OCT 2021

Technology & Data: Technology Strategy 2021
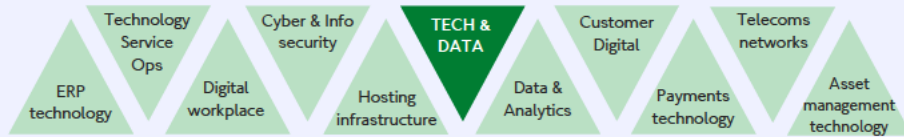
The T&D Technology Strategy 2021

The strategy…

…is driven by technology capabilities which Technology & Data are responsible for:

- ERP technology
- Technology Service Ops
- Digital workplace
- Cyber & Info security
- Hosting infrastructure
- **TECH & DATA**
- Data & Analytics
- Customer Digital
- Payments technology
- Telecoms networks
- Asset management technology

…enables

**MAYOR'S TRANSPORT STRATEGY
TFL PRIORITIES
COVID-19 RESTART AND RECOVERY**

…has challenges:

1. Legacy technology
2. Inconsistency across TfL
3. Desire for emerging technologies
4. Malicious cyber threats
5. Financial and resource constraints

Our commitments

Technology enabled workforce	Informed customers	Seamless payments	Infrastructure that works	Secure and resilient	Data driven technology design
We provide the technology tools our people need to do their jobs at the front line, in head offices and from home	We deliver the digital experiences that help customers make informed and safe transport choices	We manage daily revenue collection processes and technologies to ensure we can reliably collect our revenue every day whilst ensuring they continue meet the changing needs of our customers and operations	We provide our people and customers with infrastructure that is cost effective, secure and simply works	We make sure technology is sufficiently secure and resilient to collapse, attack and quick changes in demand, and that our customers and operations are confident of that fact	We adopt technology that is focused on making data available and accessible for decision making

… and all with TfL's financial constraints in mind.

Our delivery principles (how we'll do it)

FOCUS ON BUSINESS OUTCOMES	CONSOLIDATE AND STANDARDISE	REUSE	START SMALL, PLAN BIG	SAFE, PROTECTIVE, RESILIENT	PROTECT OUR COMMERCIAL POSITION	RISK MANAGED
• Listen to business needs and take colleagues on the journey • Our teams will help you shape appropriate and cost effective technology-driven solutions	• Consolidate multiple systems • Standardise technologies, use industry standard products and opt for off-the-shelf where possible • Avoid bespoke solutions • Decommission unused systems	• Be resourceful with the technology we have already bought or built • Challenge the need to buy new kit or software	• Use feedback from regular contact with users to inform new requirements • Start with the Minimal Viable Product • Buy and build solutions in an iterative manner	• Keep technology up to date consistently • Protect our customers, staff and business integrity • Continually find ways to withstand failures and attacks	• Manage contracts to keep whole life costs down • Agree option prices before entering into contracts to keep variation costs down • Understand our intellectual property to protect us at contract end	• Identify when our delivery principles, policies and standards are not met • Ensure plans are adapted to address relevant threats • Deliver appropriate and proportionate risk controls • Manage effective assurance of outcomes

OUR COMMITMENT TO THE CLIMATE EMERGENCY	We will consider where we can mitigate the environmental impact of our footprint and will consider how our technology and data services can support TfL's strategic aims to encourage sustainable travel.	OUR COMMITMENT TO THE CLIMATE EMERGENCY

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EVERY JOURNEY MATTERS

1. Context

This strategy sets out Tech & Data's approach to prioritising investments to ensure the seamless delivery of core Technology capabilities in alignment with the Mayor's Transport Strategy and our values and visions to the organisation and our customers.

Working with our colleagues, TfL's customers and stakeholders has always been a key part of what we do and how T&D delivers success. We believe that by having close partnerships across TfL and engaging with our customers, we are able to create personas that help build products and services to meet the needs of all groups.

We understand the challenges of running a transportation system, one that enables 1.65 billion journeys to be made safely each year and will help get London moving and working, safely and sustainably, as quickly as possible. As a team, we deliver critical technologies that underpin our operational excellence and our thinking is grounded in a deep understanding of the London network.

This strategy has been developed to provide a high-level overview of our detailed lower-level strategies and future plans.

