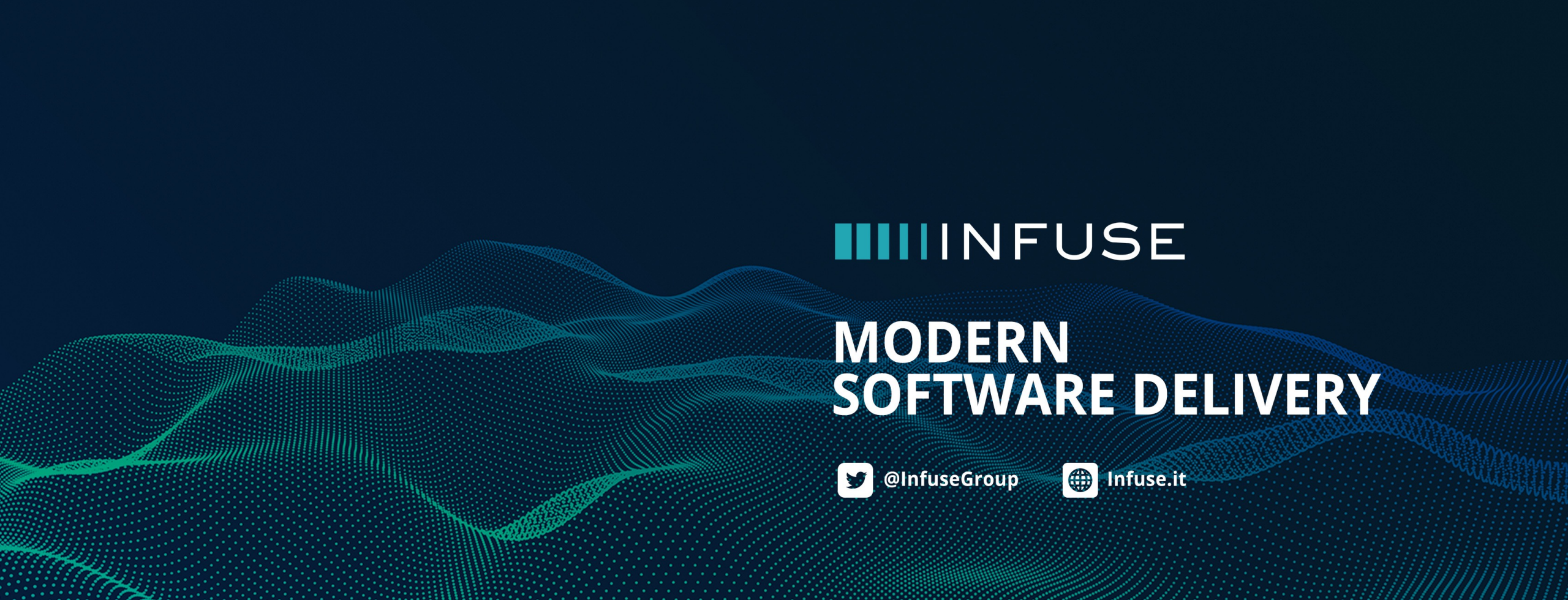




INFUSE

MODERN
SOFTWARE DELIVERY



@InfuseGroup



Infuse.it

Aberdeen University
Integration Architecture



UNIVERSITY OF
ABERDEEN

INFUSE

Agenda

- **What** do we want to achieve?
 - Goals and aspirations
- **Why** are we doing this?
 - Our reasons for change
- **When** should we do this?
 - Industry and technology context
- **How** should we achieve our goals
 - Step 1 clearly define goals
 - Step 2 understand what we have
 - Step 3 define the vision
 - Step 4 prove it! With a pilot
 - Step 5 define the roadmap

What do we want to achieve? - Goals

- *“The University of Aberdeen has a complex application estate, with several core products (including Admissions, CRM, Finance, HR, Student Records). Currently data exchange/interfaces between systems is predominantly achieved by scheduled data file extracts (typically XML or CSV) which are transferred and imported to the target system. These interfaces are point-to-point, resulting in significant maintenance overhead.”*
- *The University of Aberdeen is looking **to design a new integration platform**. The design is expected to include:*

Goals

- Modular integrations from source system to the integration platform (allowing for easier system replacements).
- Greater use of APIs for information exchange.
- Real-time or near real-time data exchange.
- Data exchange in JSON, XML and/or CSV format.

Goals

- Support for message-based or event-based approaches.
- A comprehensive data security model.
- The ability to connect both on-premise and cloud solutions.
- The ability to progressively implement the solution, allowing point-to-point interfacing to coexist with the new approach until each interface is migrated.

