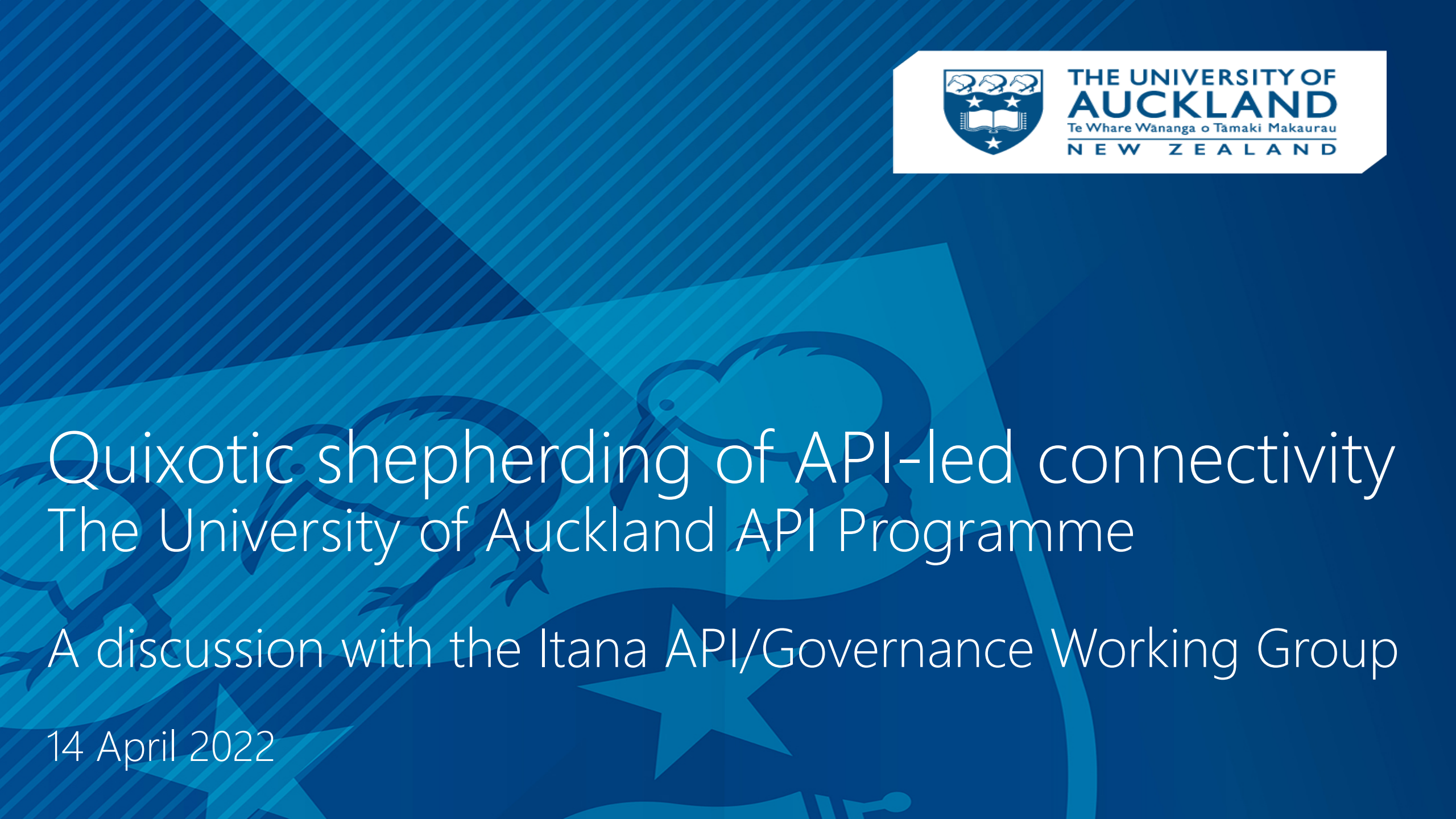


Quixotic shepherding of API-led connectivity
The University of Auckland API Programme

