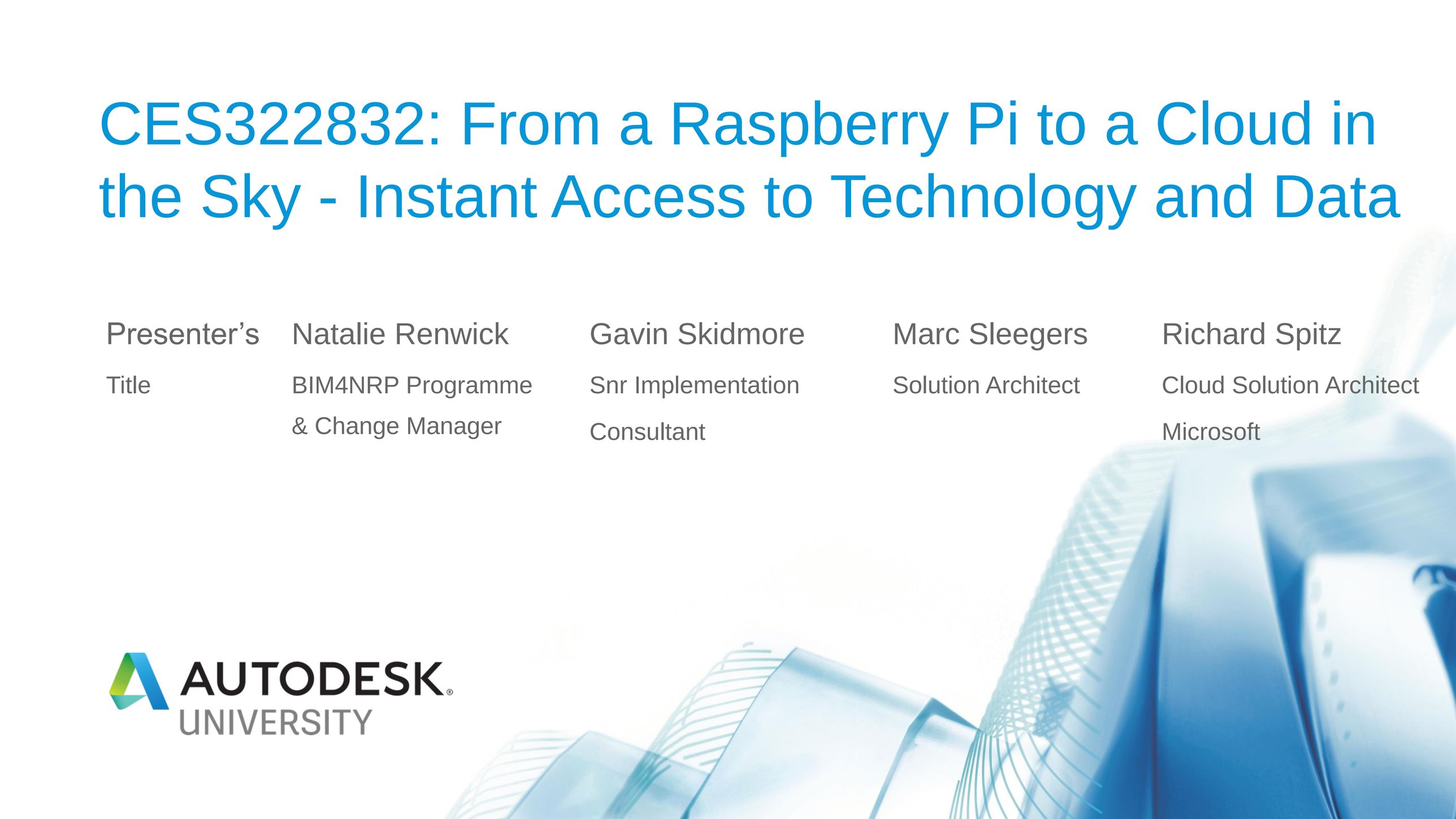
CES322832: From a Raspberry Pi to a Cloud in the Sky - Instant Access to Technology and Data

Presenter's	Natalie Renwick	Gavin Skidmore	Marc Sleegers	Richard Spitz
Title	BIM4NRP Programme & Change Manager	Snr Implementation Consultant	Solution Architect	Cloud Solution Architect Microsoft



Introduction and Class Objectives

Gavin Skidmore

Senior Implementation Consultant (UK)

Global Consulting Delivery

- Over 17 years experience in Multi-Disciplinary organisations supporting the implementation of BIM tools and processes at corporate level.
- Specialisation in Civil Infrastructure, CDE process, BS, PAS & ISO 19650 suite of documents.

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Natalie Renwick

BIM4NRP Programme and Change Manager

- Project; Programme; Portfolio Manager with 16 years' experience in project work within multifunctional environments.
- Independent Consultant, currently on assignment with Network Rail Ltd, based in UK
- Proven track record in delivery of; organisational and business change, solutions, systems implementations, high performing teams, plans and business analysis; on challenging and business sensitive projects – On time, on budget.
- Loves include; business, listening to music, festivals, hanging out with family & friends, helping people and start-ups to realise their full potential.

Mobile: +44 (0) 7740 783225

Email: Natalie.Renwick@networkrail.co.uk

Marc Sleegers

Solution Architect at Autodesk Consulting

- 12 years with Autodesk
- Solution Architect in Autodesk Consulting EMEA, part of Customer Success Organization (CSO)

Richard Spitz

Senior Cloud Solution Architect

- Passionate about everything Microsoft Azure-related, from Virtual Machines, Virtual Networking and Containers to Machine Learning, Cognitive Services, IoT and DevOps tooling with Azure DevOps and IaC, with experience working with the top ISV, ITES and Manufacturing customers in the US, India and Southeast Asia

Class Objectives

CES322832 From a Raspberry Pi to a Cloud in the Sky

Instant access to technology and data

- Gain deep knowledge on how Network Rail managed the challenge of working with terabytes of data in a collaborative environment
- Learn about the significance of online technology in the future of infrastructure design and the ability to connect anytime and anywhere
- Learn about how cloud-based infinite computing is set to revolutionize this age of connection
- Learn how to fully automate a pioneering cloud workplace with highly optimized user experience on any connected device

Overview

About Network Rail

Network Rail is the owner-operator of the railway infrastructure in England, Scotland, and Wales.

Maintaining 20,000 miles of track

Maintaining 30,000 bridges, tunnels, viaducts

Employs more than 45,000 staff

4.7 Million journeys everyday

20 largest UK stations

>2500 stations run by TOCs

>95,000 in Supply Chain

OSBORNE

Balfour Beatty Rail

bam nuttall

ARUP

KIER

MURPHY

MOTT MACDONALD

SKANSKA

ATKINS

About Network Rail

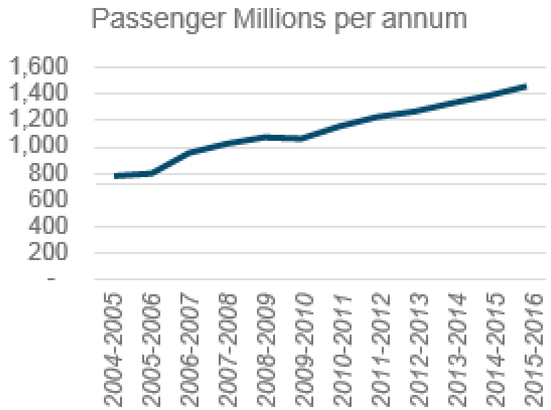
CP6 – £12.5bn to upgrade a Victorian Infrastructure

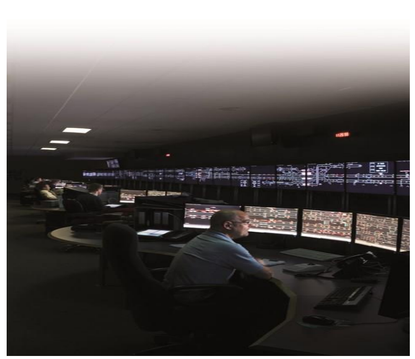
£11bn enhancement projects	£13bn renewals	£2b civils	£11bn current major schemes

CP6 - £25bn to improve existing network reliability & maintenance

KPIs: 15% reduction in train delays, focus on Digital Railway, recruit 50% more women, improve sustainability, reduce carbon consumption...

Similar expectation to be placed on the supply chain!





About Network Rail | Infrastructure Projects (IP)

In 2018 IP delivered 5.4bn of projects

=

>45,000m²

318km of track replacement

LONDON  PARIS

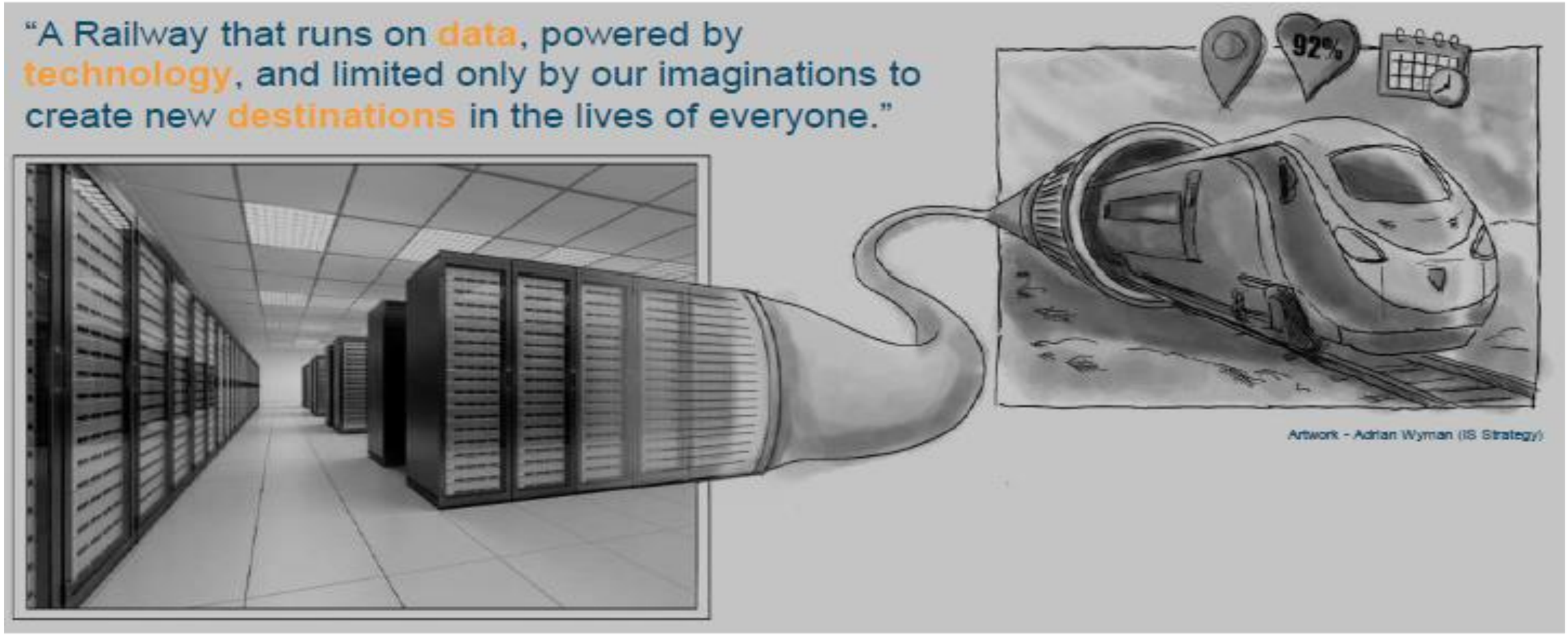
24% of UK Infrastructure Spend

Digital Strategy

Digital Strategy | Moving To Digital

IT Vision

A Vision for Network Rail's Information Technology…



Digital Strategy | Moving To Digital

Customer First

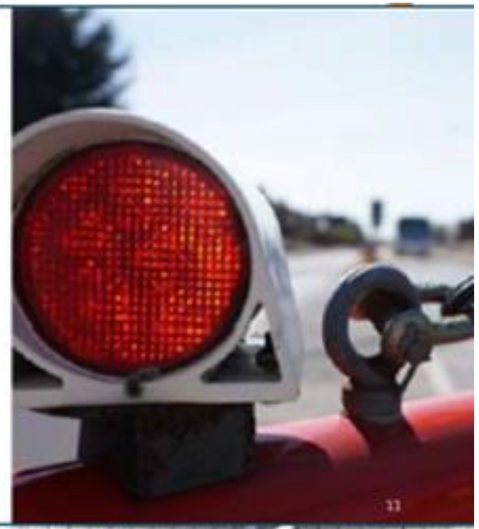
Great customer experience at every touchpoint with IT helps people exceed their goals. This starts with truly understanding the customer.

