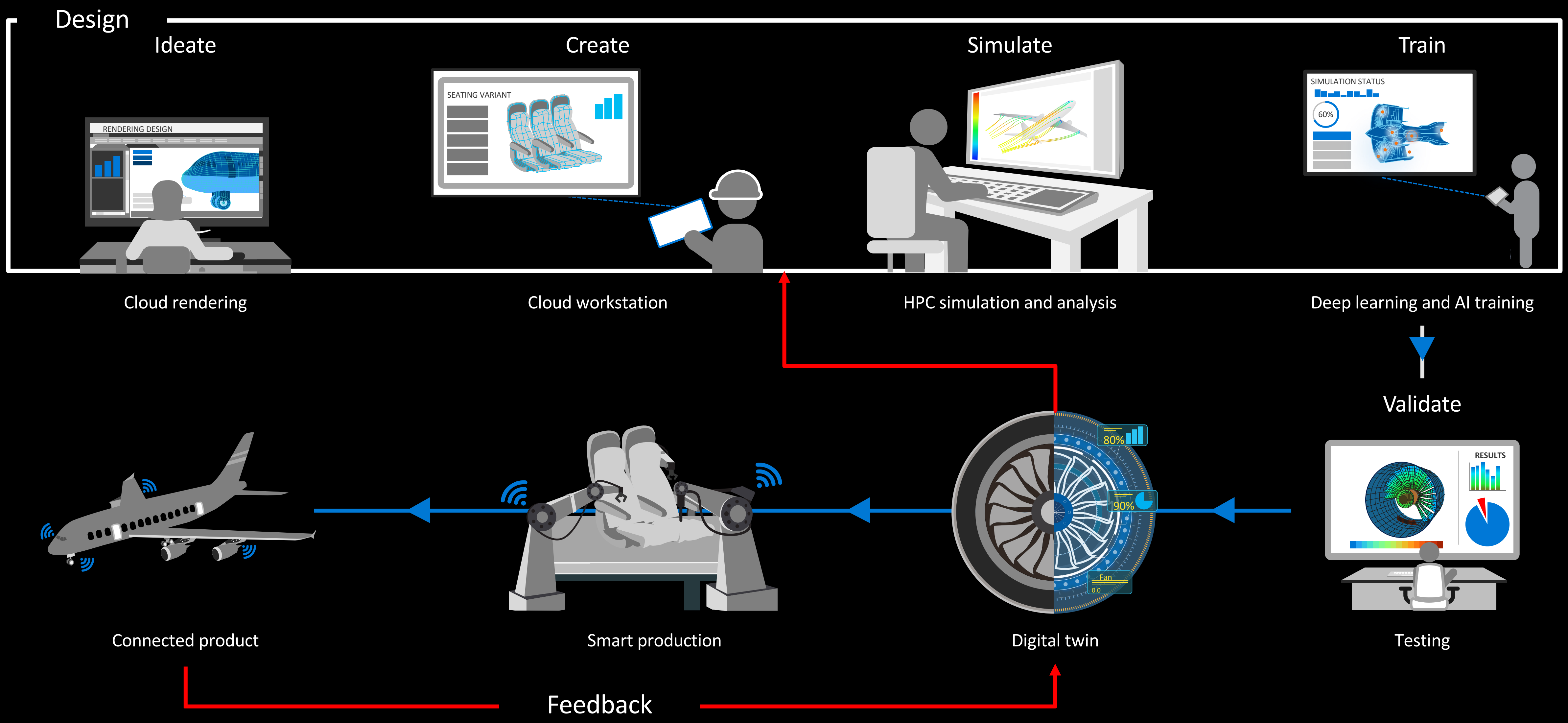
Remote Monitoring
Predictive Maintenance