Why are we doing this? - Rationale



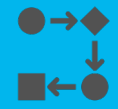
Student
Experience



Development
Accelerator



System
Replacement



Low Code
Enabler



Developer
Experience

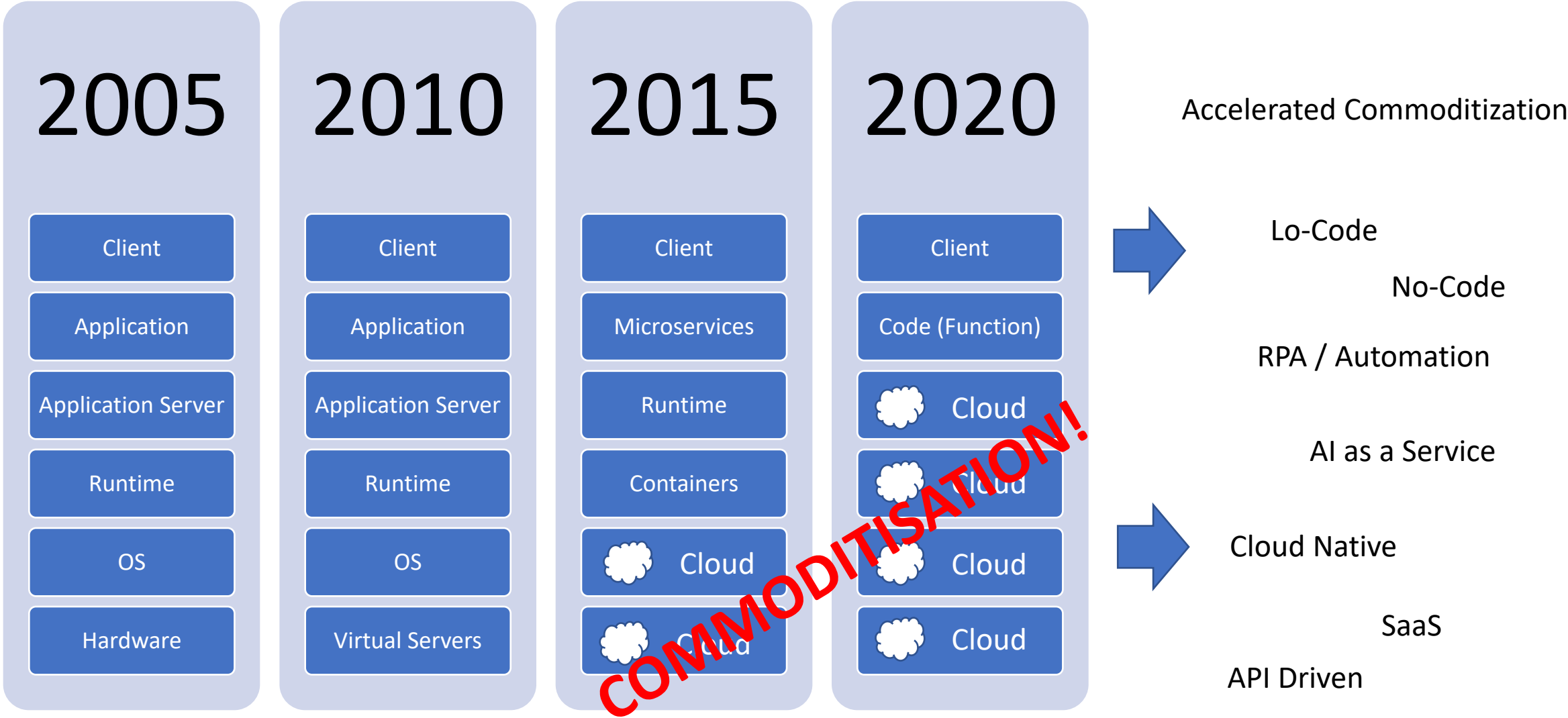


Cloud vs On
Prem



Fault
Tolerance

When are we doing this? - Industry Context



How are we doing this?

- Step 1 clearly define goals ✓
- Step 2 understand what we have - current state
- Step 3 define the vision - target state
- Step 4 prove it with a pilot (de-risk)
- Step 5 define the roadmap

Current State

- Do we understand what we have?
- Yes, we operate it day to day, but...
 - No overview or systems map
 - Lots of tacit knowledge within the IT Team
- So Step 1 is to understand our current state

Current State

- Build the asset list
 - What systems do we manage
 - Where do they reside

Domain	System	Vendor	Technology	Location
HR	Rebus	External	its Decomissioned	UoA
HR	Web Staff Pages	Internal	PHP	UoA
Facilities / Security	Door Entry (ARX)	External	java	UoA
Facilities / Security	ID Cards	External	java	UoA
Facilities / Security	ID Cards Lookup	Internal	PHP	UoA
Facilities / Security	Photo Upload	Internal	.NET	UoA
Facilities / General	Aberdeen Sports Village	External	.NET	UoA
Facilities / General	Fertility (RI Witness)	External	?	?
Facilities / General	Library (ALMA)	External	?	Cloud
Facilities / General	Multifunctional Devices (Printing)	External	?	?
I.T.	DMZ (eAccom)	Internal	Oracle	UoA
I.T.	Enterprise Service Bus	Internal	Oracle	UoA
I.T.	Microsoft Identity Manager	External	Microsoft	?
I.T.	Online Student Services	Internal	Oracle	UoA
BI	Admissions (Discoverer)	Internal	OBI EE	UoA
BI	Finance (Discoverer)	Internal	OBI EE	UoA
BI	IMBA (Discoverer)	Internal	OBI EE	UoA
BI	IRR (Discoverer)	Internal	OBI EE	UoA
BI	KPI (Discoverer)	Internal	OBI EE	UoA
BI	Student Loads (Discoverer)	Internal	OBI EE	UoA
BI	Student Retention (Discoverer)	Internal	OBI EE	UoA
BI	Student Loads (PowerBI)	External/Internal	PowerBI	UoA
Finance	ePayments (WPM)	External	?	Cloud
Finance	eProcurement (Parabilis)	External	?	Cloud
Finance	ePayments System	Internal	PHP	UoA
Finance	Finance (ABW)	External	.NET	UoA
Finance	Grants&Contracts	Internal	Oracle Forms	UoA
Finance	Online Store (WPM)	External	?	Cloud
Finance	Research Awards Management System	External	?	Cloud
Finance	Student Awards Agency Scotland	External	?	?
Finance	Scottish Funding Council	External	?	?