Route Services

Safe and Secure

When critical decisions are made every day, Security and Safety go hand in hand. IT helps by protecting NR's data from threat and supporting safety decisions through IT automation and data insights.

Route Services



Powering NR's Data

The railway runs on business decisions using data accessed through IT. Great data and great IT reinforces confidence in the decisions we make every day.

Route Services

Connecting the Railway

IT provides access to NR's data and processes that connect individuals, teams and industry partners. These "electronic contracts" enable NR to transact in the digital age.

Route Services

Digital Strategy | Moving To Digital

Always On

The Railway does not sleep and neither should IT. This means IT designed for continuous service operation.

Route Services

Whole System

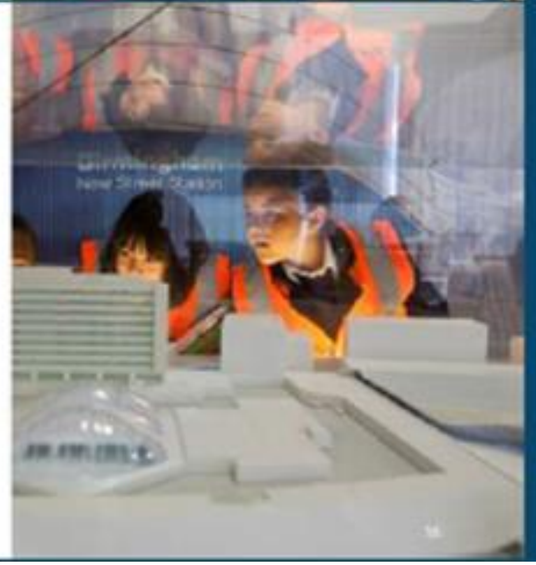
IT is part of a complex business and technology ecosystem. IT changes must be made with clarity of accountability and deep understanding of potential chain of events.

Route Services

Build on Ideas

Reuse of ideas and technologies helps keep costs down, reduce complexity risks and helps NR achieve its objectives faster.

Route Services



Speed and Scale

IT must think big, but start small. This means spending wisely and delivering value in small steps that can then scale to enterprise proportions.

Route Services

Digital Strategy | Moving To Digital

Business Challenges

Business Challenges

As part of the token flex model for Autodesk applications:

- Users request products which are then installed on their assets
- Takes a lot of time to package the software and takes up a lot of disk space on assets
- Sharing and downloading files and designs takes a significant amount of time to complete which slows down efficiency across the design community.

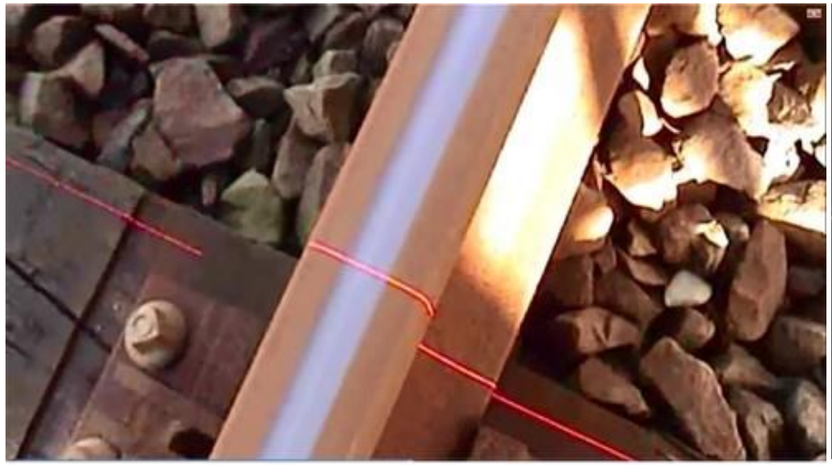
Business Challenges

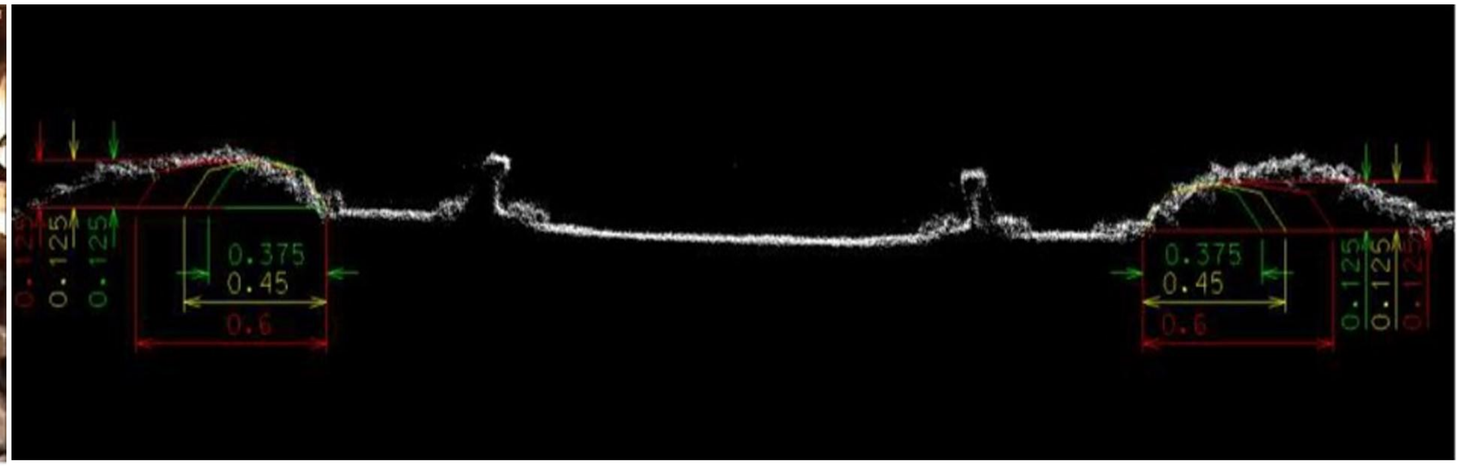
Survey collection methods

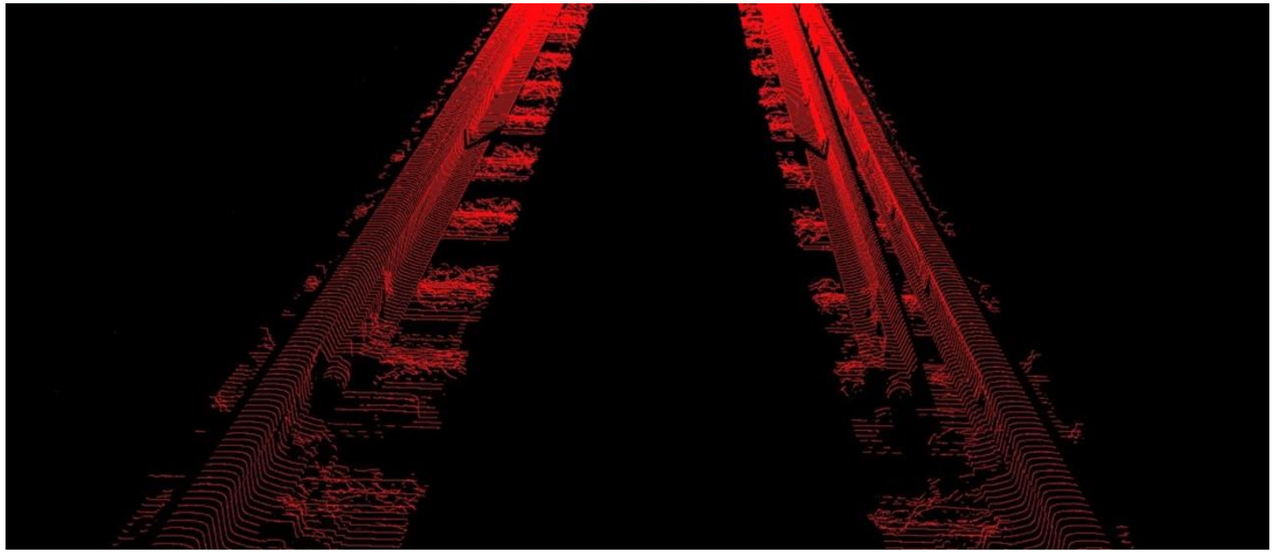
- Constantly gathering and collating data from the field
- Many different survey methods
- Petabytes of data

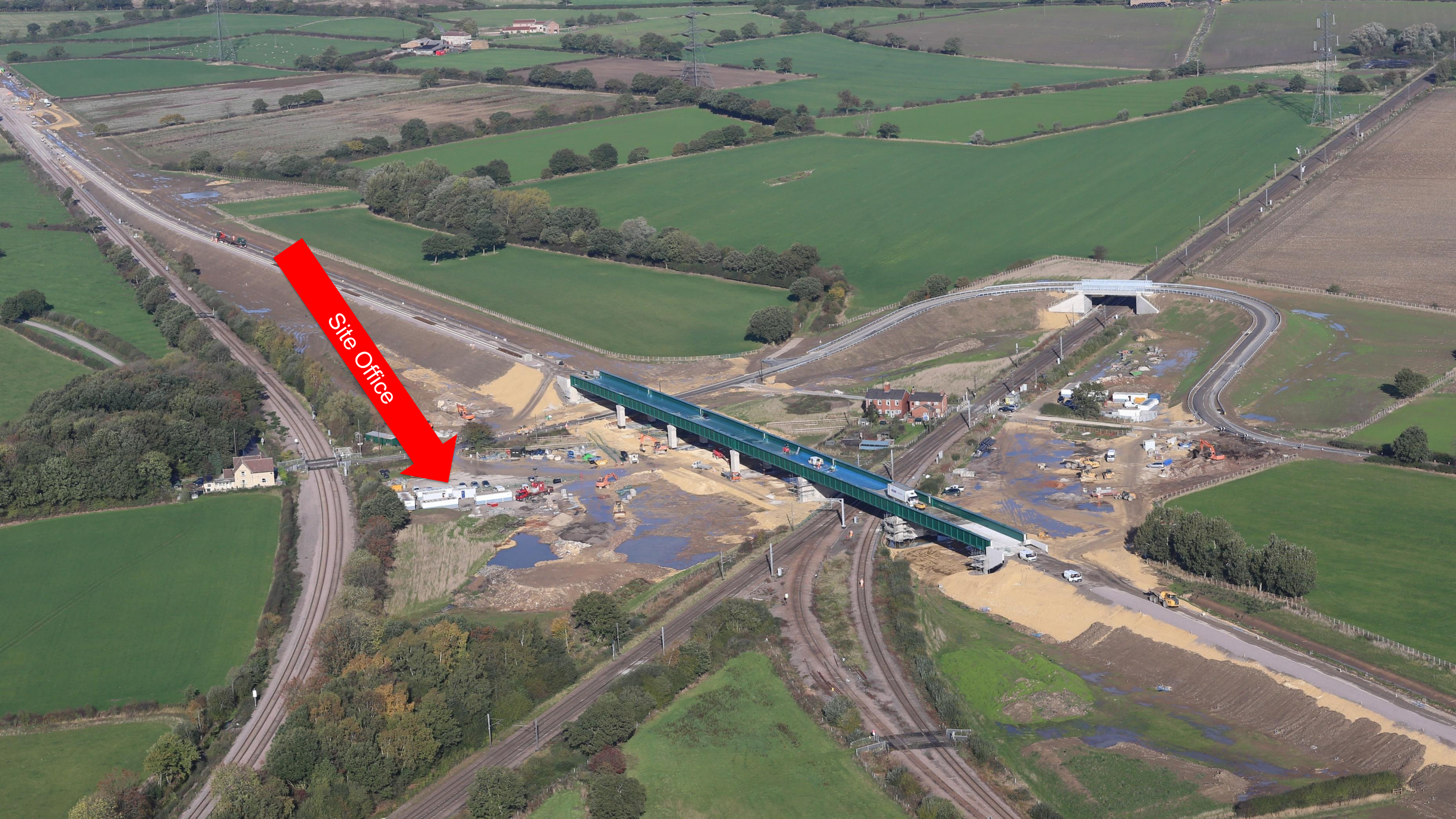
Business Challenges

Business Challenges








Site Office

The Work Package

The approved work package requests for a new Digital Workspace and Point Cloud Work-sharing; **a custom software development** which will consist of using API’s integrated with Microsoft Azure which will **provide the end users with a user interface** and workflow to exchange Recap Cloud Models with an Azure blob storage so that **users can collaborate faster**.