EVERY JOURNEY MATTERS

2. Tech & Data Strategic Direction

Technology is an integral capability that helps to deliver our objective themes and core mission to *"unlock the potential of technology for our customers, our colleagues and for London"* whilst ensuring the business outcomes align with TfL's visions and values for the future and the Mayor's Transport strategy.

21/22 Objective Themes:

Safety – Continue to progress the Vision zero goal by ensuring we provide a platform where customers can easily report incidents to aid faster resolution. Eg: Successful delivery of Body-worn cameras by all staff.

Customer – Continue to provide security and confidence in our systems, enabling 4/5G services on the network and ensuring the customer journey is a seamless process.

People – To improve the level of engagement with our people to ensure proper management of their wellbeing through Viewpoint reviews and Senior Management updates.

Delivery – To ensure timely delivery of our Investment programme which comprises of projects across TfL which supports our economic recovery

Operations – Investing in ensuring our assets are secure, reliable, resilient and operational for all stakeholders that interface with Tech & Data

Financial – Maximise our current technology by consolidating multiple systems and challenge the need to buy new software.

3. Strategy Overview
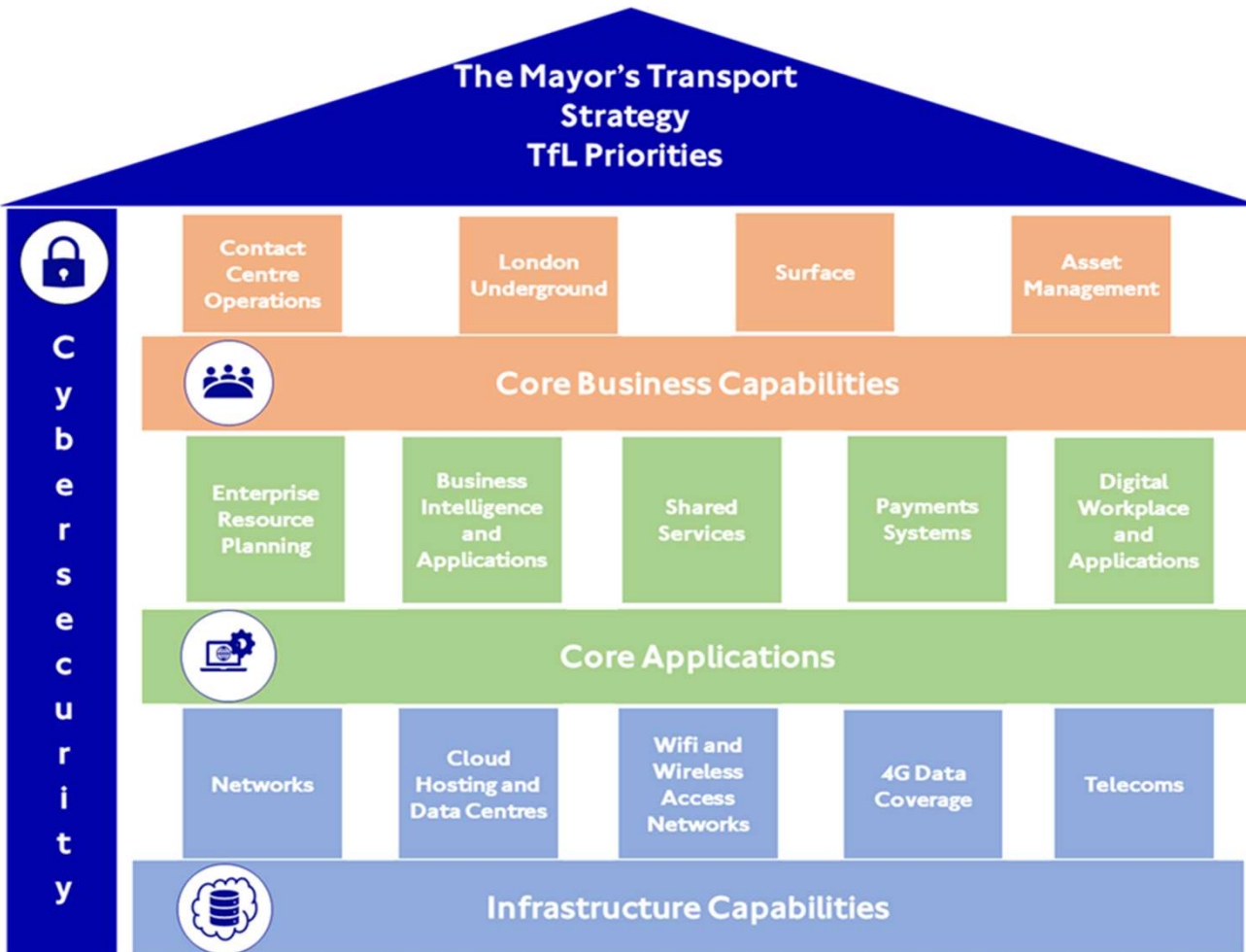
The section of this strategy provides an overview of how our strategies fit together enabling us to deliver on our objective themes and the Mayor's Transport strategy. For clarity, we have made the demarcations based on the primary capabilities of our products and service delivery.