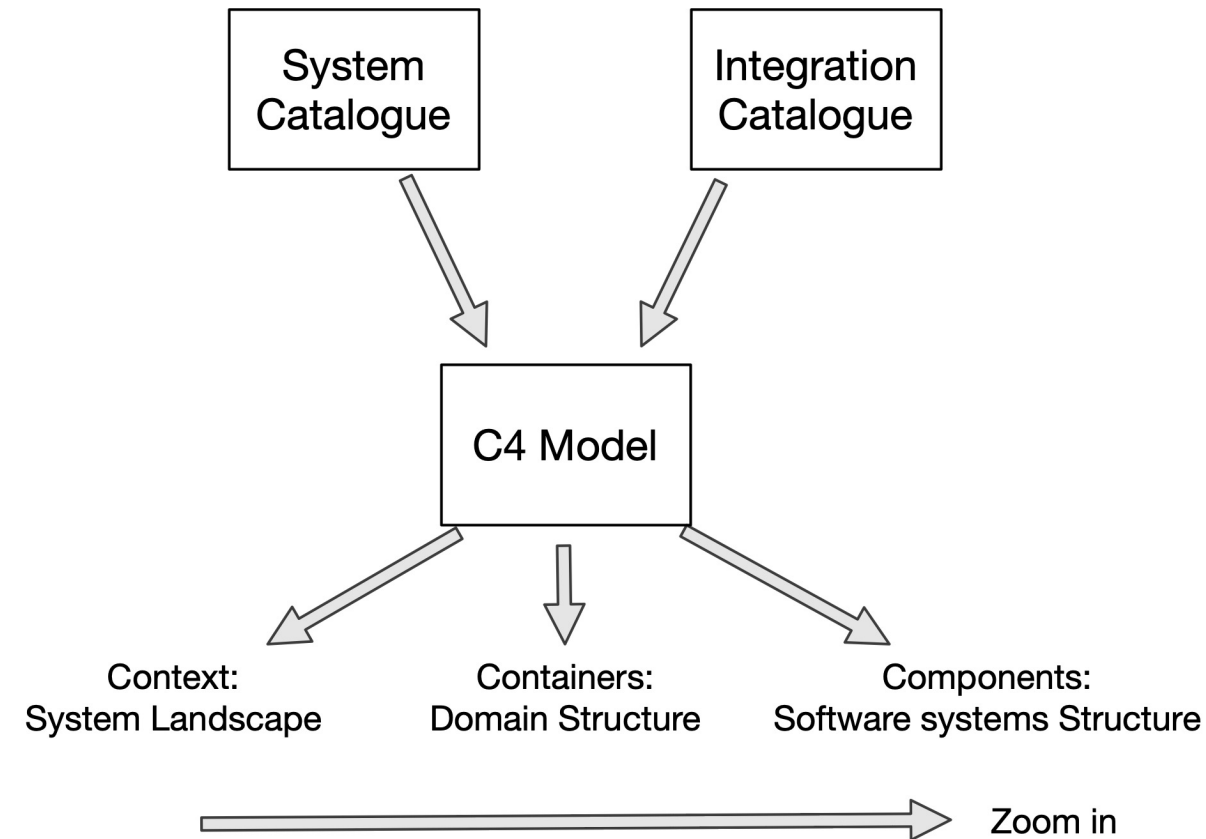
Current State

- Build the integration catalogue
 - How do our systems connect?
 - What are the external touchpoints

Interface Name	Source Domain	Source System	Target Domain	Target System	B
Aberdeen Sports Village - Student Records	Student Records	Student Records System	Facilities / General	Aberdeen Sports Village	
Aberdeen Sports Village - HRN	HR	HR (Northgate)	Facilities / General	Aberdeen Sports Village	
Aberdeen Sports Village - IDC	Facilities / Security	ID Cards	Facilities / General	Aberdeen Sports Village	
Accommodation - Online Application Form (Auth.)	Admissions	Admissions System	Accommodation	Choices	
Accommodation - Online Application Form (Auth)	Student Records	Student Records System	Accommodation	Choices	Y
Accommodation - Online Application Form (Choices)	Accommodation	Accommodation System	Accommodation	Choices	Y
Accommodation - eAccommodation	Student Records	Student Records System	Accommodation	Portal	
Accommodation - Student Debt	Finance	Finance (ABW)	Accommodation	Accommodation System	
Accommodation - Student Details	Student Records	Student Records System	Accommodation	Accommodation System	
Accommodation - Student Changes	Student Records	Student Records System	Accommodation	Accommodation System	Y
Admissions - Agent Portal	Admissions	Admissions System	Admissions	Agent Portal	Y
Admissions - Erasmus	Admissions	Erasmus	Admissions	Admissions System	
Admissions - HR	HR	HR (Northgate)	Admissions	Admissions System	
Admissions - Medical Admissions	Admissions	Admissions System	Admissions	Medical Admissions	
Admissions - Postgraduate Applications	Admissions	Postgraduate Application	Admissions	Admissions System	Y
Admissions - PG Programme Hierarchy	Student Records	Student Records System	Admissions	Admissions System	
Admissions - Transfer Applicants to SRS	Admissions	Admissions System	Student Records	Student Records System	
Admissions - UCAS	Admissions	UCAS	Admissions System	Admissions System	
Admissions - UCAS Data for HESA (STARJ)	Admissions	UCAS	Admissions System	Admissions System	
Admissions - UGPT Application	Admissions	Admissions System			
Admissions - Widening Participation (REACH)	Student Records	Student Records System	Admissions	Admissions System	
BI - Admissions	Admissions	Admissions System	BI	Admissions (Discoverer)	
BI - Finance	Finance	Finance (ABW)	BI	Finance (Discoverer)	
BI - KPI	Multiple	Finance, HR, SRS, Grants and Contracts	BI	KPI (Discoverer)	
BI - IMBA	Multiple	Finance, HR, SRS, Grants and Contracts	BI	IMBA (Discoverer)	

Current State

- Using the gathered information, build a **domain model** for the estate
- **C4** - Context, Containers, Components, and Code
 - **Structurizr** - Diagrams as Code 2.0
 - DSL for system models
- We can maintain current state documentation as a simple text based model.
 - Render the model from multiple perspectives
 - Landscape -> Context -> Detail
 - Organization -> Domains -> Applications



