CONFIDENTIAL

Deep Dive - BT Infrastructure and Operations

Recommendation

That the Board:

i. Receives this report.

Executive summary

This report is an overview of the Business Technology (BT) infrastructure and operations. BT headcount and expenditure has grown over recent years as AT becomes more technology rich in the support of its customers and staff. Technology is reaching ever deeper into what were once manual processes (e.g. ticketing and asset management) or static assets (e.g. street lights). Customers expect digital information (like "where's my bus") and to be communicated with using social media. Responding to these and other changes needs a sound strategy supported by an understanding of emerging challenges such as security and use of the cloud.

BT manages $112 million of assets and holds over 800 terabytes of data. It supports over 2,300 users and 180 applications. There are 107 projects with a BT dimension scheduled this year at an expected cost of $30 million.

Background

When AT formed in 2010, BT provided infrastructure and application support for the AT Staff only. Auckland Council provided call and customer centre services, network, email, security and communication services. In 2012 these services were transferred to AT.

In addition, a number of new or enhanced services have been introduced:

- *CRM* – Single customer view for all customer calls and recording of complaints, including Metro, general, parking and roading
- *TOC (Central)* – implementation of new TOC and consolidation of five CCTV systems into one.
- *SharePoint* – ATs document management solution including specialised document management for CRL and capital projects
- *Voice over IP* – Communications over the computer network replacing telephones, providing internal instant messaging, presence awareness, and video conferencing

CONFIDENTIAL

- *Upgraded and expanded the data Network* – Network expanded to rail and bus stations and all wharves enabling AT HOP and Real Time signage

- Remote access for staff and third party contractors
- WiFi for staff at every site, and for public on rail, wharf and key bus stations
- Infrastructure to enable the sharing of data with third parties

Changes in User Base

The supported user base has also increased significantly:

	2012	2015	Comment
AT Staff	1,128	1,569	
AT Contractors	229	167	
Outsourced Services	60	300	Includes PT Bus, Rail & Ferry Operators, NZTA, AC, NZ Police
ATEED	0	280	
Total	**1,417**	**2,316**	63% increase in the number of users.

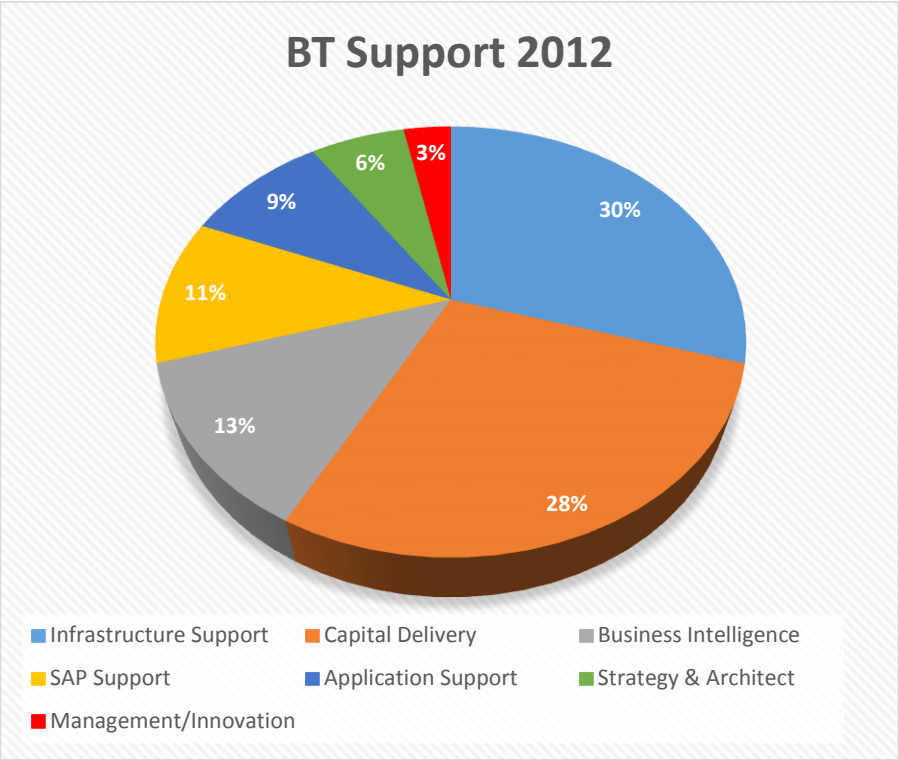
Change in user base continues to grow, for example World Masters Games 2017 have requested they migrate their system to AT management.