The pillar that ensures all our technology is adequately secure and resilient to collapse, attack and quick changes in demand in our operation.

The foundation and enabling technologies providing the foundation to other business facing solutions and user facings products, for example networks or data provided to stations.

Our strategic technology which contributes to major programmes of change within our line of business from frontline staff to our travelling customers.

The tools and information we provide our customers to enable, and improve, their journeys as well as ensuring our staff can work wherever, whenever and however they need.

Key focus areas for technology

Investing in our technology and finding ways to develop tools/software in house is the key to unlocking cost savings across TfL and delivering on our objectives. This year, we will focus our investment on improving/managing our technology to unlock a safer and more resilient infrastructure for our travelling customers, colleagues and for London.

Travelling Customers

- Increase and enhance the adoption of Digital services measured by TfL Go.
- Trialling new features and functionality built around customer data
- Introduction of Care leaver concession
- Rollout of new Revenue inspection device
- Withdrawal of magnetic in-boundary Travelcards from sale
- Timely resolution of written correspondence and phone calls scoring 80% in the quality we resolve our customers' enquiries

Our Colleagues

- Evolution of Maximo to replace SAP AMIS
- Delivery of the Safe Access System (SAS) Mobile App giving staff access to the right safety information.
- Complete Apollo Service transition into T&D support and development work beginning on Power BI visualisation tooling.
- upgrade to window 10 compliant software version and standardisation of network components from Vodaphone to O2 sim cards.
- Launching of Triapps v2 and EIRP to improve LU operational reporting.
- Continue to upgrade Trackernet and make it more standardised.
- Delivery of Realtime optimiser and Traffic Management system

Pan-TfL

- Successful delivery of SAP hosting migration to Amazon Web Services and upgrade to SAP Ariba.
- Achieving self-serve Power BI to deliver information across TfL.
- Deliver an improved Cybersecurity roadmap which includes policy refresh and protective control for TfL.
- Continue to support new ways of working and improving tools to drive tangible benefits.
- Refresh compute platforms and transform Oracle SPARC workloads.
- Continue to maintain service availability on mission critical services.

EVERY JOURNEY MATTERS

T&D focus areas for technology

Investing in our technology and finding ways to develop tools/software in house is the key to unlocking cost savings across TfL and delivering on our objectives. This year, we will focus our investment on improving/managing our technology to unlock a safer and more resilient infrastructure for our travelling customers, colleagues and for London.

Infrastructure Capabilities

- Complete Apollo Service transition into T&D support and development work beginning on Power BI visualisation tooling.
- Upgrade to window 10 compliant software version and standardisation of network components from Vodaphone to O2 sim cards.
- Continue to maintain service availability on mission critical services.
- Refresh compute platforms and transform Oracle SPARC workloads.
- Deliver an improved Cybersecurity roadmap which includes policy refresh and protective control for TfL.

Core Applications

- Successful delivery of SAP hosting migration to Amazon Web Services and upgrade to SAP Ariba.
- Achieving self-serve Power BI to deliver information across TfL.
- Continue to support new ways of working and improving tools to drive tangible benefits.
- Increase and enhance the adoption of Digital services measured by TfL Go.
- Rollout of new Revenue inspection device.
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- Trialling new features and functionality built around customer data.

Core Business Capabilities

- Evolution of Maximo to replace SAP AMIS.
- Delivery of the Safe Access System (SAS) Mobile App giving staff access to the right safety information.
- Launching of Triapps v2 and EIRP to improve LU operational reporting.
- Continue to upgrade Trackernet and make it more standardised.
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- Introduction of Care leaver concession.