The Primary reason to implement this Digital workspace and Point Cloud Work-sharing is to **improve efficiency and effectiveness within the design delivery groups** and collaborative working among users internally and the supply chain.

The Work Package | What Are The Business Objectives?

Work package sets out the following business objectives:

- Reduce internal hardware and software overhead costs
- Remove the need to deploy software thus reducing the time to make newer versions available to the end user, thus increasing productivity
- Reduce the time to make newer versions available to the end user
- Increase collaboration by allowing multiple users to access data concurrently

Key issues the project will address:

- **Deployment of software on the assets** and the time to make newer version available to the end user
- Need to c**onnect the digital workspace with the Network Rail CDE**
- Limitation on the **storage capacity for data** (e.g. survey files etc.) and the limited backup routine
- Duration it takes for users to upload and download files
- Need to free up local hard disk space on assets
- Allowing the users to **work collaboratively**

The Work Package | What Are The Project Objectives?

The objectives identified for the project are to:

- Provide an efficient way of storing files and documents in the cloud
- Reduce internal storage and associated costs
- Increase / improve collaboration by allowing multiple users to access data concurrently - > ratio from 1:1. removing duplication of data in current process - reduction in courier costs - risk of lost data - cost of USB stick - compliance with IT Data Security policy
- Enhance how users catalogue and search for information
- Provide easy access to the entire Autodesk suite of application (not just the ones we currently have under the token flex model) through the cloud
- Provide integration with other systems e.g. ProjectWise and SharePoint
- Eliminate the need to deploy software and reduce the time to make new versions available to the end user
- Eradicate legacy and decommissioning
- Improve team collaboration

The Work Package | The Expected Business Benefits

Business benefits:

- Improved the passenger experience
- Improved business performance
- Reduced software packaging and installation rollout costs
- Reduced internal storage
- Reduced risk of losing files (by improving back up schedules)
- Improved times in downloading and accessing point cloud data from ProjectWise
- Increase collaboration by allowing multiple users to access data concurrently
- Removed data duplication
- Integration with other systems such as SharePoint and ProjectWise.
- No long-term legacy and decommissioning exercise required.

The Work Package | What Are The Project Acceptance Criteria?

The output that will be delivered to the user includes but is not limited to:

- Access in the cloud
- Speed of application usage (opening applications)
- Design creation and storage
- Reduction in internal storage
- Time to download and access Point Cloud data
- Increase collaboration allowing multiple users to access data
- Increase capability to catalogue and search for information
- Integration with Bentley and SharePoint

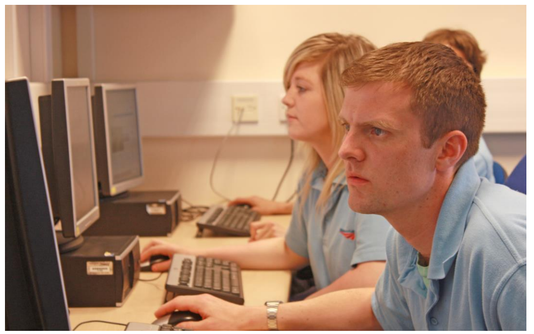
What A Good Solution Looks Like

What A Good Solution Looks Like | Enterprise Perspective

- I want to mitigate commercial risk.
- I want to reduce IT overhead costs in packaging and deployment.
- Deliver services to my business in a fast and timely manner.
- Reduce to cost of storage.
- Maintain end user satisfaction.
- Provide a truly digital experience to my business.
- Security and data protection.
- Reduce hardware costs.

What A Good Solution Looks Like | End User Perspective

- I want to experience fast access to point cloud data.
- I don’t want to wait weeks or months for new software to be packaged and delivered to my desktop.
- I want a high performance workstation – Tired of waiting or my workstation crashing.
- I want fast access to project data that is reliable and shared with project participants.
- I want the same performance from the site, office or home working.
- Enable project teams with technology within minutes.

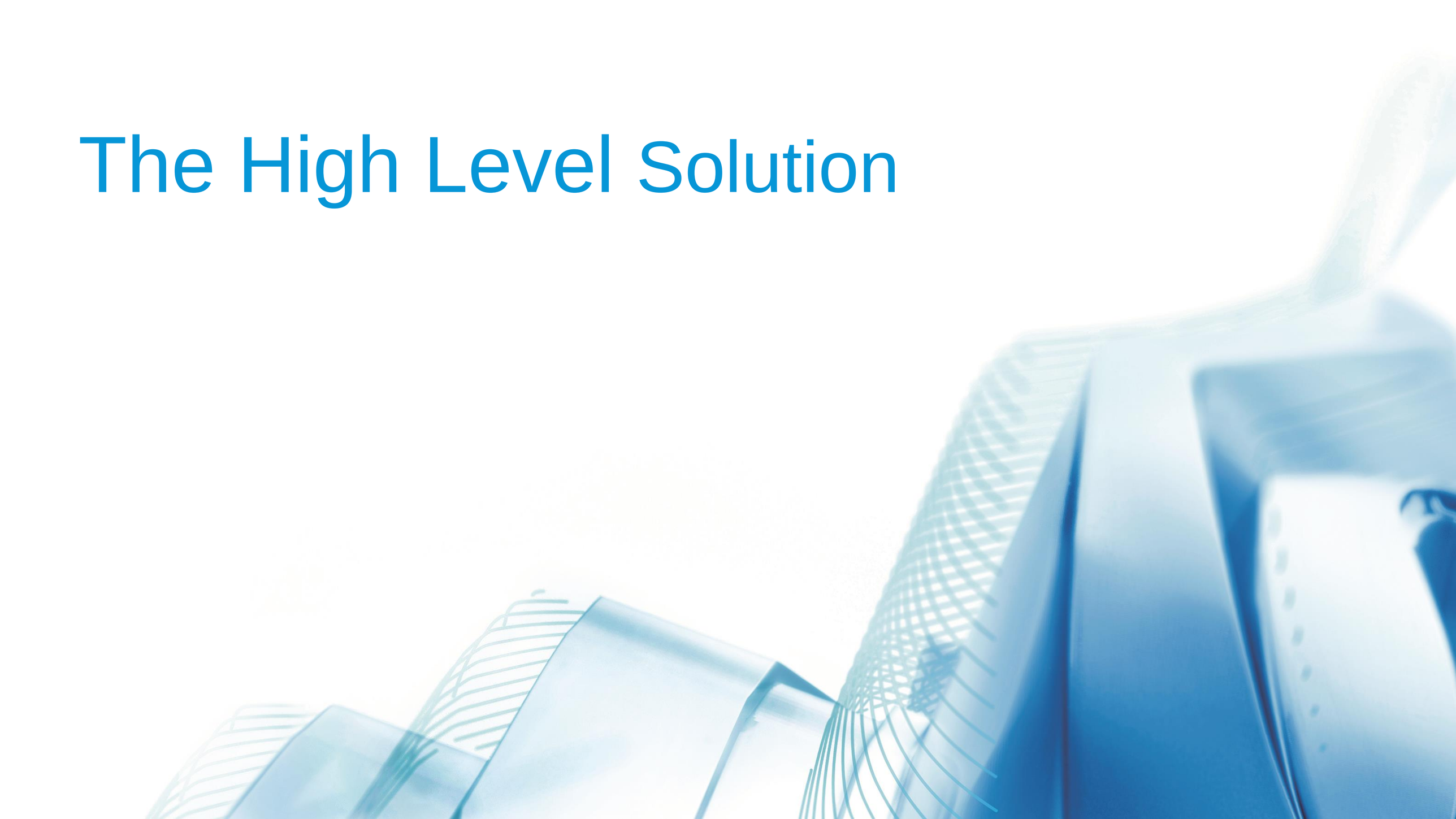


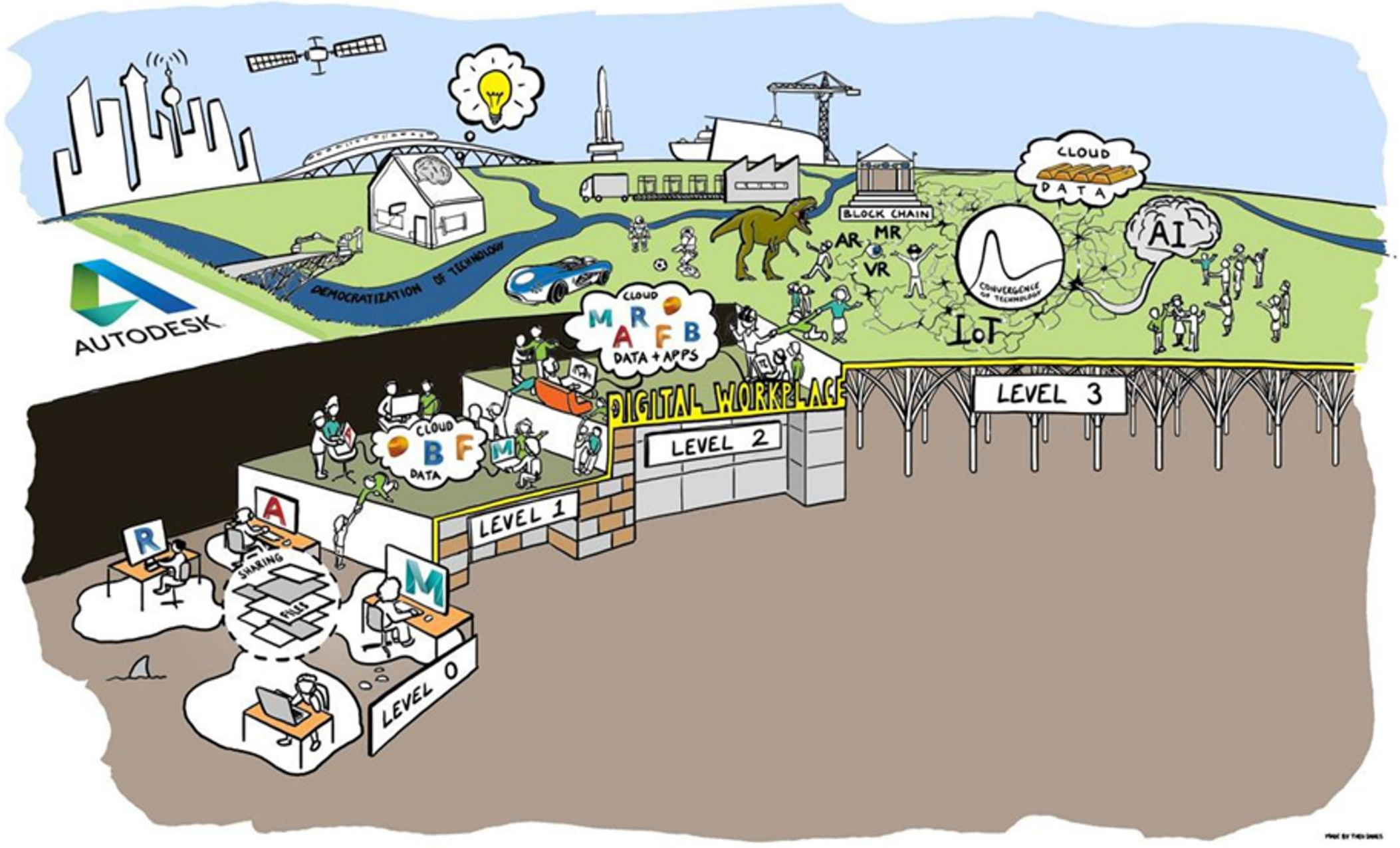
Your point cloud will be with you in a few hours