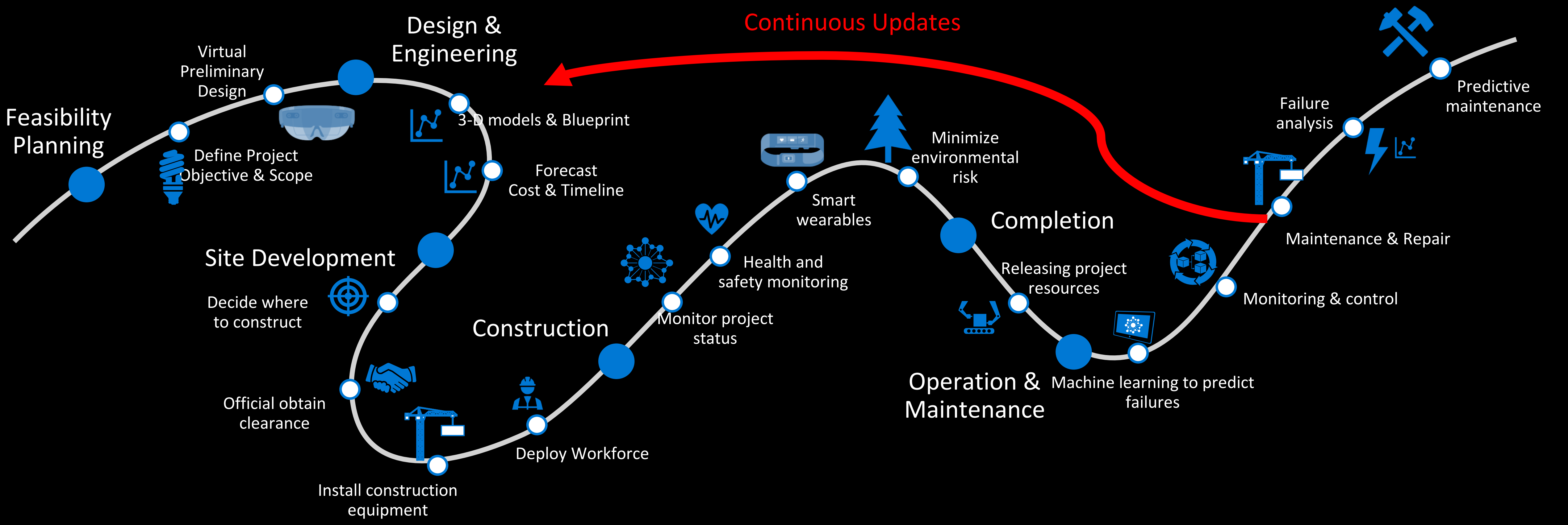
Enable any organization to create digital feedback loops for all aspects of their business

