Data and Integration (summary paper)
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1 Current operating model

Historically, integration at UQ was point-to-point, bespoke, eclectically implemented and difficult to maintain. The resulting ‘integration hairball’ made system interdependencies challenging to understand. The ITS Data Services team was established in 2011 as a shared service, primarily to deliver integration services at UQ. The team, now known as Data and Identity Services, has matured integration and data engineering capabilities which are underpinned by a number of key data and integration technology platforms. Centralisation of integration via these platforms helps the University to understand the plethora of data flows across UQ’s extensive and complex application landscape. These activities also align with IT’s strategic vision and the ICT policies and procedures.

Data and Identity Services includes the following data and integration-focused teams:

- Integration Services
- Analytics Data Services
- Data Administration
- Data Governance.

The data and integration teams always endeavour to re-use common integration patterns from one project to another. If a project requires a new pattern then it will be established with future re-use in mind. Sound development practices are followed (e.g. APIs are documented via OpenAPI (Swagger) contracts) before they are built.

The Data and Identity Services team currently supports the following key platforms to deliver data and integration services to the University:

- **UQ Data Hub**: A data integration platform founded on traditional extract-transform-load (ETL) style capabilities.
- **Central Integration Platform (CIP)**: An integration capability to support real-time or near real-time interoperability between applications.
- **Analytics Data as a Service (ADaaS)**: A big data platform to support an emerging advanced analytics capability at UQ.

2 Emerging challenges

Many challenges have emerged since the initial establishment of teams to deliver data and integration services. Some of the more prominent challenges are listed below:

- **Technical cohesion of platforms**: While the key data and integration platforms have successfully delivered solutions for UQ, each platform was established at a different time using different technology stacks. There is limited technical cohesion between the platforms, which can lead to ‘wheel reinvention’ at times.

- **Platform support vs service delivery**: The central data and integration teams are responsible for integration development as well as the operational support and administration of these platforms.

- **Software as a Service (SaaS)**: UQ is rapidly accelerating adoption of SaaS and managed service models to deliver systems that support business capabilities. As UQ implements more SaaS

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solutions the variability and limitations of integration approaches supported by SaaS products will increase the complexity and unpredictability of integration work. In addition, there is often a lack of clarity about technical stewardship and support for SaaS products, which creates financial impediments to optimal integration solutions. Without technical stewardship from within UQ, keeping vendors accountable can be a challenge.

- **Project demand:** Central integration services are experiencing skyrocketing demand from projects and this has created the following challenges:
  - conflicting project schedules
  - significant support from central resources is generally required
  - integration requirements are often unclear
  - integration service providers are often engaged too late in the process
  - central integration services often mediate or orchestrate services or endpoints delivered by other teams who may also be required to do work
  - there can be a perception that integration is a blocker or bottleneck.

- **Resourcing:** The Integration Services and Analytics Data Services teams are quite small considering the demand for their services. Expanding these teams is difficult due to reliance on operational funding, and reluctance of smaller projects to contribute to shared resources.

- **Governance and workflow:** The data stewardship workflow is not well automated and can sometimes slow down progress of integration flow deployment. There are also issues where data is re-used without notifying data and integration teams, and without approval from the relevant data steward.

- **Business and technology change:** Technologies are changing rapidly, as are business practices. Data streaming, Internet of Things (IoT) devices and robotic process automation (RPA) are key initiatives with significant impacts to data and integration teams.

- **Reliance on technical resources:** There is some reliance on technical resources from upstream systems to assist with the extraction of data, and especially with understanding the data.

3 Future operating model

Traditional integration architectures cannot keep up with the speed and volume of integrations – digital transformation and modern integration requires speed, flexibility, security, and scalability.

Additionally, to harness the power of big data, organisations need to access real-time, easily digestible data from diverse systems such as IoT logs and instrumentation, unstructured voice or image data, structured records, or information stored on peripheral devices. Connecting devices such as smartphones and mobile systems also increases storage access requirements because data stores may be required at any time to feed real-time information into specific queries.²

Achieving this future state requires changes to people, processes, governance and technology. These specific changes and challenges are summarised below, and defined in more detail in our longer form Data and Integration discussion paper.

- **People:** In future, platform operational support and administration should be separated from integration development and deployment work. Centralised data and integration development teams

will scale up and down to service the integration needs of projects. Additional staff with strong engagement skills are required.

- **Process:** There should be a heavy focus on automating best practice to the greatest extent possible. This will improve consistency and efficiency in the centralised teams while enabling self-service within suitable constraints. Effective data governance will also allow IT to better leverage integration platforms and facilitate self-service. Additionally, an integration design authority should guide procurement and project decisions regarding integration approaches and requirements.

- **Technology:** IT should consolidate, embed and deliver well governed data and integration services through data fabric (including data virtualisation) and Integration Platform as a Service (iPaaS) platforms.

### 3.1 Functional model

The Data and Integration Enablement functional model in Figure 1 is intended to show the major functional capabilities that future central data and integration teams will be required to deliver. It is not necessarily a team structure, but rather a core group of competencies to enable enhanced data and integration services at UQ. For more information on the functional model and the future of data and integration at UQ, refer to the long form [Data and Integration discussion paper](#).

**Figure 1** Data and Integration Enablement functional model
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