Current State

Aberdeen

Landscape View

Contextual Views

BI Context

FacilitiesGen Context

Finance Context

SRS Context

Accommodation Context

Admissions Context

CRM Context

IT Context

HR Context

FacilitiesSec Context

Detailed Views

SRS Detail

Accommodation Detail

FacilitiesSec Detail

BI Detail

Finance Detail

FacilitiesGen Detail

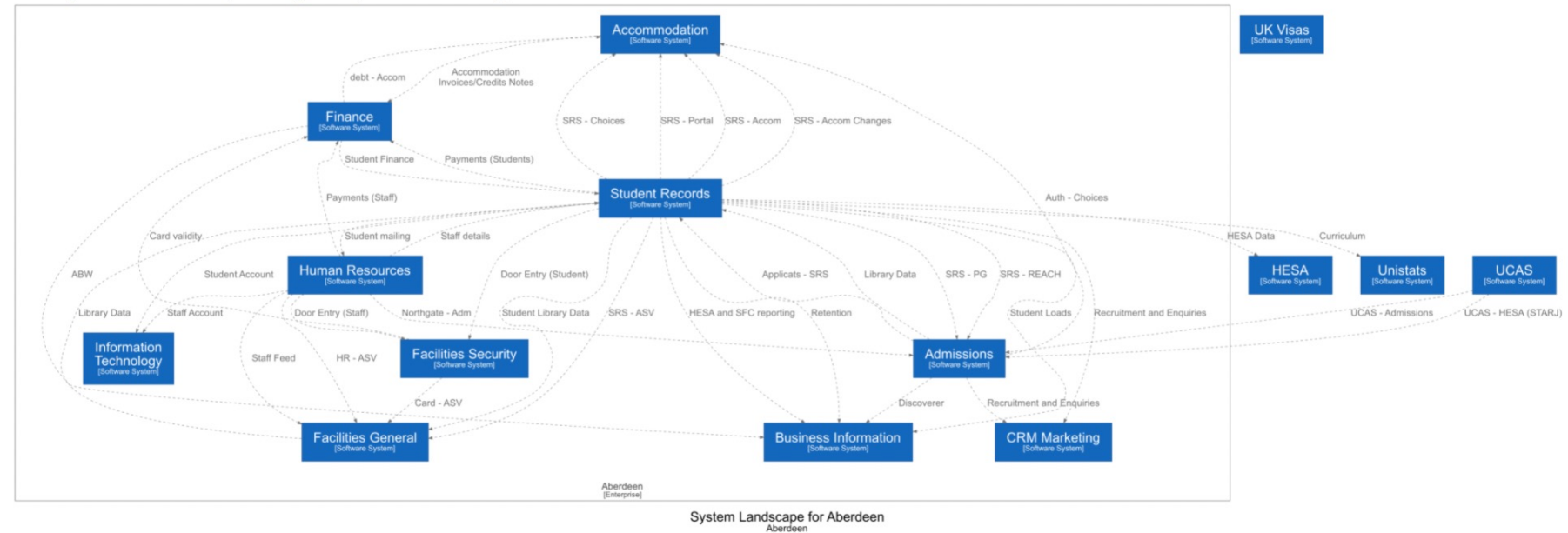
IT Detail

Aberdeen

Architecture diagrams for Aberdeen current state

Landscape View

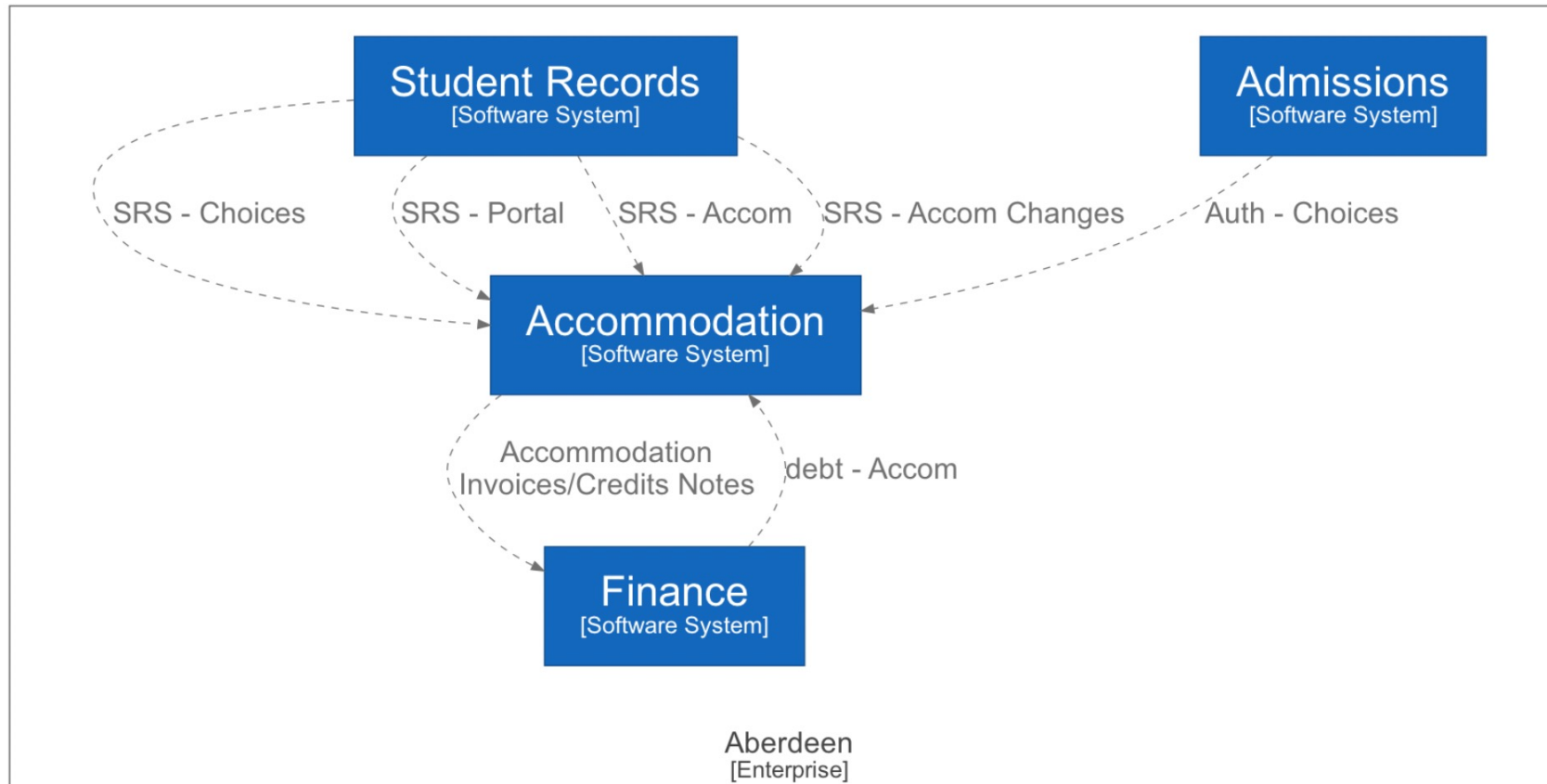
The system landscape diagram provides a high level overview of the estate and shows how each the domains in the estate are connected.