A discussion with the Itana API/Governance Working Group

14 April 2022

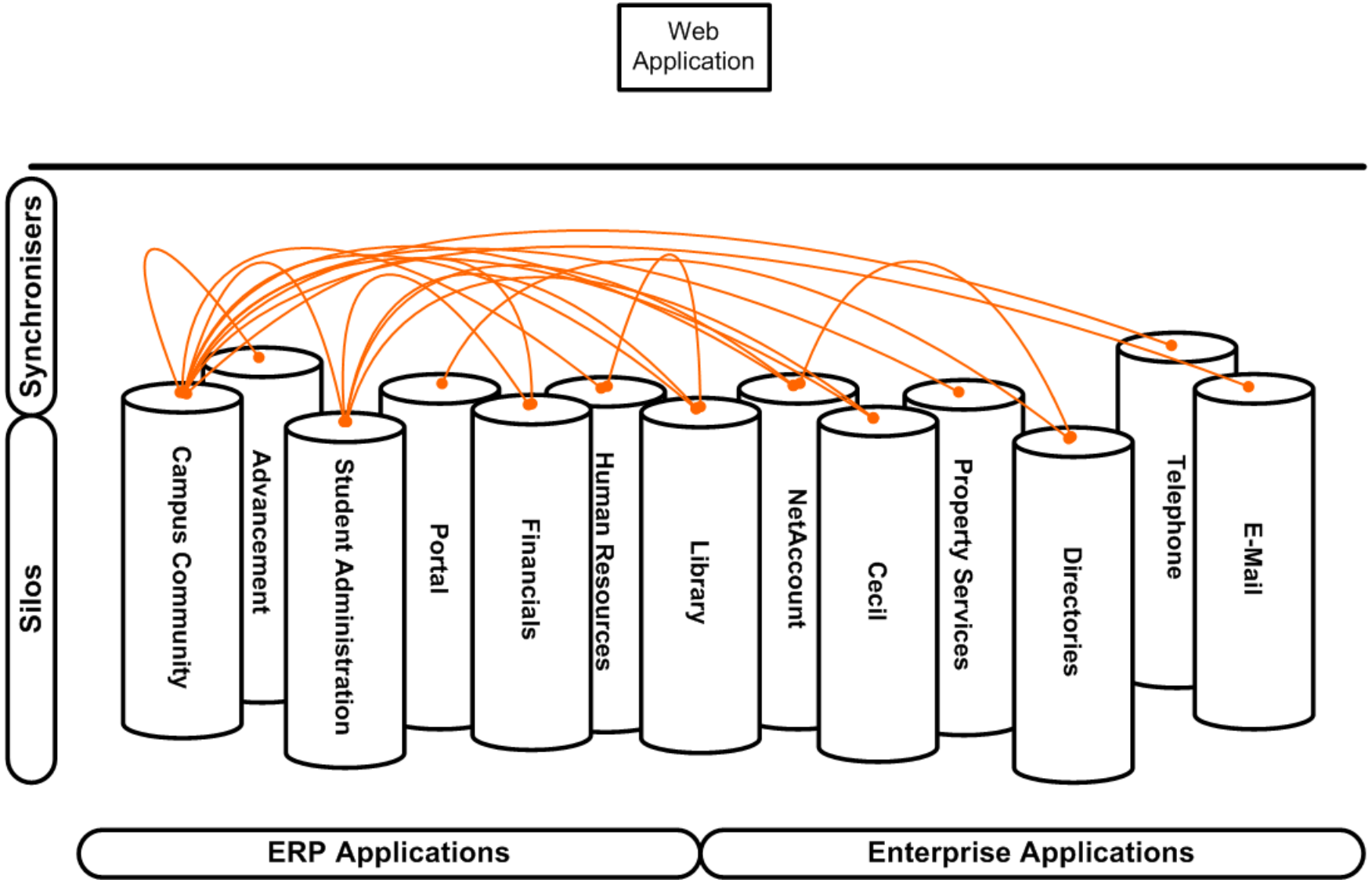
Proposition

- The University of Auckland embarked upon an API Program more than a decade ago, and success has proven elusive --- this discussion outlines the organizational waxing and waning of enthusiasm, capability, and appetite, and paints a picture of necessity-driven hope for an API-centric future

Schedule

- Ancient History
- Growing beyond service-oriented architecture
- Imagining open connectivity
- Beginning
- Struggling
- Restarting

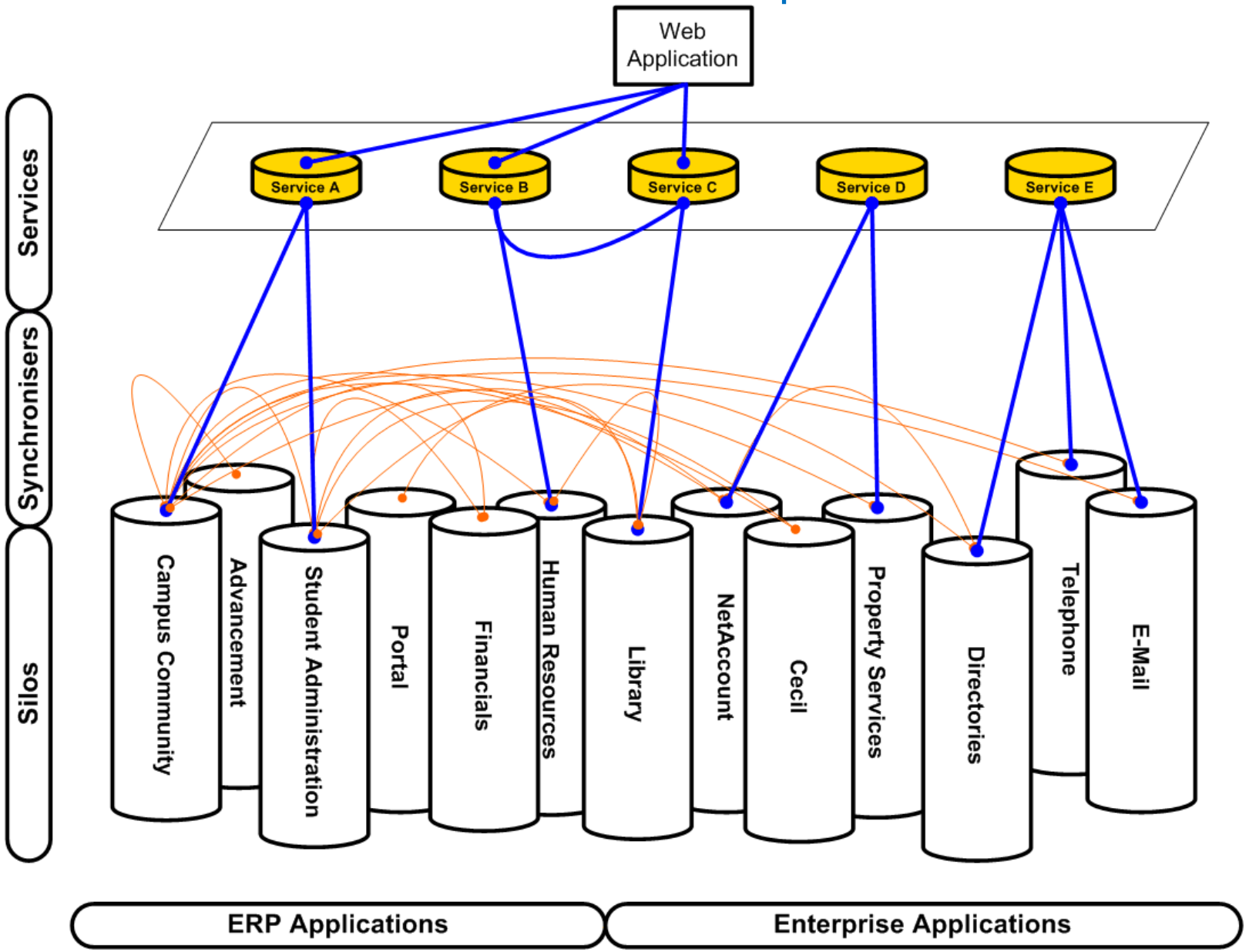
Difficulty Accessing Enterprise Data



A Dreamy Vision

- Automated provisioning and deprovisioning.
- Encouraging *boundaryless information flow* between external-in, internal-in, and external-out aspects of the enterprise.
- Rapid deployment of high-quality Web applications.
- Enabling workflow.