EVERY JOURNEY MATTERS

The T&D Technology commitments

EVERY JOURNEY MATTERS

3.1. Technology enabled workforce

We provide the technology tools our people need to do their jobs at the front line, in head offices and from home

This means...

- Ensuring our colleagues have the technology they need to plan and deliver a world class customer service and get everyone home safe everyday
- Delivering Digital Workplace technology which enables us to connect, communicate and collaborate – helping us work smarter
- Ensuring that technology incidents are quickly and efficiently resolved
- Providing and maintaining line of business applications (applications vital to running TfL) efficiently and effectively
- Liberation of data through self-service tooling and equipping our staff to maximise its use
- Enabling improved decision-making utilising technology and information
- Keeping the risk of outages low by maintaining the equipment our colleagues use

Some of the projects delivering this...

Body-worn video	Office 365 rollout
Surface and LU Asset Management Information Systems (AMIS/SAMIS)	Enterprise Resource Planning – improved finance and commercial processes
Future Bus Systems	Self-Service Reporting

The experience...

From logging on... ...to logging off.

Log on	Applications and tools available	Receive data/information to inform decisions	I can communicate and collaborate	Log problems easily	I can easily manage my personal requirements
• I can log onto my device easily and quickly (either desktop, laptop or mobile) • My device has the network connections I require (cables or WiFi) work • My devices are Synced • Applications open quickly when I need them	• I open the applications needed to do my job on my device by **signing on once** • I am able to easily move **between applications I use on my devices** • Other devices (such as body worn video) are simple to use and images captured can be quickly transferred • I can print when I need to	• There is a single source of truth for data/information and I have access to what I need via self-service tools- I can use it to make decisions • I trust that the system is working correctly • Data/Information is readily available to allow me to accurately support customers	• I can look up numbers and contact people via email, skype or telephone • I have access to the sites I need to work, (e g Sharepoint and Teams) • I can post on Yammer & get responses on the go • Meeting rooms have working technology and I can meet with people from different locations	• When an issue with my technology does occur, I am able to access help easily though either phone or internet or chat • The issue is resolved quickly, and I am satisfied with the outcome	• I can easily request / approve leave on any chosen device, as well as that of my team • I can check and download my pay slip

Note: please refer to the appendix for details on supporting strategies

EVERY JOURNEY MATTERS

3.2. Informed customers

We deliver the digital experiences that help customers make informed and safe technology choices

This means…

- A joined up digital experience and convergence around one app (to build a direct digital relationship with customers)
- A single TfL account and seamless payments (to reduce unnecessary friction)
- A connected, real-time view of the network (to improve customer information at times of disruption)
- An informed view of individual customer behaviour (to nudge travel behaviour towards sustainable transport modes)
- A shift towards digital channels for customer support (to reduce costs)
- A focus on inclusive design (to deliver products that work for all Londoners)

Some of the projects delivering this…

Customer Digital Platform	Natural Language Processing
TfL Go	TfL ID
Future website	New Electronic Service Update Boards (ESUBs)
Road User Charging	TfL Pathfinder
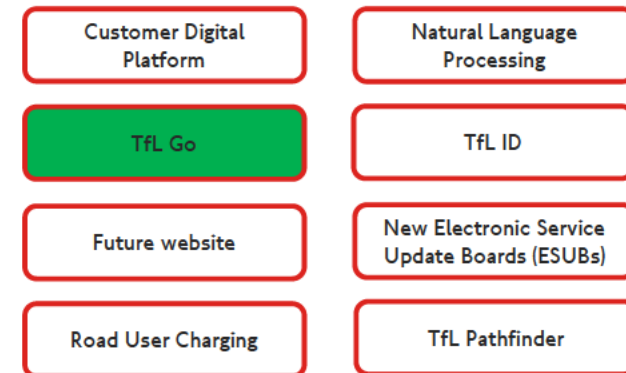
The experience…

From the moment a customer first encounters TfL…   ...to the moment they step off the H37 bus.