What A Good Solution Looks Like | End User Perspective

- Application
- Platform
- Infrastructure

The High Level Solution

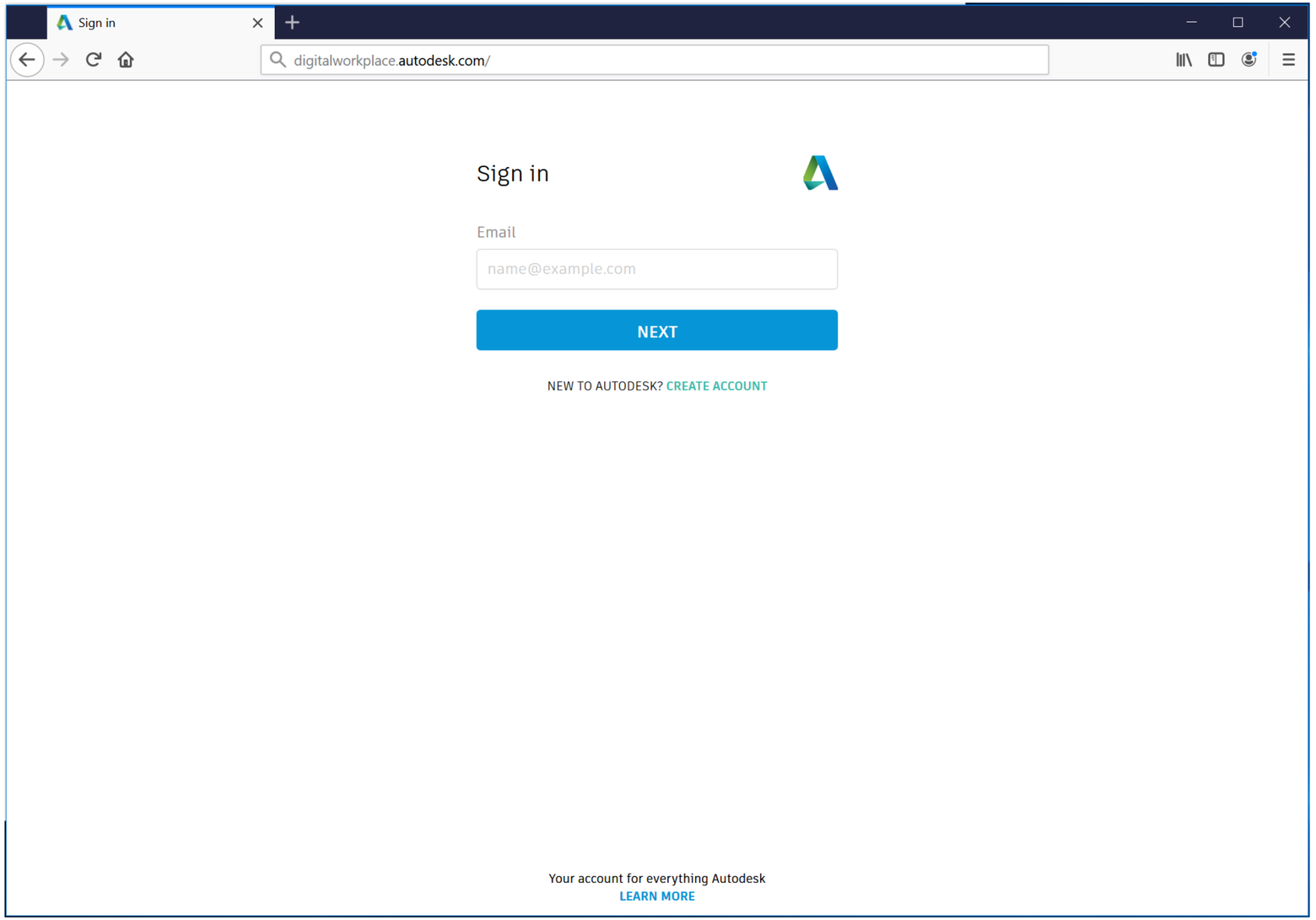



AUTODESK
DEMOCRATIZATION OF TECHNOLOGY
CLOUD
DATA
BLOCK CHAIN
AR
MR
VR
CONVERGENCE OF TECHNOLOGY
IoT
AI
CLOUD
M R
A F B
DATA + APPS
DIGITAL WORKPLACE
LEVEL 3
LEVEL 2
CLOUD
B F
DATA
LEVEL 1
A
R
M
SHARING
FILES
LEVEL 0

AUTODESK®
DIGITAL WORKPLACE

- Provides access to a workplace in the cloud with the ability to consume Autodesk desktop applications in a SaaS-like environment.
- The service is connected to Autodesk's data platforms (Forge, BIM 360, Fusion 360) and provides a superior user experience for Autodesk applications on many connected devices starting from Raspberry Pi to a iPhone, Android phone, iPad, Mac Book or normal PC anywhere in the world.
- **Early adoption phase**

Product Overview | Login experience



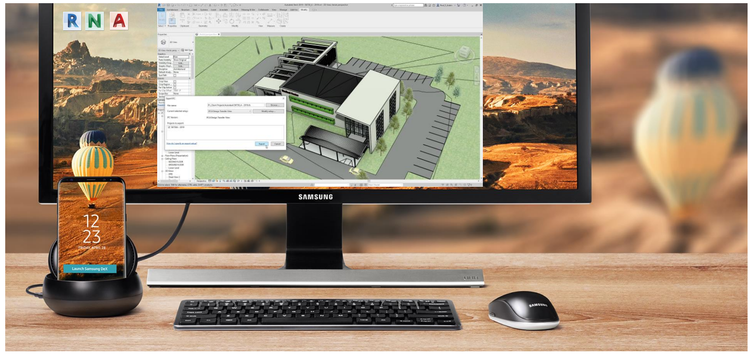
Supported SSO Provider:

ADFS

Ping Identity

okta

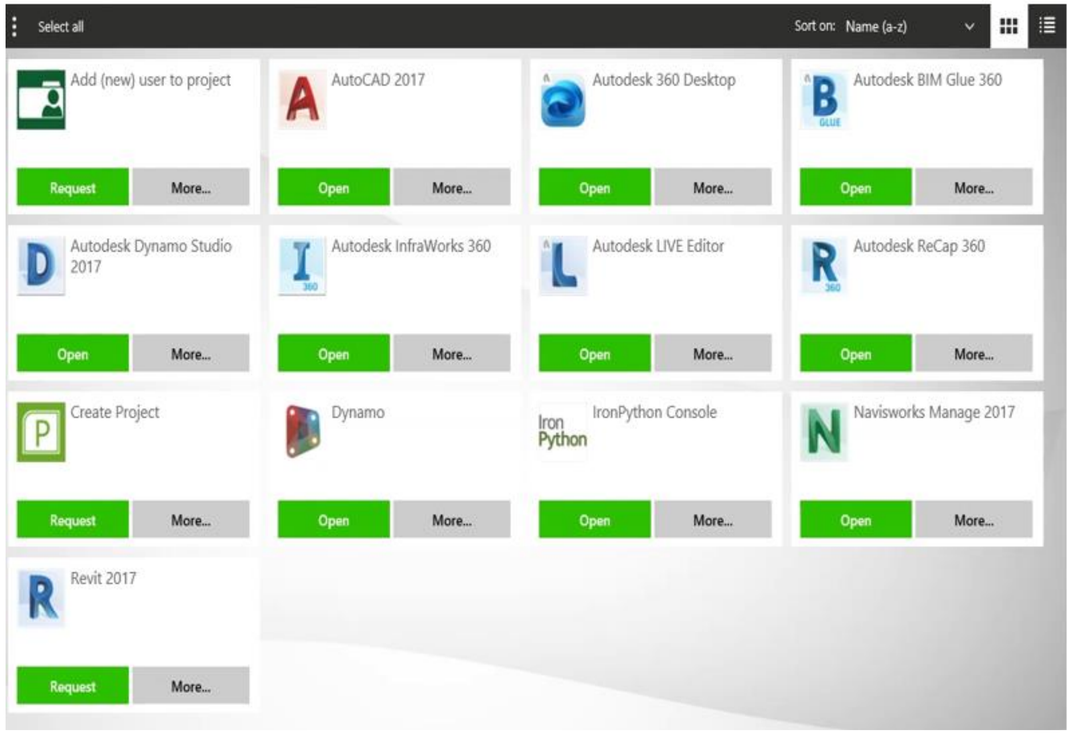
Product Overview | Multiple devices and mobility



Product Overview | Consume services as an online store

Flexible management

- Users consume applications, services, plugins, etc.
- (Admin) roles to automatically assign plugins, templates, …



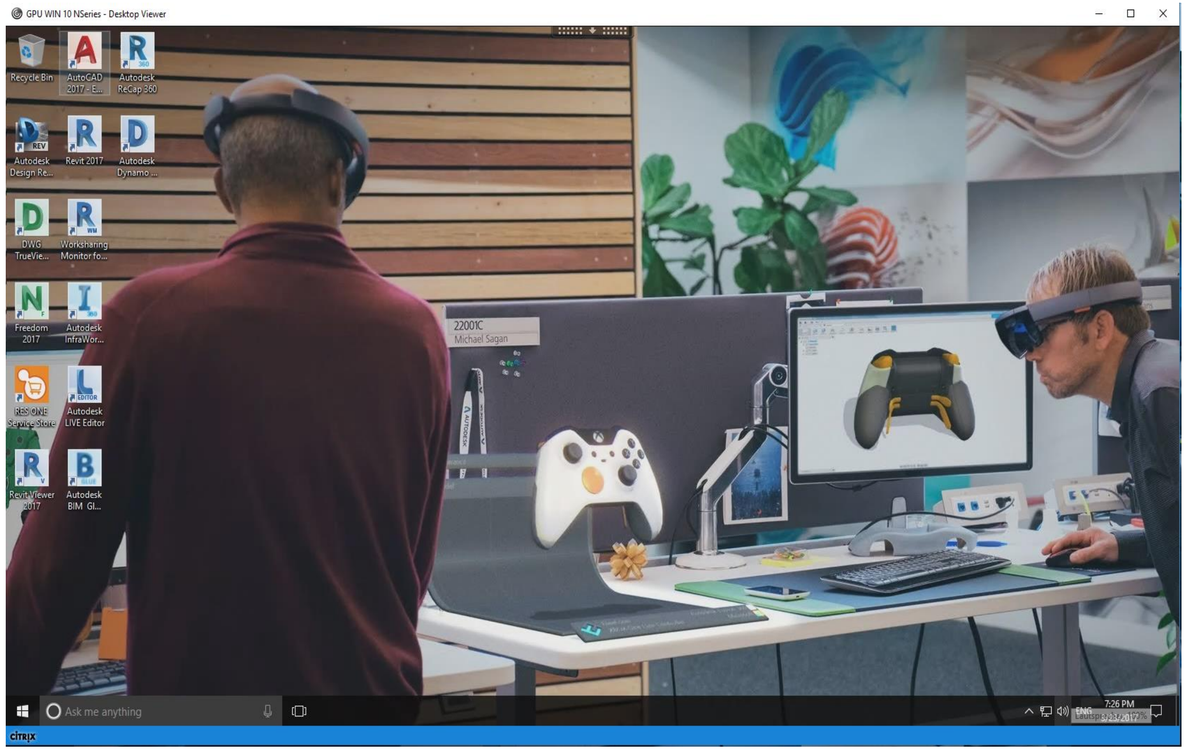
Product Overview | Desktop products enabled