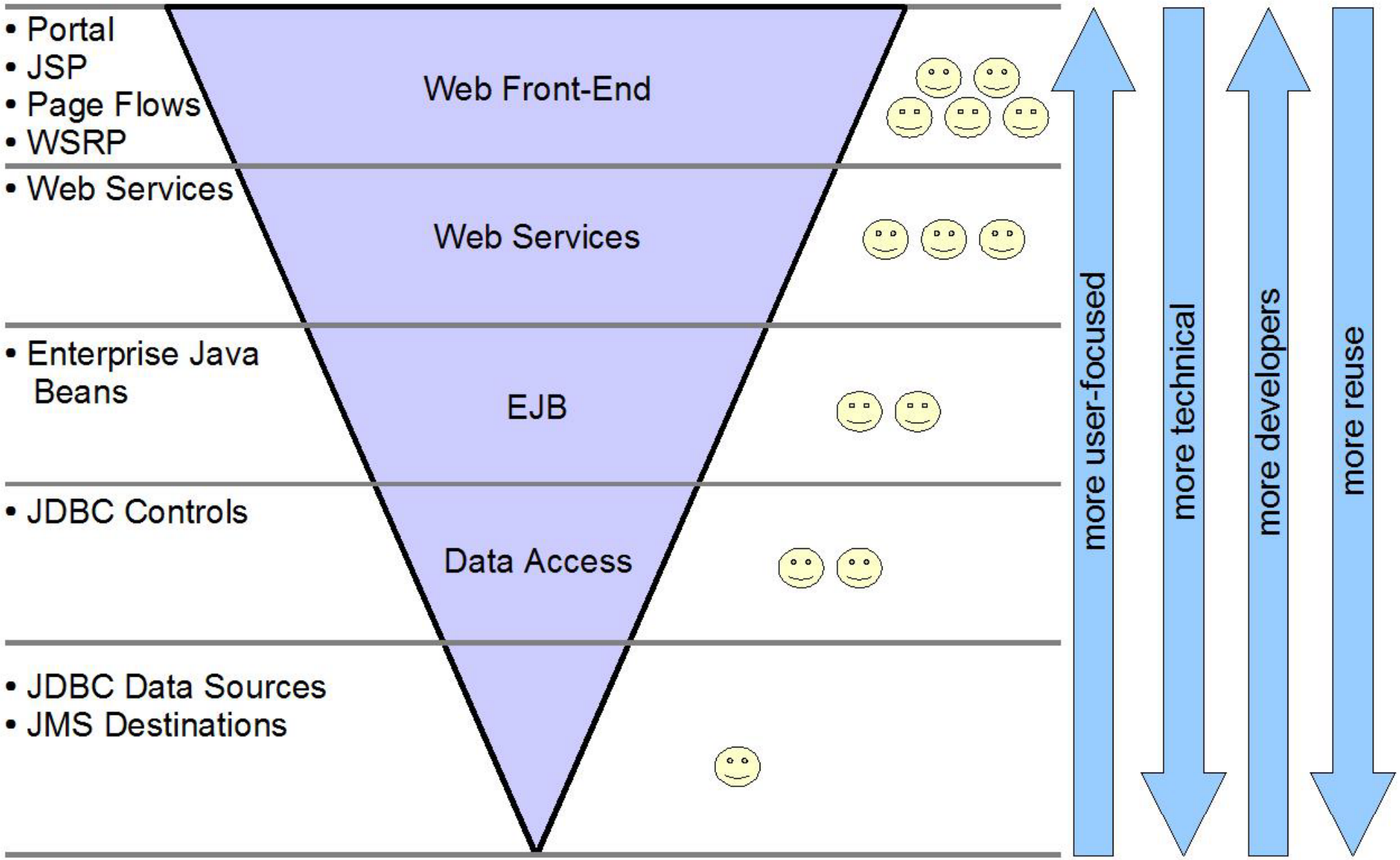
Improved Access to Enterprise Data



The Previous Three Slides Were Created In…

2004

The (Old) Inverted Triangle Model



The Solution!

The Solution!