Current State

- Drill down from landscape to accommodation context

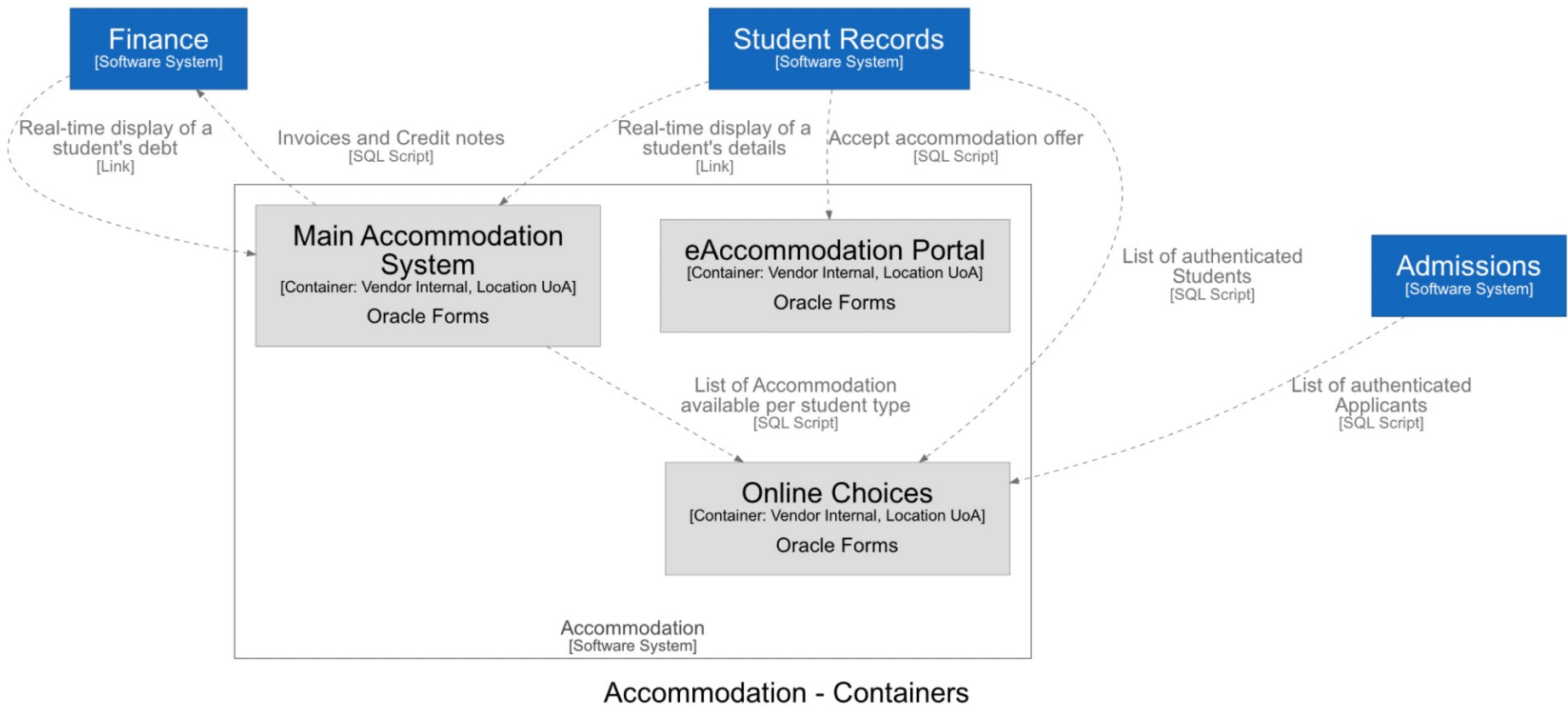
Accommodation Context



Current State

- Drill down from accommodation context to detail

Accommodation Detail



Observations on Current State Model

- The University has built a large portion of it's systems in house, including the main student records system.
- Integrations have historically been point to point and typically use SQL files, CSV or XML import / export
 - Some newer integrations are API based
- Integrations typically run on a scheduled basis – usually daily
- The architecture is 'accidental' and has grown organically
- The integrations form a 'hub and spoke' type system centred around the student record system.

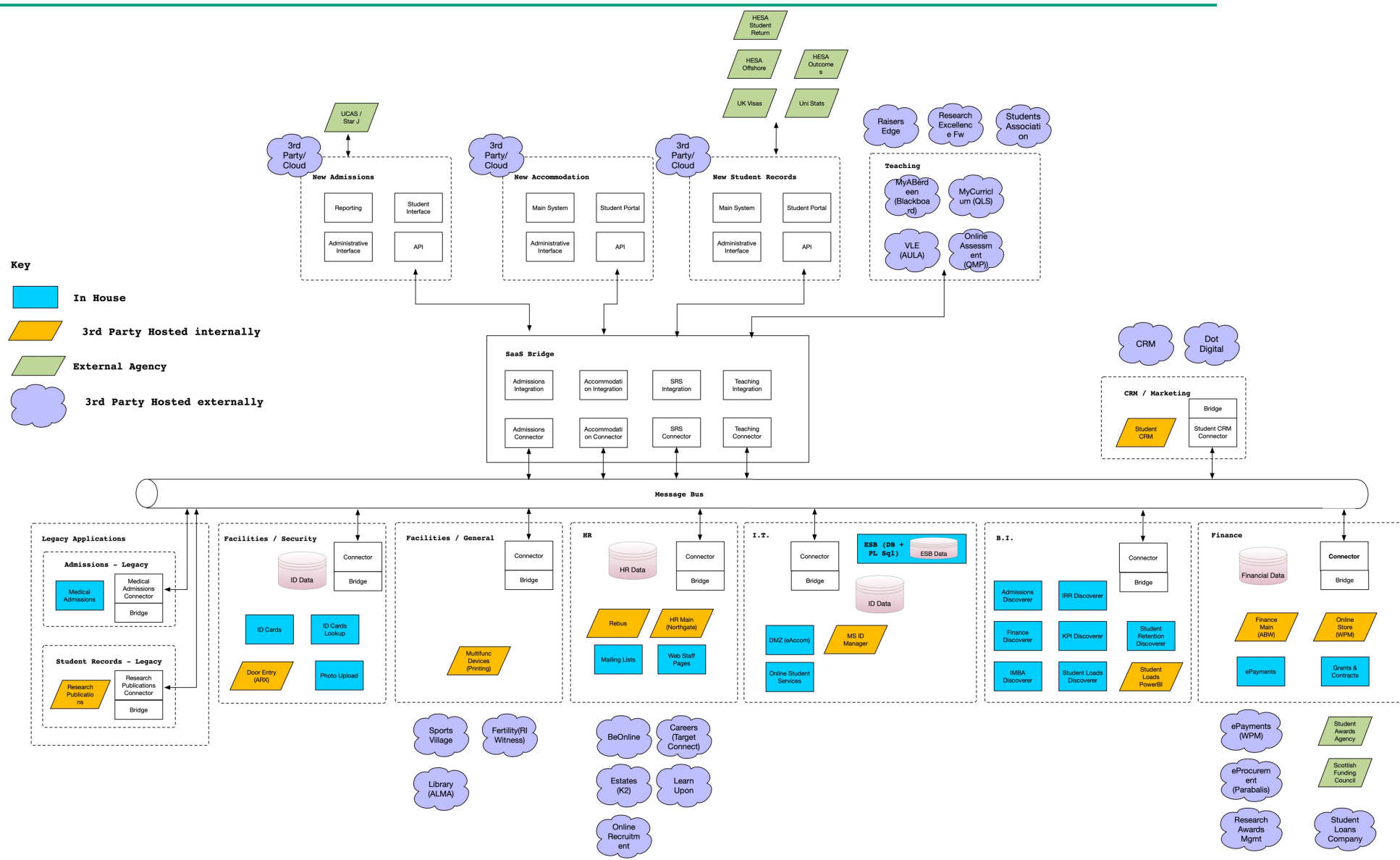
How are we doing this?