*Dr. Michael Grieves and John Vickers – University of Michigan

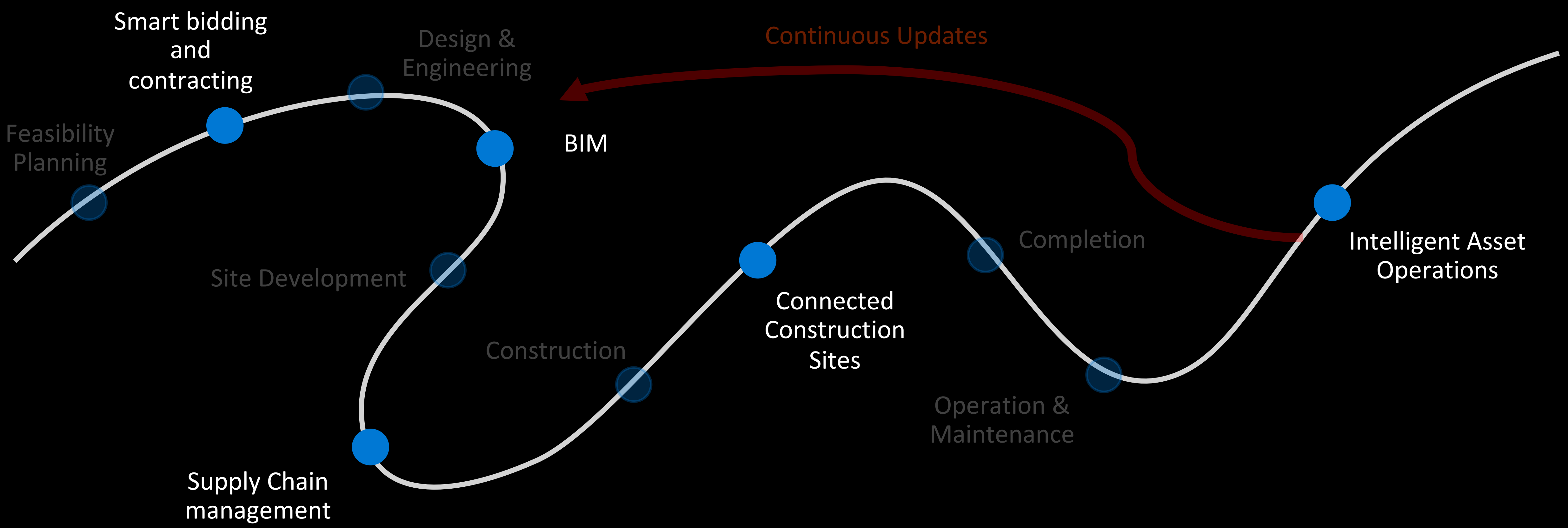
The digital twin pioneers - Aerospace



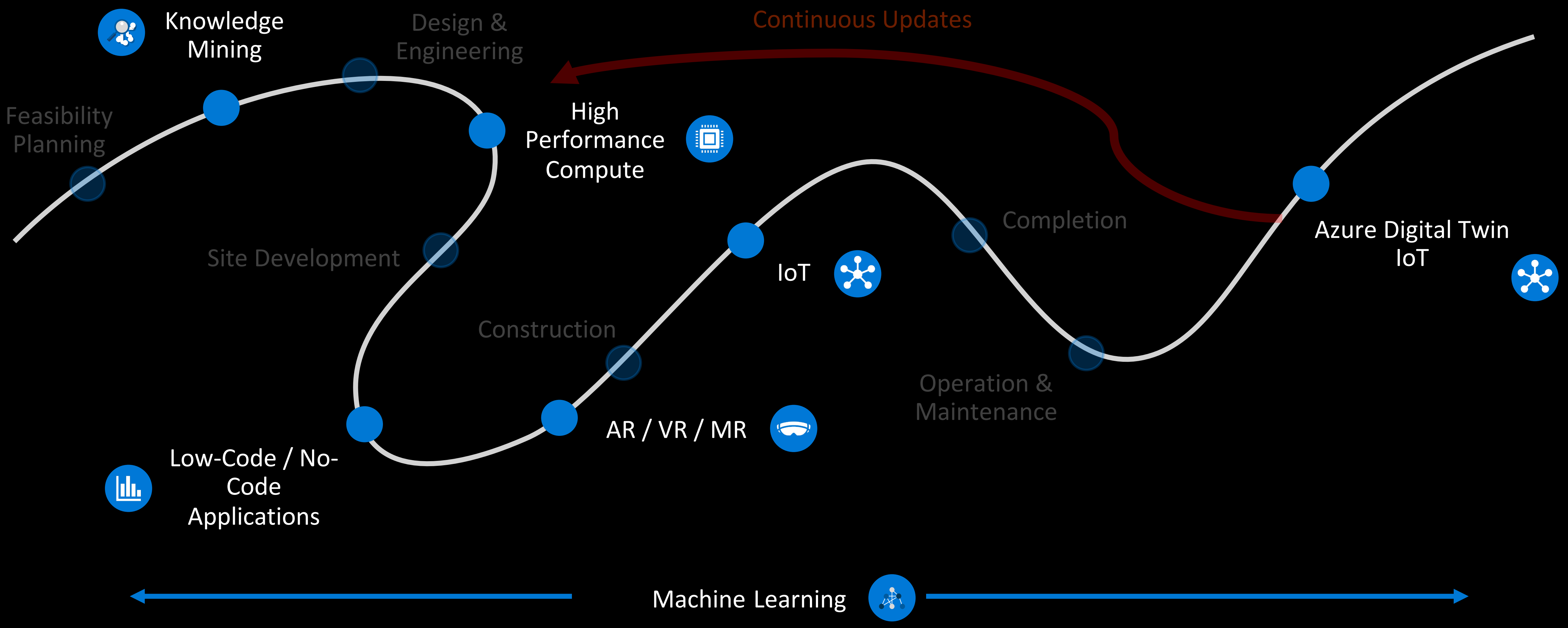
The end to end Built Environment digital twin



The technology enablers



The technology enablers



What is knowledge mining?