Motivation

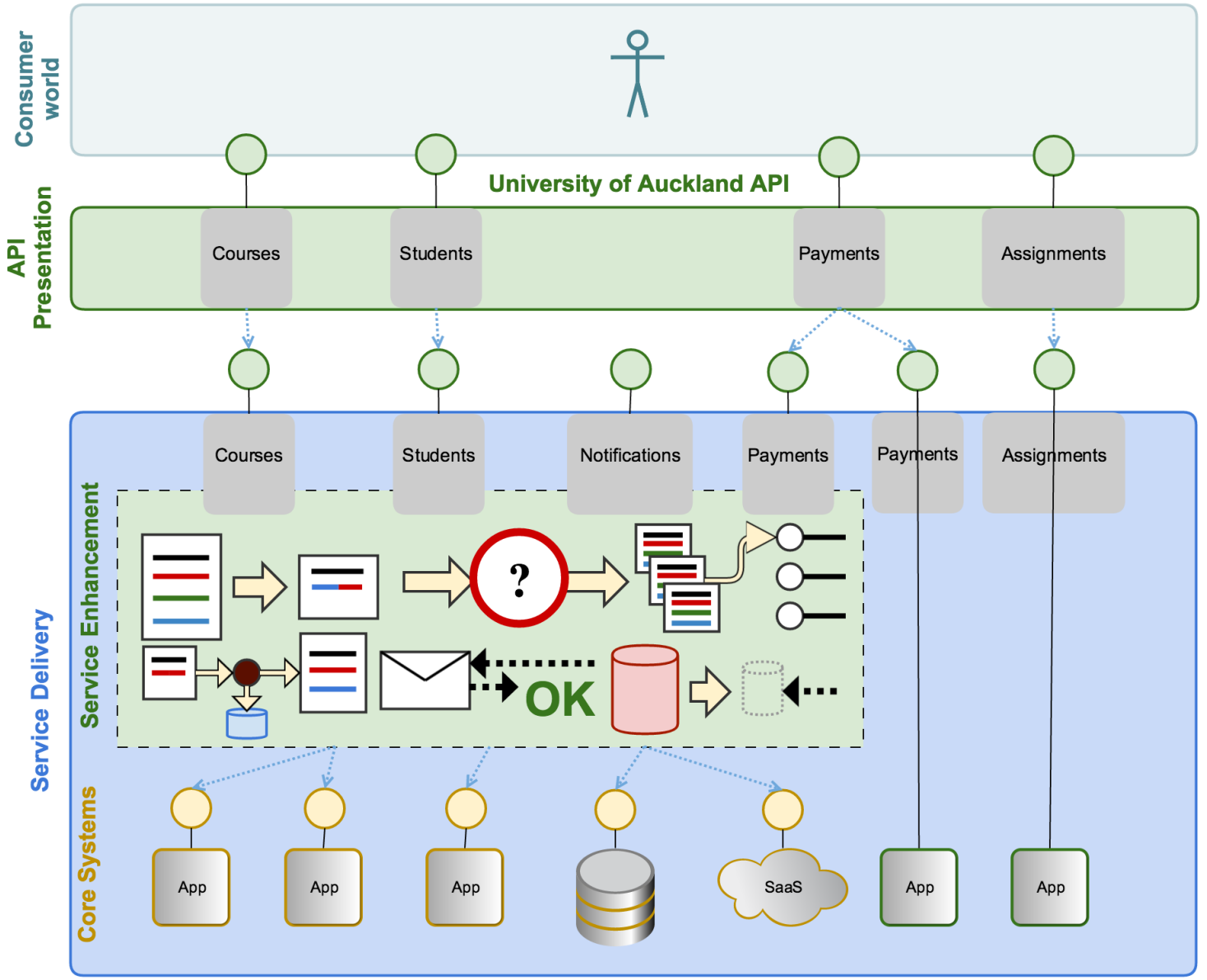
- The University of Auckland wishes to provide an easy-to-use and beautiful API to enable wider consumption of its services, innovation by students, and faster and better application delivery and integration services.
- The University API will provide an effective, efficient core of excellent services that will expose data and functionality from throughout the University's business domains.

Drivers

The University API will enable and enhance the University's ability to:

- *Integrate* data across its business applications, both those on-premise and those consumed on-demand.
- *Automate* its business processes by making available services that expose data and functionality from its core enterprise applications.
- *Develop* bespoke web applications rapidly that are underpinned by a reusable, well-engineered API.
- *Innovate* through partnerships with the student body and citizen developers to deliver brilliant ideas and meet the needs of the wide range of mobile-device application ecosystems.
- *Expose* data and functionality about the organisation safely and securely, making the University more accessible both to itself and to its business partners, researchers, employees, alumni, and the wider constituency.

The Solution!



Resource model accessed via JSON / RESTful services

Service definitions
API management & versioning
Statistics & monitoring
Routing
Traffic control (throttling)
[caching for unprotected services?]

Services at this level are equivalent to those at the API presentation layer

Apply patterns as required in order to address any gaps between the capabilities of the core systems and the requirements of the University API

Core systems will have varying capabilities when it comes to supporting external services

The Solution!

The Solution!

The Solution!

Kong

Course API Example

MODEL

```
{
acadCareer          string
acadGroup           string
acadOrg             string
active              string
catalogNbr          string
catalogPrint        string
componentPrimary                    string
crseId              string
crseOfferNbr        integer($int32)
description         string
effStatus           string
effdt               string
effdtOffer          string
feeBand             string
gradingBasis        string
id                  string
level               integer($int32)
mainProgram         string
microcredential     boolean
rqrmntDescr         string
rqrmntGroup         string
splitOwner          string
ssrComponent        string
subject             string
text                [string]
title               string
titleLong           string
unitsAcadProg       number($double)
year                integer($int32)
}
```