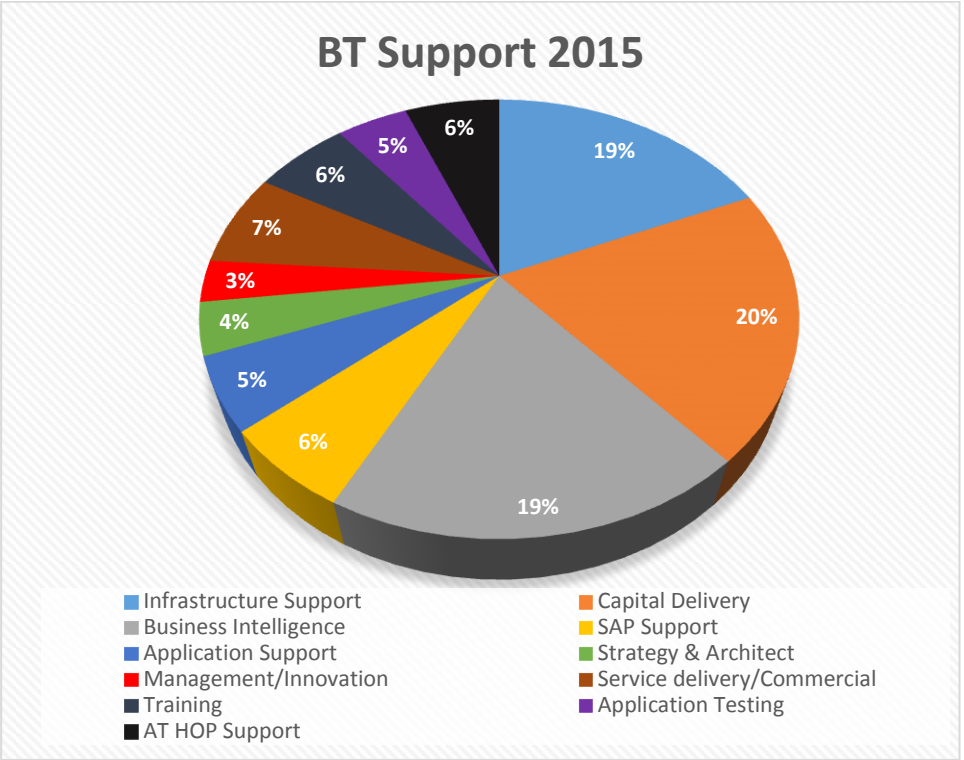
Over the last five years BT has shifted its focus from providing an IT platform from which to run the AT Information Technology system and AT Metro to implementing a wider range of solutions that impact on a greater client base. BT is now focused on leveraging existing platforms and integrating IT solutions within capital projects and other areas of the business aside from AT Metro, using data from systems such as AT HOP to create data models and public accessible data and improve reporting as well as greater external client support from web and mobile applications development.

This is extending into broader Council family technology, such as the Digital Auckland sponsored Works Planning and Land Use applications.

At the same time, business as usual activities around testing and development of applications, compliance and security have received additional investment. There is a small commercial team to manage BT contracting.

CONFIDENTIAL





Support has been diversified to cover the changing business functions. To cater for this growth BT FTEs have increased from 40 in 2011 to 130 in 2015. Support staff for end users has been increased to allow for the multiple sites that AT support (11 offices and key locations).

There has been a shift in the types of PCs supported. Desktop PCs have stayed static at 700 between 2010 and 2015, but laptops have increased as part of the strategy to increase staff mobility from 180 to 1080, and mobile devices from 400 to 1100. The shift towards the usage of mobile computing has increased services such as remote access and the use of cellular data. In turn this has increased pressure on the management requirements in terms of risk, security and policy compliance.

