

Market Interface Technology Enhancements Working Group (MITE WG)

Wednesday 05 March 2025
(1:00pm to 4:30pm AEDT)

This meeting will be recorded for
minute taking purposes.



We acknowledge the Traditional Custodians of the land, seas and waters across Australia. We honour the wisdom of Aboriginal and Torres Strait Islander Elders past and present and embrace future generations.

We acknowledge that, wherever we work, we do so on Aboriginal and Torres Strait Islander lands. We pay respect to the world's oldest continuing culture and First Nations peoples' deep and continuing connection to Country; and hope that our work can benefit both people and Country.

'Journey of unity: AEMO's Reconciliation Path' by Lani Balzan

AEMO Group is proud to have delivered its first Reconciliation Action Plan in May 2024. 'Journey of unity: AEMO's Reconciliation Path' was created by Wiradjuri artist Lani Balzan to visually narrate our ongoing journey towards reconciliation - a collaborative endeavour that honours First Nations cultures, fosters mutual understanding, and paves the way for a brighter, more inclusive future.

Read our
RAP



Housekeeping



1. This meeting will be recorded for minute taking purposes
2. Please mute your microphone, this helps with audio quality as background noises distract from the conversation.
3. Use the 'Raise hand' function should you wish to speak to an item.
4. Use the 'Chat' function for any other questions or comments you may have.
5. In attending this meeting, you are expected to:
 - Not only represent your organisation's interests but also the interests of Industry and its customers
 - Have an open mindset
 - Contribute constructively
 - Be respectful, both on the call and in the chat

1. Welcome

Blaine Miner



Objective of today's session

The MITE WG has been established to define and develop Technical Procedures/guides for IDAM, IDX and Portal Consolidation. These initiatives seek to deliver foundational capability supporting interactions between participants and AEMO and based on the agreed scope to transition or enable decisions on transitioning of existing business services

This workshop aims to cover:

- Approach to determining Decision Point 2 “HOW” Criteria:
- Focus Group playback IDX: AEMO Gateway Software
- Focus Group playback IDX: Inquiry Service

The ask of participants:

- Invite and share this pack with your technical experts who will support the MITE WG process
- Review the approach to determining Decision Point 2 criteria
- Review the Playback content
- Provide your inputs on the outcomes, polls and results as presented
- Engage in the workshop – questions are welcome

[Link](#) to the target state pack established in consultation with the industry stakeholders

Agenda

#	Indicative Timings	Topic	Presenter
1	1:00pm-1:05pm	Welcome	Blaine Miner
2	1:05pm-1:35pm	Approach to Determining DP2 Criteria: the “HOW”	Graeme Windley
3	1:35pm-2:35pm	Focus Group playback IDX: AEMO GW SW	Sri Gundu
3a	2:35pm-3:05pm	Demonstration – Monitoring Software	Phil Hayes
		NO BREAK	
4	3:05pm-4:05pm	Focus Group playback IDX: Inquiry Service	Udaya Uppalati
5	4:05pm-4:10pm	Forward Plan	Blaine Miner
6	4:10pm-4:15pm	General Business and Next Steps	Blaine Miner
	Appendix	Appendix A: AEMO Competition Law - Meeting Protocol Appendix B: References from the DP2 “WHAT” Working Group on 29 Jan 2025 Appendix C: AEMO Gateway Software reference slides	

Note: While a break is scheduled, if Agenda items #2 and #3 run over time this time will be used for content discussions

Notes

Blaine spoke to the Objective and Agenda.

- Highlighted that agenda will prioritise key topics such Decision Point 2 “How” criteria of the IDX Transition, playback the IDX: AEMO Gateway Software and IDX: Inquiry Service.

2. Approach to Determining DP2 Criteria: The “HOW”

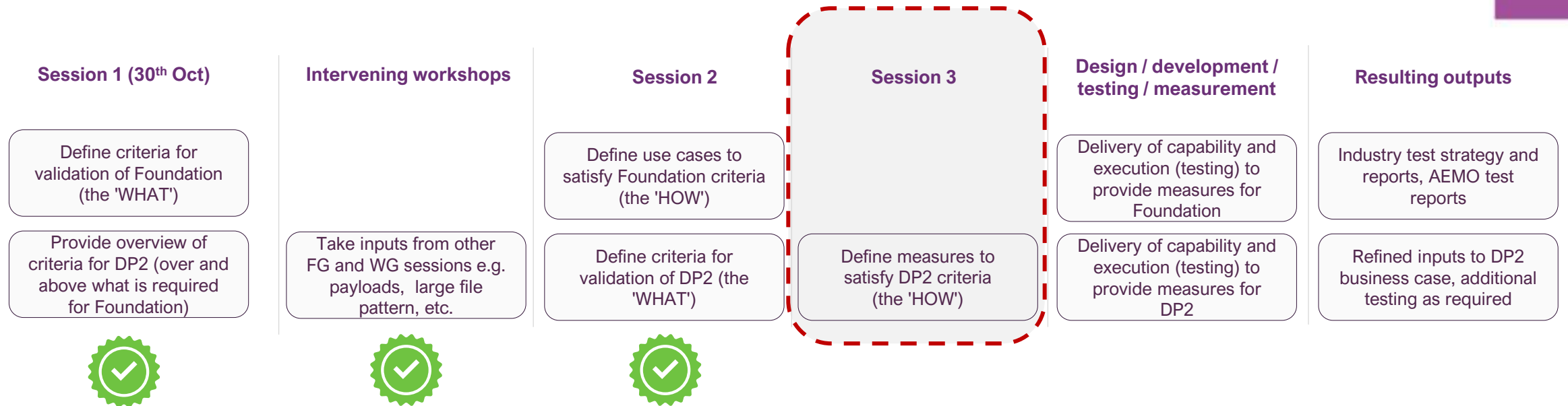


Graeme Windley



AEMO existing Industry Engagement Approach

AEMO had proposed the below to collaboratively establish the measures needed to confirm the Foundation capabilities and DP2

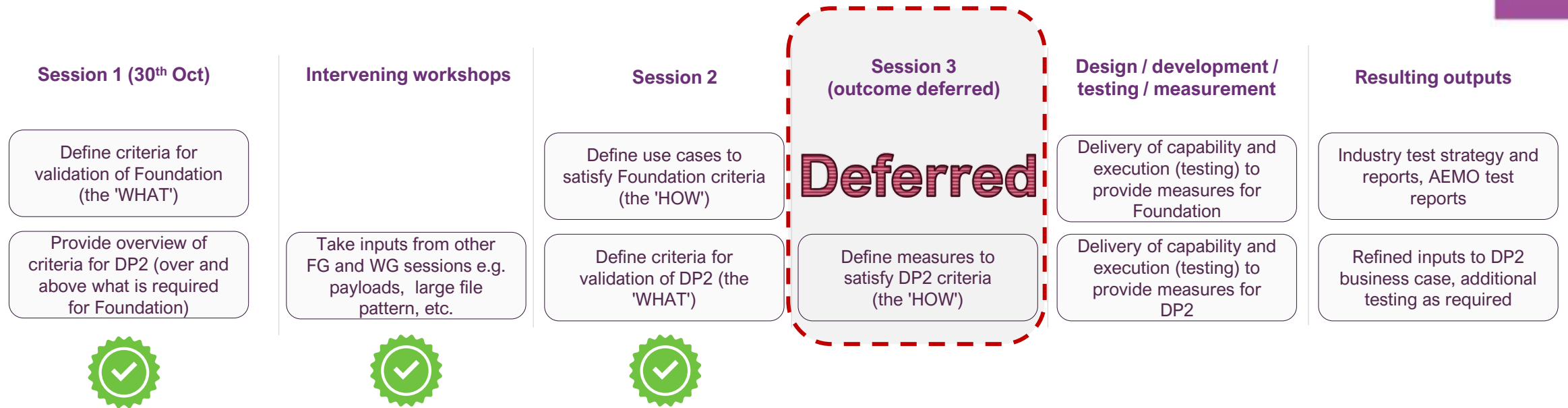


DP2 'How': In Session 3 we were to propose a set of measures to assist with defining the measures to satisfy DP2 Criteria.



AEMO adjusted Industry Engagement Approach

After the process for defining the Use Cases for Foundation completed, the approach to DP2 Criteria, the “HOW”, was re-considered.



DP2 ‘How’: To properly define the HOW all business services will need to be defined. This is a considerable undertaking, and therefore not possible in the originally proposed time-period.

Instead, AEMO would like to put forward a proposed approach to preparing inputs for the DP2 Business Case which form dependencies for the above



Notes

Graeme outlined the Industry engagement approach highlighting that DP2 'HOW' will be deferred. The sessions focus would be on preparing inputs for the DP2 business case.

Participants asked the following:

Q: Whether there is any impact to overall timelines caused from the deferral of DP2?

A: AEMO considers the work can be completed in parallel with foundation, therefore we expect there will not be an impact to future timeliness.

Criteria for validation – Foundation vs Decision Point 2

The FaSI Business Case has been scoped to deliver IDX Foundation for all energy markets and enable a 'Decision Point 2' on the transition of NEM legacy services. This division was established to allow for greater certainty regarding industry costs and timelines to transition NEM legacy services. The next slides focus on the Considerations for enabling Decision Point 2.

IDX Foundation

The purpose of the **IDX Foundation Phase** is to deliver industry data exchange foundational capability that efficiently supports upcoming new reforms in a secure and extensible way.

Foundational capability includes

- All patterns and channels
- Connectivity and security (noting this leverages IDAM)
- Payload formats
- AEMO Gateway Software
- Platform capabilities

Additional topics for consideration may include:

- Non-functional requirements
- Participant capabilities
- Governance

Foundation provides capability to be leveraged for new data exchange services for all existing and any emerging markets and fuels under AEMO's remit, including **NEM, WEM and Gas jurisdictions**.

Enabling Decision Point 2 (NEM legacy data exchange services)

Decision Point 2 (DP2) assesses the case for transition of NEM legacy data exchange services for Retail and Wholesale.

Considerations for Decision Point 2 include:

- Application of new patterns and channels to legacy services
- Payload format decisions
- Transition strategy
- Enabling capabilities supplied by AEMO
- Industry timelines and costs
- Interoperability

Decision Point 2 only contemplates transition of NEM legacy data exchange services, with the output of the decision point being a business case. Criteria is therefore constrained to the inputs to developing this business case, noting criteria to validate transition itself would be developed within the scope of the DP2 business case.

DP2 Business Case inputs

Participants identified a lower confidence in estimates in the original IDX business case; to improve this confidence the following opportunities have been identified:

- **Development estimates** – technical specifications will be developed in the upcoming phase, in addition foundation industry testing will provide an opportunity to validate effort and complexity assumptions for sample business services
- **Development inventory** - as part of the next phase of consultation, AEMO and industry will work in collaboration to define how existing NEM Retail and NEM Wholesale business services are re-deployed onto the IDX framework
- **Gateway options** – as part of foundation industry testing participants can validate options and assumptions relating to the use of AEMO Gateway software / 3rd party solutions / self-built solutions
- **Transition plan** – as part of the next phase of consultation, AEMO and industry will work in collaboration to review and update the transition approach for existing NEM Retail and NEM Wholesale services taking on board learnings from the definition of the IDX foundation
- **Interoperability assumptions** – as part of foundation industry testing participants can validate the interoperability functions proposed to underpin transition

Principles for the IDX Transition Approach

AEMO is basing its approach to Transition around the below key points

- AEMO considers a detail-focused approach to the Transition engagement as the appropriate one to fully enable participants to assess the impact of Transition.
- Without understanding the specification for each Business Service, coupled with a detailed understanding of what the IDX Foundation project is delivering, this is not feasible, and so far has resulted in a wide range of delivery estimates and cost.
- As agreed with industry in 2024, the IDX Foundation Project and the IDX Transition Project have separate business cases. From a governance perspective, due to the size of the projects, AEMO will be looking to stand up a separate IDX Transition project delivery team but with common architectural oversight, to reduce delivery risk and enables a dedicated focus on each project.
- Due to the obvious overlap of the projects and dependency of the Transition on the success of the Foundation delivery, the two projects will work closely together and align activities with respect of each other.
- Participants will continue to be engaged via the MITE WG for both projects.

Notes

AEMO detailed inputs to the DP2 business case and principles for the IDX transition approach, noting that ODX Foundation and IDX Transition have separate business cases.

Participants asked the following questions:

Q: Participants asked if IDX Foundation and IDX Transition are running as two separate projects? In terms of engagement are there any risks of engagement overlap and how will AEMO ensure effective use of participant time?

A: The two projects are working closely together, however for the purposes for this forum both projects are discussed via the MITE working group.

Q: Participants asked if legacy and IDX endpoints will be available in parallel for participants so that we can connect to both not either/or at a point in time?

A: Yes, that is the core assumption that's been put forward to be reconfirmed with industry as part of transition strategy.

Q: Participants had several questions regarding the technical specifications:

- Will specs for all business services will be published or only the foundation ones?
- What sort of detail will the specifications have?
- What are the timelines?

A: In time all specs will be updated for IDX, not just the foundation ones. Things like the B2B procedures are expected to have minimal impact, however the underlying technology outlined in the technical specifications to support those business functions will be updated. This includes things such as format, pattern, payload structures and other technical schema details. The timelines for this are detailed on the PCF slide pack, however there's going to be an iterative process as each of the business services are refactored for IDX under DP2 for which timelines are not set at this point in time.

Q: Participants wanted clarification if IDX - Foundation, IDX - Transition, IDAM and PC under the MITE umbrella?

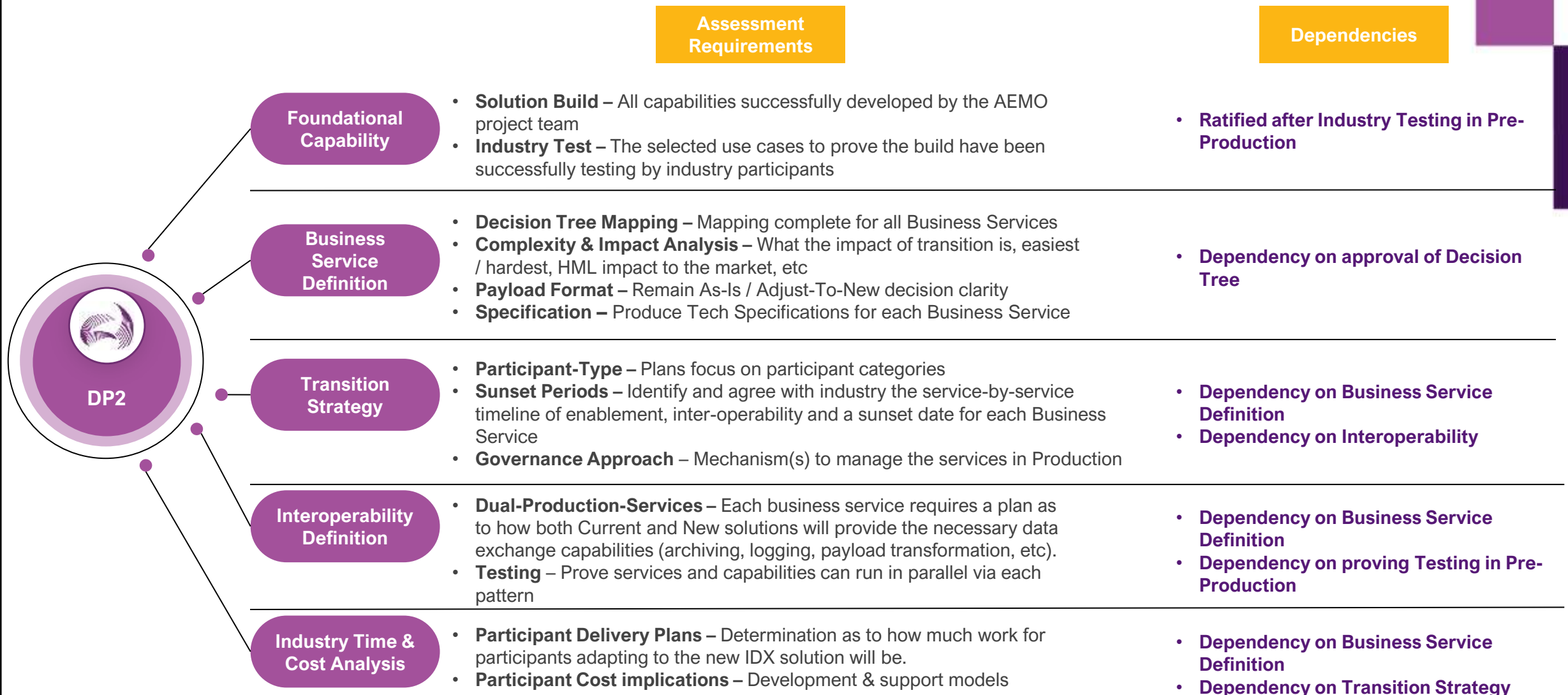
A: The 4 projects are considered under the MITE banner and working group.