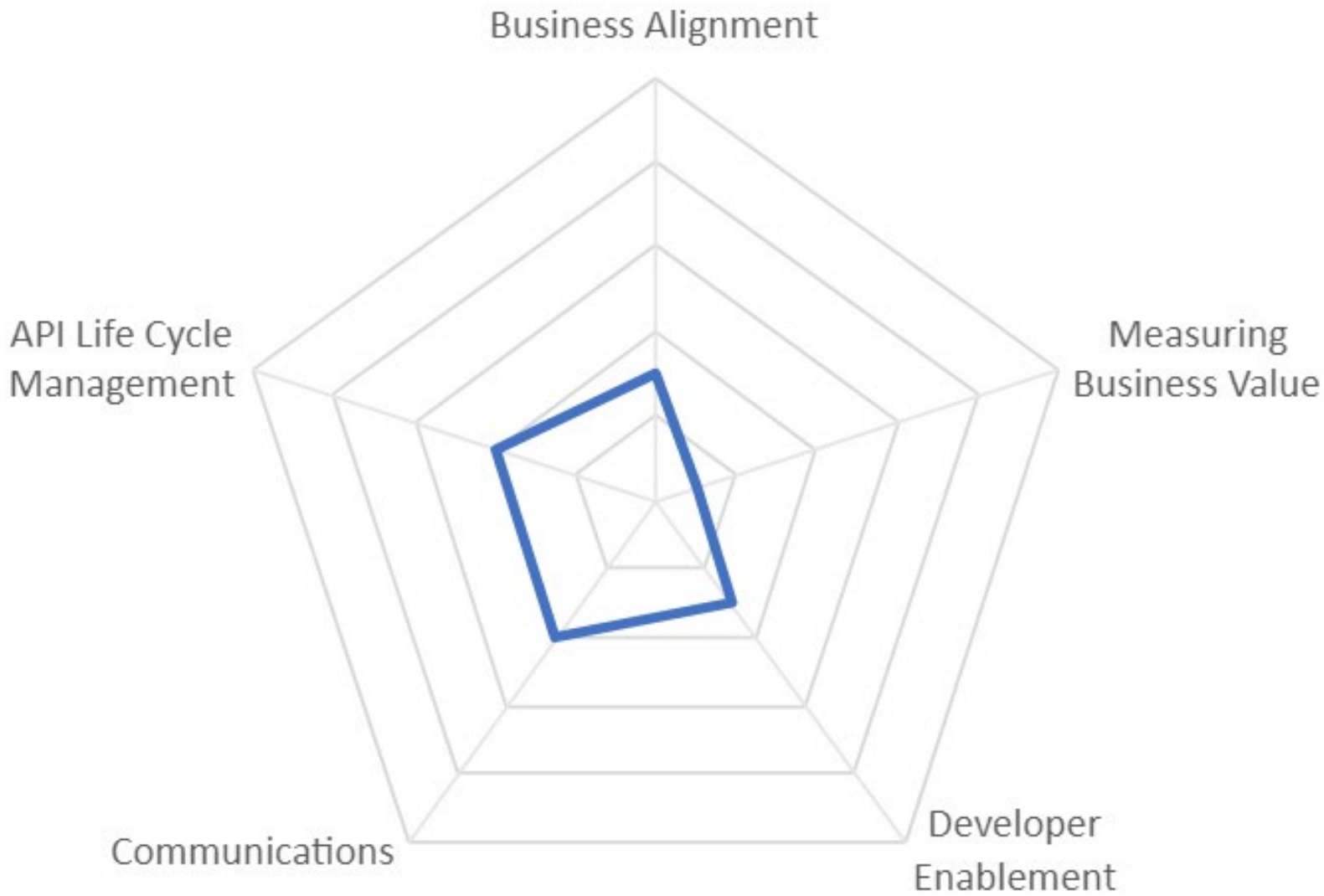
RESPONSE


```
{
  "id": "001342-1-2023",
  "year": 2023,
  "active": "Y",
  "level": 1,
  "feeBand": "SUC-PRM",
  "crseId": "001342",
  "crseOfferNbr": 1,
  "effdt": "2023-01-01",
  "effdtOffer": "2023-01-01",
  "acadCareer": "UC01",
  "acadGroup": "4000",
  "acadOrg": "CHEM",
  "subject": "CHEM",
  "catalogNbr": "110",
  "titleLong": "Chemistry of the Living World",
  "title": "Chemistry of the Living World",
  "description": "A foundation for understanding the chemistry of life is laid by exploring the diversity and reactivity of organic compounds. A systematic study of reactivity
[...]",
  "catalogPrint": "Y",
  "componentPrimary": "LAB",
  "gradingBasis": "GRD",
  "rqrmntGroup": "442933",
  "rqrmntDescr": ".",
  "splitOwner": "N",
  "unitsAcadProg": 15,
  "ssrComponent": "LAB",
  "mainProgram": "BSC",
  "effStatus": "A",
  "microcredential": false
}
```

Selected Impediments

- Technology Leadership
- Loss of key influencers
- Information & Technology Operating Model
- Realities of the API Production Model
- Project-Based Funding Models
- Enterprise Architecture
- Information Architecture
- Organizational-Cultural Inertia
- Heavy Legacy
- Deep Backlogs

Our Current State



Five Dimensions of API Strategy Maturity

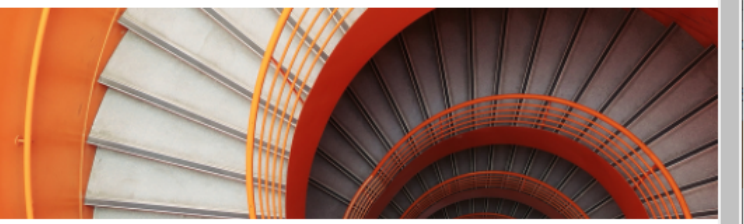
- Business Alignment
- Developer Enablement
- Measuring Business Value
- API Life Cycle Management
- Communications

Source: Gartner (2019)
ID: 451168

research.verveengine.co.uk/WebProd/cgi-bin/AskiaExt.dll?Action=DoInterview&Survey=1S32IIKAJL9F80QH&Intvw=1S30IJMRCR9D3D1X