Desktop-Applications

- 3ds Max
- Advance Steel
- AutoCAD
- AutoCAD Architecture
- AutoCAD Civil 3D
- AutoCAD Electrical
- AutoCAD Map 3D
- AutoCAD Mechanical
- AutoCAD MEP
- AutoCAD Plant 3D
- Dynamo Studio
- InfraWorks 360
- Inventor Professional
- Maya
- NavisWorks Manage
- NavisWorks Simulate
- Point Layout
- Recap 360 Pro
- Revit
- Robot Structural Analysis Professional
- Structural Bridge Design
- Vault Office
- Vault Professional

Product Overview | Digital desktop

Digital Desktop & Autodesk desktop applications installed



Machine configuration:

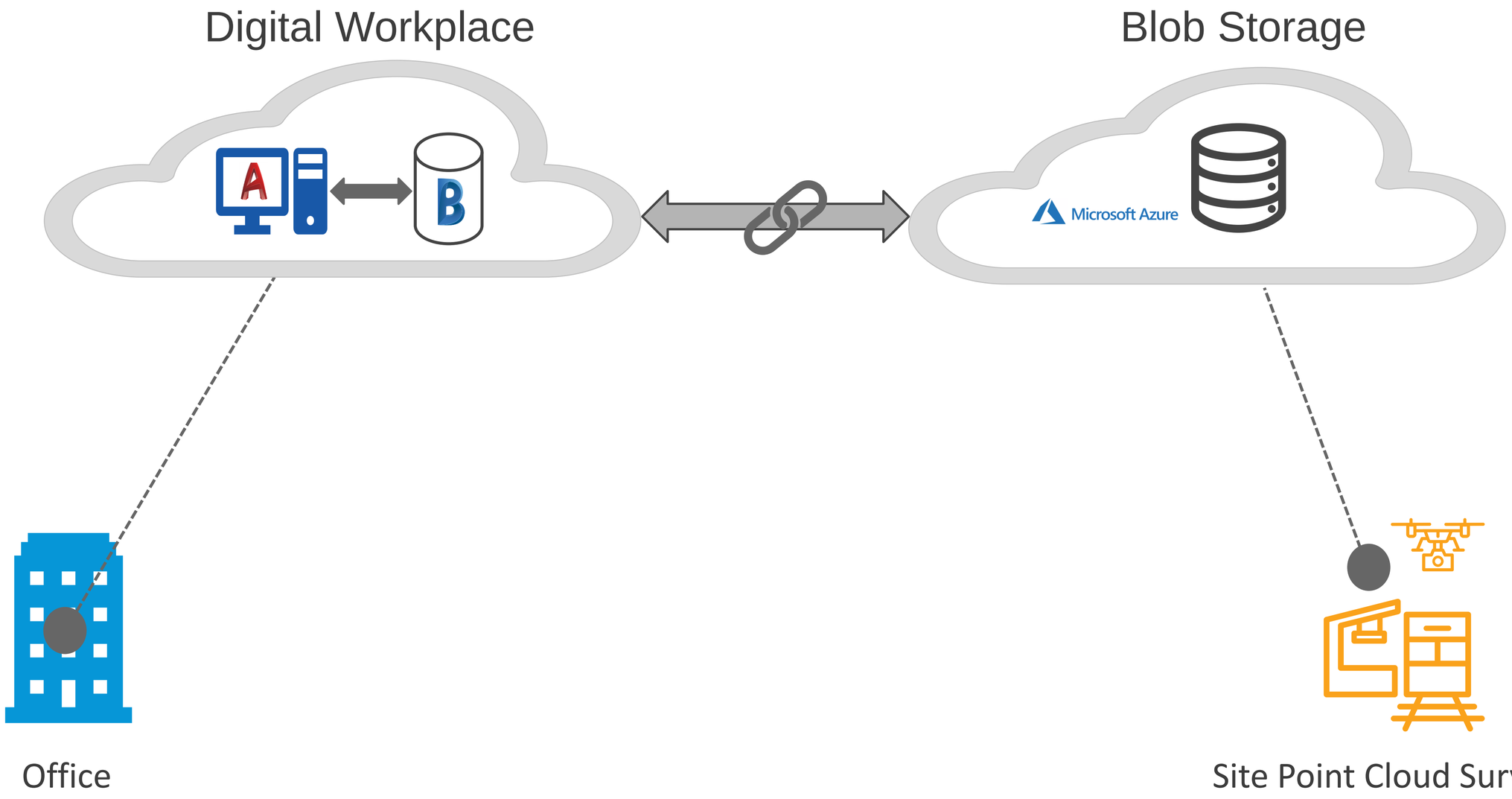
- Windows 10
- 12 VCPU
- 112 GB RAM
- NVIDIA GRID M60
- 500 GB SSD

Region


Soon available
Soon available
Digital Workplace Region
Digital Workplace Edge Site

The Detailed Solution

The Detailed Solution | Point Cloud Work Sharing



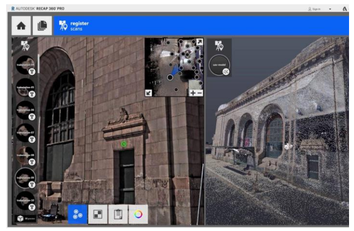
The Detailed Solution | Scan2BIM Workflow