DP2 Assessment & Dependencies

AEMO has highlighted the following Considerations for DP2. The below maps their relationship to assist with the approach to DP2 and Transition Planning.

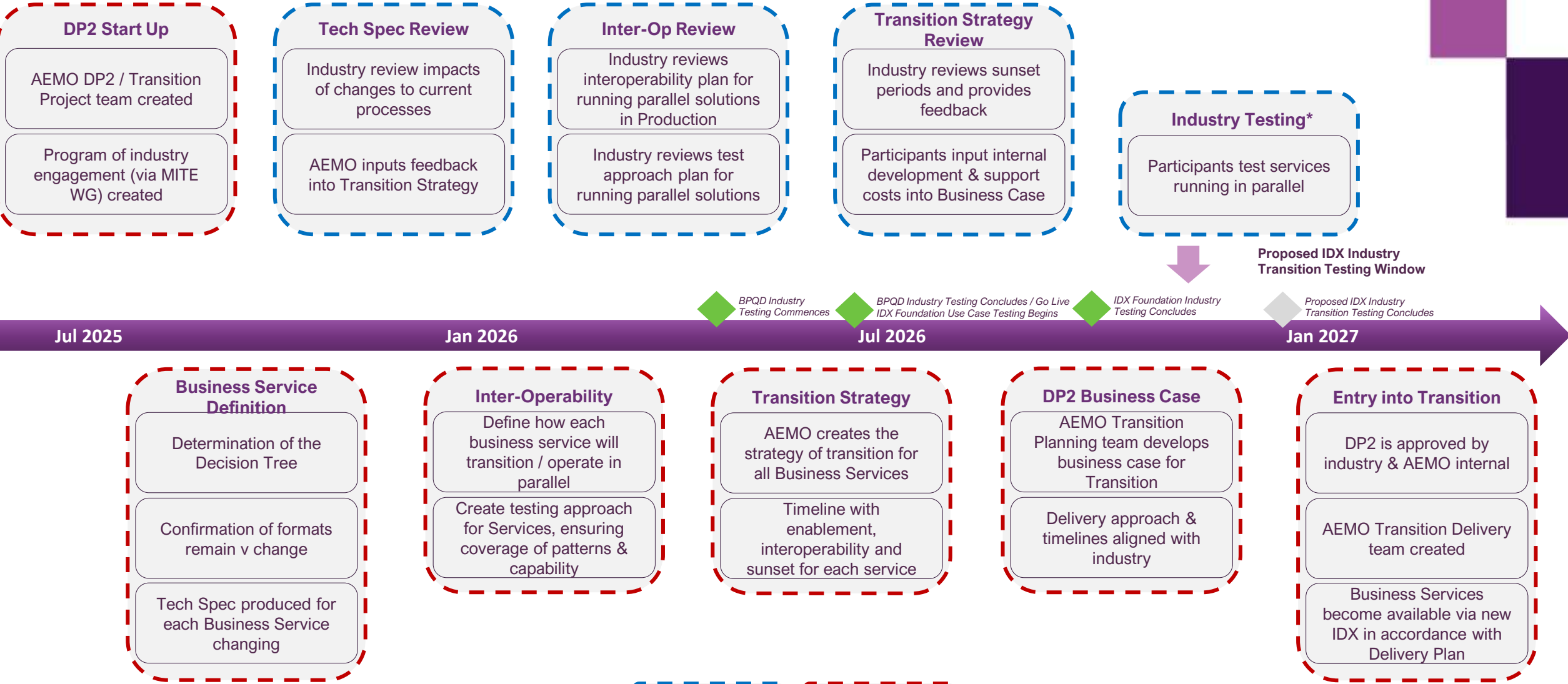
Assessment Requirements

Dependencies



Ordering Activities based on Dependency & Timeline

AEMO seeks feedback on the expectations of and impact on industry participants with the approach to creating the Transition Business Case.



* Assumed Interoperability testing to proceed once Foundation Use Case Testing concludes

Participant Action (dashed blue box) AEMO Action (dashed red box)

Poll: DP2 Approach

AEMO plans to ramp up its IDX Transition Engagement Team from Q3 2025. Details of the industry engagement will follow from that time, including a revised schedule. AEMO will not provide further Transition details until this time.



In your opinion, does the Validation Criteria for DP2 cover the key criteria required to validate DP2 (over and above what has been validated in PQD and Foundation releases)?

Option 1: Yes, the approach seems reasonable to enable our organisation to understand the effort required.

Option 2: We request changes or considerations to the proposal.

Option 3: Require further internal assessment within my organisation, will reply by Wednesday 19 March.

Notes

Poll Results:

Poll Options	Poll Results
Option 1: Yes, the approach seems reasonable to enable our organisation to understand the effort required.	7% (2/27)
Option 2: We request changes or considerations to the proposal.	0% (0/27)
Option 3: Require further internal assessment within my organisation, will reply by Wednesday 19 March	93% (25/27)

3.Focus Group playback IDX: AEMO GW SW



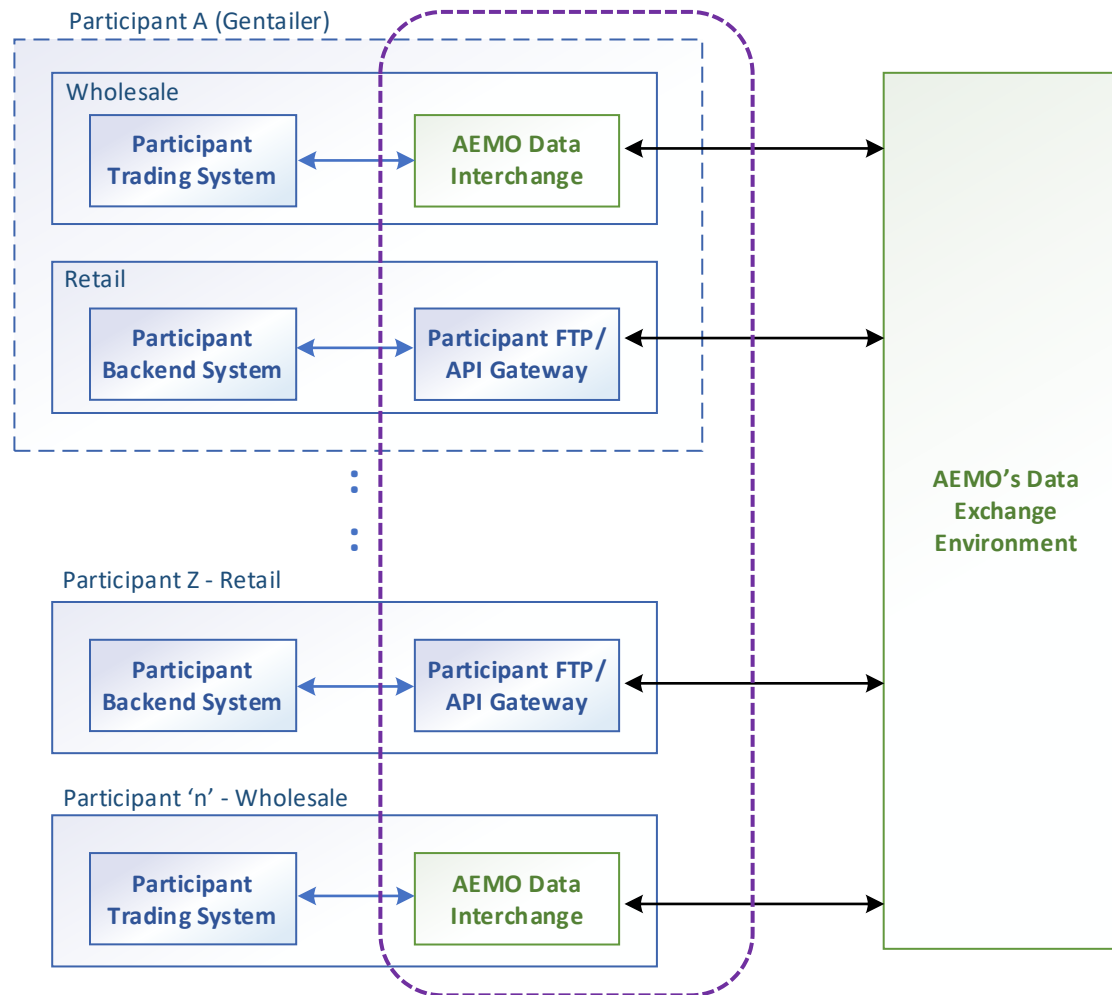
Sri Gundu



What is Gateway Software?

Gateway Definition

Software hosted in the Participant landscape which plays a crucial role in communicating with the AEMO IDX Environment in the agreed channels, protocols, and patterns.



Key Points :

- 1) Gateway software connects Participants' systems and AEMO Data Exchange Environment on the agreed protocols, channels, and patterns that are specific to each of the markets
- 2) Gateway connects to AEMO Data Exchange Environment on the agreed AuthN & AuthZ patterns and security mechanisms (e.g. OAuth , https ,mTLS connections etc)
- 3) Gateway implements schema validations
- 4) Gateway manages the generation and delivery of message-level acknowledgements
- 5) Current State-All Participants have a Gateway Functionality which they can have their own gateway or AEMO-supplied software that is currently offered for each of the markets
- 6) Future State - All Participants can continue to operate gateway – they can either use their own gateway or AEMO-supplied software

Current State

Current software definitions
Current gateway landscape
Current state statistics
Feedback

Current software definitions

Current AEMO-Supplied Software

AEMO currently offers the following software hosted in the Participant landscape to communicate with the AEMO NEM Retail and Wholesale environments through **FTP only**.

Retail

Participant Batcher software (Batcher)

- Provides a simple batch interface to MSATS and B2B by removing the detail of the file handshaking and leaving participants to deal with the raw .zip files only.
- The Participant Batcher software transfers files from and to the MSATS and B2B participant file shares using FTP.
- The Participant Batcher software does the entire message acknowledgement and file manipulations as required by the batch file interfaces.
- The intended users for the Participant Batcher software are:
 - Participants having a Participant ID to access AEMO's IT systems.
 - Participants in the retail market interfacing with the MSATS system.
 - B2B Hub participants interfacing with the B2B e-Hub, including B2B users interfacing with the AEMO Network Outage Scheduler (NOS) and the High-Speed Monitoring (HSM) system

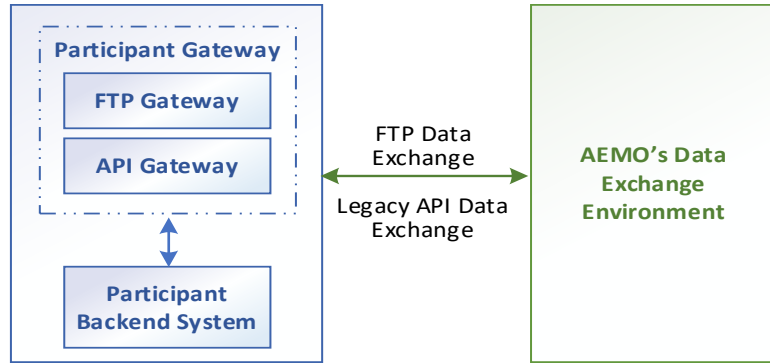
Wholesale

Participant Data Replication Batcher (pdrBatcher)

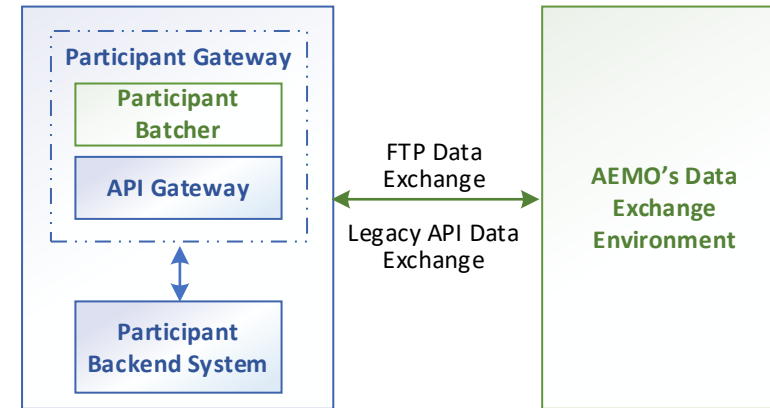
- Provides a file transfer solution for transferring files to and from AEMO's participant file server to the participant's local Data Interchange folders.
- The pdrBatcher software transfers files from and to Wholesale participant file shares using FTP.
- A prime use for the pdrBatcher is a simple interface to the wholesale market system to collect CSV files published to a participant's directory on the participant file server. A companion product, the Participant Data Replication Loader (pdrLoader), can parse those files into a local database instance, implementing the Electricity or Gas Data Model.
- pdrBatcher can also be used to submit files to the processing of AEMO market systems.
- The intended users for the PdrBatcher software are:
 - Participants replicating data between AEMO's Wholesale Market Systems and their RDBMS conforming to the Electricity and Gas Data Models.