Gartner

Welcome to Research Circle



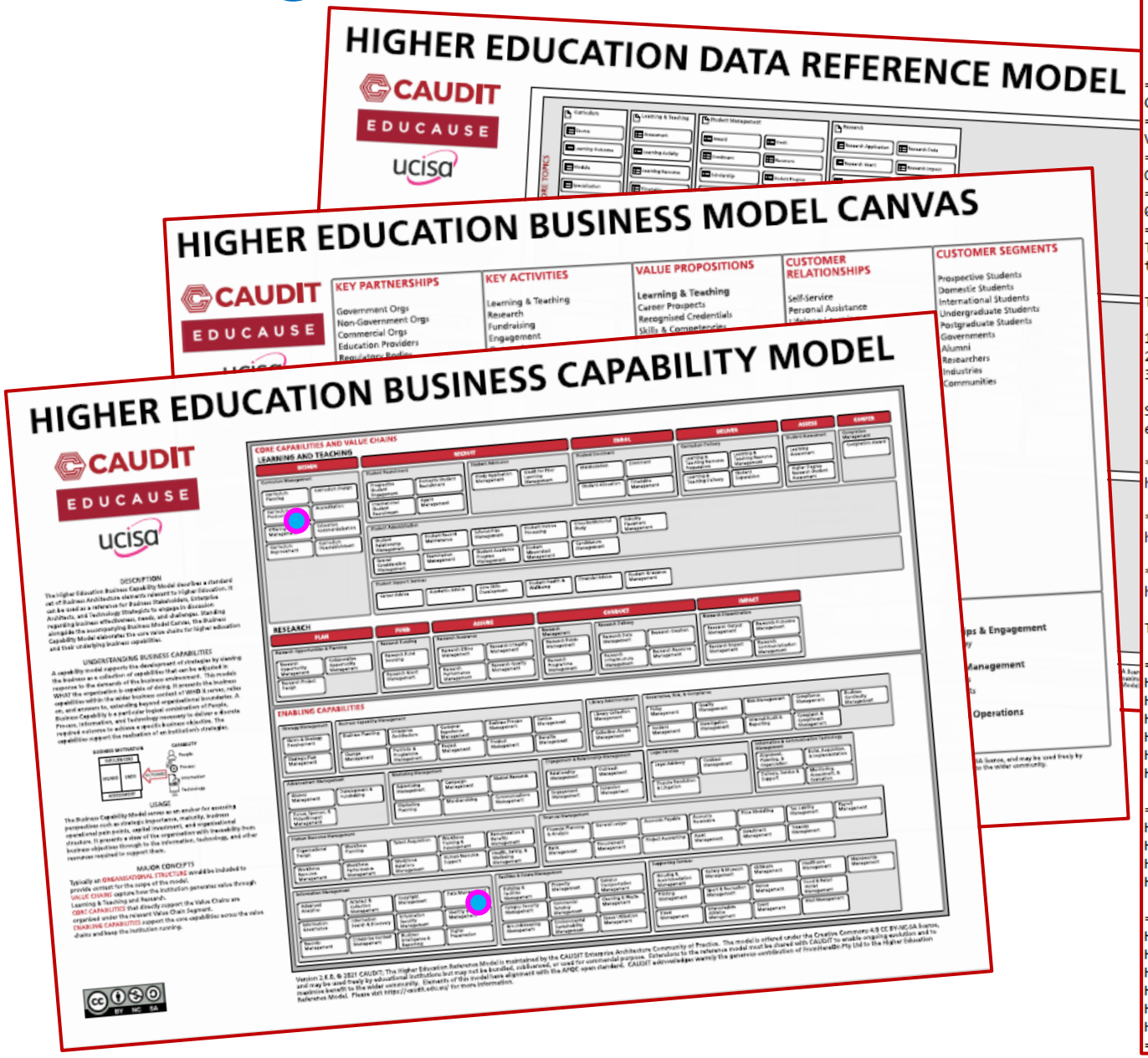
What are the top 3 business goals or objectives of your organization's APIs?

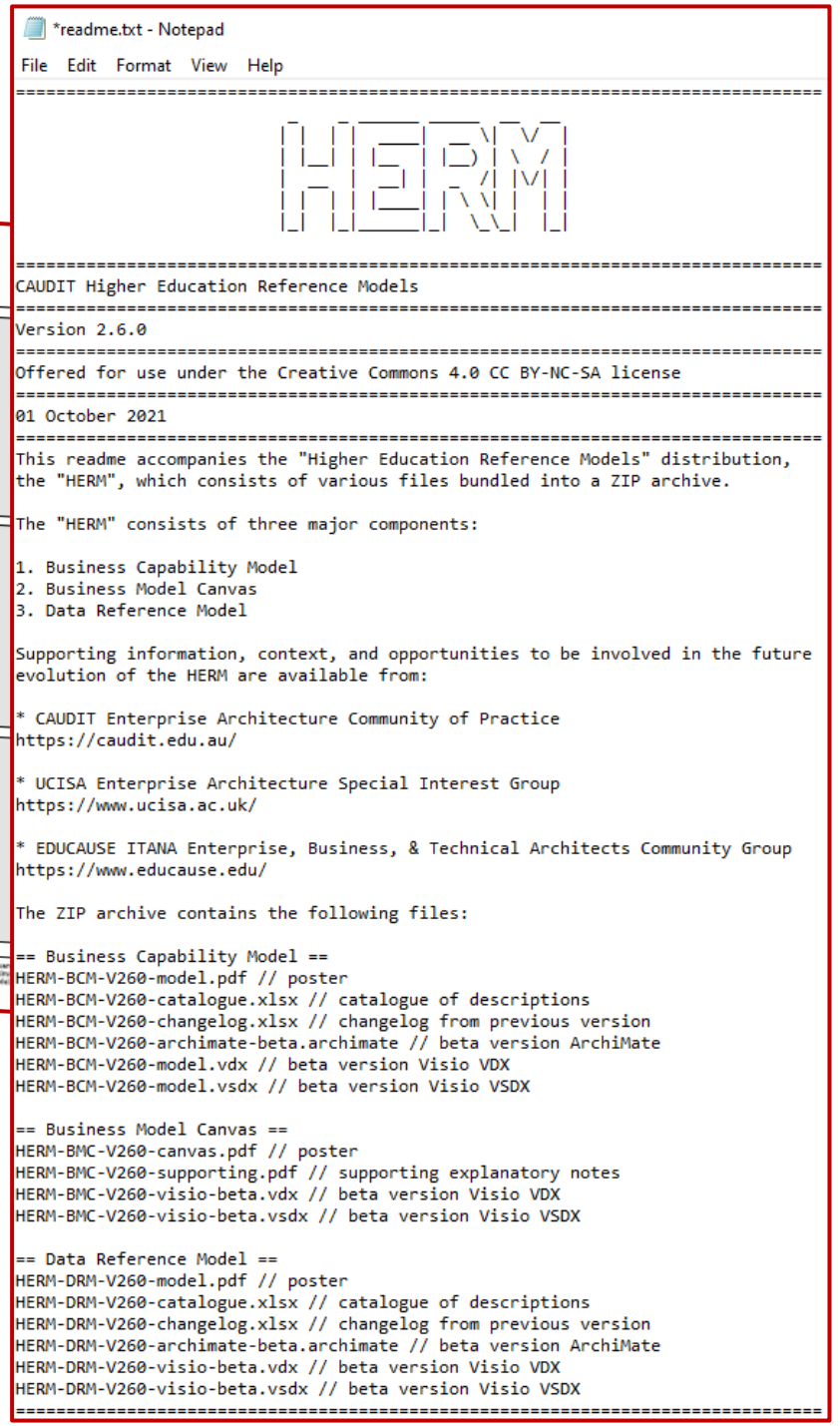
- Standardization of interfaces
- Internet of Things (IoT) use cases
- Better customer experience
- Reusability of integrations
- Automation
- Data monetization
- Enable mobile apps
- Multi Experience Development
- Integration between various platforms/apps/systems
- Digital business/transformation/services
- Access to Data
- Better time to market
- Interchange data/services with partners
- Other, please specify
- Unsure