- Step 1 clearly define goals ✓
- Step 2 understand what we have - current state ✓
- Step 3 define the vision - target state
- Step 4 prove it with a pilot
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Target State

- Replace in house developed software with commodity SaaS based solutions
- Replace the in house point to point integrations with a common integration layer
- Adopt a Message Bus type architecture as the integration approach to enable real-time data flows
 - Break Hub and Spoke dependencies
- Leverage existing commodity services as much as possible to construct the integration layer
- Plan to bring on stream one system at a time

Target State

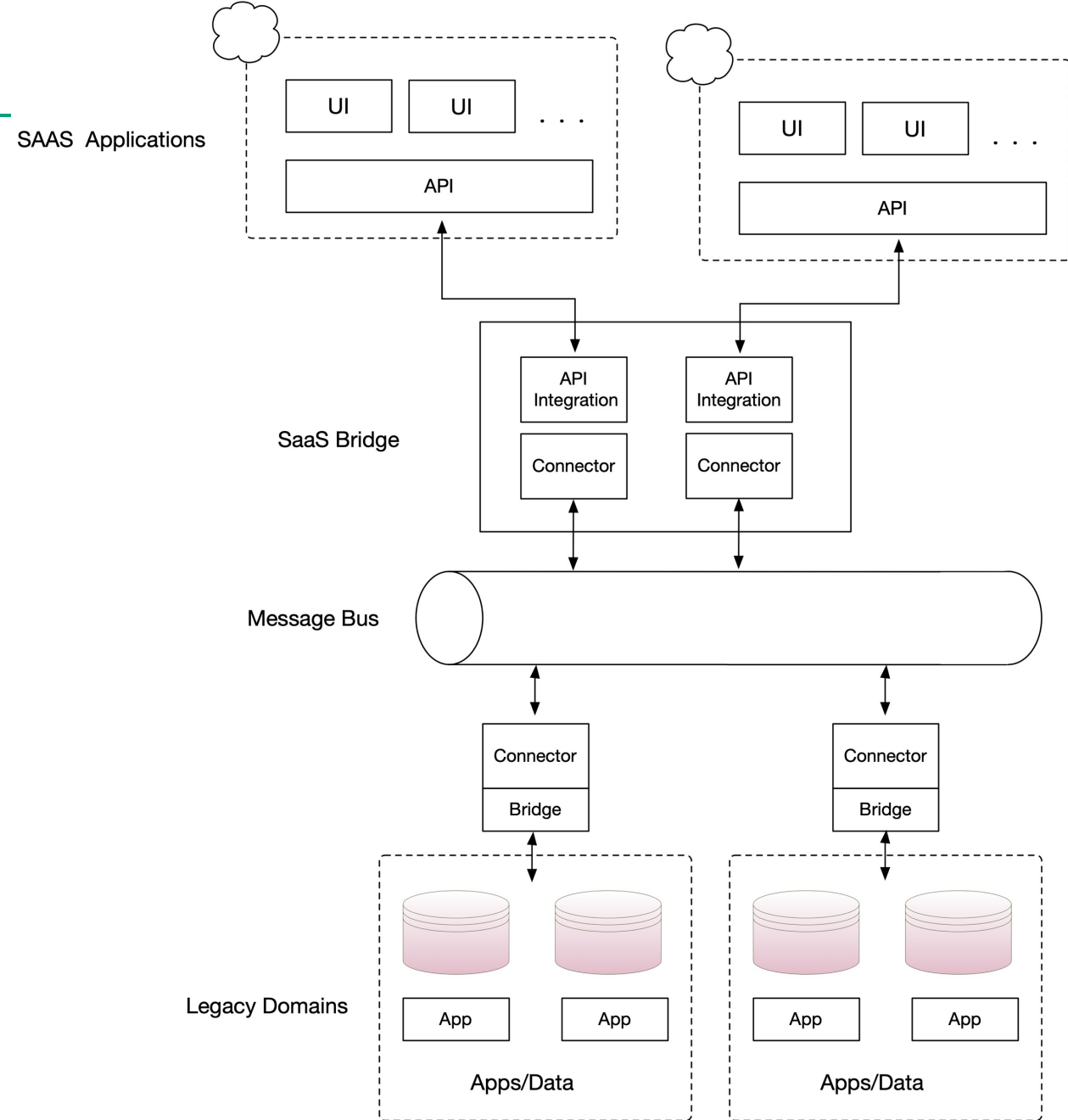


Cloud Managed SaaS

Existing On Premise

Target State

- Decoupled, event driven integration architecture
- Apache Kafka used as the message bus
 - Prefer the use of prebuilt connectors - Confluent
- SaaS products selected provide rich API based integration capability
- On premise systems are largely Oracle based
 - Bridge the integration layer via ORDS (Oracle REST Data Services)