Your business data

Unlock valuable information lying latent in all your content

Knowledge mining with Azure Search

CONTENT

COGNITIVE SKILLS

- Key Phrase extraction
- Organization entity extraction
- Face detection
- Custom skills
- Location entity extraction
- Persons entity extraction
- Celebrity recognition
- Landmark detection
- Sentiment analysis
- Language detection
- Tag extraction
- Printed text recognition

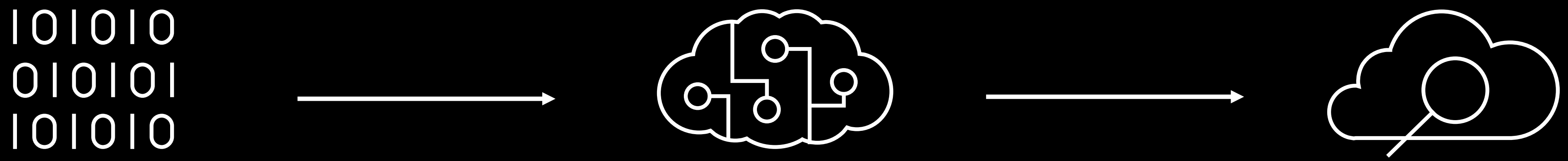
SEARCHABLE INDEX

How knowledge mining works

Ingest

Enrich

Explore



Document cracking

Customer data

.pdf

.doc

.jpeg

…

Extensible enriching pipeline

Pre-built enrichers

OCR
Sentiment analyzer
Caption
Key Phrase Extraction, People Names, Company Names, Computer Vision