Laser Scanner / Drone

Azure Blob Storage

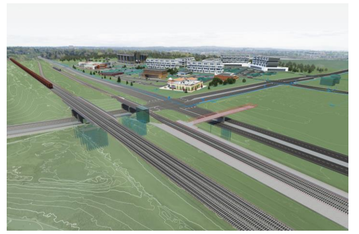
AUTODESK DIGITAL WORKPLACE

Register the point cloud



Create BIM Model

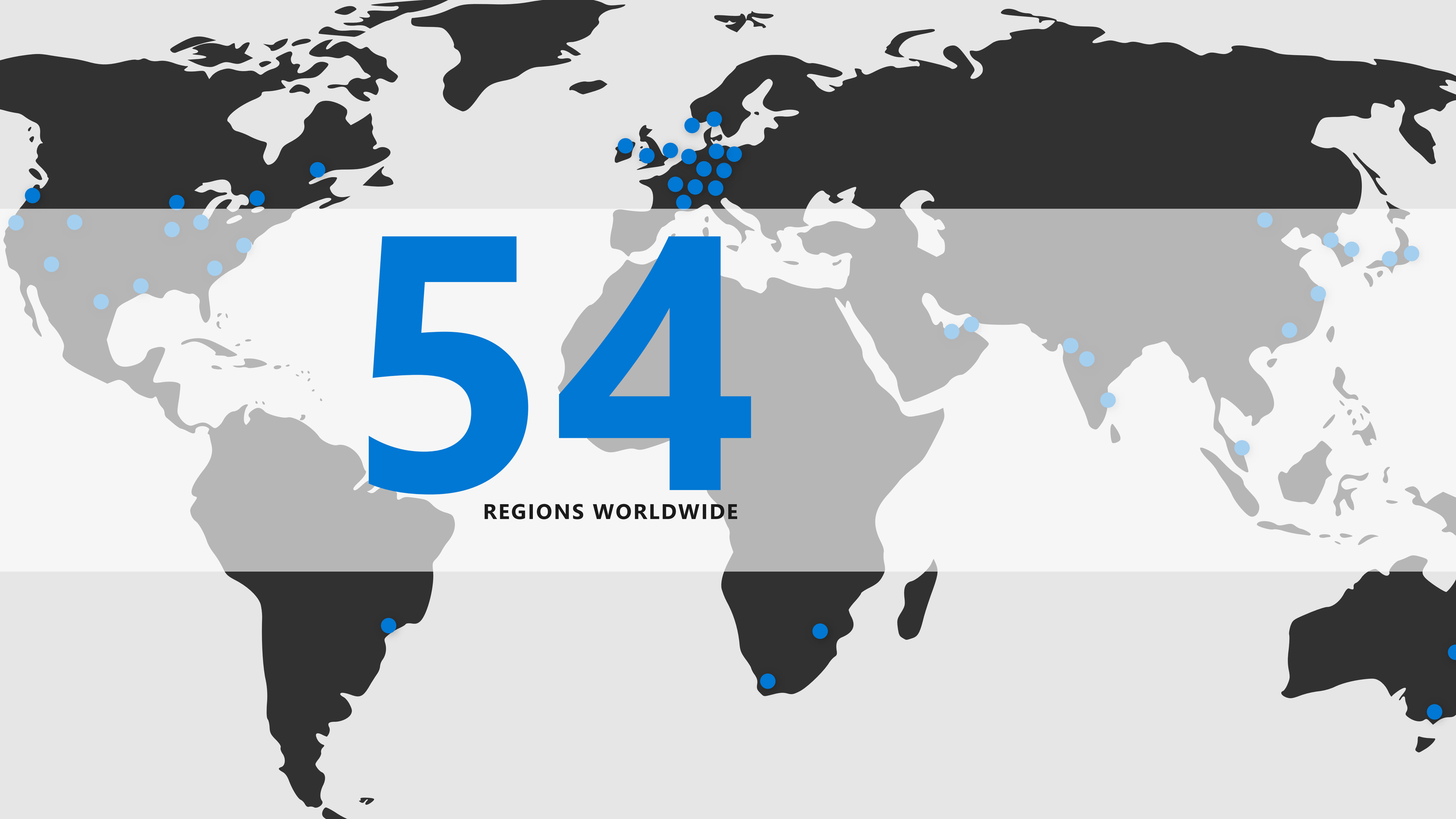
Pre-Processing



BIM 360

Surveyor

BIM Modeler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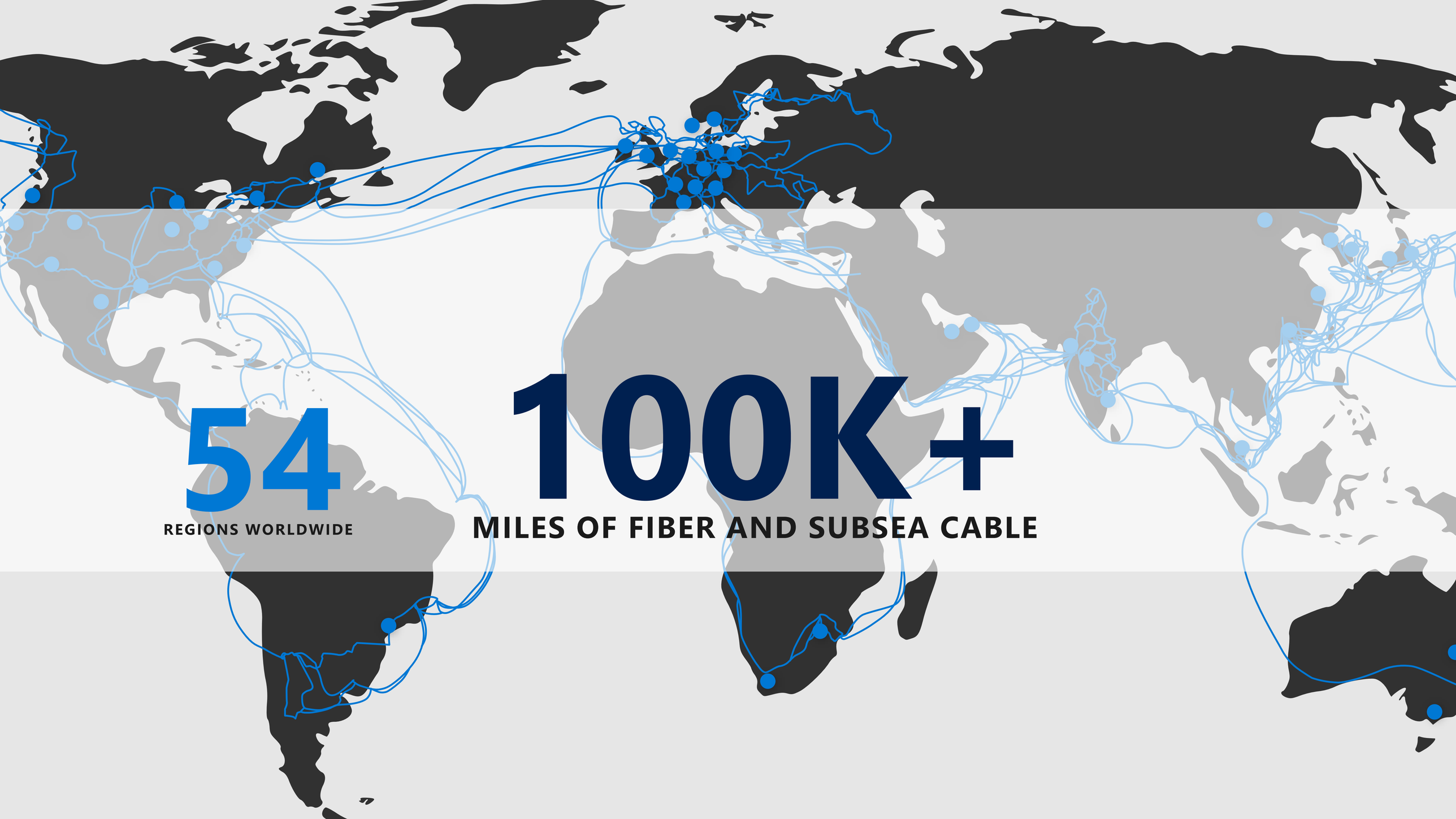
REGIONS WORLDWIDE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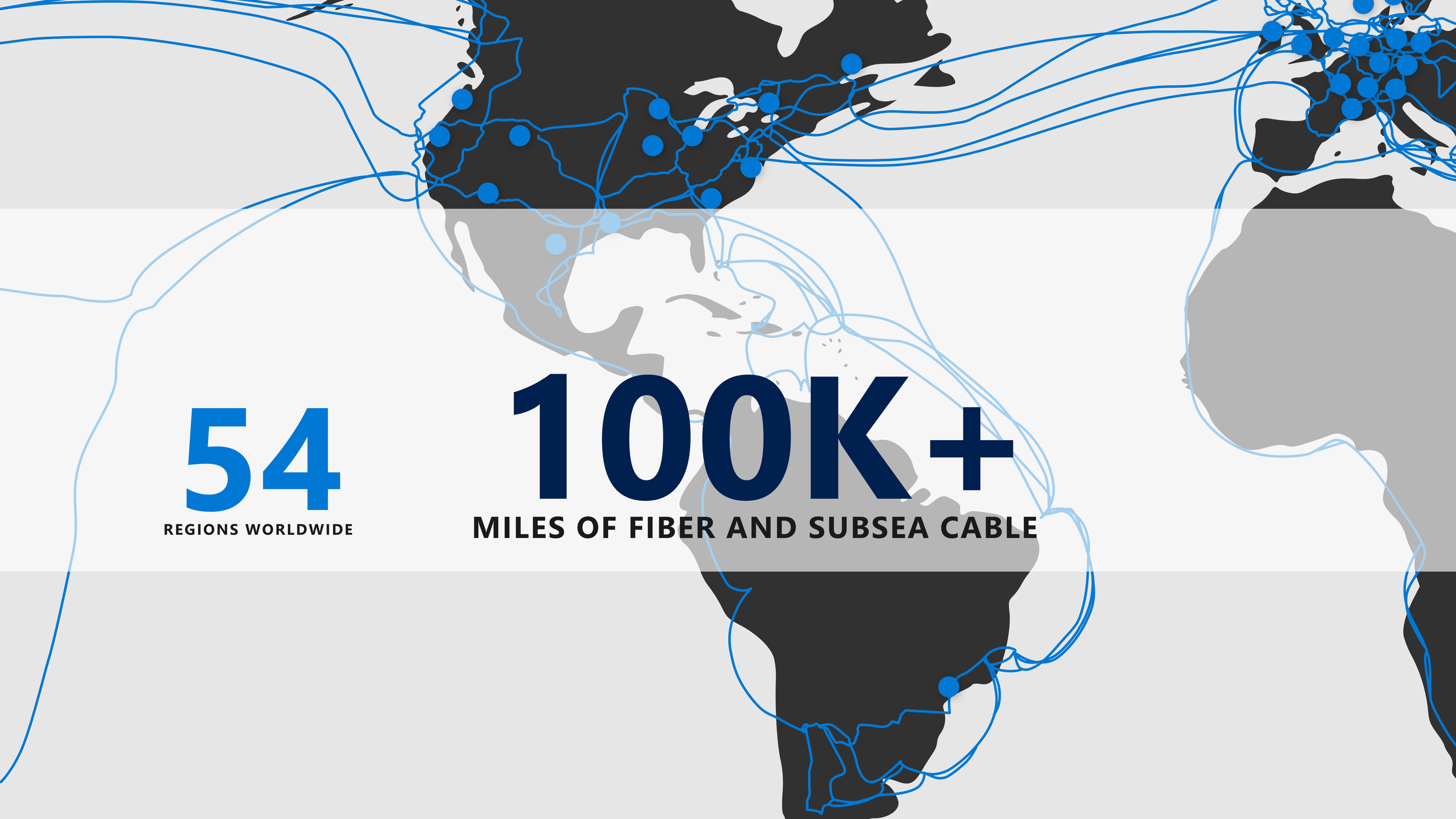
REGIONS WORLDWIDE
100K+
MILES OF FIBER AND SUBSEA CABLE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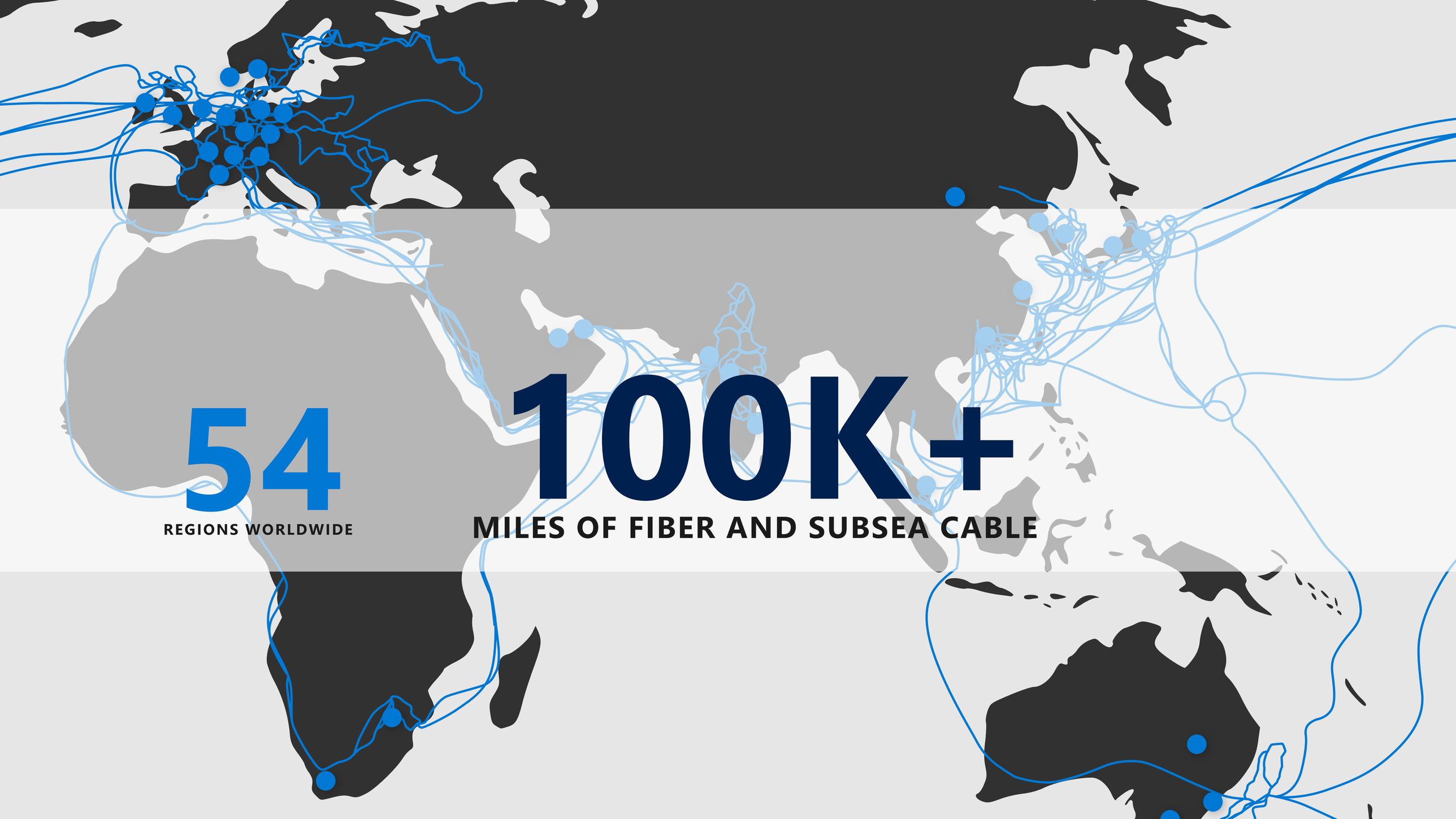
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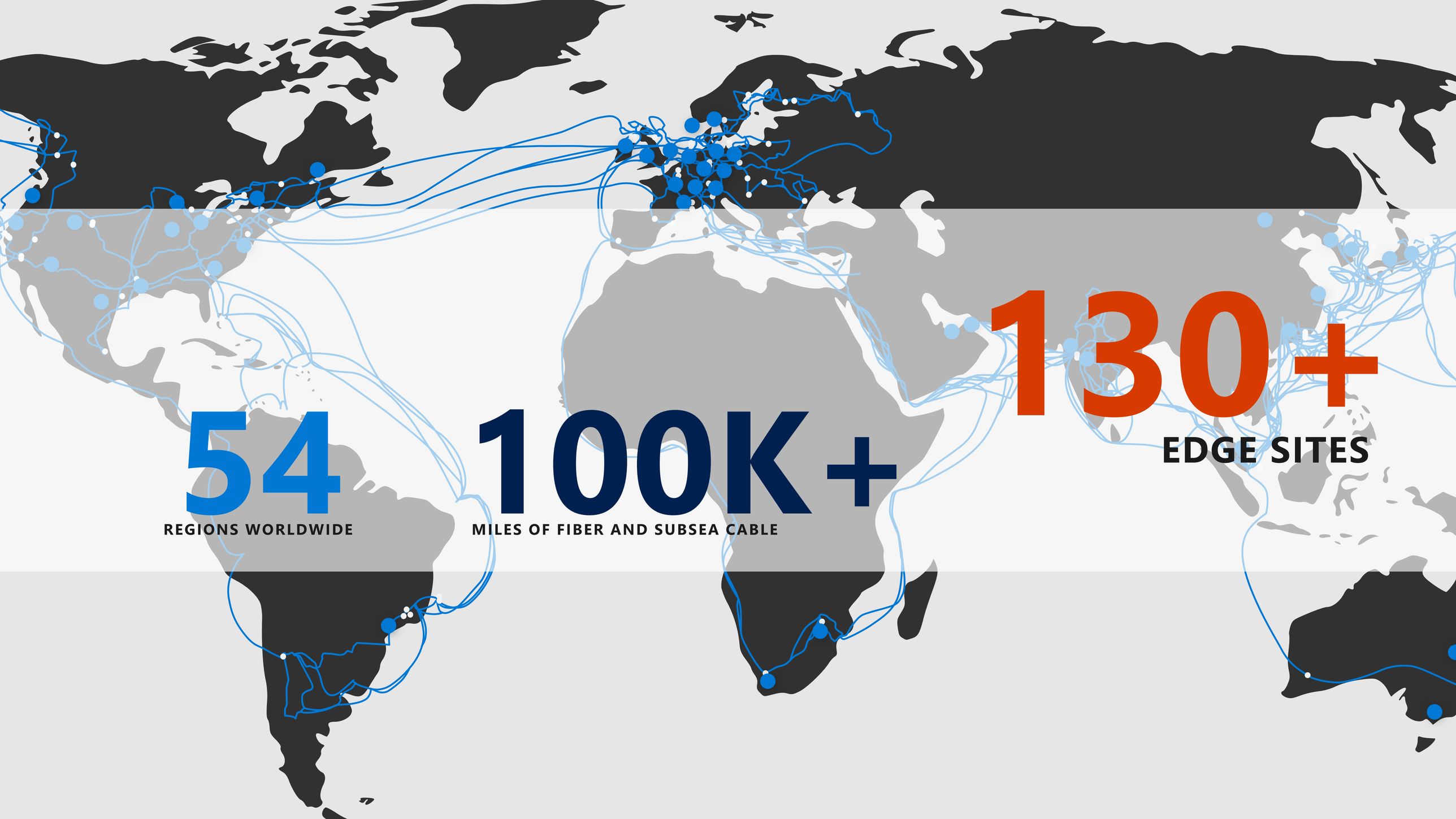
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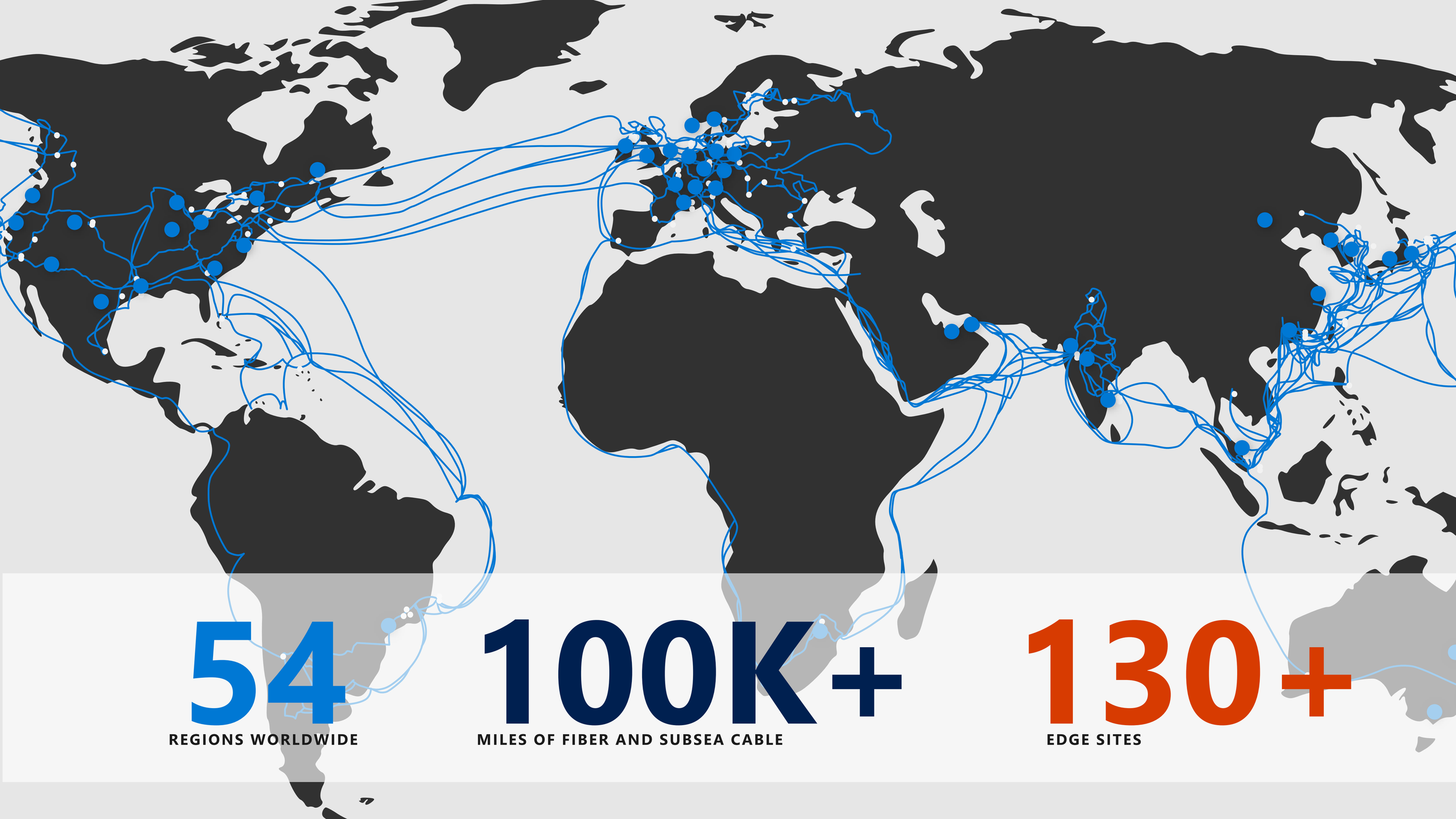
REGIONS WORLDWIDE
100K+
MILES OF FIBER AND SUBSEA CABLE
130+
EDGE SITES