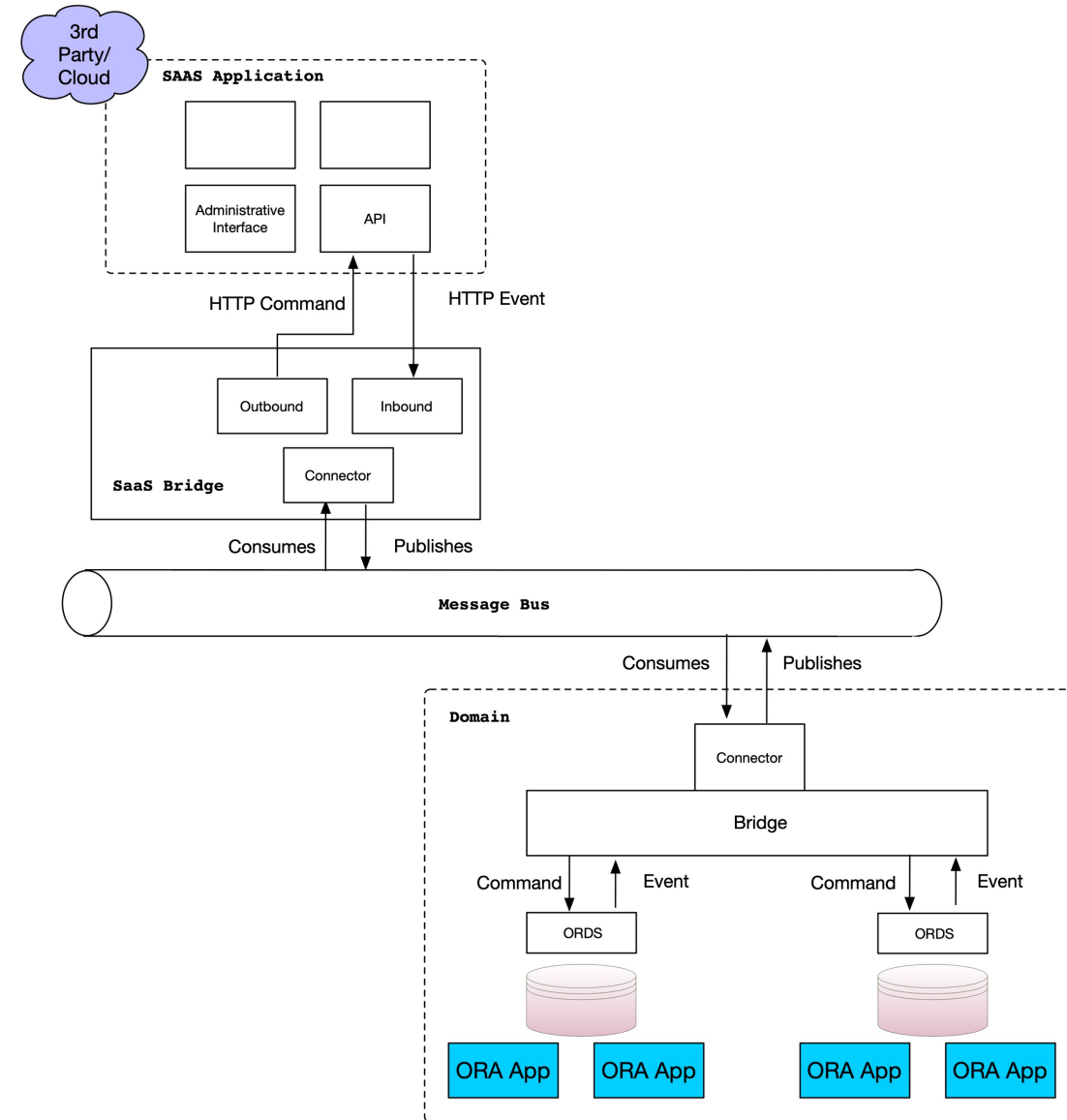


How are we doing this?

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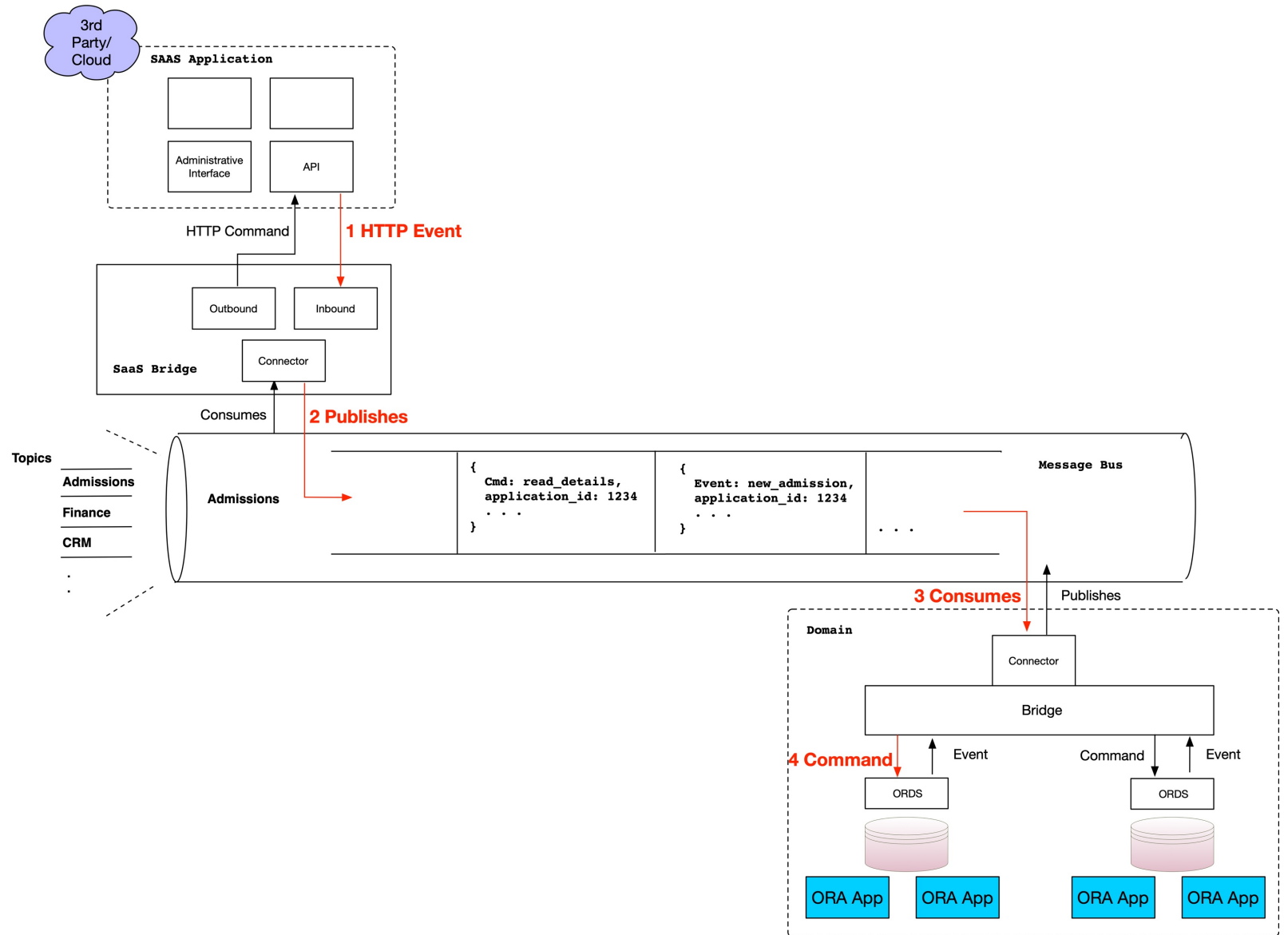
Target State - Bridging The Gap