Gateway Landscape - Current state

Retail

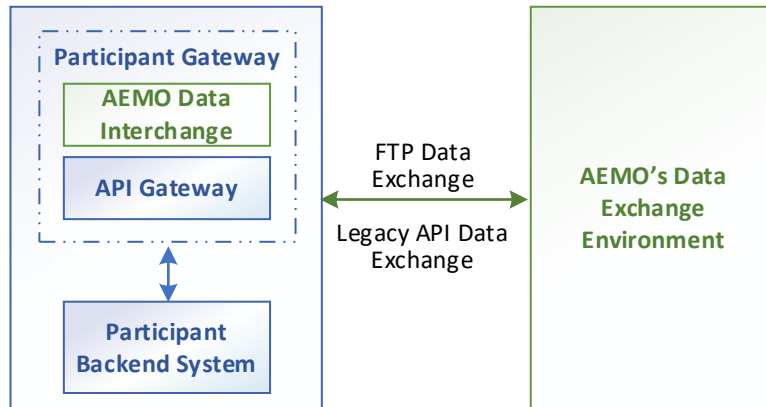


Participants are operating their own gateways for managing inbound and outbound data

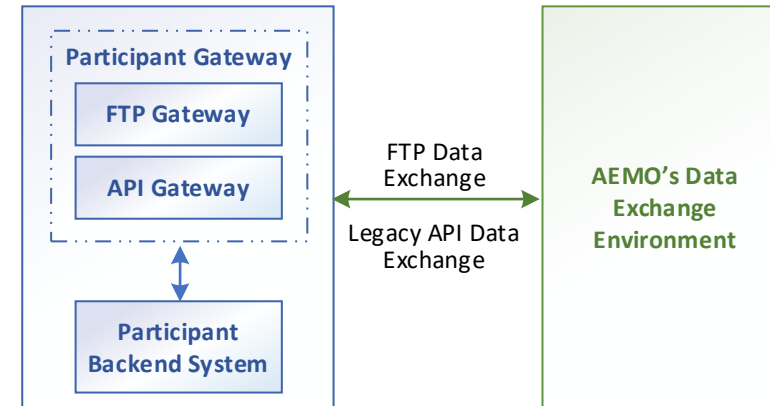


- Participants are operating ParticipantBatcher, an AEMO-supplied software to perform hokey-pokey FTP data exchange
- Participants are operating their own data exchange software for exchanging data via API

Wholesale



- Participants are operating AEMO Data Interchange Software (pdrBatcher, pdrLoader & pdrMonitor), an AEMO supplied software suite to exchange data via API
- Participants are operating their own data exchange software for exchanging data via API



- Participants are operating their own gateways for managing inbound and outbound data

Current usage Statistics

Retail

Participant Batcher software (Batcher)

- From AEMO Logs we can see 38 instances of Participant Batcher being used in production
- Some of them can be a direct Participant Batcher Installations or some of them can be Vendor Applications built on top of Participant Batcher

Wholesale

Participant Data Replication Batcher (pdrBatcher)

- From AEMO Logs we can see 263 instances of Participant Batcher being used in production
- This is only capturing whether there is at least 1 active instance against a participantID
- For some participant ID there will be multiple instances running (one for the asset owner, a second for a service provider) so the actual number of installations is more than the number mentioned above
- Some organisations collect their data through one participantID with lots of data sharing

Participant feedback

Retail

Participant Batcher software (Batcher)

- Single Threaded Application
- Can handle only one participantID
- No Prioritization available
- Cannot be executed as a windows service

Wholesale

Participant Data Replication Batcher (pdrBatcher)

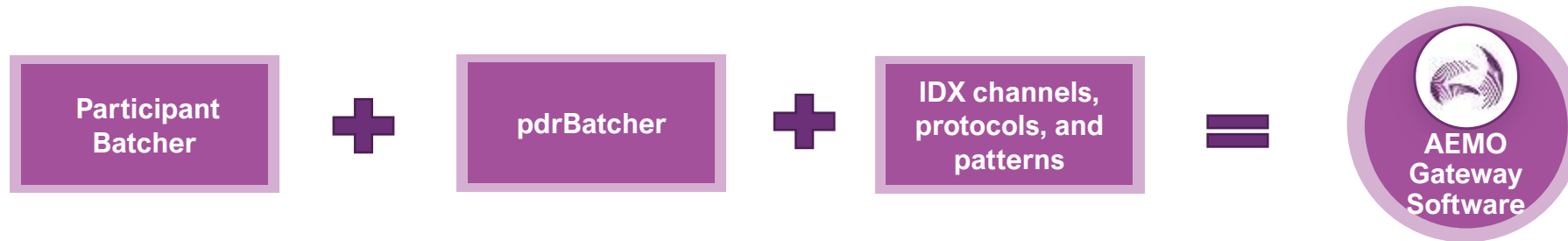
- Received positive feedback on all the features and capabilities
- Handles almost all the requirements of data transfer for wholesale market

Target State

AEMO Gateway Software

AEMO Gateway Software

AEMO proposes providing Industry with a new AEMO-Supplied software product that combines the Participant Batcher, pdrBatcher capabilities and is extended to support the target state AEMO IDX Environment.



Target state features

- The AEMO Gateway Software provides standard gateway capabilities, including efficient protocol conversion.
- It is designed to support new participants during the transition by maintaining compatibility with legacy protocols.
- Backward compatibility is crucial, with payload conversion capabilities to aid change and transition management.
- To align with the IDAM roadmap, the software supports the latest IDAM patterns, ensuring secure and efficient identity and access management.
- The AEMO Gateway Software can be extended by Participants, for example, to add personalised validations and Transformations.

Notes

Sri outlined the AEMO gateway software in the current state and the proposed target state.

Participants asked the following:

Q: Is there a plan for when the sunset period ends that the current solution will be decommissioned?

A: The sunset periods and approach have not been reviewed since the business case , however in principle there will be a discontinuation of functionality once the sunset period ends. This is especially relevant to format transformations to legacy formats such as aseXML.

Capabilities

AEMO Gateway Software Capabilities

AEMO Gateway Software



AEMO is proposing the below foundational capabilities of the AEMO Gateway Software, designed to unify and simplify interaction with AEMO's centralised data exchange platform



Channels connectivity (IDX & Backend)

Protocols supported for connectivity from AEMO Gateway Software to AEMO-IDX

- sFTP/FTP
- https
- GraphQL services
- WebSocket

Protocols supported for connectivity from AEMO Gateway Software to Participants Systems


- sFTP/FTP/FTPs
- BLOB file connectors (GCP/AWS/Azure, object store via AWS)
- Internal file connectors
- https
- AMQP
- SMB

➔ When connecting to participant backend systems AEMO Gateway software connects as client only

Configuration

The Configuration will drive the functionality within the AEMO Gateway Software, such as

- Credentials
- schema
- endpoints
- priority
- Performance



All base configuration will be maintained in files (Technical Guide)
Out of the box default config-templates are made available (currently available in PDR Batcher)

Transformation Framework

AEMO Supplied Data Exchange Software shall support the following optional capabilities as a part of data transformation


- format transforms from/to various combinations: AEMOCSV, JSON, Plain CSV
- perform text manipulation (head, tail, replace, etc)
- zip/unzip the payload
- rename files
- perform XML transformations using XSLT.

→ Framework supports custom transformation modules to be plugged in (will not be supported by AEMO)

Validation Framework

AEMO Supplied Gateway Software shall have a generic validation module that can be configured to validate the integrity and correctness of the data before and after conversion, ensuring consistency and correctness.

- It can perform schema validations
- Contains plug-in modules for business validations (B2B Validation Module etc.)
- Some basic validations are built in (CRC check for Zip files etc)



Framework supports custom Validation modules to be plugged in (will not be supported by AEMO)

Logging & Error management

- Error Management within the software supports following features

- Recoverability features for transient errors
- Data protected through processing chain
- No loss of data (may cause duplicates)



Provides intuitive file-based logging for each step performed & a flexible logging framework (log4j) based on participant preference (SNMP, DB etc.)

Security

Encryption

- Enables data protection through encryption technologies to transfer data securely

Access Control

- Enables policies and rules to access or modify resources based on configuration

Security Updates & patch management

- Regularly updating software to fix vulnerabilities and security flaws if any

Audit & Logging

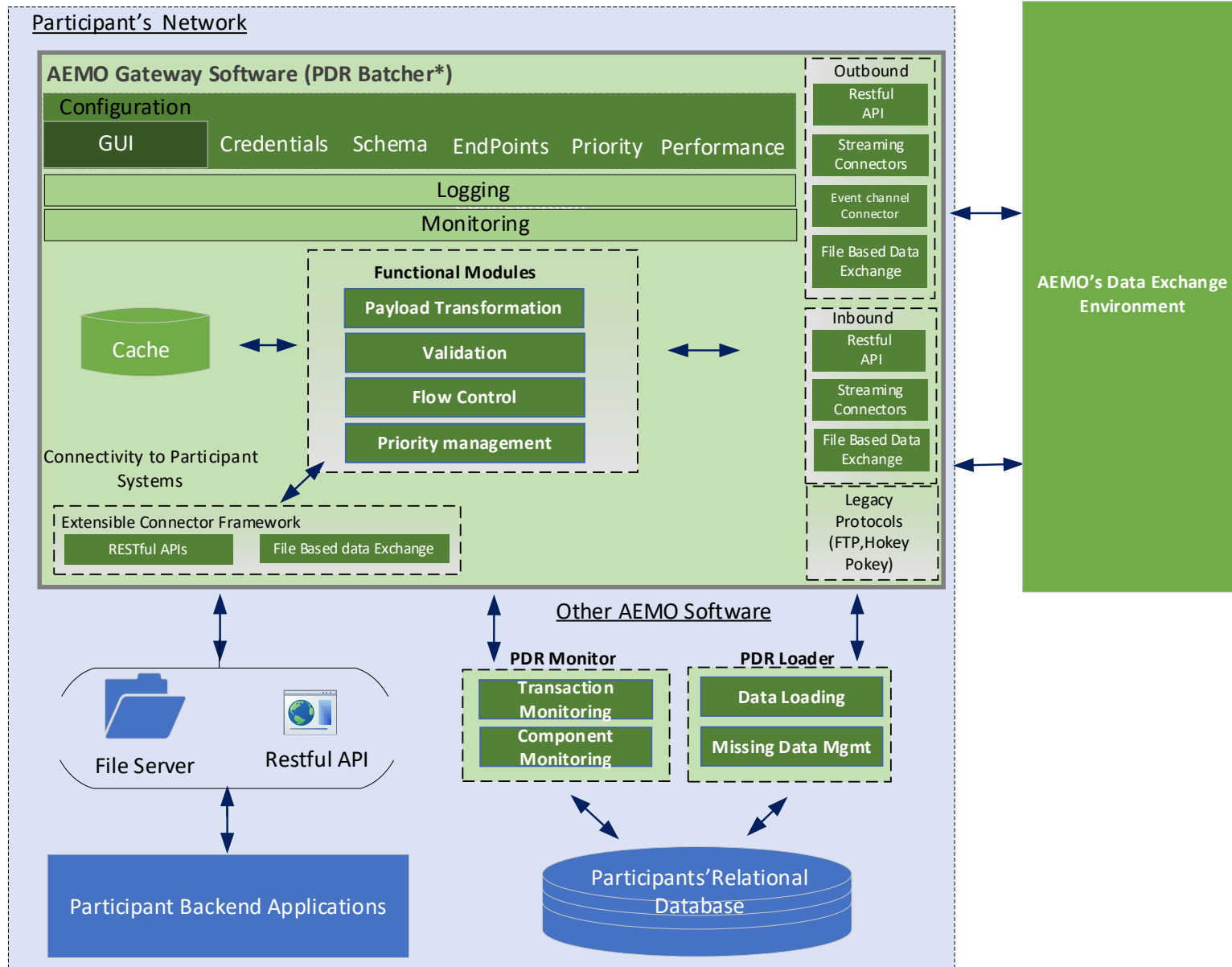
- Maintaining logs of access and changes to system for monitoring

➔ There is obligation on the participant in maintaining the underlying infrastructure security where the software is hosted

What AEMO Gateway software won't do

- It is Stateless
- No run time GUI capability
- No Intrinsic Business intelligence or logic (via configuration /plug in module)
- New functionality mostly would be delivered via configurations
- No built-in standing data reconciliation engines

AEMO Gateway Software



Notes

Sri outlined the AEMO gateway software capabilities highlighting:

- It supports the future IDX protocols and patterns
- Allows for participant customisation by way of configuration artifacts
- There is an obligation for participants to host the software on secure underlying infrastructure
- It is stateless and does not contain standing data or other timeline/reconciliation engines.

Participants asked the following questions:

Q: Will the AEMO Gateway Software integrate with IDAM?

A: Yes. Further details available in this slide pack for reference.

Q: Is the AEMO gateway expected to be installed in the DMZ zones in the participant hands?

A: Yes, it is intended to be a stateless client to support all channels connecting to the IDX but not as a server.

Q: Participants inquired whether credentials also cover certificate management passwords or secrets and if it can connect to the client sides own security management solutions.

A: Yes, it does support connecting to local on prem, it supports conjure and other cloud based key vaults.

Q: Participants noted that the solution will have flexibility to extend the solution for their own use. Where does that support agreement fall in?

A: No specific answer within the support agreement, however in principle if the participant uses extensions and a ticket is raised, AEMO will look to see where the issue is coming from. If it is an issue on AEMOs end it will be fixed, but if it's an issue due to custom code/module on the participant side the expectation is the participant will need to resolve it.

Q: What happens when issues arise from patching? The messages should flow on both sides, who is accountable in this situation?

A: The onus is on participants to install the software to meet the SLA requirements and support the necessary infrastructure to support it. As this sits on the client side, initially it will sit with the participant to look into the causation of the issue and to take additional steps from there.

Notes

Q: In terms of validation, is this going to be something like the EVM module used for b2b? Will they be updated as new business functions come online?

A: From a conceptual perspective, something like EVM is what is being suggested for the validations. The intent is that the software is assessed based on updates to existing or new business functions come online as to whether the validations and its configuration artefacts require updating. This is usually to bridge the gap between schema validations and other procedural validations which the schema is not able to implement. This functionality can be deployed modularly as required.

Q: Participants asked what the process might look like for major changes to the validations and how it might be worked through at an industry level.

A: Besides foundation changes, no major changes are expected. Besides security patches, once the patterns and channels are established, generally it is expected they will stay the same.

If a new service comes online, and a new data element is introduced, assuming it is using JSON then the schema would be updated to include the new data attribute. This would be completed as part of the regulatory consultation or relevant working group. That said, because we are moving away from monolithic aseXML versioning, the changes will be much more targeted based on the business service, reducing the frequency of these versioning/update events significantly. In addition, if a new service comes online which is not relevant to that participant, then no update is required.

Q: Participants inquired around participant SLAs, and whether there will be a specification to outline performance based on participant type?

A: we will be validating the performance of the AEMO Gateway Software as part of the foundation use cases. We seek participant feedback on the best business functions to use to give confidence to participants on the performance. In addition, the current software is used to transact in other areas of the market today, so this implementation is not starting from 0.

Q: What is the thinking on the clustering capability for this software? Will it have capability like that?

A: Yes, it can provide active clustering capability. Details around this would need to be worked through on the participant side and on the AEMO side.

Notes

Q: What does the upgrade cycle look like?

A: The base version of the software will have the capabilities AEMO wants to support. AEMO will provide configuration artefacts to participants to enable a degree of customisation on the participant side, on a business function level. In addition, AEMO typically provide software basis on a roughly 18-24 month cycle. There is potential for shorter release times, especially in high severity circumstances.

Q: Is participant recertification required in scenarios where AEMO releases new versions of the software?

A: Not for standard updates, and the roadmap forward after foundation is clear. However, AEMO would not rule out recertification if there were a wholesale change to the platform.

Q: Does the software have duplicate deletion capability:

A: It does not have retain transactions and is a stateless software

Q: Is the cache in memory?

A: It is runtime cache, not something stored

Q: What happens in the event of an outage?

A: The cache stores pending messages and sent messages should already be synced with AEMO's system.

Deployment Options

Software Deployment options

GUI based Installer

Currently GUI installers are provided for NEM wholesale and GAS markets ,will continue to be provided.

The GUI installer will be packaged with proper templated configuration file, which will be mostly basic configuration like participant Id, port, etc. Any customization required on top of that will be done manually in the properties file by the participant with help of the technical guide for configuration.