The number of servers that run AT applications has grown from 100 in 2010 to 704 in 2015. These servers have grown to support system availability, backups, increased capacity, disaster recovery, added testing and development facilities (which were previously missing) and AT HOP. This does not include approximately 20 servers hosting or storing CCTV footage which are fully managed by HP.

CONFIDENTIAL

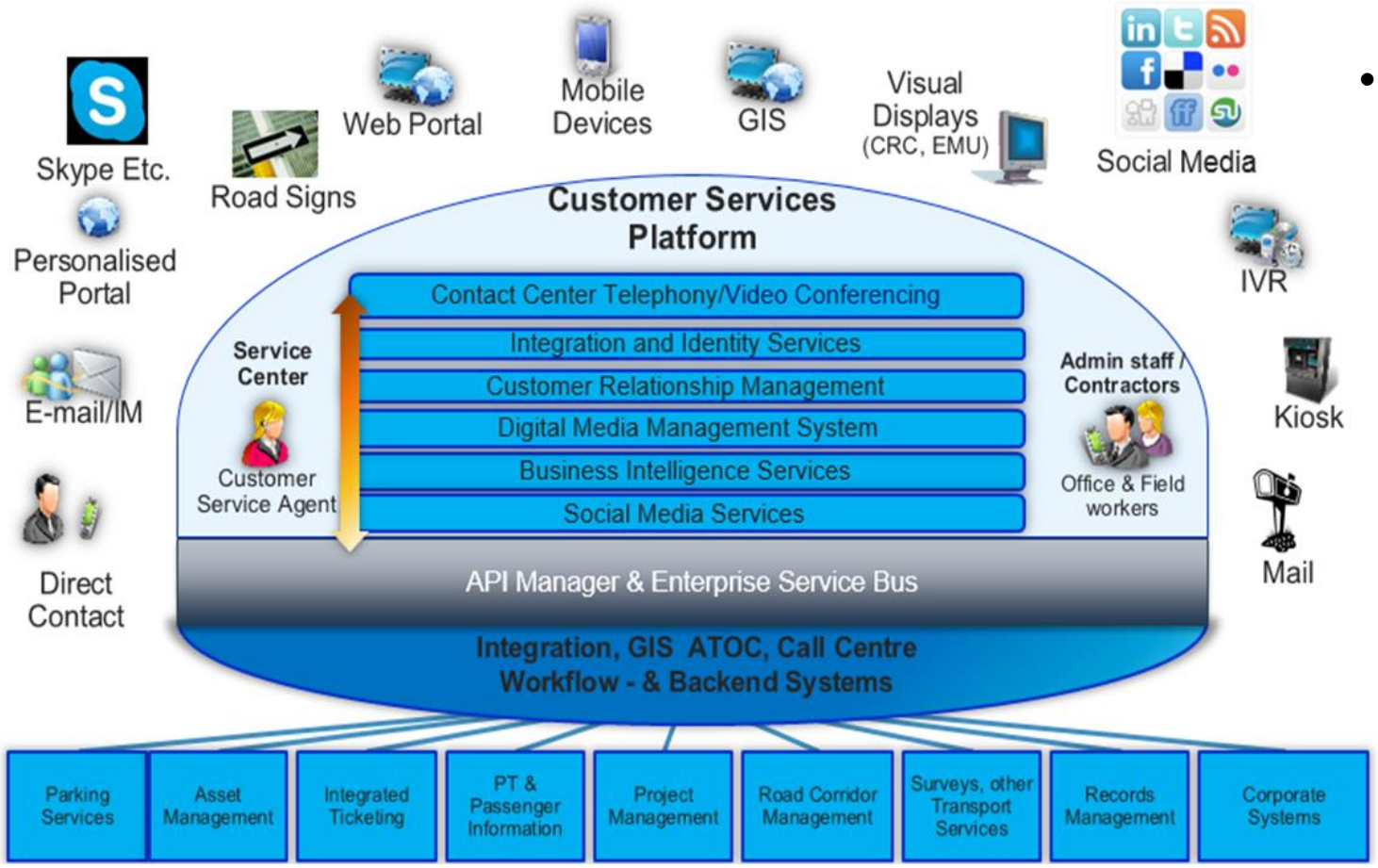
BT Services

Shown below are some of the various technology solutions out of the 180 plus applications that Business Technology supports. Many of which impact on the everyday lives of Aucklanders.