Custom enrichers

Custom classification models,
Custom entity extraction

…

Indexing for search

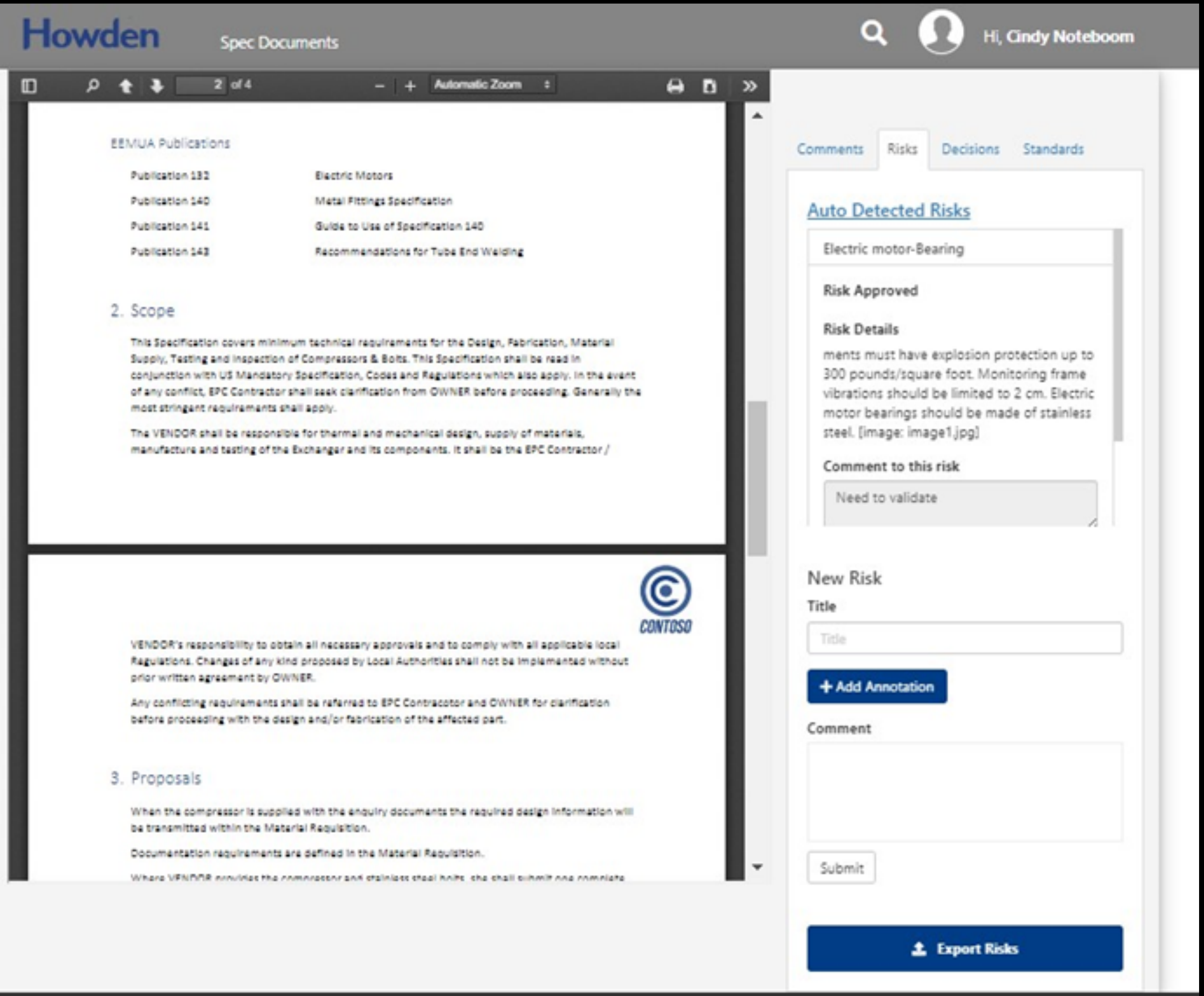
Annotation

Documents annotated before indexing

Search Index

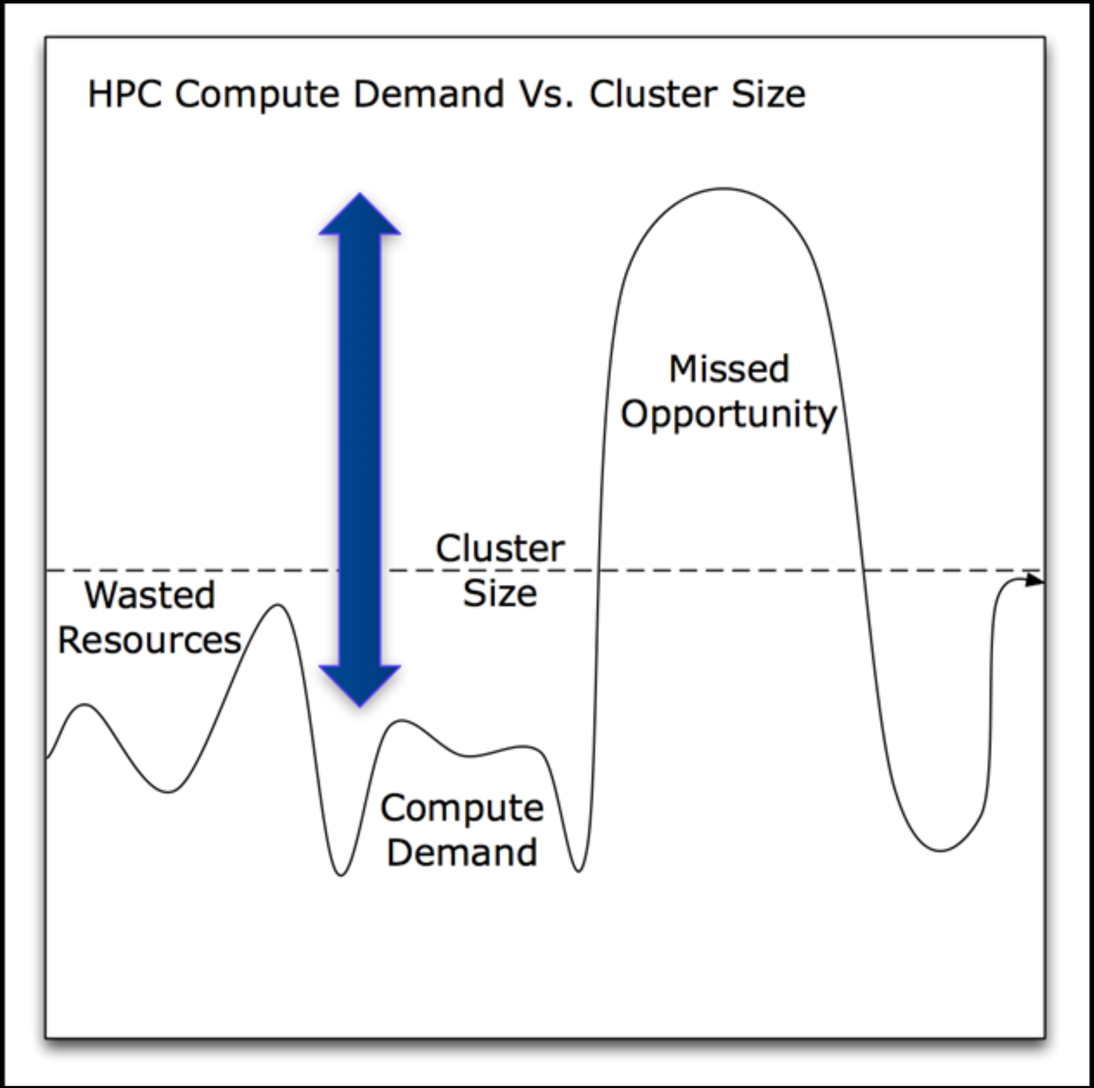
Accurate indexing for easy retrieval

Knowledge mining – customer story



- Howden, a global engineering company, focuses on providing quality solutions for air and gas handling, from mine ventilation and waste water treatment to heating and cooling.
- Every new project requires the creation of a bid proposal, typically of thousands of pages in PDF format to be scoured to identify key areas of design and specialized components in order to produce accurate bids.
- If they miss key or critical details, they can bid too low and lose money, or bid too high and lose the customer opportunity.