Command Line based Installer

CLI based installer will be provided which will participants flexibility to manage the configuration

Software Deployment options

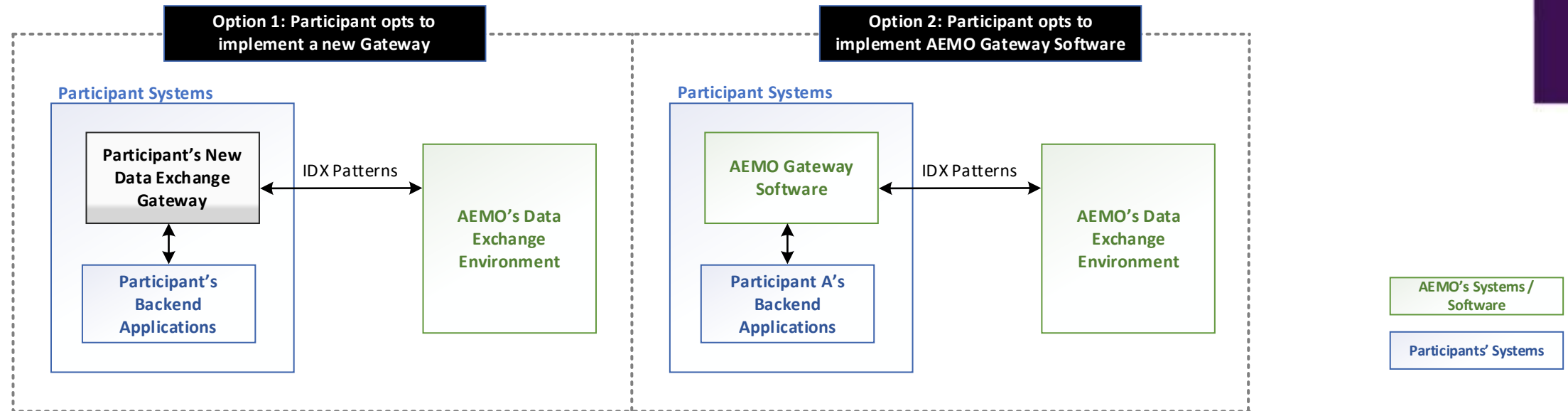
Containerization

- There are lots of moving parts involved when we look at containerising the software (OS, networking, storage ,security etc)
- There are frameworks where participants have options to extend the functionality, and this would need to be managed during containerization
- There are security aspects to be considered with regards to the hardening of the image



Participants planning on containerizing the software would need to manage the different aspects as per mentioned above and AEMO would provide instructions (technical guide) for containerization which would help in that process

Participant End state Landscape



Notes

Sri walked the group through the different deployment options.

Participants asked the following questions:

Q: What is the preferred disaster recovery strategy from AEMO?

A: The software is stateless, however there are many options outside the PDR batcher to leverage for disaster recovery. If there are particular DR capabilities required for DR, then AEMO would consider any suggestions. Any transactions would be on either side of the software.

Q: Will that software cater for the gas connectivity to existing FRC hub?

A: There's a current range of channels and protocols that are supported in the software and specific configuration available to operate that in the NEM as has been described as market specific. IDX foundational capability is not market specific, however, each market needs to have transitioned its services onto the new IDX framework to commence leveraging it .

Q: How will the bid submission work in the AEMO Gateway Software work?

A:AEMO gateway software doesn't currently support synchronous exchange. An asynchronous exchange for bids could be made available, alternately if of value to participants a synchronous exchange capability for bids could be explored noting this would require additional integration into participant systems potentially leveraging federated identity .

Release Plan

AEMO Gateway Software – Release Approach

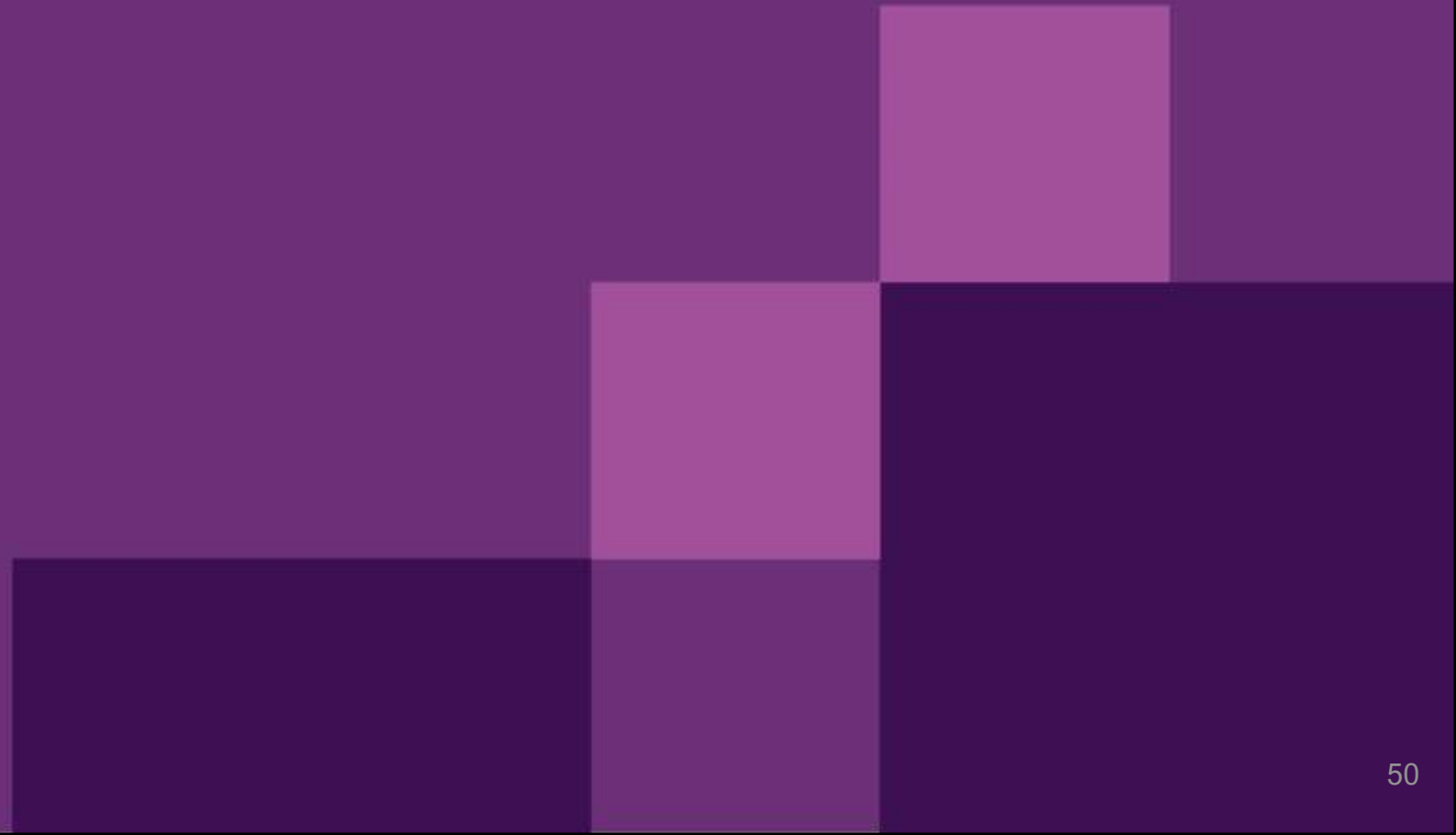
The AEMO Gateway Software, developed in the Foundation phase, shall be released as a comprehensive solution. Subsequent releases will introduce tailored configuration artifacts to cater to specific business function needs. For example, NEM Retail business functions require aseXML to JSON and CSV to AEMO CSV payload transformations capabilities.

AEMO Gateway Software	IDX Foundation		IDX Transition	
	<ul style="list-style-type: none"> • Data Handling & Transformation • Flow Control & priority Management • Configuration & Monitoring • Logging & Error Management 		Wholesale Business Functions	Retail Business Functions
		<ul style="list-style-type: none"> • Endpoint configurations based on the business functions deployed in prod will be available (PQD) 	<p>Artifacts to support capabilities for NEM Wholesale business functions.</p> <ul style="list-style-type: none"> • Schema validations configuration artefact • JSON to AEMO CSV configuration artefacts • Reverse Transformation 	<p>Artifacts to support capabilities for NEM Retail B2M business functions.</p> <ul style="list-style-type: none"> • Schema validations configuration artefact • JSON to AEMO CSV, JSON to aseXML, JSON configuration artefacts • Reverse Transformation



AEMO welcomes feedback from the Focus Group on the above topic .

Support



Support

- AEMO shall publish the AEMO Supplied Gateway Software data exchange guidelines, technical documentation (technical guide) to the market participants.
- AEMO shall define a product lifecycle roadmap for the AEMO supplied Gateway Software that outlines the stages a product goes through from its inception and further releases . This roadmap shall provide a high-level view of the product's development, launch, growth, maturity, guiding the organization's decisions and actions at each phase. This shall also detail future release cycle for AEMO Gateway software after its initial release.
- AEMO supports level 3 support for the Gateway software* and will establish support SLA based on priority .
- AEMO provides software as optional with no additional support cost and is covered under the broader services AEMO provides to the market participants
- Governance / forum –IDX Governance process



AEMO welcomes feedback from the Group on topics presented for AEMO Gateway Software .
NEMReform@aemo.com.au

Notes

Sri walked the group through the support approach, welcoming feedback.

Participants asked the following questions:

Q: Will there be training for participants to use configure and deploy the solution?

A: As of today, we don't have any formal training plans but there will be technical guides. There's a significant number of participants and third-party service providers that use the software today. If the participants believe formal training would be of value, then that feedback can be taken on board.

4. Focus Group playback IDX: Inquiry Service



Udaya Uppalapati



Objective of today's session

The MITE FG has been established to discuss in detail specific topics for IDX. This focus group session will focus on Inquiry Service specifically.

This focus group aims to..

- Review and discuss drafted Definitions and Objectives
- Review and discuss drafted Inquiry Service principles
- Review and discuss drafted Inquiry Service use cases
- Review how the Inquiry Flexible Service works

The ask of participants...

- **Participate** in highly technical discussions, including engaging within their business prior, to provide detailed responses to matters under discussion
- **Champion** technical discussions with their peers and within own organisations.
- **Review** draft documentation prepared by the Focus Group and provide input.

Call Out's

- Access, Identity & Entitlement will be covered in a future IDAM focus group.
- Payloads and Schema structures specific to individual transactions are discussed in a future focus group.
- Decision Tree and business function mapping will be discussed in future in collaboration with Industry.

Inquiry Service - Introduction

What is an Inquiry Service?

An Inquiry Service allows participants to retrieve data from AEMO in an efficient manner. This service allows users to fetch specific inquiry data, and any other related information in a single query.

Types of Inquiry Service?

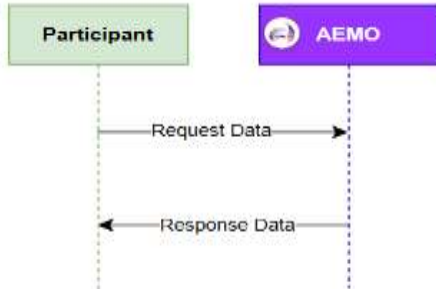
Inquiry Service – Flat

Enables participants to interact with the services provided by AEMO through the principles of RESTful APIs, utilizing HTTP methods such as GET and POST. This service provides a defined response with a fixed set of data elements.

Inquiry Service – Flexible

Allows participants to interact with the services provided by AEMO via the dynamic query functionalities of GraphQL. Clients have the flexibility to request the response data elements (available within the schema) as part of the request query, which reduces the data over-fetching issues and improves the overall query performance.

Inquiry Service – Objectives

Pain points	Proposed Principle(s)	Target State Concept
<p><i>Industry raised pain-points:</i></p> <ul style="list-style-type: none"> • Protocols, formats and standards are inconsistent and unnecessarily convoluted. • Mandatory schema updates are costly, aseXML schema version change mandates industry to upgrade the aseXML schema even if the Participants do not have any procedural impact to the changes. <p><i>AEMO's reading of Industry pain points:</i></p> <ul style="list-style-type: none"> • aseXML schema updates require significant effort from participants even when these changes do not have any substantial impact at their end. • Clients do not have the ability to customize the request query to define the structure of the desired response. This limitation allows clients to access complete data sets even though they are interested in specific information. • Participants want an "alternate data consumption pattern - Consumption of queryable & interoperable data in a simple & standard way". 	<ul style="list-style-type: none"> • A standard set of Industry agreed on channels, protocols, patterns, and capabilities to meet the Inquiry Service needs across all Participants, Markets and Domains. • Remove complexities and apply standardisation in the Inquiry service usage. • Applying speed and efficiency in data transfers. • Remove overheads in over fetching of datasets. • Provide information that is requested by the participants. 	<ul style="list-style-type: none"> • The inquiry service hosted by AEMO will establish the foundation for data query solutions between participants and AEMO. <div data-bbox="1625 429 2058 715" data-label="Diagram">  <pre> sequenceDiagram participant P as Participant participant A as AEMO P->>A: Request Data A-->>P: Response Data </pre> </div> <ul style="list-style-type: none"> • Inquiry service enables clients to access AEMO-defined data sets that have static structures, while also offering the flexibility to obtain response structures as specified by the clients. • Inquiry service's queryable response structures allows schema updates with little to no impact to the participants. • Inquiry service allows clients to access data they are interested in, to tailor a response that suites their needs. • Inquiry service tackles the issue of over-fetching, which occurs when an API returns a substantial dataset, while the client may only require a specific subset of the fields.

Notes

Udaya walked the group through the inquiry service.

Participants asked the following questions:

Q: For inquiry flexible – can participants specify the schema version in the request for 1 field, should that field have changed schema version?

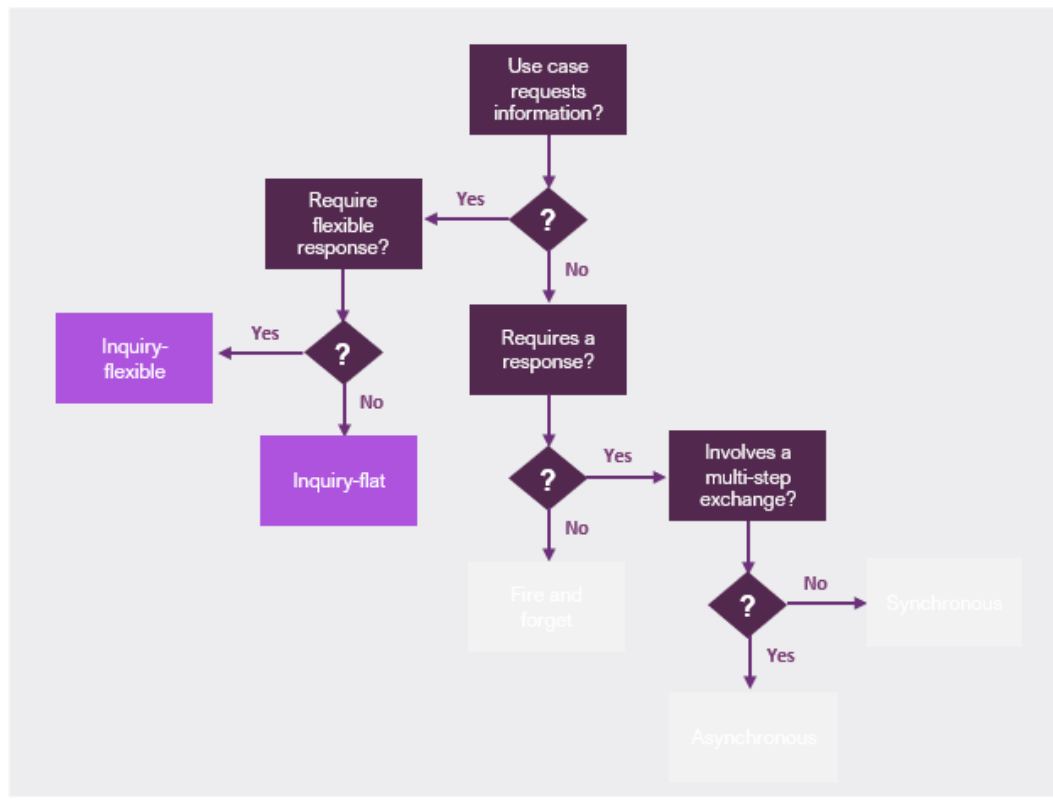
A: GraphQL follows schema evaluation mechanism. If the data is available, field values will be returned. If the data is not available, it will provide a null response. For eg; If there are any groundbreaking changes (renamed, deleted, new element added) to a schema, whereby a participant wants to retrieve the deprecated or removed element, then those elements values will be returned as null instead of throwing any errors. We will define the guardrails around the schema changes and its usage to our participants at a later stage.