- Legacy systems exposes an interface using ORDS
- ORDS API interacts with bridging layer
- The bridging layer connects into the message bus
- SaaS applications interact via RESTful APIS
- SaaS connector integrates to the message bus



Target State - Example Message Flow

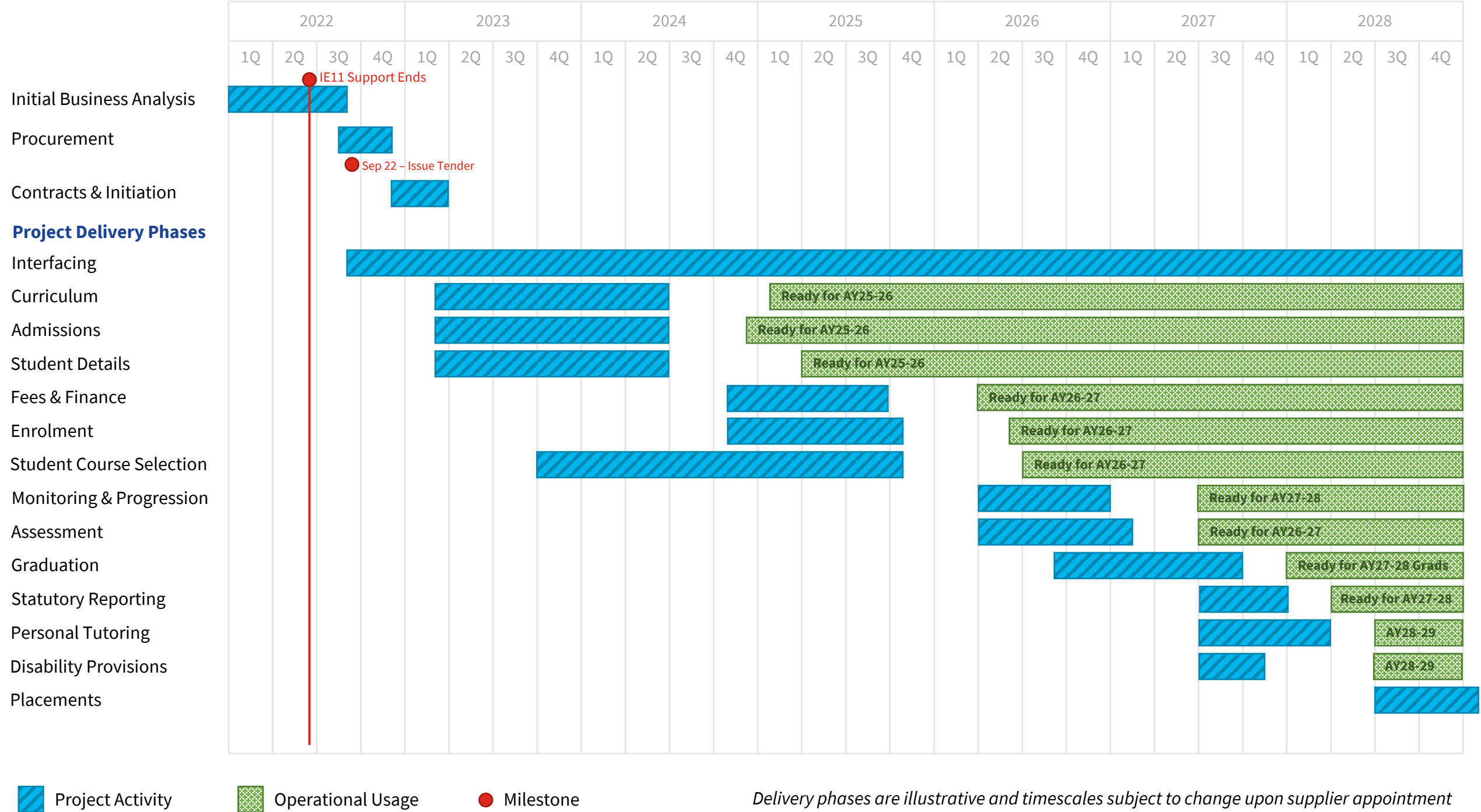
- Event generate in SaaS application (e.g. Record updated)
- Event flows through to on premise application via ORDS



How are we doing this?

- Step 1 clearly define goals ✓
- Step 2 understand what we have - current state ✓
- Step 3 define the vision - target state ✓
- Step 4 prove it with a pilot ✓
- Step 5 define the roadmap

- Piecemeal replacement of systems with SaaS solutions
- Allow existing legacy systems to run in parallel
- Bridge in only what is needed as we replace each component in the estate
- Make small, reversible incremental changes



How are we doing this?

- Step 1 clearly define goals ✓
- Step 2 understand what we have - current state ✓
- Step 3 define the vision - target state ✓
- Step 4 prove it with a pilot ✓
- Step 5 define the roadmap ✓

Conclusion

- Clear understanding of end goals
- Detailed understanding of current estate
- Build target state vision
- Test assumptions and end state with PoC / Pilot
- Incremental Roadmap for change