Services BT Supports

CONFIDENTIAL

AT Customer Services Information Platform



- Customer focussed
- Extended AT capability over three years
- Platform for future of AT in DIGITAL WORLD

Auckland Transport
An Auckland Council Organisation

CONFIDENTIAL

BT Support Key Statistics

BT Support Key Statistics			
Supported Users	2,316	Number of Servers	704
Average Support calls per month	2,000	Terabytes of Data Storage	*800,565
Emails received/sent per day	100,000	CCTV Camera Monitored	Over 2,000
Web site hits per year	34 million	Number of Applications	180
Hacks attempts average per week	20	AT Devices supported	2,880
Viruses prevented average per week	115		

** Excludes 1 petabyte of storage for CCTV images*

Attempts to infiltrate the AT network occur on an on-going basis with an average of 20 serious attempts stopped per week. AT has implemented high end firewall appliances to help manage these threats.

High Priority service calls (P1s) to the help desk are around 15 per month, half of the average from 12 months ago. This is due to improved processes and implementation of automated technology. This number is expected to decrease further.

Software Development Guidelines

BT has a strategy of buying applications that are considered “off the shelf”. Development is limited to specific requirements and completed by qualified third party providers rather than BT staff. The focus on maintaining the minimum number of applications is essential to AT to decrease the number of vendors used to support systems and reduce the costs of vendor and software management.

CONFIDENTIAL

BT Infrastructure

Currently the strategy is to purchase our own equipment comprising of servers, switches, end user devices and equipment. It is evident that more software companies are adopting subscription services and these will be entered into on an as required basis as we move forward.

BT Assets		
($000)	Total Capital Value	Net Value
Desktop/office computers	2,590	2,241
Communication equipment	1,257	767
Laptop	1,001	796
Infrastructure	4,157	2,865
File servers	2,818	2,133
Network	3,573	2,795
Storage	579	418
Other IT equipment	4,589	1,957
Enterprise software	12,450	6,418
Line of business software	7,571	4,821
Other software	71,994	48,938
Total	**112,578**	**74,148**

Commercial and Service Delivery

During 2014/15 the introduction of commercial service delivery teams for BT has produced a significant uplift in the management of vendors, associated contracts and the impacts of these back into the business units. BT has over 40 significant vendors to manage, and the introduction of the commercial team to manage the SLAs, contracts and vendor spend has seen a reduction in overall costs. For example in 2014/15 a $360,000 reduction in one contract was achieved. Tighter controls on supplier invoicing and reconciliation continues to achieve ongoing savings.

The service delivery team actively engaging with the AT business units has helped to increase the user satisfaction of IT services.

CONFIDENTIAL

Products

The key software application product set is Microsoft, with SAP being used for Enterprise Resource Planning (ERP).

Currently SAP Business Objects is the key corporate reporting platform. MS Power Pivot and the Microsoft reporting toolsets will be introduced during the year as a key end user reporting toolset to complement SAP Business Objects for the complex corporate and external reporting.

ARC GIS is the geographical platform for AT. The 3D capability in this product will be implemented in December 2015, along with their equivalent of Google Earth.

The asset management system for roading is currently RAMM. Work is currently underway to form a new strategy around asset management, tied to 3D modelling and a Business Information Model (BIM), specifically required for CRL, Light Rail and other infrastructure projects.

Fulcrum, a document management system, built on Microsoft SharePoint will be the application used by infrastructure projects and will be used later in the year for all BT projects as well. Fulcrum is expected to result in savings of $1.5m to $2.5m over the next few years as legacy systems are phased out.

SharePoint is also the document management system for all staff across AT.

Microsoft Dynamics (CRM) is the key system used across the business to manage and provide a single view of customer and customer interactions.