Re-cap of Decision Tree 1/2

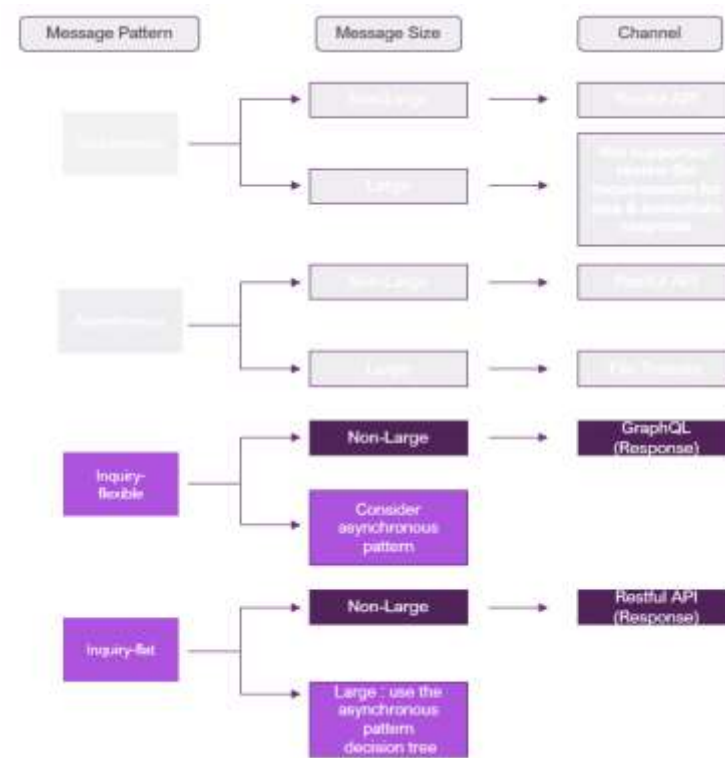
The IDX Decision Tree will be used for all new and transitioning business functions to determine the channel and pattern that the business function will use on IDX.

In subsequent slides we will present **worked examples** of existing NEM business functions and what may be their IDX channel and pattern. AEMO will work with the industry to determine all business function mappings to channels and patterns as part of DP2.

Step 1: Determine the Pattern for the business function



Step 2: Determine the Size and Channel for the business function



- Decision Tree to illustrate the scenarios and how a use case is assessed to determine which pattern it should follow

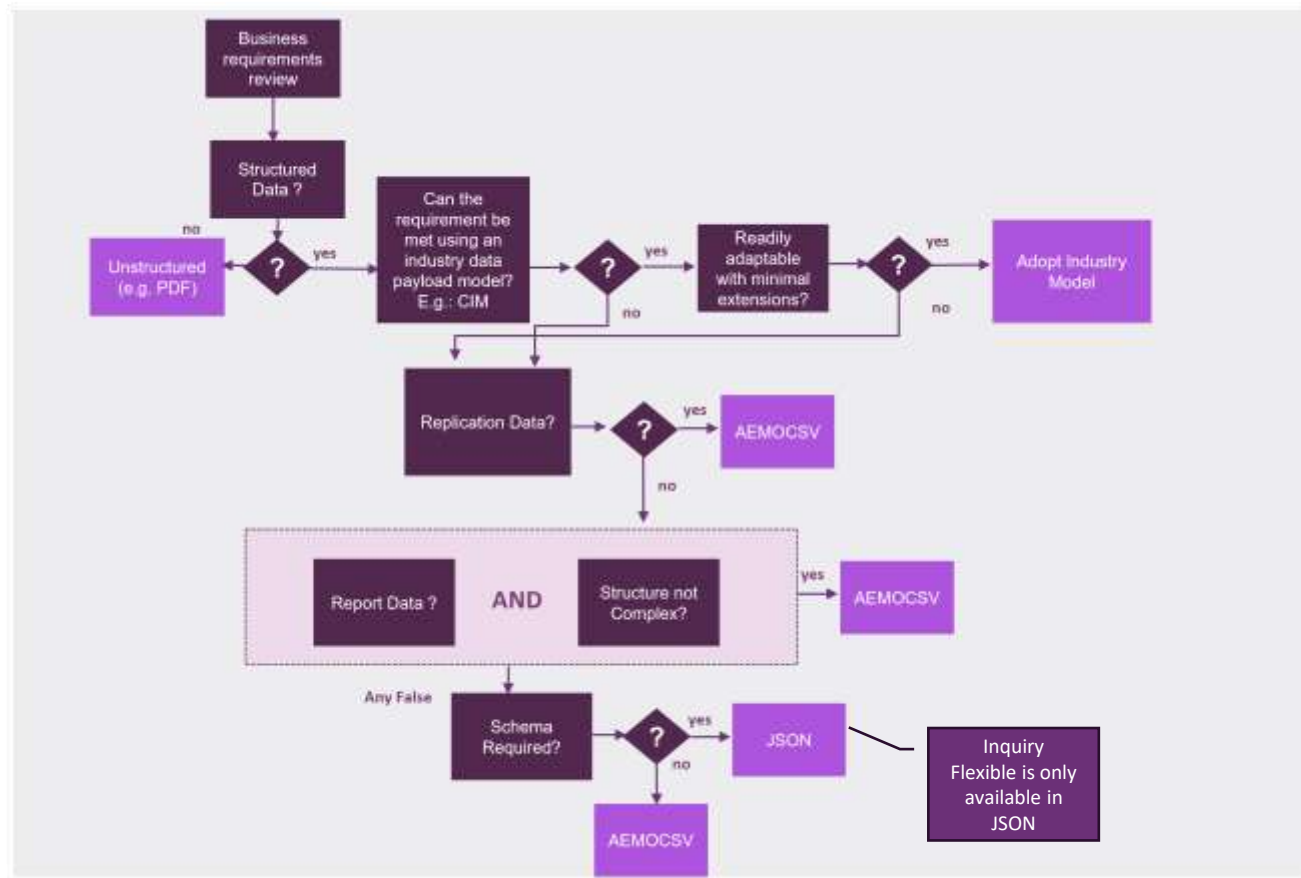
- For the decision tree to function this process must result in a consistent determination of pattern for like use cases

Re-cap of Decision Tree 2/2

Once the pattern and channel is determined for the business functions, the payloads on transitioning business function will be reviewed and mapped to the IDX payload structure.

In subsequent slides we will present **worked examples** of existing NEM business functions and what may be their IDX channel and pattern. AEMO will work with the industry to determine all business function mappings to channels and patterns as part of DP2.

Step 3: Determine the Payload required for the business function endpoints



- The Payload Decision Tree is used to determine what payload a particular endpoint on a business function should be mapped to.

Inquiry Flat vs. Inquiry Flexible

	Inquiry Flat	Inquiry Flexible
Characteristics	<ul style="list-style-type: none"> This service is aligned for simple queries. Client applications use the RESTful endpoint to extract the full data set. REST is an existing standard and is extensively used across the industry. REST can result in over-fetching, or under-fetching, of data. Multiple network requests may be needed for querying related resources. Uses multiple endpoints for different resources. Requires versioned endpoints to manage API changes. 	<ul style="list-style-type: none"> This service is aligned towards custom queries. Client application use the GraphQL endpoint and query data that they are interested in. Eliminates over-fetching and under-fetching of data as responses are specific to the data requested. Can decreased the number of network requests by eliminating or reducing the need to query related resources. Capability to retrieve and combine multiple data sets using a single endpoint. Client applications can query data even as the schema evolves, reducing the impact of schema changes on participants.
Data Direction	Outbound	Outbound
Communication Channel	HTTPS / RESTful API/ Large File Share	HTTPS / GraphQL
Supported API Methods	GET – Simple queries, leveraging query parameters POST – Complex queries that require a request body	GET – Simple Queries POST – Complex Queries that has variables and operations used as the input (e.g. query language inputs)
Response Payload	Server defined	Client defined and the payload will be within the GraphQL envelope.
Exchange Pattern	Supports two responses types: a) Sync – Provides an Immediate response to the client application. b) Async – Where the response requires processing by AEMO, the participant is notified (via Event mechanism) or polls to pull the data once processing is complete.	Sync – Provides an Immediate response to the client application.
Acknowledgement	a) Sync – Not applicable. b) Async – Message ack is required upon successful retrieval of data.	Not applicable

Inquiry Flexible Details

- Inquiry flexible service is useful when dealing with business services that offer access to extensive structured data sets, especially in scenarios where various use cases require participants to use specific subsets of data.
- Inquiry Flexible offers a method to request only the necessary subset, thereby preventing the receipt of redundant information.
- Implementation of the Inquiry Flexible service offers numerous advantages, including the reduction of network bandwidth , minimising unnecessary access to potentially sensitive information, fetching only the required data subsets, and insulating client applications from the underlying schema changes or breaking changes as well.

Inquiry Service - Features

Feature Category	Features / Capabilities	Sync API	Async API Inbound	Async API Outbound	Async Large File Inbound	Async Large File Outbound	Fire & Forget API Outbound	Fire & Forget Large File Outbound	Inquiry Flat	Inquiry Flexible	Event Notifications	Other Categories
Network Connectivity and Security	Connectivity: MarketNet & Internet	X	X	X	X	X	X	X	X	X	X	
	Certificate Management	X	X	X	X	X	X	X	X	X	X	X
	Transport Layer Security	X	X	X	X	X	X	X	X	X	X	
IDAM	IDAM Authentication & Authorisation Patterns	X	X	X	X	X	X	X	X	X	X	
Policies	Encryption & encoding	X	X	X	X	X	X	X	X	X	X	
	Flow control & spike management	X	X	X	X	X	X	X	X	X		
	Round Robin				X	X	X	X			X	
	Virus & malware scans				X	TBC	X	TBC				
	Enforce file/message size limitations		X		X							
	Enforce file masking		TBC		X		X					
	Other policy enforcements	X	X	X	X	X	X	X	X	X	X	X
Archiving	Archiving	X	X	X	X	X	X	X	X			
Non-Repudiation	Non-Repudiation	X	X	X	X	X	X	X	X	X	TBC	
Logging & Monitoring	Technical Audit Logs - Capture & LVI views	X	X	X	X	X	X	X	X	X	X	
	Monitoring via LVI	X	X	X	X	X	X	X	X	X	X	
Payloads	Payload compression	X	X	X	X	X	X	X	X	X		
	JSON payload data exchange	X	X	X	X	X	X	X	X	X	X	
	AEMOCSV payload data exchange	X	X	X	X	X	X	X	X			
	Unstructured payloads	X	X	X	X	X	X	X	X			
	Schema validations	X	X	X	X	X	X	X	X	X	X	X
Transformation	On-Demand transformation	X		X			X		X			
	Hub transformation based on opt-in version					X		X				
	Support inbound 'n' & 'n-1'	X	X		X				X	X		
	Ability to define the outbound data elements									X		
Business Acks	Manage message acknowledgements		X	X	X	X			X		X	

Note: Archiving, Business Acks, Business Logs, Event Notifications are applicable to Inquiry Flat - Async mechanism.

Inquiry Service - Features

Feature Category	Features / Capabilities	Sync API	Async API Inbound	Async API Outbound	Async Large File Inbound	Async Large File Outbound	Fire & Forget API Outbound	Fire & Forget Large File Outbound	Inquiry Flat	Inquiry Flexible	Event Notifications	Other Categories
Orchestration & Routing	Orchestration	X	X	X	X	X	X	X	X	X		
	Routing	X	X	X	X	X	X	X	X	X		
Fan In & Out	Fan-out		X	X	X	X	X	X			X	
	Fan-In		X		X							
Message Enrichment	Message enrichment	X	X	X	X	X	X	X	X	X		
Business Logs	Business Message & Transaction Logs		X	X	X	X	X	X	X			
Event Notifications	Trigger outbound message event notification			X		X		X	X		X	
	Flow control notifications (stop files)					TBC			X		X	
	System health & notifications				TBC	TBC			X	X	X	
AEMO Gateway	AEMO Gateway supported patterns, Channels and Payloads	X	X	X	X	X	X	X	X	X	X	
IDX Self Certification	IDX Technical Self Certifications	X	X	X	X	X	X	X		X	X	
	Responder capability	X	X	X	X	X	X	X	X	X		
	Validation Module											X
IDX LVI	IDX LVI capabilities	X	X	X	X	X	X	X				X
Manifest & Reconciliation Process	Patterns where message exchange will log for Manifest Process			X		X	X	X				
	Reconciliation process for the messages/files transacted using the patterns:			X		X	X	X				
	Retrigger transactions			X		X		X				
Enhance Developer Experience	Developer experience (API, MFT Portals, Data dictionary, system documentation)	X	X	X	X	X	X	X	X	X	X	X
Non Functionals	Highly available services (Tier 1 services)	X	X	X					X	X	X	
	Highly available services (Tier 2 services)				X	X	X	X				
	Performance & volume simulation	X	X	X	X	X	X	X	X	X	X	X
Exception Management & Error Handling	Business exceptions & errors	X	X	X	X	X			X	X		
	Technical exceptions & errors	X	X	X	X	X	X	X	X	X		

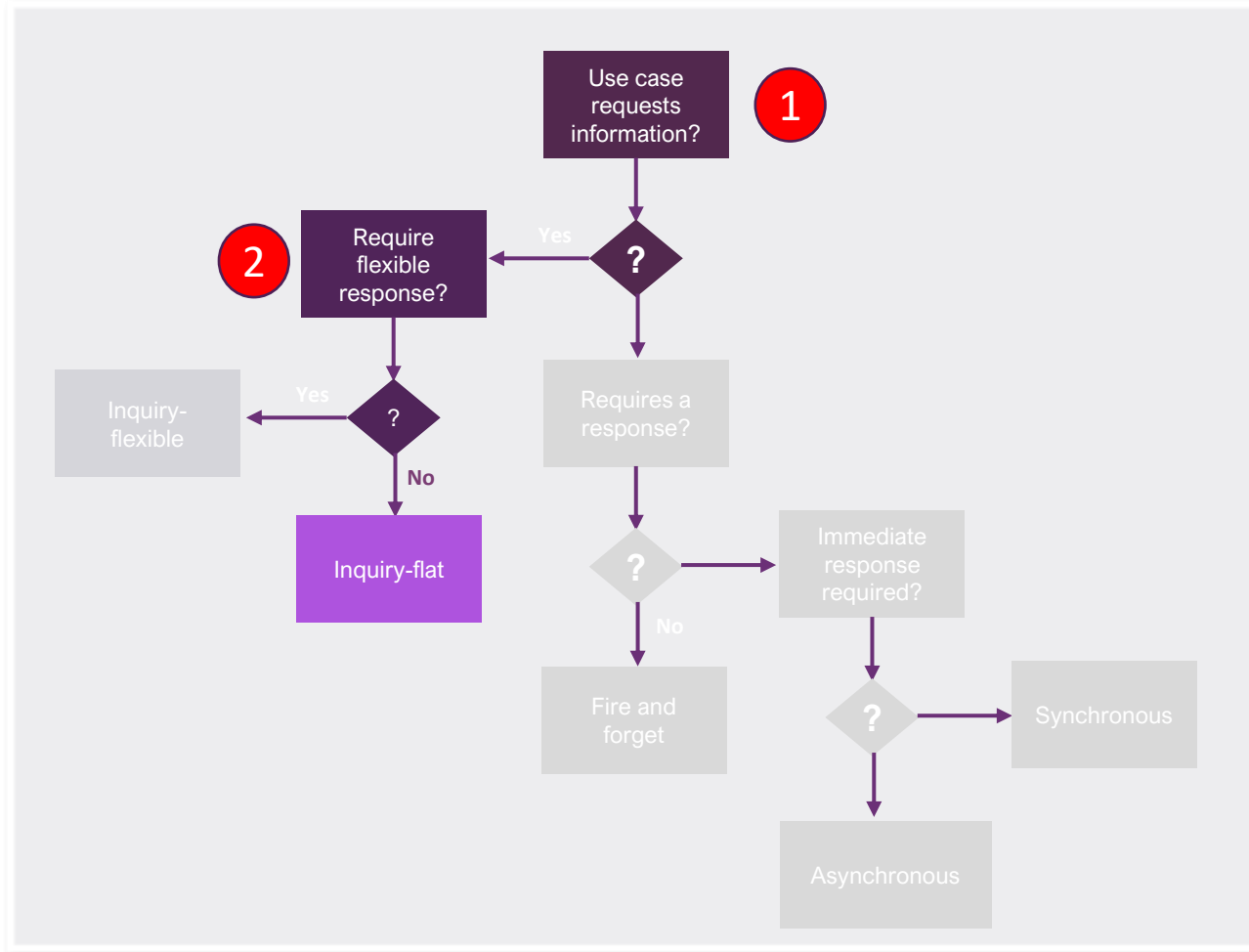


- Feedback from participants on any other features that should be included.