Discover
- I can appreciate the travel options provided by TfL, and make the most of what London has to offer

Plan
- I can compare routes and make an informed choice involving walking, cycling and public transport
- I can focus on personal transport needs e g step-free access

Pay
- I can manage all of my payment activity (road use, sponsored services and public transport) through one, secure TfL account
- I can pay using modern payment methods

Travel
- I can receive personalised updates on my regular journeys
- I can re-mode, re-route or re-time on-the-go
- I can share my travel data for the wider benefit of London

Note: please refer to the appendix for details on supporting strategies

EVERY JOURNEY MATTERS

3.3. Seamless payments

> We manage day to day revenue collection processes and technologies and ensure they meet the needs of our customers and operations

This means…

- Eliminating paper tickets on our network by 2024
- Eliminating the notion of a "ticket" altogether by 2027 in favour of a pay as you proposition that serves all our customers
- Removing legacy oyster technology to ensure competition for future ticketing arrangements and to further reduce costs
- Supporting the DfT in their project to extend contactless to the whole of the Southeast
- Supporting LU's strategy to reduce cash payment

Some of the projects delivering this…

Replacement card reader	Retender of the Revenue Collection Contract
Replacement Revenue Inspection Device	Oyster online modernisation.
Reduction in Advance Fare Machines.	Asset refresh of "front office" equipment
Multi-modal Oyster weekly capping	Improvements to service delay refunds

Introduction of Care Leavers concession

The experience…

From a £ coin in a customer's bank account…

…to a £ coin in TfL's bank account.

Paying	Travelling	Revenue Management	Protection of revenue
• We provide a range of channels through which customers can pay, including the Oyster and Contactless app, ticket vending machines and Oyster ticket stops • We ensure customer can access relevant concessionary schemes • We deliver clear, transparent, consistent pricing through fares revisions	• We ensure our ticketing technology estate continues to support contactless, Oyster payment and "ITSO" acceptance • We maintain our tap-in-tap-out readers and ticket barriers so that they remain operational	• We ensure fares revenue is accurately apportioned between TfL and Train Operating Companies • We run checks to ensure the fares revenue collected matches journeys made (revenue assurance) • We provide revenue forecasting and support mayoral fares advice	• We ensure our revenue collection systems support the TfL Fare Evasion Strategy • We find opportunities to reduce revenue leakage/lost revenue

Note: please refer to the appendix for details on supporting strategies

EVERY JOURNEY MATTERS

3.4. Infrastructure that works

We provide our people and customers with infrastructure that is cost effective, secure and simply works

This means...

- Improving digital connectivity for Londoners on the Underground
- Provisioning fit for purpose network and telephony services that deliver what projects specify they need, when and where they need it
- Providing secure, cost effective and flexible hosting services that deliver the required levels of availability and performance, with data centres which have environmental accreditation (ISO 14001)
- Managing the delivery of operationally-critical telecoms services that are key to the Underground
- Keeping the risk of outages low by maintaining our data centres and networks infrastructure; ensuring our infrastructure is supportable and secure
- Generating revenue by commercialising our assets to deliver telecoms networks
- Ensuring returned End User Computing kit is either re-used by TfL, sold or disposed in line with Waste Electrical and Electronic Equipment (WEEE) Regulations 2013 and associated environmental standards

Some of the projects delivering this...

CONNECT Radio Upgrade	4G Pilot on Jubilee line
Data Centre Network Refresh	Access Networks & WAN Transformation
Telecoms Commercialisation	Surface Transport Network Transformation
Compute and Storage Transformation	Data Centre Refresh and Rationalisation

The experience...

From your data in our Data Centres... ⟶ *...to your data on your device*
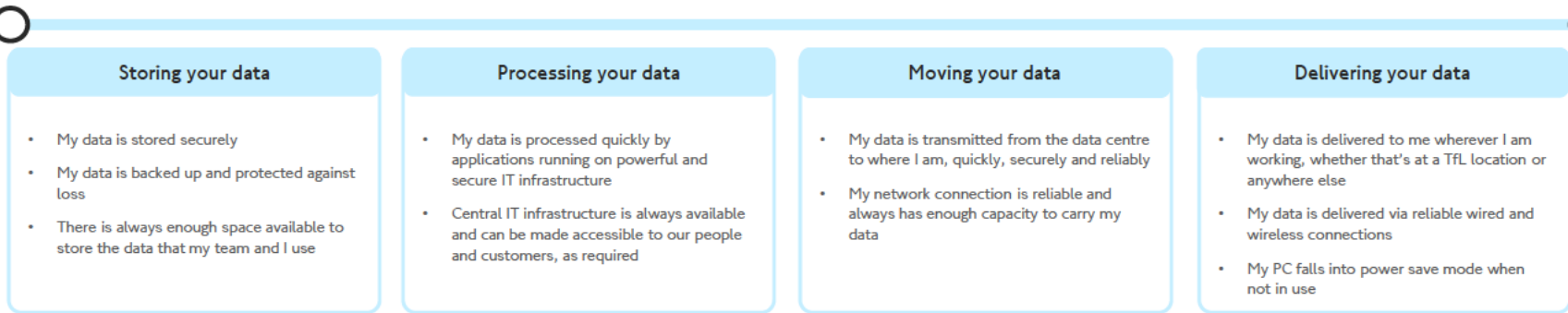
Storing your data