The selection of HP as the preferred supplier for the provision of servers, switches, laptops and hardware has achieved a 50% cost reduction in the circa of $250,000 and ongoing savings will continue. HP equipment has doubled the useable life of the equipment. In addition AT is one of a select number of clients able to access the HP innovation lab in the USA directly and participate in joint innovation projects. For example, looking at aggregating data collection at traffic intersections in order to reduce bandwidth requirements back to the AT data centre.

Cloud

Microsoft and SAP are pushing solutions into the cloud in favour of on-premises, with reduced functionality available on the on-premise versions. Moving applications to the cloud will be considered on a case by case basis, taking into account costs, functionality, integration and performance. One of the impacts of moving into the cloud is that costs are changed from capex to opex.

CONFIDENTIAL

Financial Overview

All new positions created across AT will attract new licencing and support costs. This is initially estimated at $10,000 per user to account for hardware, licences, support and back end infrastructure, this compares to the average of USD$17,000 for other large organisations which are technology heavy.

Each month there is on average 2,000 calls to the help desk which is an average cost of $25 per call. There are plans in 2016 to reduce this call volume as it is above the industry norm.

BT Operational Expenditure				
($000)	**2011/12 Actuals**	**2013/14 Actuals**	**2014/15 Actuals**	**2015/16 Budget**
Staff	5,216	7,145	8,753	11,587
Professional Service	7,483	6,017	4,745	4,091
Software Licences	2,497	2,752	3,386	4,684
Outsourced Support	1,237	6,732	7,450	7,165
Communications	54	1,141	1,249	1,278
Other Operating Costs	1,915	1,186	1,193	884
Operating Result	**18,396**	**24,973**	**26,725**	**29,689**

Staff costs are currently 39% of BT total operating cost. However, the majority of cost is reflected in nine key business partnerships.

CONFIDENTIAL

Key Partnerships

Vendor	Service	Annual Spend ($000)
Microsoft	City Next program and application stack, early adopter program, Microsoft management consoles	1,131
SAP	Financial and Human Resources reporting tools	1,480
HP	Innovation partnership, networks, network management software, servers and end devices	665
Vodafone	Mobile devices	553
Fusion	Network provision and management	412
Spark	Network provision and management	1,000
Propellerhead Limited	Website and Middleware development and management	1,142
Fujitsu	Supports all the core infrastructure, servers, and storage	2,600
Dimension Data	Supports the firewalls, WiFi, and also provides help desk and incident management services	4,932
Total		**13,915**

The nine key partners account for 52% of the BT expenditure. These are mainly fixed costs for software licences, application and network support. Currently AT is consolidating its support under the All of Government options, this will see the current services transferred from Dimension Data to Fujitsu with expected savings of $1m to $1.5m in support costs.

Projects

BT supports a significant and growing volume of projects. These range from upgrades of BT systems, development of business systems (such as AT HOP and Parking) and the technology elements of infrastructure, such as technology at bus interchanges. Projects have a budget of $30 million in the current year to deliver 107 projects with an average duration of four months. BT has 40 FTEs supporting project delivery.

The BT Business Delivery team also support a number of infrastructure capital projects such as CRL and new or upgraded rail stations. This support will typically entail:

- Network connectivity
- System requirements
- Business Analyst resource
- Implementation resources
- System Testing

CONFIDENTIAL

Examples of typical current projects, the budgeted spend for various departments and the governance in place to manage those projects are included in Attachment 1.

Attachments

Attachment Number	Description
1	Project Examples
2	Challenges
3	AT Technology Roadmap

CONFIDENTIAL

Document ownership

Submitted by	Terry Harrison **AT HOP Finance Manager** Tracey Berkahn **Operations Financial Manager**	
Recommended by	Roger Jones **Chief Information Officer** Richard Morris **Chief Financial Officer**	
Approved for submission	David Warburton **Chief Executive**	