Te Rautaki Matihiko | The University of Auckland Digital Strategy

- *Accessible Services*: We will provide a suite of valuable and valued well-described and discoverable services through a platform that enables people to access safe and robust services that expose the data, digital content, and functionality to which they are entitled. Achieving this is a digital priority for the Business Solutions IT Capability Plan.

API Coverage and Value





```
*readme.txt - Notepad
File  Edit  Format  View  Help
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================================================================================
CAUDIT Higher Education Reference Models
================================================================================
Version 2.6.0
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================================================================================
01 October 2021
================================================================================
This readme accompanies the "Higher Education Reference Models" distribution,
the "HERM", which consists of various files bundled into a ZIP archive.

The "HERM" consists of three major components:

1. Business Capability Model
2. Business Model Canvas
3. Data Reference Model

Supporting information, context, and opportunities to be involved in the future
evolution of the HERM are available from:

* CAUDIT Enterprise Architecture Community of Practice
https://caudit.edu.au/

* UCISA Enterprise Architecture Special Interest Group
https://www.ucisa.ac.uk/

* EDUCAUSE ITANA Enterprise, Business, & Technical Architects Community Group
https://www.educause.edu/

The ZIP archive contains the following files:

== Business Capability Model ==
HERM-BCM-V260-model.pdf // poster
HERM-BCM-V260-catalogue.xlsx // catalogue of descriptions
HERM-BCM-V260-changelog.xlsx // changelog from previous version
HERM-BCM-V260-archimate-beta.archimate // beta version ArchiMate
HERM-BCM-V260-model.vdx // beta version Visio VDX
HERM-BCM-V260-model.vsdx // beta version Visio VSDX

== Business Model Canvas ==
HERM-BMC-V260-canvas.pdf // poster
HERM-BMC-V260-supporting.pdf // supporting explanatory notes
HERM-BMC-V260-visio-beta.vdx // beta version Visio VDX
HERM-BMC-V260-visio-beta.vsdx // beta version Visio VSDX

== Data Reference Model ==
HERM-DRM-V260-model.pdf // poster
HERM-DRM-V260-catalogue.xlsx // catalogue of descriptions
HERM-DRM-V260-changelog.xlsx // changelog from previous version
HERM-DRM-V260-archimate-beta.archimate // beta version ArchiMate
HERM-DRM-V260-visio-beta.vdx // beta version Visio VDX
HERM-DRM-V260-visio-beta.vsdx // beta version Visio VSDX
================================================================================
```

Our Technology Plan

Strategic Priorities

- Accessible, equitable lifelong higher education opportunities
- A research ecosystem characterised by collaboration, agility, simplicity, engagement and empowerment
- Mana-enhancing services and practices
- Seamless, effective and equitable user experiences across social, physical, and digital environments
- Develop a future-ready workforce
- Commitment to achieve net-zero carbon status
- Efficient, effective, prudent, transparent, and informed operations
- Institutional Information Framework

Business Objectives

- **Accessible, integrated digital university**
- **Business-driven operating model & workforce**
- **Safe, resilient, adaptable technology & infrastructure**
- **Value focused for service excellence**

Technology Plan Actions

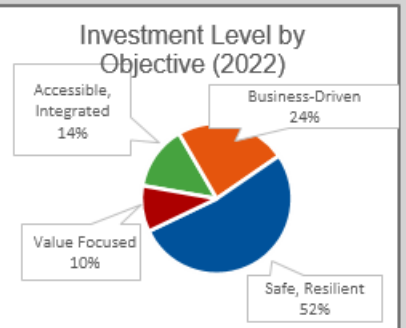
- Action 1.1 Provide the organisation with great collaboration and communication tools and platforms and services
- Action 1.2 Development environment & platforms that are safe, effective to deliver timely, high-quality business solutions
- Action 2.1 Deliver customer-centric service offerings and experiences enabling innovation
- Action 2.2 Develop workforce talent, skills & capabilities, with focus on equity
- Action 3.1 Create a nimble, simpler cloud-first contemporary technology environment
- Action 3.2 Balance cybersecurity risks with the need for business change
- Action 4.1 Optimise the value provided by IT assets, services & data
- Action 4.2 Improve governance across what we do and why we do it