54
REGIONS WORLDWIDE

100K+
MILES OF FIBER AND SUBSEA CABLE

130+
EDGE SITES

What Is Azure?

Edge Devices

Azure Stack | Azure Data Box | Azure Sphere | Azure Kinect | HoloLens

Serverless

Web
Mobile
Mixed Reality
Containers
Events + Integration

Databases
Analytics
AI + Machine Learning
Internet of Things
Media

Infrastructure

Compute | Networking | Storage | Security | Identity

Tools

Visual Studio
GitHub
PowerApps
Power BI

Azure Provides Best In Class Performance

Compute performance

960
CPUs

Largest in public cloud

Memory

24
TB RAM

Largest in public cloud

Remote Storage (single disk)

160K
IOPs

Fastest in public cloud

Local storage

3.7M
IOPs

Fastest in public cloud

File storage

100K
IOPs

Fastest in public cloud

VM-VM Networking

30
Gbps Ethernet

100
Gbps InfiniBand

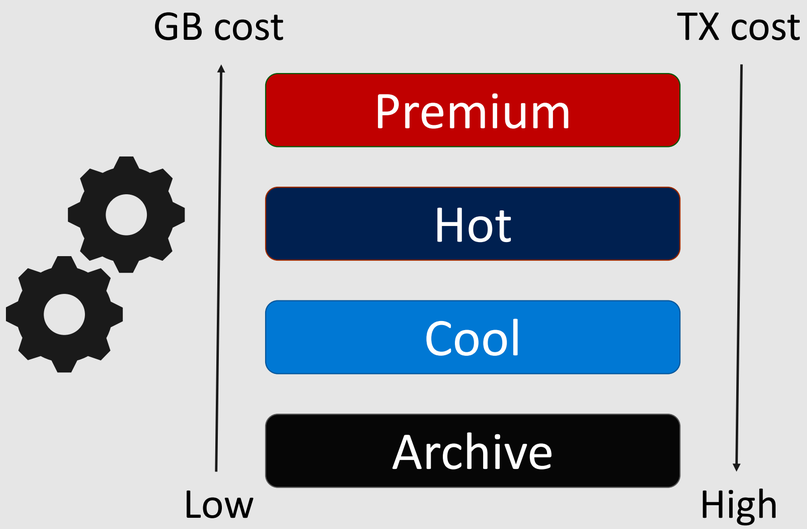
Fastest in public cloud

Hybrid Networking

100
Gbps Connectivity

Fastest in public cloud

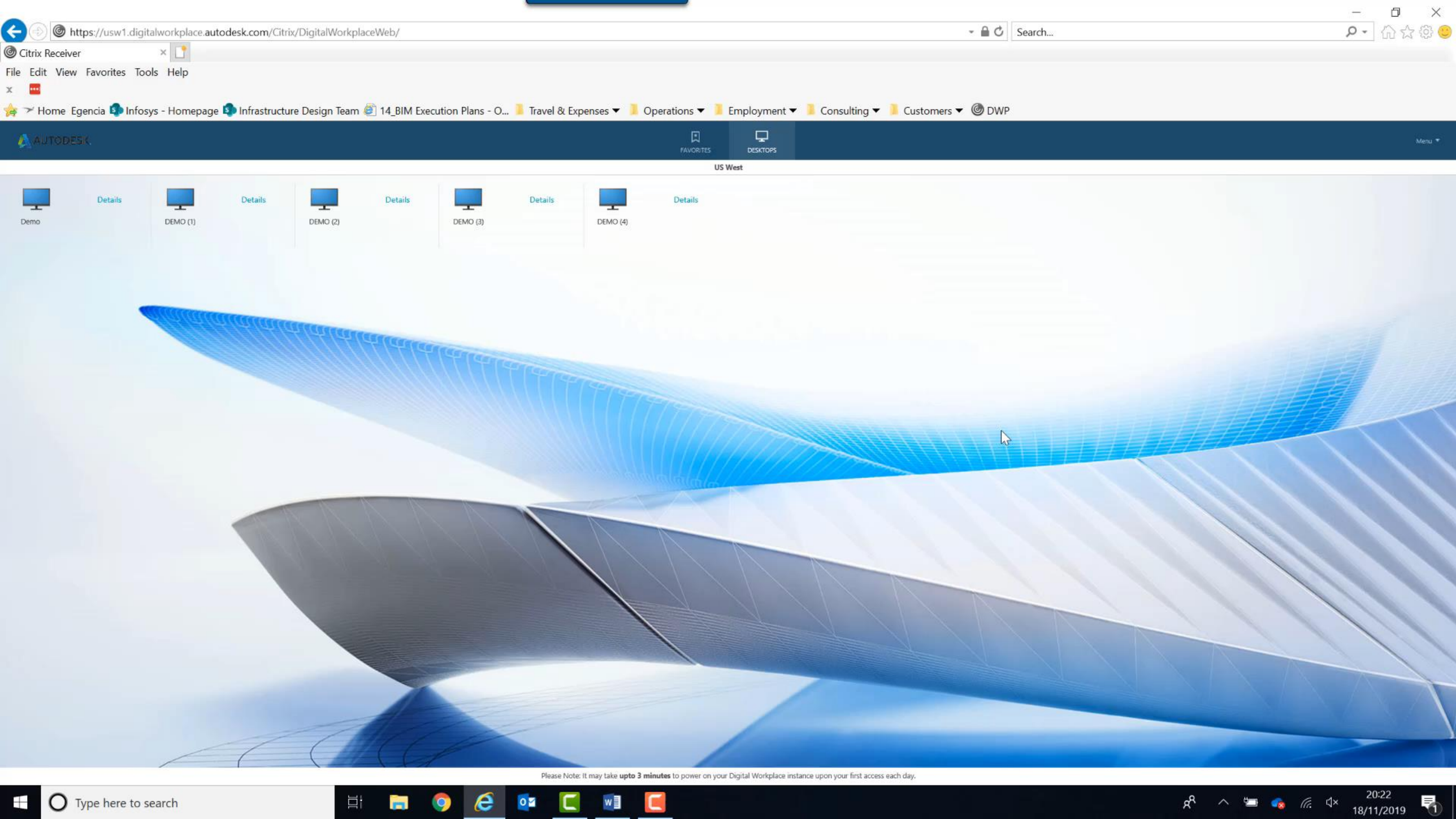
Azure Blobs



Azure Blob Storage tiering with Lifecycle Management

Account and Object	Current	
	Default	Max Limit
Accounts per region per sub	250	250
Account capacity (LRS/GRS)	2PB (US, EU) 500TB (Other)	5PB
Account capacity (ZRS)	2PB (US, EU) 500TB (Other)	5PB
Account IOPS (LRS/GRS/ ZRS)	20K	50K
Account Bandwidth[1:]Ingress (LRS/GRS)	25Gbps (US, EU) 10Gbps (Other)	50Gbps
Account Bandwidth[1:]Ingress(ZRS)	25Gbps (US, EU) 10Gbps (Other)	50Gbps
Account Bandwidth[1:]Egress(LRS/GR S)	50Gbps	50Gbps
Account Bandwidth[1:]Egress (ZRS)	50Gbps	50Gbps
Max object size	5TB	5TB
Single object IOPS	500	500
Single object read	50Gbps	50Gbps
Single object write	50Gbps	50Gbps