Project Examples

Project Name	Description	Funding	Benefits
LED Streetlight Upgrade Project **BT Supported**	This project is to upgrade the existing street lights to ensure they are fit for purpose, are maintained and managed cost effectively and to ensure the Network is safe for operators.	$66m to $22m over five years	Upgrading the Network of Street lights to energy efficient LED Lights will significantly improve road and operator safety, allow proactive management of the Lighting Network and reduce costs and impact on the environment.
Video Management System (VMS) **BT Lead**	Migrate the 5 legacy CCTV systems to a single video management system (VMS) and virtual operations room console enabling ATOC Central, ATCO Smales, & multi-agency views.	$5.6m	Provides 1 CCTV Platform for AT • Decommissions legacy VMS platforms • Enables Disaster Recovery ATOC Central/Smales, improved agency integration • Provides alignment to future incident management system • Reduced lifecycle costs from converged storage • This system will facilitate cost reductions associated with running multiple platforms as legacy AT VMS are decommissioned
NITMS **BT Lead**	Implementation of a tactical Event & Incident Management Solution by June 2016, for ATOC central and ATOC Smales utilising existing systems within NZTA and AT.	$2m	A single system to manage all transport incidents across Business Units: Train, Buses, Parking, and Ferries. • Improved travel time reliability • Increased network throughput • Improved Coordination of partner agencies • Improved incident and event management
Parking Future Platform **BT Lead**	Creating a common technology platform for on street and off street management through upgrading its current enforcement system. It is looking to extend the functionality of that solution to include Payment options, Permits, Coupons and significant customer self service capabilities.	$5.5m	• Significant capex savings through not having to replace aging pay and display machines • Evidence base for future Pay and display on-street hardware quantities • Significant opex savings through reduction of cash collections, machine maintenance, and vandalism. • Significant revenue enhancements through incentivising compliance, removing essential services permits and getting greater buying for new paid parking areas • Parking enforcement officers will be able to issue and manage infringements based on current mode as well as methods introduced by Pay Stay • Increased self-service options for customers. • Reduces the amount of customers querying infringements, and increases the number of infringements paid in a faster turnaround time.
Property Management **BT Supported**	This project will provide a solution for managing properties that AT purchased for major Projects and leased out until required by the major project.	$800k	Allow AT to manage the day-to-day operations of their properties and fully understand income from these properties

Approved FY15/16 BT Capex Budget

Revised BT Prioritisation Budgets Inflight & New FY15-16			
Programme	**Inflight**	**New Projects FY15-16**	**Total Budget for FY15-16**
Core	$322,454	$5,517,240	$5,839,694
Corporate	$585,000	$930,000	$1,515,000
Metro	$1,716,200	$6,670,000	$8,386,200
Parking Services	$1,273,143	$4,271,600	$5,544,743
ITS - Other Programmes	$869,411	$2,350,000	$3,219,411
AT HOP	$1,525,000	$1,075,000	$2,600,000
Capital Infrastructure	$0	$2,200,000	$2,200,000
Total Programme Budgets	**$6,291,208**	**$23,013,840**	**$29,305,048**
Parking – Non BT Projects	$0	$700,000	$700,000
Contingency Budget			
Current Contingency Pool	**$0**	**$0**	**$1,744,172**
Total Budget	**$6,291,208**	**$23,713,840**	**$31,749,220**

BT Project Governance

Steering Committee	Chair	BT Representatives	Areas of Business
CTO BT Capital Programme Review Meeting	Chief Technology Officer	Group Manager BT Solutions Group Manager BT Technology	Overall Programme Control of BT Capital Expenditure
Corporate Steering Committee	Programme Manager Corporate Programme	Group Manager BT Solutions	HR, Finance, Health & Safety, Customer Contact Centres, & Websites for the Business
ITS & Parking Services Steering Committee	Programme Manager ITS Programme	Group Manager BT Solutions	Parking Services Platform, CCTV and Analytics for the Services Division
AT Metro Programme Steering Committee	Programme Manager AT Metro Programme	Group Manager BT Solutions	AT Metro
AT HOP Steering Committee	Programme Manager AT Metro Programme	Chief Technology Officer	AT HOP
Core Programme Steering Committee	Programme Manager Core Programme	Group Manager BT Technology	Core Infrastructure implementation and support for the Business
Capital (Infrastructure) Programme Steering Committee	Programme Manager Capital Projects	Group Manager BT Solutions	Capital Infrastructure, CRL, & Light Rail,