- My data is stored securely
- My data is backed up and protected against loss
- There is always enough space available to store the data that my team and I use

Processing your data

- My data is processed quickly by applications running on powerful and secure IT infrastructure
- Central IT infrastructure is always available and can be made accessible to our people and customers, as required

Moving your data

- My data is transmitted from the data centre to where I am, quickly, securely and reliably
- My network connection is reliable and always has enough capacity to carry my data

Delivering your data

- My data is delivered to me wherever I am working, whether that's at a TfL location or anywhere else
- My data is delivered via reliable wired and wireless connections
- My PC falls into power save mode when not in use

Note: please refer to the appendix for details on supporting strategies

EVERY JOURNEY MATTERS

3.5. Secure and resilient

> We make sure technology is sufficiently secure and resilient to collapse, attack and quick changes in demand, and that our customers and operations are confident of that fact

This means...

- We are appropriately and proportionately protected against cyber and insider attack
- We keep technologies running efficiently and securely for our customers and users
- Our service resiliency is proportionate to service criticality so that we have 99.6% availability on the technology that keeps London moving
- When things go wrong, we recover quickly – our operations have the resiliency to keep London moving and maintain UK economic security
- We make sure we have enough capacity to deal with the increasing reliance on technology
- We make sure our technology is compliant with software licences and enterprise agreements
- We make sure we are compliant with relevant legislation and standards (e.g. GDPR, Payment Card Industry), and TfL policy

Some of the projects delivering this...

Cyber security improvement programme	T&D GDPR programme
Technology service resiliency improvements	SAP procurement software upgrade (ARIBA)
Ticket reader accreditation	Software Asset Management initiative
Periodic risk monitoring and mitigation planning	New Generation Service Desk (NGSD)

The experience...

From a proposal for new technology hardware or software...

...to the technology being used day to day...

...and standing up to unforeseen problems down the line.

Security and resilience by design

- We make sure technology design and introduction is secure and resilient
- We ensure technology and associated data access and use is compliant with legal and policy requirements
- We design risk awareness and compliance training

Keeping the lights green

- We prioritise frontline services that keep TfL going
- We proactively monitor our technology estate and deliver health checks including cyber threat
- We undertaking continuous assurance of risk controls
- We maintain an understanding of our technology license requirements and flex to meet business needs
- We deliver upgrades to meet changing legal and policy requirements

When the lights go red

- When tools stop working we execute pre-defined and practiced plans to keep TfL running
- We empowering our users to fix most common issues themselves
- We upskill our IT helpdesk first line support staff so more incidents are resolved on call
- We increase and improve the channels available to contact us new portal, new mobile app working alongside traditional phone and chat channels
- We communicate in a timely manner, without jargon

Note: please refer to the appendix for details on supporting strategies

EVERY JOURNEY MATTERS

3.6. Data driven technology design

We adopt technology that is focused on making data available and accessible for decision making

This means…

- Building governance systems that assure data quality and develop a trust in our data so staff can rely on it to help them do their jobs
- Creating data catalogues that give an understanding of the data we hold, how it is captured and how it can be used
- Developing data products that ensure data is transformed into insight and intelligence which is delivered to a high standard, to the right people, systems and processes at the right time.
- Putting in place monitoring systems that ensure data interactions are managed in a controlled and transparent manner.
- Designing systems so that data can move between them, with a push to real time data exchange, enabling a comprehensive view of our business
- Empowering colleagues to access the data that they need to take decisions through a combination of self-service access and Data & Analytics data services