Worked Examples

Decision Tree Mapping Examples for Inquiry Service

Step 1: Message pattern worked example: Get Bid Data



Use Case Description

Get Bid Data Request to AEMO

Decision tree applied criteria

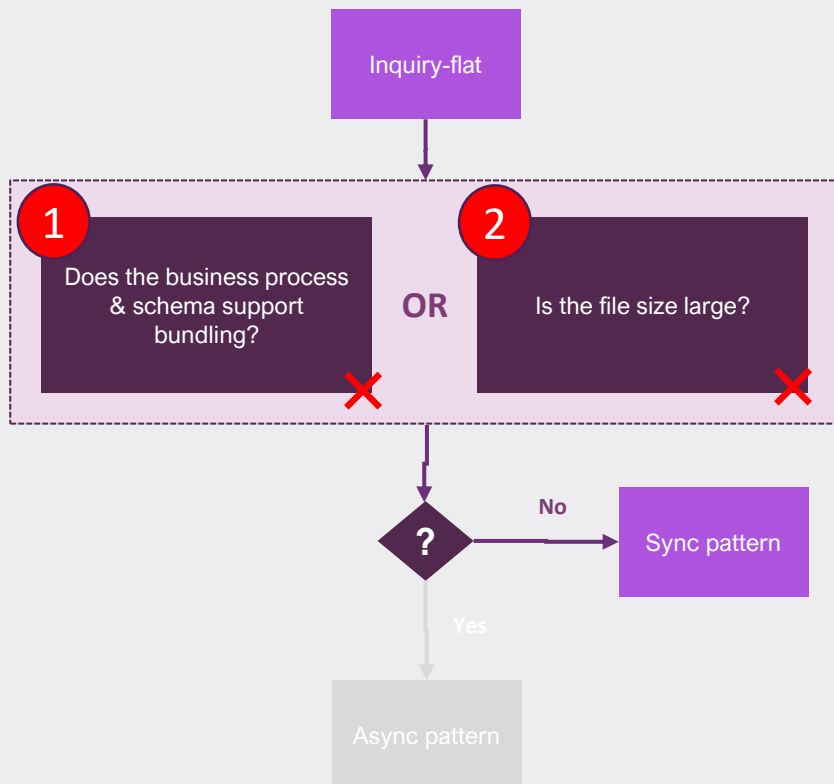
1. Data is being requested in the form of 'Get Bid Request'
2. AEMO formulates the Bids Data in a Response payload and sent back to the participant.

Applying Decision Tree for the Use Case

Get Bid Data is determined to be Inquiry Service Flat

Step 2: Determine whether Sync or Async pattern applies

The Inquiry Flat service can be delivered either Asynchronously or Synchronously. To determine whether it's an Async or Sync service the bundling and message-size needs to be determined.



Use Case Description

Bidding API – Get Bid Data

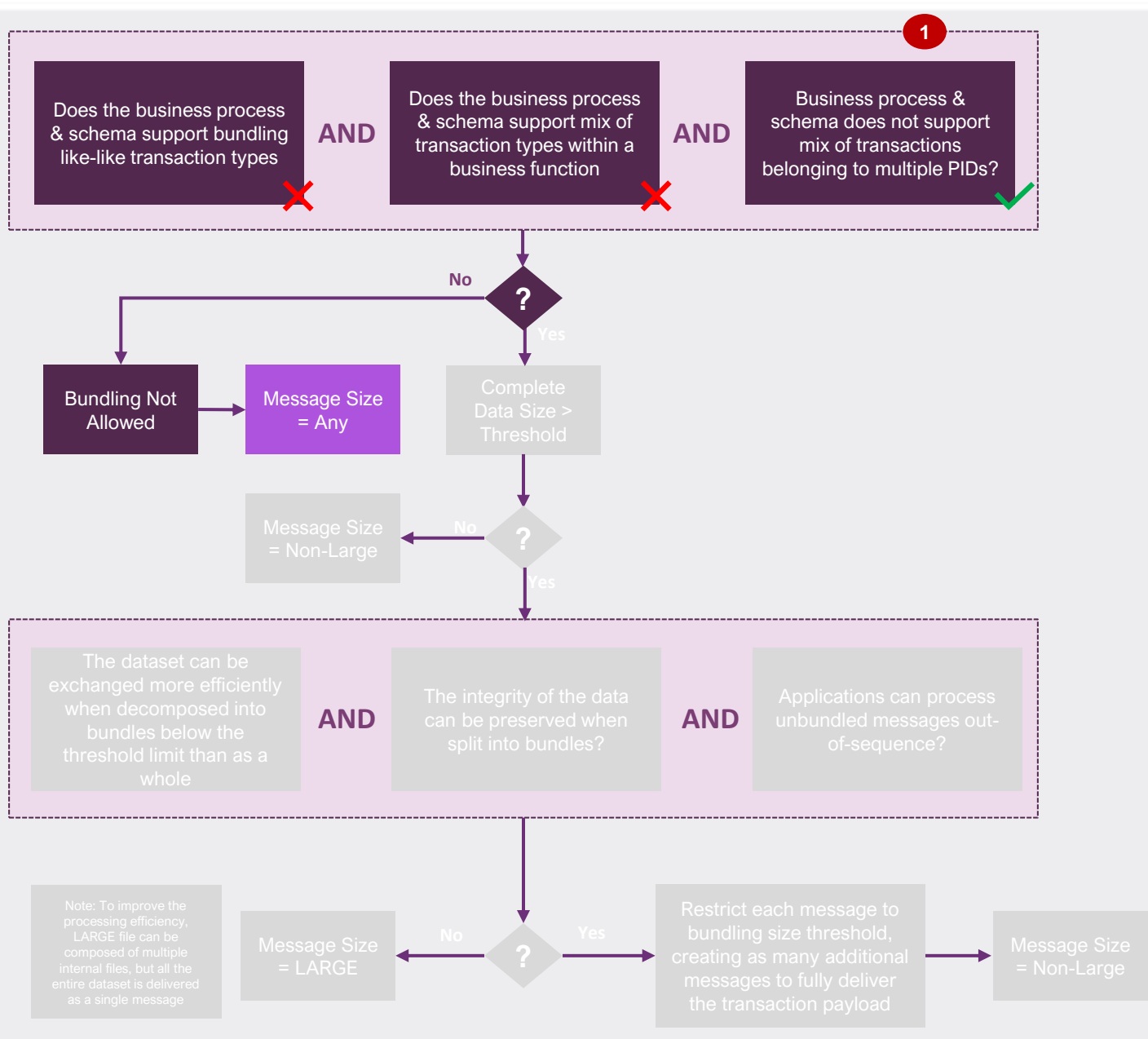
Decision tree applied criteria

1. Does the business process and schema support bundling of transactions? – No
2. Is the file size large? – No

Applying Decision Tree for the Use Case

Decision tree output = Sync

Step 3: Message Bundling Worked Example: Get Bid Data Request-Response



Use Case Description

Bidding API – Get Bid Data

Get Bid Data on a Sync Mode: Participants invoke Sync Get Bid Data service wherein the Get Bid Response Data is provided in the blocking thread of the invocation

For illustration: Message size threshold = 1MB

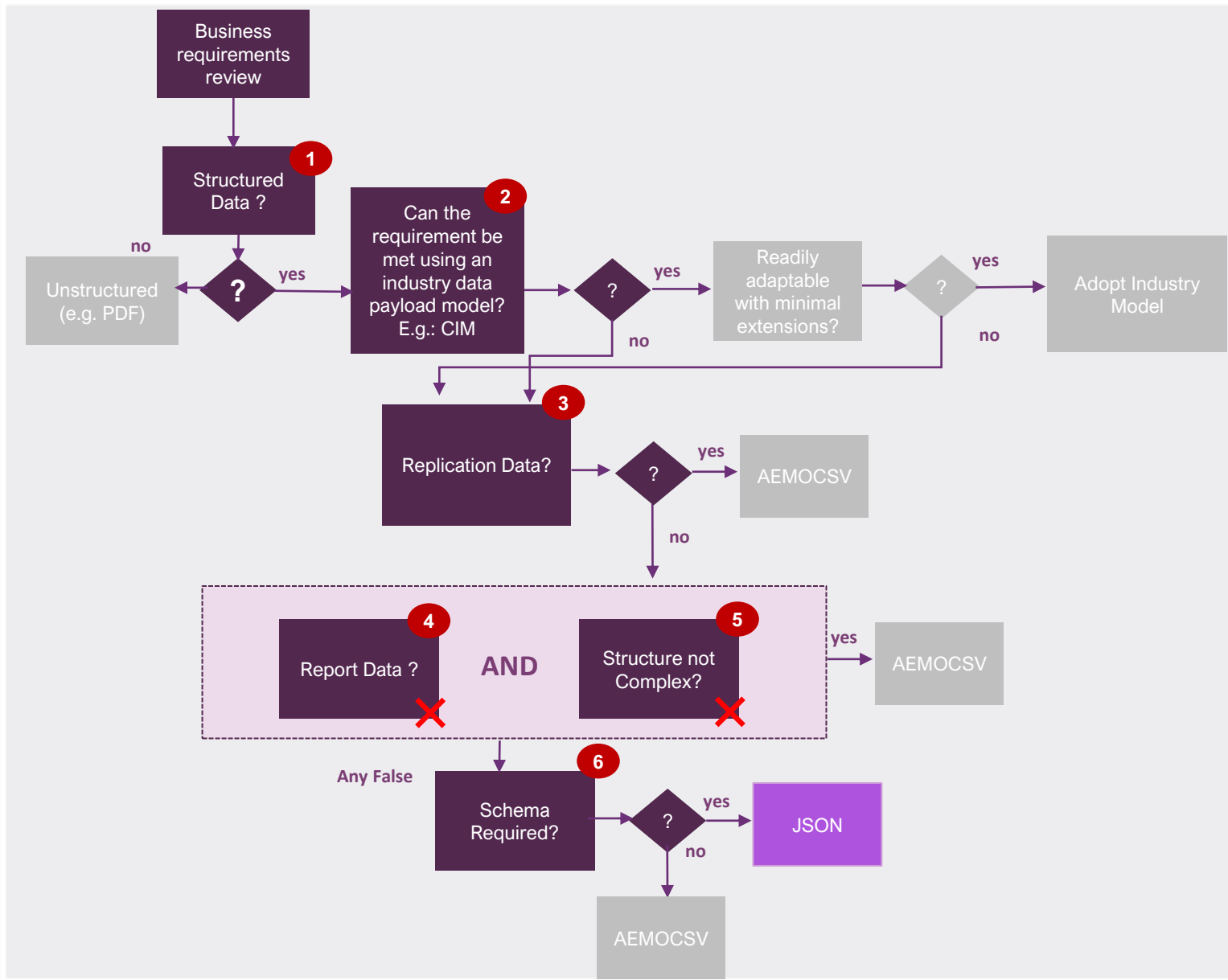
Average Compressed Message size for Bid Data Response: ~100 KBs

Request Transaction: Get Bid Data Request
Response Transaction: Get Bid Response Data

Applying Decision Tree for the Use Case

- 1a. This is a Sync Inquiry Service that only supports one transaction per message
- 1b. This is a sync inquiry service that doesn't support multiple transactions in a message
- 1c. A single request is limited to a ParticipantID

Step 4: Message payload worked example: Get Bid Data



Use Case Description

Bidding API – Get Bid Data

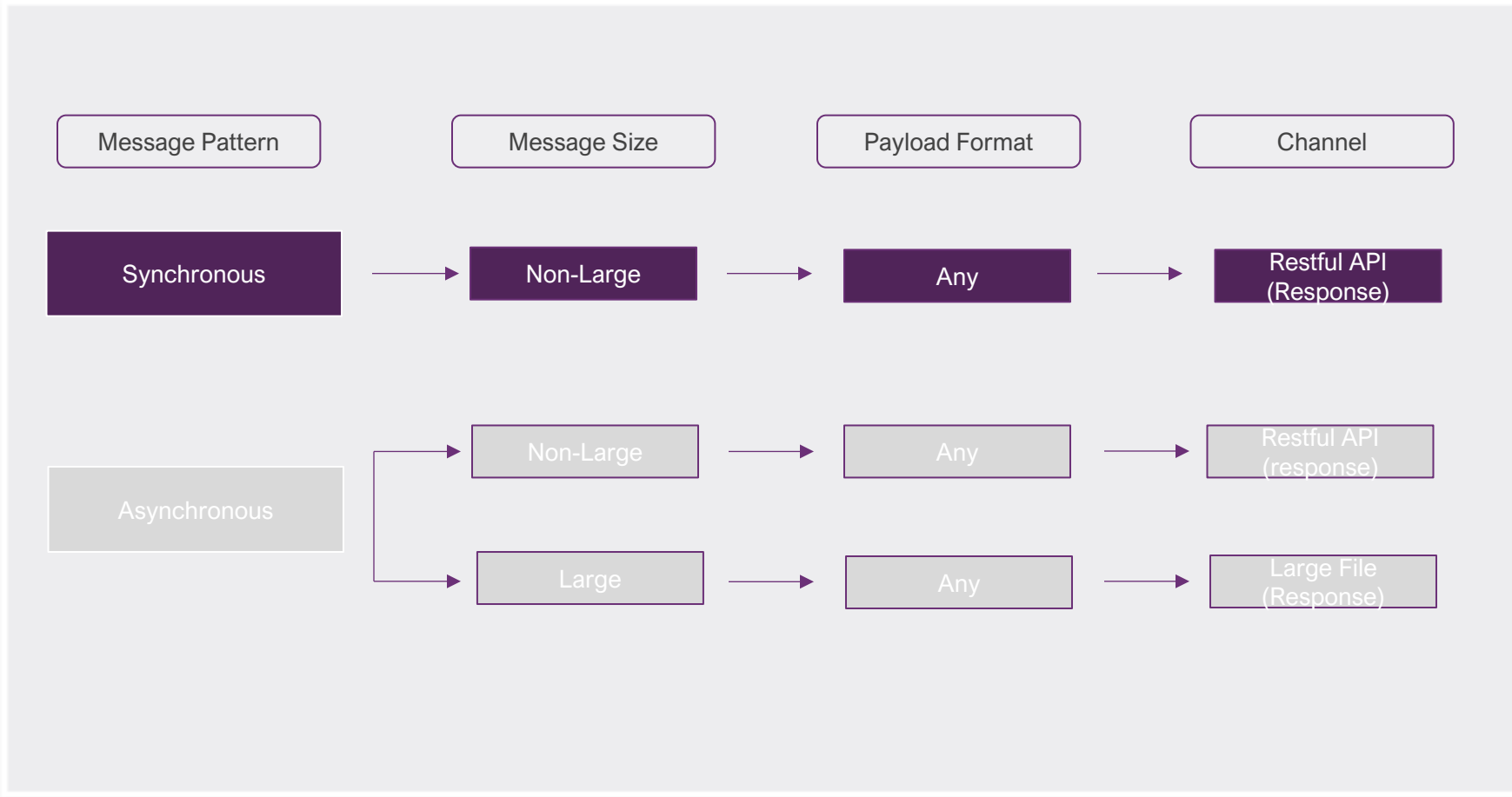
Decision tree applied criteria

1. Data output is structured? – Yes
2. Can the requirement be met using an industry data payload model? – No
3. Replication Data– No
4. Report Data – No
5. Structure Not Complex – No
6. Schema Required - Yes