Challenges

(a) **The move to Cloud based software solutions.** Many software companies (Microsoft and SAP included) are moving to cloud based delivery approach. Today's model of purchasing software is primarily through a one off software acquisition cost and annual support fees. The cloud based approach moves to subscription based purchasing through on-going monthly fees based on consumption of services. This reduces the three to five year investment nature of software purchases both the suppliers and AT's point of view. However it does create the following issues:

- Application purchases will transfer from Capital expenditure to Operating costs
- Issues of data ownership within a cloud model need to be clarified
- Increased security risk as data is accessible via the web
- Less customisation of applications
- Suppliers ceasing on-premise software features and only supporting delivery through cloud-based models

The advantages are:

- AT will require less on-going capital investment in hardware to store and run the applications
- Patching and updates maintained by software/cloud provider
- Smoothing of expenditure on applications and licences
- Cloud services are provided at price points reflected by global economies of scale
- Cloud delivered services provide access to new features immediately and have richer functionality

(b) **On-going OPEX from Capital projects**. With the increased IT requirements within many capital projects, there are additional on-going costs either as licence fees, network costs and web/mobile application costs. Many business cases in the past have not factored in these on-going OPEX costs. However BT have been expected to provide the support. With circa $30-35m (including CIO Projects) to be spent on capital projects in 2015/16 these OPEX costs are expected to be absorbed by BT within current budgets.

BT is working closely with the Infrastructure project managers to better understand the business requirements and the ongoing impact on the BT services and costs. This will include improvements to the Business Cases to have better financial analysis to factor in the on-going operating costs.

(c) **Meeting customer demands vs. keeping systems stable:** There is a high demand from AT and external users to be able to use a variety of different applications. Examples include the use of Apple machines, alternative software and even "free" applications which users have installed. Even free applications incur costs and create many risks to AT. Many of these applications are not supported by BT and pose a security risk: i.e. bypassing firewalls, antivirus software or causing a conflict with other systems. As well the security of the data and access by many of these "free" applications is poor exposing AT to reputational and data loss risk. The functions of many of these applications are

duplicated by existing applications supported by AT, thus costing AT more in support costs. For example AT has three different project management tools.

(d) **The threat of external hackers and malicious software.** As AT grows, one of the biggest risks facing it is emerging as a more prominent target for malicious attack. Partnership and increased usage of internet for many applications is resulting in more data and network sharing which increases the security risks. Auckland Transport is classified as a Level 2 merchant by Visa/MasterCard, with between one million – six million credit card transactions being processed through its various payment systems per year, and as of October 2015 AT is fully PCI compliant. This makes AT a tempting target for hackers who believe AT holds credit card data. (Note AT does not store credit card data anywhere on its network).