Some of the projects delivering this…

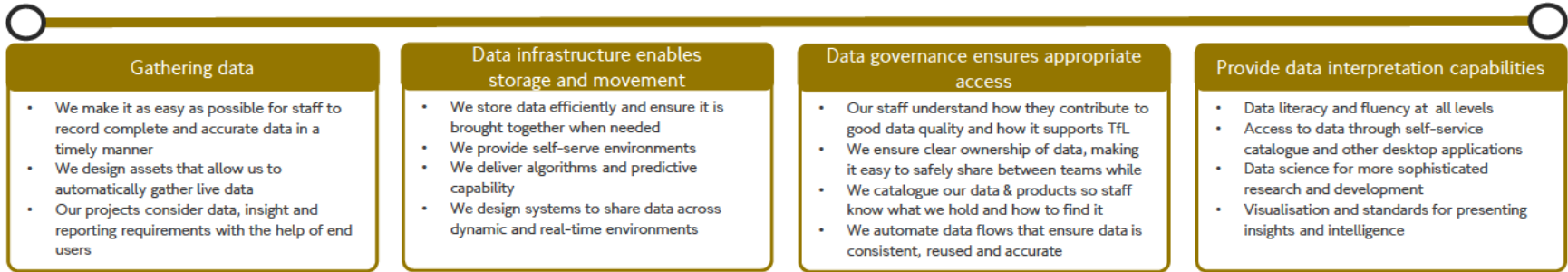|	
Real time asset management	Remote condition monitoring
Power BI and self-service capability	Data Catalogues
Data engineering tools and platforms	Intelligent Transport Systems

The experience…

From the data being collected from source…

…to its contribution as evidence in decision making.

Gathering data

- We make it as easy as possible for staff to record complete and accurate data in a timely manner
- We design assets that allow us to automatically gather live data
- Our projects consider data, insight and reporting requirements with the help of end users

Data infrastructure enables storage and movement

- We store data efficiently and ensure it is brought together when needed
- We provide self-serve environments
- We deliver algorithms and predictive capability
- We design systems to share data across dynamic and real-time environments

Data governance ensures appropriate access

- Our staff understand how they contribute to good data quality and how it supports TfL
- We ensure clear ownership of data, making it easy to safely share between teams while
- We catalogue our data & products so staff know what we hold and how to find it
- We automate data flows that ensure data is consistent, reused and accurate

Provide data interpretation capabilities

- Data literacy and fluency at all levels
- Access to data through self-service catalogue and other desktop applications
- Data science for more sophisticated research and development
- Visualisation and standards for presenting insights and intelligence

Note: please refer to the appendix for details on supporting strategies

EVERY JOURNEY MATTERS

4. How are we going to do it

Our ability to deliver our technology commitments is challenged by **legacy technology**, **resource availability**, **inconsistencies across TfL**, a growing **desire for the revolutionary** and **tight financial constraints.**

In light of this, below are T&D's **technology principles.** These are the rules we follow when making decisions about investing in, running or maintaining technology.

1 Focus on business outcomes	2 Simplify our technology estate and processes	3	4	5 Safe, protective and resilient	6 Protect our commercial position	7 Risk managed
	Consolidate and standardise	Reuse	Start small, plan big			
• Listen to business needs and take colleagues on the journey • Our teams will help you shape appropriate and cost effective technology-driven solutions	• Consolidate multiple systems • Standardise technologies, use industry standard products and opt for off-the-shelf where possible • Avoid bespoke solutions • Decommission unused systems	• Be resourceful with the technology we have already bought or built • Challenge the need to buy new kit or software	• Use feedback from regular contact with users to inform new requirements • Start with the Minimal Viable Product • Buy and build solutions in an iterative manner	• Keep technology up to date consistently • Protect our customers, staff and business integrity • Continually find ways to withstand failures and attacks	• Manage contracts to keep whole life costs down • Agree option prices before entering into contracts to keep variation costs down • Understand our intellectual property to protect us at contract end	• Identify when our delivery principles, policies and standards are not met • Ensure plans are adapted to address relevant threats • Deliver appropriate and proportionate risk controls • Manage effective assurance of outcomes

WITHIN EXISTING FINANCIAL CONSTRAINTS

EVERY JOURNEY MATTERS

5. Consultation

Stakeholder group	Contact	Note
T&D Senior Leadership Team	██████████████	