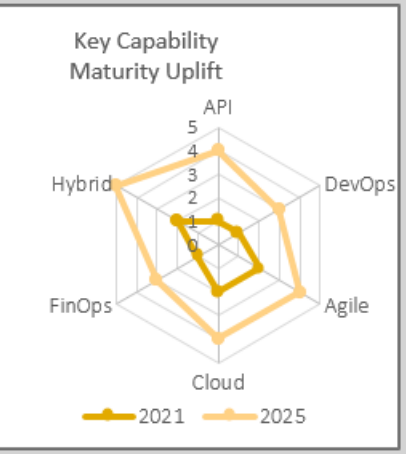
Roadmap

2022 | 2023 | 2024

- Enable seamless on-line and on-campus learning & teaching delivery
- Increase agility & collaboration for research & education (storage and connectivity)
- Forms, Workflow, and Low-Code Platforms, and API Services
- Automation of testing, deployment, services, & business processes
- Intelligent & continuous service provisioning for robust service design - there when it's needed
- Ways of working, skills & capabilities for faster delivery
- Digital skills for collaboration
- Technology solutions to support organisational sustainability goals (multi-cloud platform, single data centre)
- Self-sustaining infrastructure and networks
- Standard cybersecurity frameworks and business governance
- Govern and manage University data for greater insights & value
- Application Portfolio Management
- Measure and communicate the performance of IT assets & services
- Mature governance, risk & compliance across service demand
- Digital Technology Skills and the Future Workforce
- Create minimum viable architecture
- New Information & Technology Operating Model
- FinOps for Software As A Service (SaaS) & Platform As a Service (PaaS)
- Operationalise Artificial Intelligence and Conversational Interfaces
- Business innovates using IT apps & platforms
- Collaboration across tertiary sector

Digital Portfolio





Enabling Changes and Initiatives

- Hybrid workplace enables effective collaboration and performance
- Architectural guardrails to support governance & decision making
- Transition to new IT operating model to increase productivity
- Monitor, predict, and manage the cost of shifting to cloud
- Emerging technologies - machine learning, artificial intelligence, chatbots
- Business-led innovations and solutions using IT applications & platforms
- Leverage partnerships and ecosystems

Key Dependencies and Risks

- Delivery of integrated solutions constrained by lack of architectural guidelines and inconsistent delivery practices
- New business models emerging in higher education require more innovative approaches to change
- Competitive job market for digital talent
- Hybrid/remote ways of working
- Escalating cybersecurity threats
- Support for complex applications, platforms, ecosystems overwhelms delivery of change & innovation

Metrics/KPIs

- X% growth in use of collaboration services
- X% growth in number of deployments per month
- Delivery team effort increases from x% to y% on run & transform by 2025.
- x% of Digital Services/University staff will have the digital skills their role requires by 2025
- X% customer satisfaction with digital services by 2025
- 100% critical applications can be recovered within the required business timeframe by 2025
- x% of all University staff feel empowered and aware to keep themselves safe online by 2025
- Cloud adoption metric: new apps, existing apps migrated
- Total cost of ownership of applications

Resurrection and Hope

- Centre for Enablement
- Information & Technology Operating Model
- Low-Code Application Platform
- Enterprise Systems Refurbishment
- Business-Led IT
- Digital Business Imperatives
- KPIs and Progress-Tracking

Thank You

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Digital Strategy & Architecture
The University of Auckland
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Selected References

- The University of Auckland (2021) _*Te Rautaki Matihiko | The University of Auckland Digital Strategy*_, available at https://www.auckland.ac.nz/en/about-us/about-the-university/the-university/official-publications/digital-strategy.html
- Dayley, B. & Olliffe, G. (2021) _*How to Design Great APIs*_, Gartner for Technical Professionals, Article ID #G00747014, available at https://gartner.com/document/4002549 — *APIs are a fundamental component of the digital business environment, enabling application architectures that support composition and integration. Application technical professionals designing APIs must adopt a consumer-centric approach to ensure they provide value*.
- Alaybeyi, S. & O'Neill, M. (2021) _*Gartner's API Strategy Maturity Model*_, Gartner Research, Article ID #G00451168, available at https://gartner.com/document/3970520 — *IT organizations struggle to evolve their processes for developing, delivering and managing APIs for integration and digital business transformation. Application leaders must assess and improve their API strategy using five key dimensions explained in this research*.
- Dayley, B. & Olliffe, G. (2021) _*How to Deliver Sustainable APIs*_, Gartner Research, Article ID #G00747015, available at https://gartner.com/document/4002570 — *Implementing and supporting APIs that are discoverable, easy to use and reliable is critical to modern composable application architecture. Application technical professionals responsible for delivering APIs should use this framework to enable innovation, integration and composable architecture*.
- Modena, K., Foxwell, N., Dent, A., Abeysooriya, S., Tasker, P., Phillips, M., White, G., & kennedy, j. (2021) _*The Higher Education Reference Models*_, EDUCAUSE Library, available at https://library.educause.edu/resources/2021/9/the-higher-education-reference-models — *The Higher Education Reference Models provide standardized business and data architectures that communicate a generalized view of how higher education institutions are organized and the information they use*.
- NZ Government (2020) _*API implementation guidance*_, available at https://www.digital.govt.nz/standards-and-guidance/technology-and-architecture/application-programming-interfaces-apis/api-implementation-guidance/ — *Agencies and vendors can follow the API Standard and Guidelines for default guidance on API implementation to accelerate the development of government APIs*.
- API Evangelist (2014) _*The University of API White Paper: Looking At APIs In Higher Education*_, API Evangelist, available at https://apievangelist.com/2014/08/06/the-university-of-api-white-paper-looking-at-apis-in-higher-education/