HPC simulations and design cycle times



Inflexible Software Contracts
Not enough licenses for scaling simulation

Fixed Resources
Competition for resources causes delays

Storage Management
Result files are too large to move around

Orchestration Obstacles
Managing simulation work is complex

Geographical Disparity
Globally dispersed engineering teams

A comprehensive HPC strategy on Azure

On-demand

Access on-demand compute resources that enable you to run large parallel and batch compute jobs in the cloud, right when you need to

Extensible

Extend on-premises HPC cluster to the cloud when you need more capacity, or choose to run simulations entirely in the cloud

Scalable

Scale up and down easily, and take advantage of advanced networking features such as RDMA to run true HPC applications using MPI

Native Linux & Windows support

RDMA support

VPN & Express Route (MPLS) networking

Broad partner ecosystem

Azure HPC Attributes

Azure HPC specialized infrastructure

Entry Level VMs
Dev/Test
Workolads

General Purpose VMs
Common Applications,
Web servers etc

Compute Optimized VMs
Gaming, Analytics

Large Memory VMs
Large Databases

>80,000 IOPs
Premium Storage
Low latency, high
throughput apps

InfiniBand

Storage optimized VMs
No SQL Databases
(Cassandra, MongoDB),
Data warehousing

High Performance VMs
Batch processing, fluid
dynamics, monte
carlo simulation

GPU-enabled VMs
NV -Graphic based applications
NC – Advanced Simulation
ND – AI

FPGA*
Virtual Machines – HPC
FPGA Microservices –
AI/Edge

Cray Services in Azure
IB Connected
CPU/GPU/Storage
available in cloud

Challenges in transforming your business processes

Budget constraints

Time & Resource constraints

Business expectations

Paper processes

Complex processes

IT/Business partnership

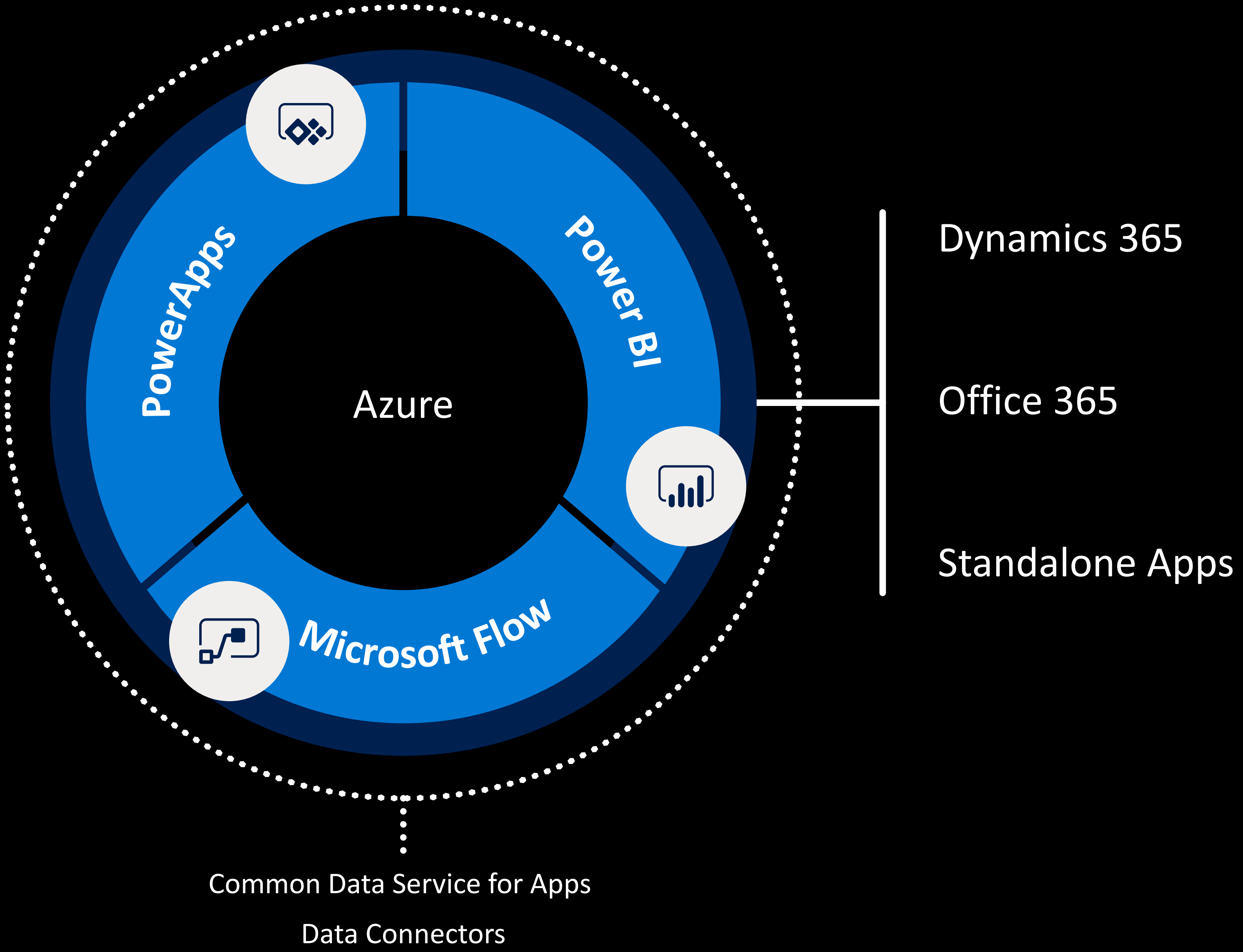
Legacy system maintenance

“Shadow IT” governance

Leverage existing technology

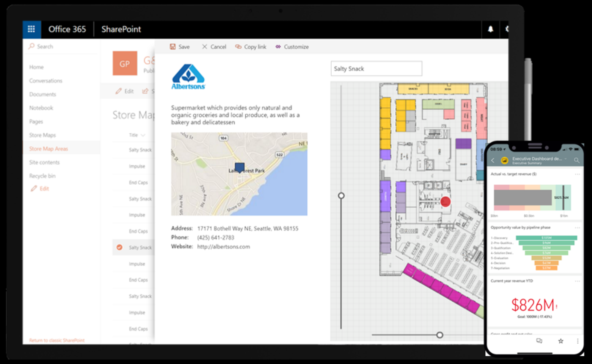
Security & Compliance

Microsoft Power Platform

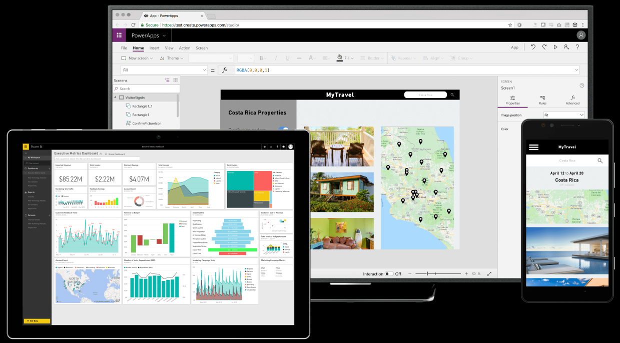


Low-code / No-code app dev experiences

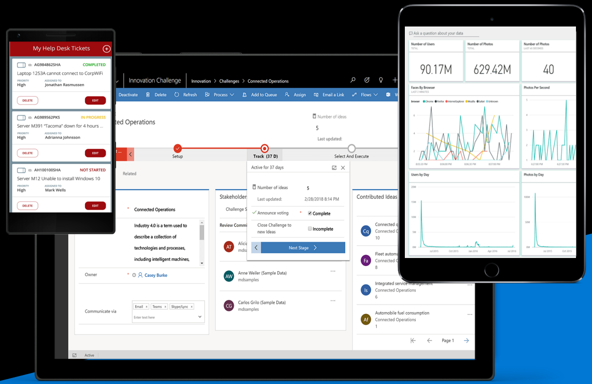
Tailor out-of-the-box solutions, embedded forms and dashboards



Highly customized task- and role-based apps



Immersive, end-to-end solutions



SOPHISTICATION


and saved around 288 hours
of manual input data.