Applying Decision Tree for the Use Case

Decision tree output = JSON

Step 5: Determine the channel



Use Case Description

Get Bid Data Request to AEMO

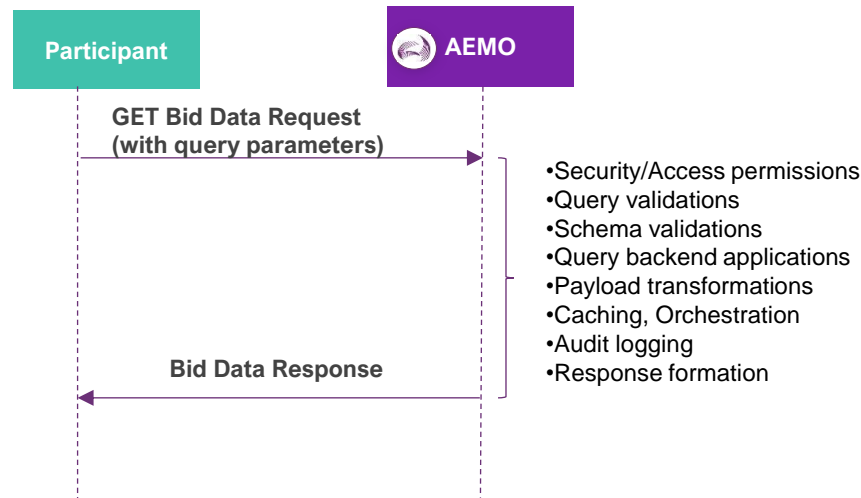
Decision tree applied criteria

1. Message pattern is Synchronous
2. It is a non-large message size with a JSON payload
3. The API channel will be used

Applying Decision Tree for the Use Case

The API channel should be used for Get Bid Data

Inquiry Service Flat – Get Bid Data



Draft Request:



Draft Response:



Business Function API Endpoint

Market: NEM Wholesale

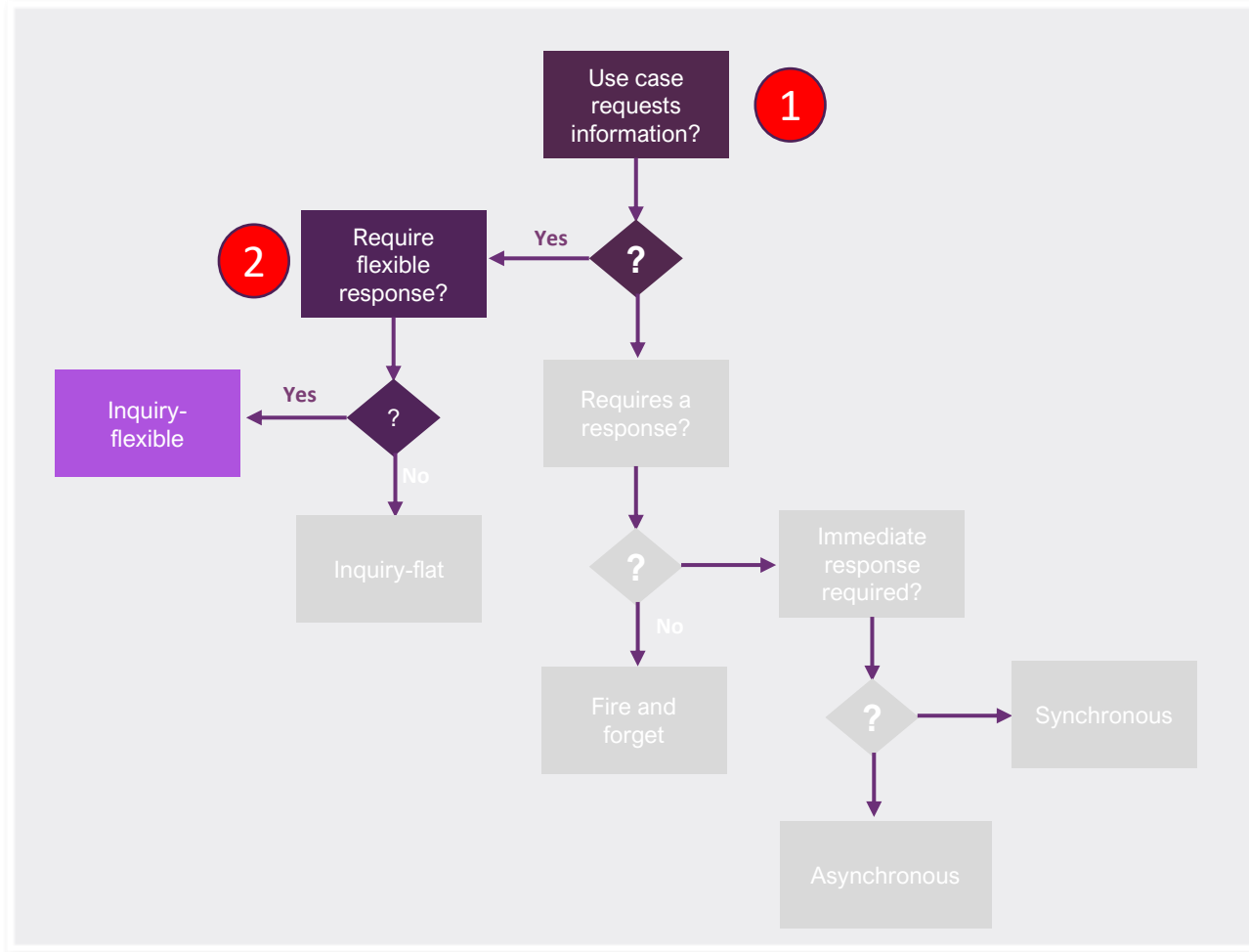
Business Function: Bidding (Get Bids)

Business Function API: <https://.../NEMWholesale/bidding/v1/getBid/>

Use Case	API Method	API Definition
Participant triggers Get Bid Data Request to AEMO. AEMO responds back with Bid Data response payload.	GET	NEMWholesale/bidding/v1/getBid

URLs presented here are sample only, actual URLs will be published as a part of technical specification

Step 1: Message pattern worked example: WEM Dispatch Interval Data



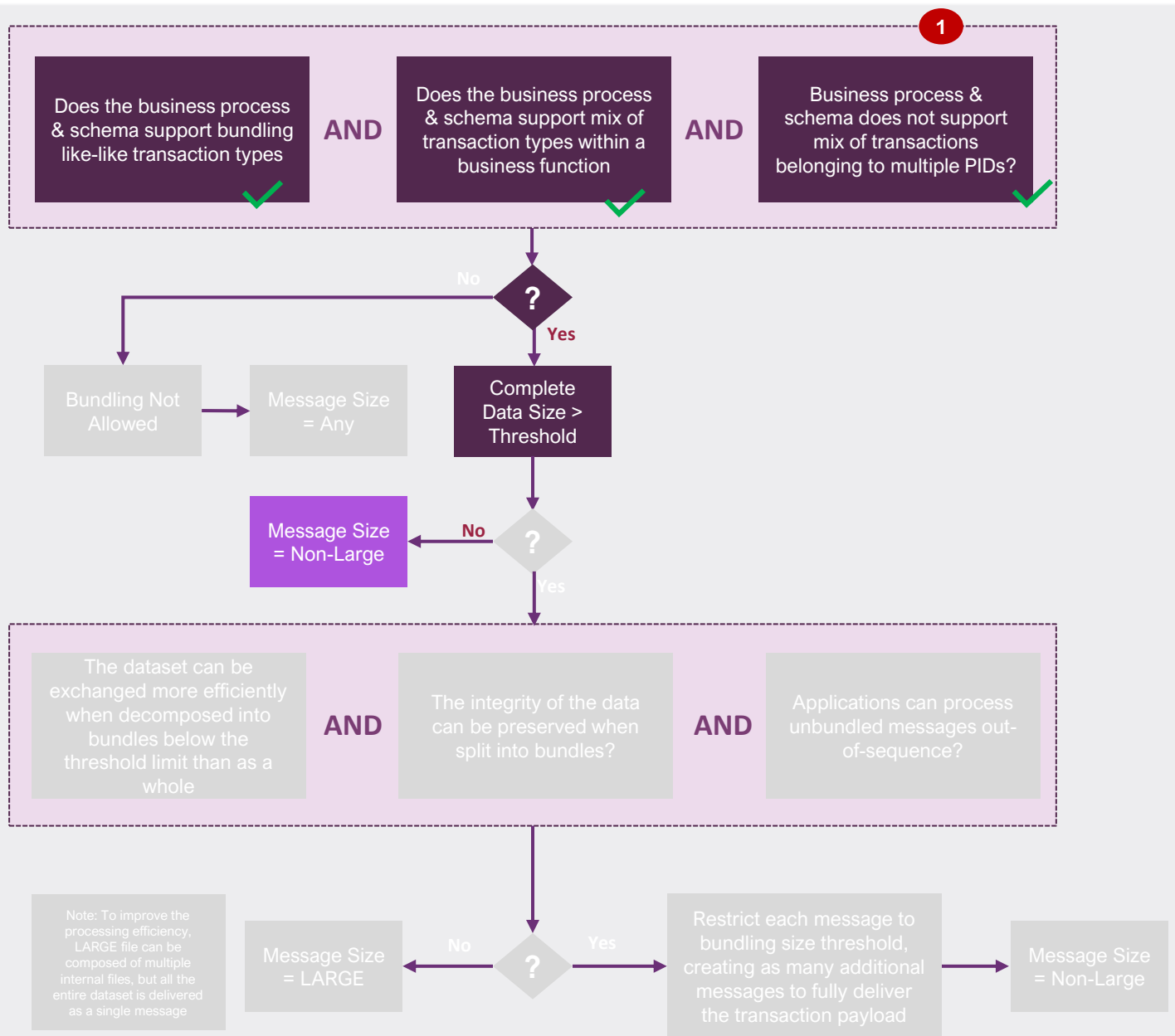
Use Case: WEM Dispatch Interval Data request to AEMO

Decision tree applied criteria

1. Data is being requested in the form of 'WEM Dispatch Interval Data Request'
2. Participant defines the list of attributes from the response schema that must be sent in the response payload i.e. defines the list of nodes or elements that are to be sent in the 'WEM Dispatch Response'

WEM Dispatch Interval Data is determined to be Inquiry Service Flexible

Step 2: Message Bundling Worked Example: WEM Dispatch Interval Data Request-Response



Use Case Description

WEM Data Dispatch on Sync Mode: Participants invoke Sync WEM Data Discovery service wherein the WEM Dispatch Response is provided in the blocking thread of the invocation.

For illustration: Message size threshold = 1MB

Average Compressed Message size for WEM Dispatch Response: ~100 KBs

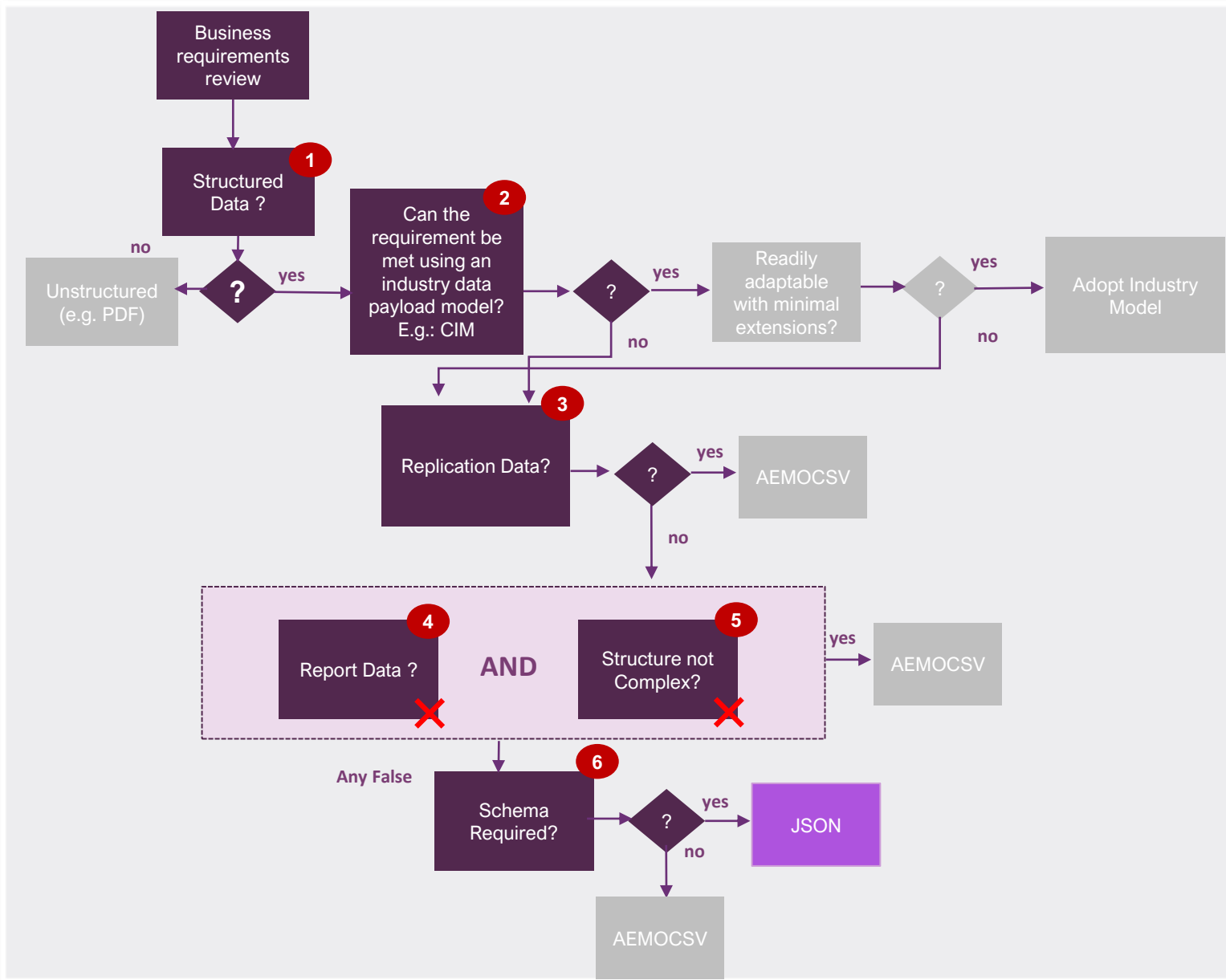
Request Transaction: WEM Dispatch Data Request
Response Transaction: WEM Dispatch Data Response