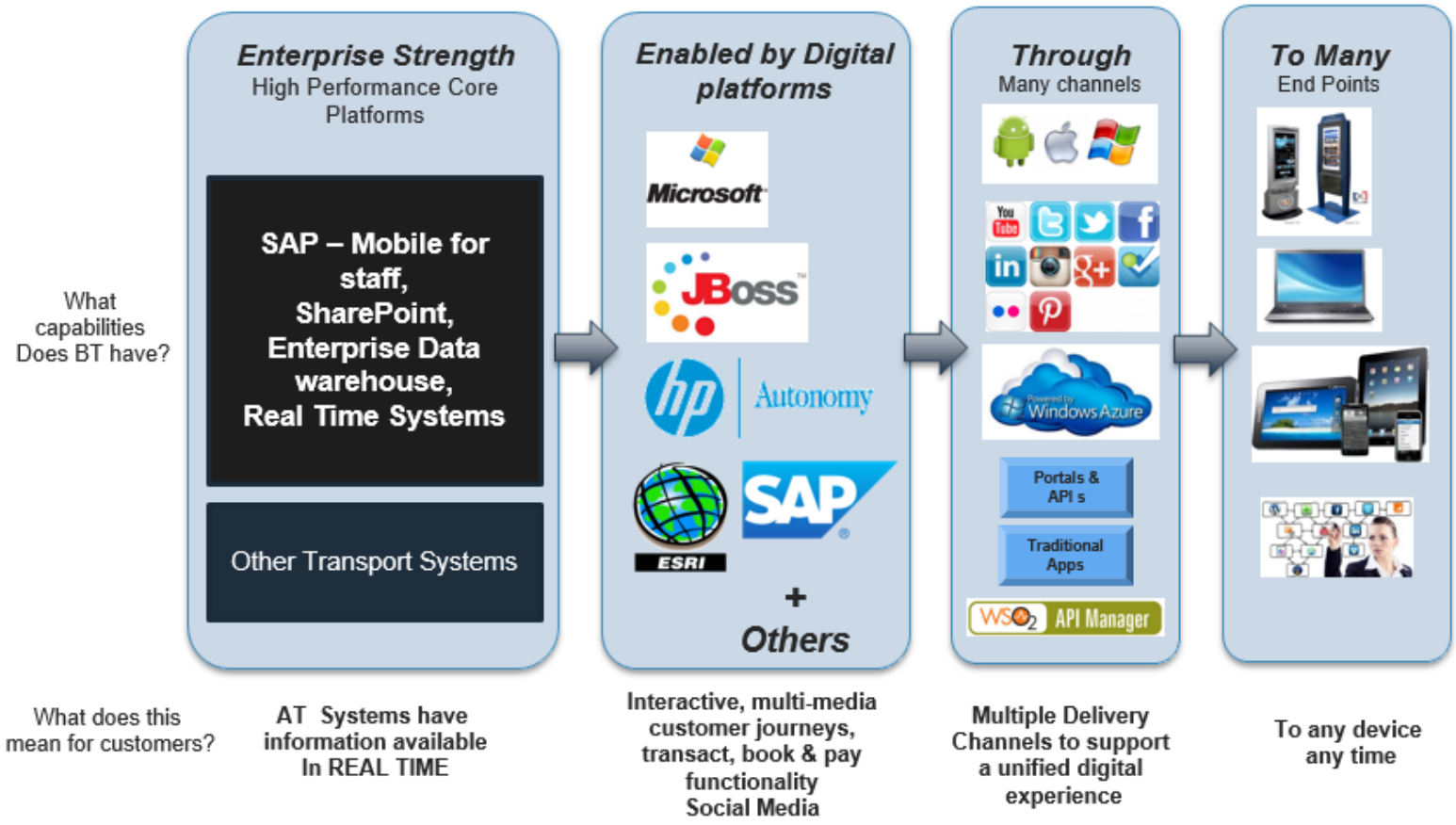
- Direct attacks on the network appliances (firewalls, routers) that connect AT with the outside world.
- Exploits embedded in malware and viruses often disguised as innocent emails.
- Social engineering where hackers steal the identity of a legitimate user and obtain their network credentials.
- Brute force attacks on the network that stop servers and systems from responding also called Denial of Service (DoS) attacks.
- Website vandalism to generally deface the public website and cause corporate embarrassment.

This security risk is prevented by dedicated firewall and anti-virus applications that are updated numerous times per day from the providers to stop new threats.

Future enhancements include the implementation of SDN (software defined network) SIEM and SDS (Software Defined Security) Technology. SDS identifies changes in network behaviour, alerts the system and if necessary shuts down the suspicious connections. The ability to leverage applications to increasingly automate and orchestrate routine functions will free up security personnel for tasks that require greater expertise, such as security architecture, development of organisation-specific analytics, and incident response. This is currently being planned to be implemented by the end of this financial year.

(e) **Outsourcing services vs. retaining Intellectual property (in-house staff).** The changing face of IT skill sets and constant learning requirements can create shortages in staff knowledge. This can be addressed through outsourcing requiring BT to outsource services or by using short term contracted employees and consultants. With the nature of short term employees, when they leave they take their knowledge and intellectual property from AT. BT has adopted a strategy to replace, where possible and applicable, contract staff with permanent staff to retain the knowledge base.

The AT Technology Roadmap



This roadmap demonstrates the mission critical applications used within AT today. It shows the key vendors used to develop these applications and the way in which access to these applications are provided to the AT workforce.