Demo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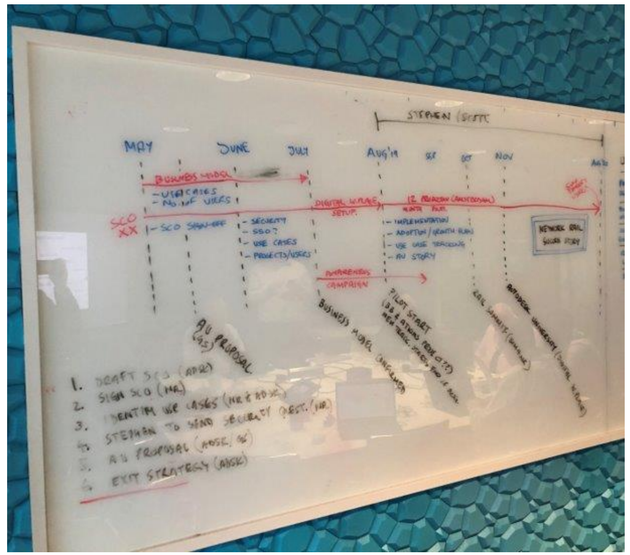
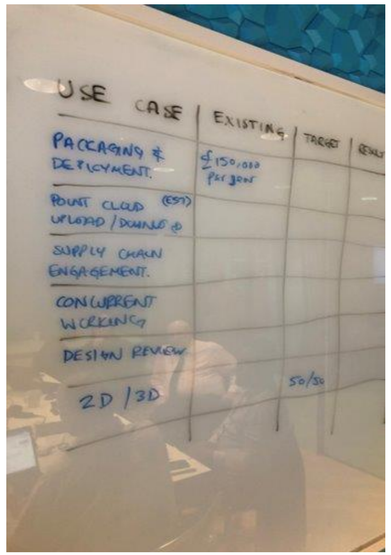
Search...
Citrix Receiver
File Edit View Favorites Tools Help
Home Egencia Infosys - Homepage Infrastructure Design Team 14_BIM Execution Plans - O... Travel & Expenses Operations Employment Consulting Customers DWP
AUTODESK
FAVORITES
DESKTOPS
Menu
US West
Demo Details
DEMO (1) Details
DEMO (2) Details
DEMO (3) Details
DEMO (4) Details
Please Note: It may take upto 3 minutes to power on your Digital Workplace instance upon your first access each day.
Type here to search
20:22
18/11/2019

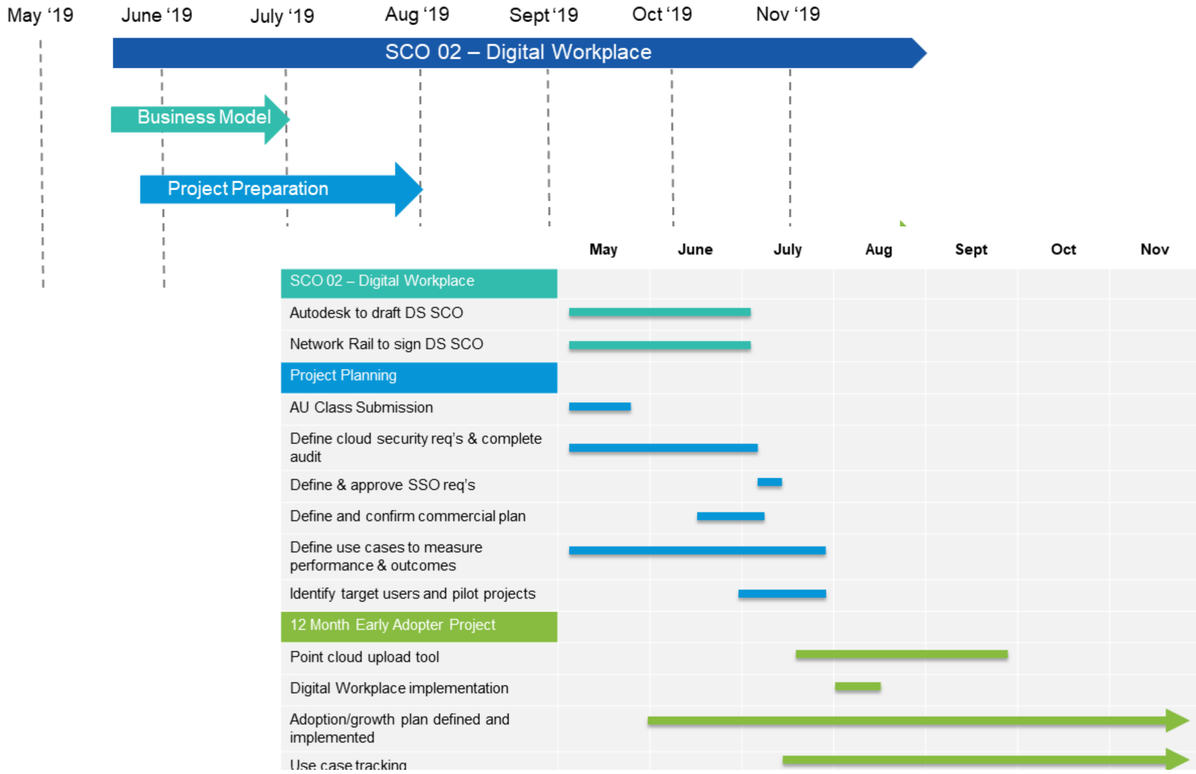
Engagement overview – Where Are We Now?

Where Are We Now? | The Project





Programme - Overview

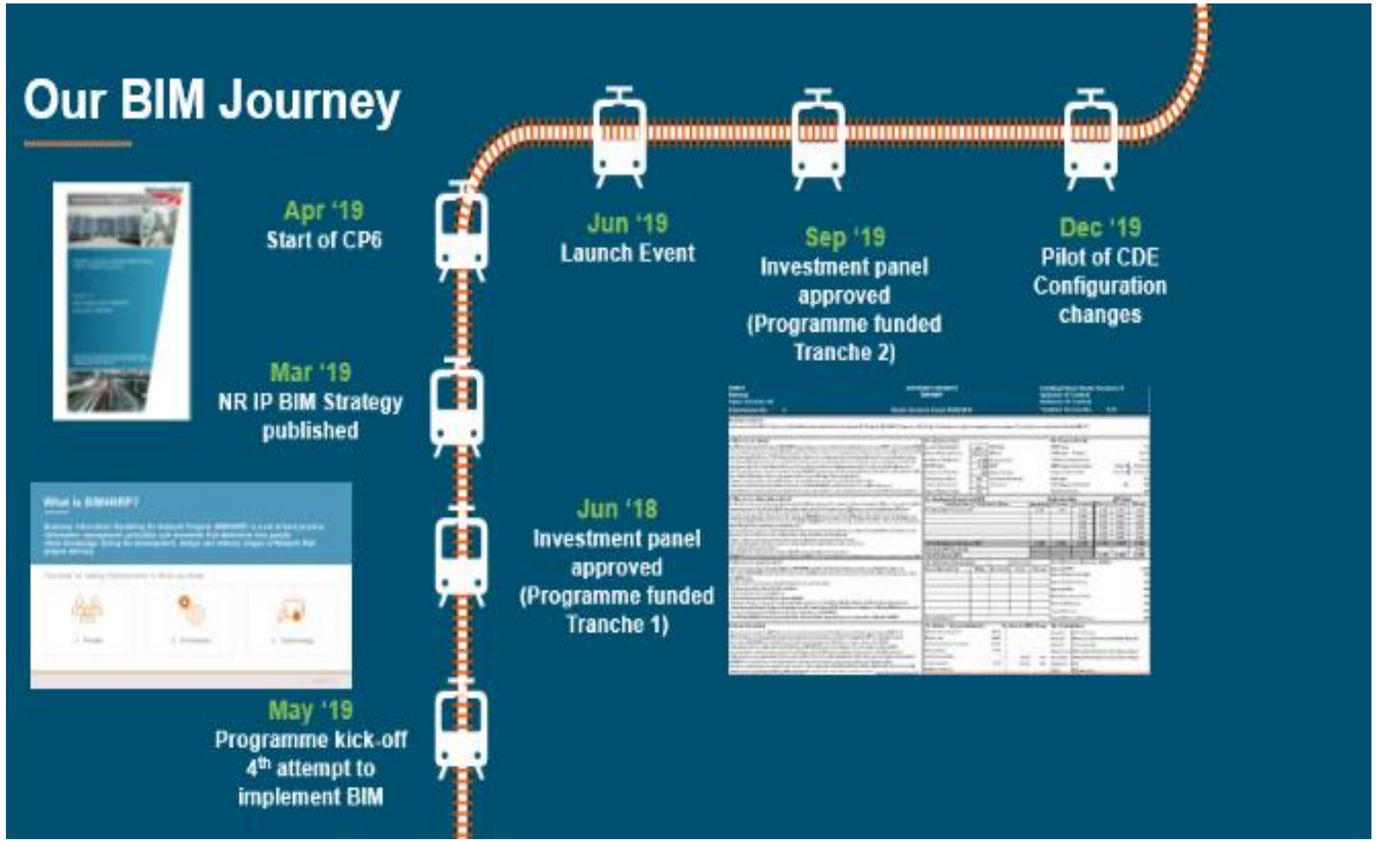


Where Are We Now? | The Businesses Technology Requirements

- Interoperability
- Functionality
- Flexibility
- Safety
- Information Security
- End User

Where Are We Now? | Project Deliverables

- Engagement steps and tasks
  - Discovery about needs and data types
  - Solution proposal
  - Solution design (current phase)
  - Deployment
  - Demonstrate stage incl. benefits realisation plan



Where Are We Now? | How Will It Work?

BIM is an internationally recognised best practice way of working

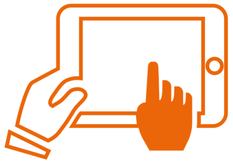
BIM4NRP focusses on making improvements in 3 key areas:

1. People

Training modules, support for implementation and dedicated champions in each of the Routes and NRDD.

2. Processes

Optimising existing processes, creating new ones where required and embedding them in existing core systems (i.e. GRIP, IMS etc.).

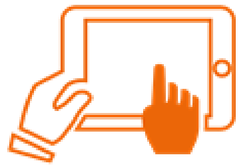


3. Technology

Using technology to make it quicker and easier for us to share information.

Things to Take Away From The Class

- Putting Passengers First - From construction engineers to project delivery specialists; from architects to accountants
- Digital Workplace transformation: A solution that offers significant benefits to the IT service AND the users
- Importance of working together to Know the business and understand their requirements
- BIM4NRP a smarter way to work: All about People, Processes and Technology



Q&A

Thank you