Applying Decision Tree for the Use Case

- 1a. This is an inquiry flexible service that supports bundling of multiple transactions
- 1b. This is an inquiry service that supports mix of multiple transaction types in a message
- 1c. A single discovery request is limited to a ParticipantID

WEM Dispatch Interval Data is determined to be Message Size Non-Large

Step 3: Message payload worked example: WEM Dispatch Interval Data



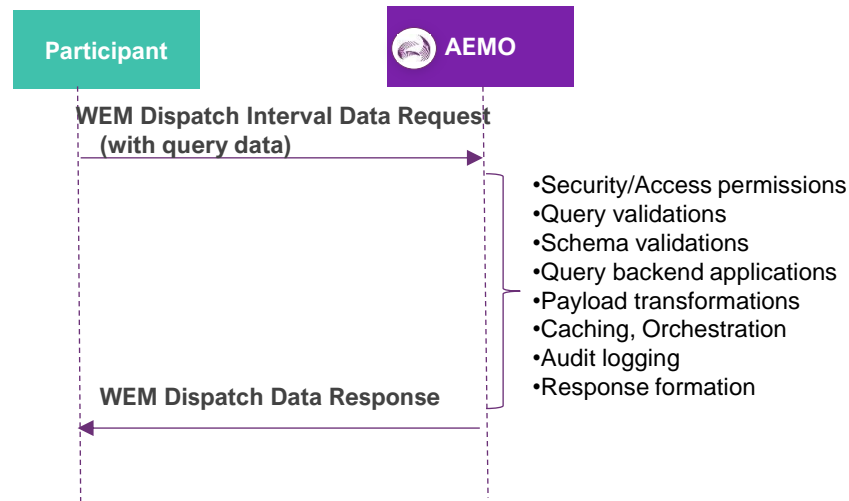
Use Case: Bidding API – WEM Dispatch Interval Data

Decision tree applied criteria

1. Data output is structured? – No
2. Can the requirement be met using an industry data payload model? – No
3. Replication Data– No
4. Report Data – No
5. Structure Not Complex – No
6. Schema Required - Yes

Decision tree output = JSON

Inquiry Service Flexible – WEM Dispatch Interval Data



Refer to the next slide on the GraphQL sample request/response payloads with query data

Business Function API Endpoint

Market: WEM

Business Function: WEM Dispatch (Interval Data)

Business Function API: <https://.../WEM/v1/gql/dispatchSolution>

Use Case	API Method	API Definition
Participant Requests for WEM Dispatch data with required response elements to AEMO	GET/POST	WEM/v1/gql/dispatchSolution

URLs presented here are sample only, actual URLs will be published as a part of technical specification

GraphQL Examples

- Example 1- Retrieve Dispatch Data for available Quantities

Request

```

query {
  dispatch {
    availableQuantities {
      quantity
      unit
    }
  }
}

```

Response

```

{
  "data": {
    "dispatch": {
      "availableQuantities": [
        {
          "quantity": 1000,
          "unit": "MWh"
        },
        {
          "quantity": 2000,
          "unit": "MWh"
        },
        {
          "quantity": 3000,
          "unit": "MWh"
        },
        {
          "quantity": 4000,
          "unit": "MWh"
        },
        {
          "quantity": 5000,
          "unit": "MWh"
        }
      ]
    }
  }
}

```

- Example 2 – Retrieve Dispatch Total Data with specific fields

Request

```

query {
  dispatch {
    total {
      quantity
      unit
      price
    }
  }
}

```

Response

```

{
  "data": {
    "dispatch": {
      "total": [
        {
          "quantity": 1000,
          "unit": "MWh",
          "price": 100.0
        },
        {
          "quantity": 2000,
          "unit": "MWh",
          "price": 200.0
        },
        {
          "quantity": 3000,
          "unit": "MWh",
          "price": 300.0
        },
        {
          "quantity": 4000,
          "unit": "MWh",
          "price": 400.0
        },
        {
          "quantity": 5000,
          "unit": "MWh",
          "price": 500.0
        }
      ]
    }
  }
}

```

Feedback from FG session



- The following outlines the feedback obtained from participants during the focus group session.

Item	Description
Potential Candidates for Inquiry Flexible Services	<ul style="list-style-type: none">• C4 Report – NMI Master Data Report• NMI Standing data Report• RM17 LVL3 Settlement Reconciliation Report• RM11 Missing Data Report
To be considered for Inquiry enablement	<ul style="list-style-type: none">• MSATS UI functions may be suitable for Inquiry Flexible.
Support for Pagination	<ul style="list-style-type: none">• Consider pagination support for Flat & Flexible services.
Service availability over multiple endpoints	<ul style="list-style-type: none">• NMI Discovery service should be available over multiple patterns to help solve various use-cases (Inquiry Flat and Inquiry Flexible patterns). Noted for DP2 discussion.

Notes

Udaya walked the group through the worked examples.

Participants asked the following questions:

Q: Does (GraphQL) make it faster for AEMO to respond to requests?

A: It is faster for AEMO, because whole sets of data will no longer be sent. The backend processing won't be much different but the response from the API gateway to the client-side application should be accelerated.

Inquiry Flexible How it Works

GraphQL with the WEM Dispatch Service

Background

Our Aim:

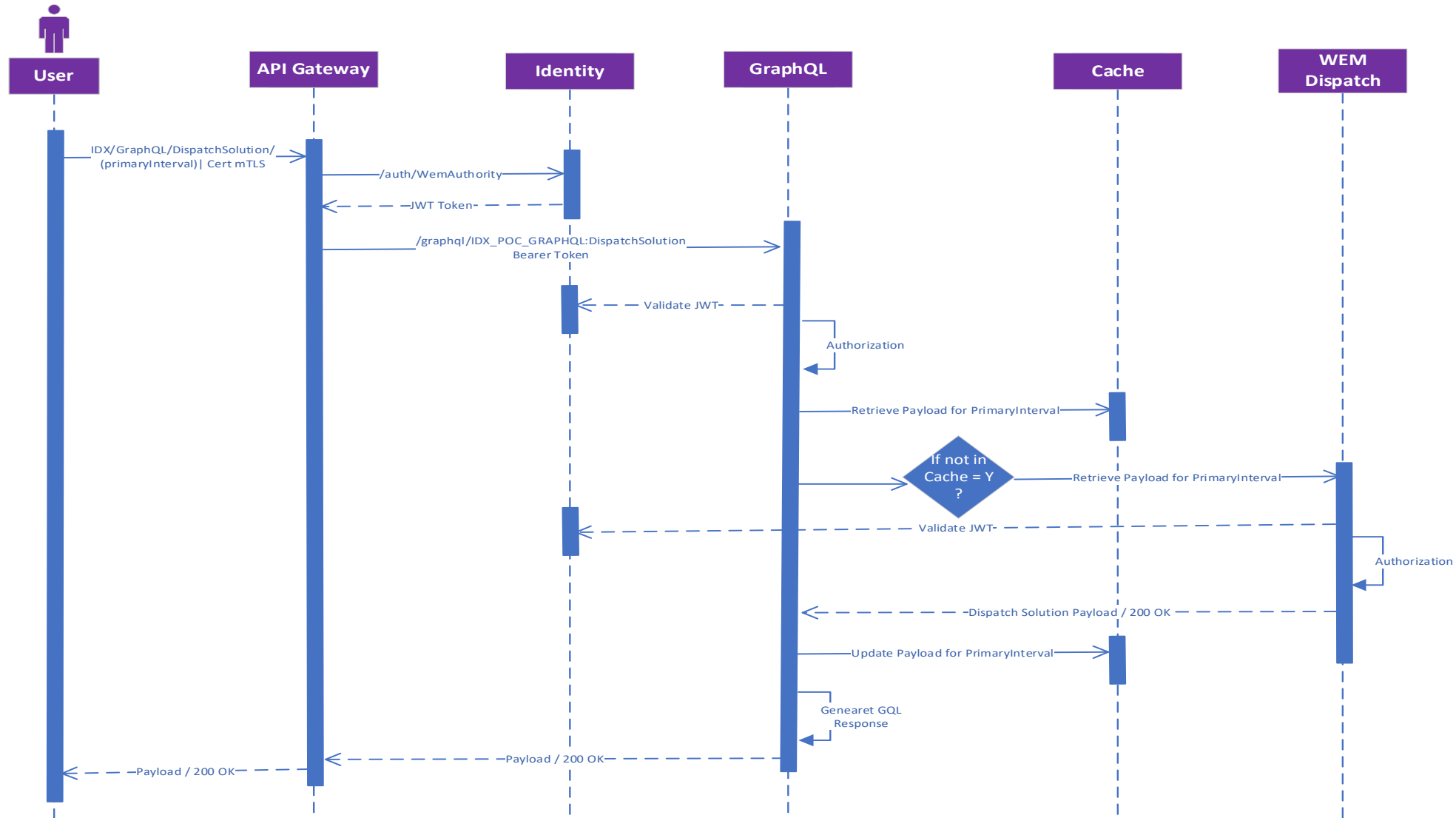
- Understand GraphQL technology along with its usage and implementation.
- Addressing data over fetching issues compared to REST services.
- Understand the simplification and flexibility that GraphQL provides in the data fetching process.
- Explore GraphQL schema building blocks and understand how schema changes impact client applications.
- Measure the response times and other non-functional aspects, such as security, caching and error handling.

Choosing WEM Dispatch:

- WEM Dispatch Interval Data, in its present configuration, over-fetches more data than most users need.
- Response data is provided as a single comprehensive payload, requiring participant applications to parse and segregate the data elements they need.
- There is no functionality available for pagination of responses, resulting in payload responses that can be more the 10MB.

Use Case – Sequence

AEMO has developed and tested the Inquiry service flexible using the WEM Interval Dispatch Data as a use case. Below is the sequence flow for this use case.



Testing Outcome - Screenshots

REST

(vs)

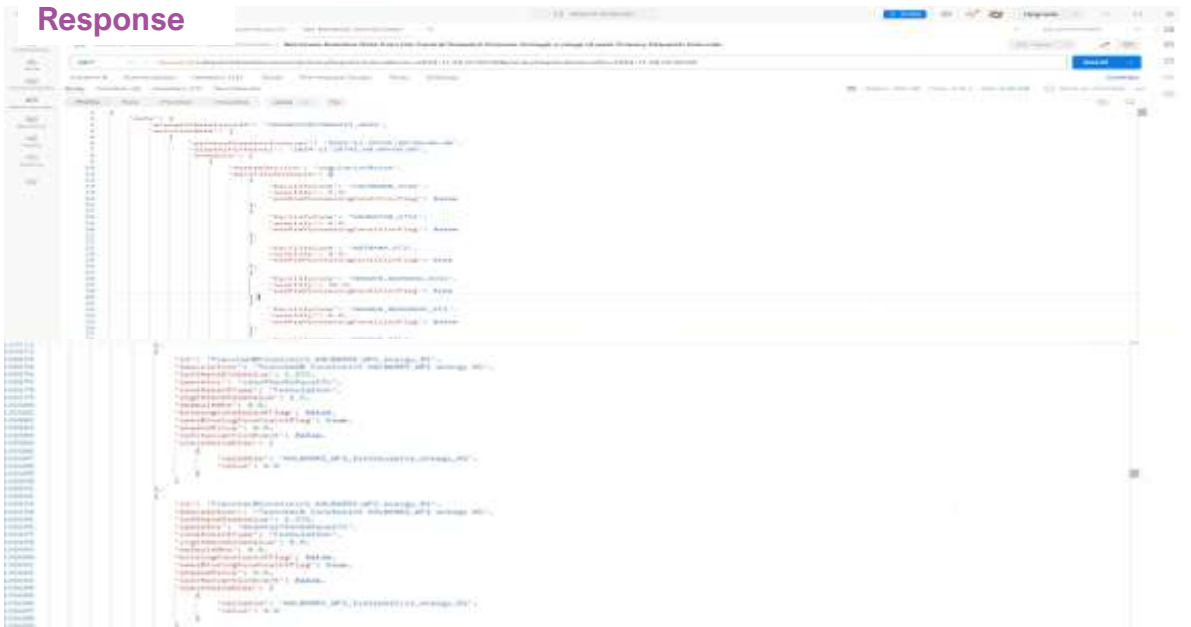
GraphQL

Request



Response

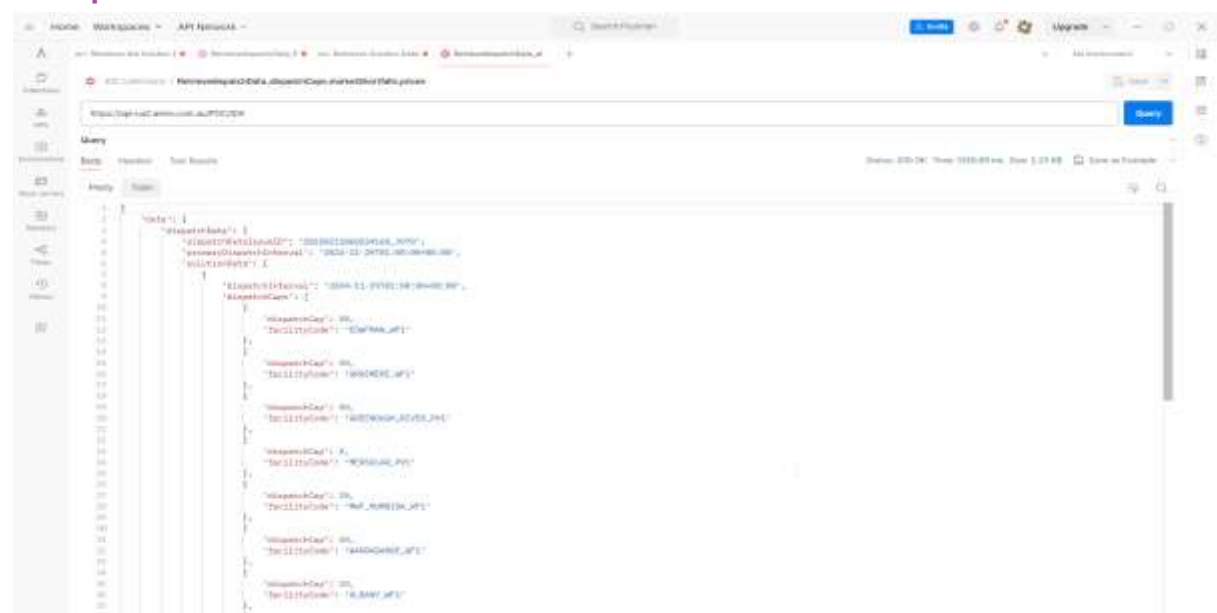
Response



Request



Response



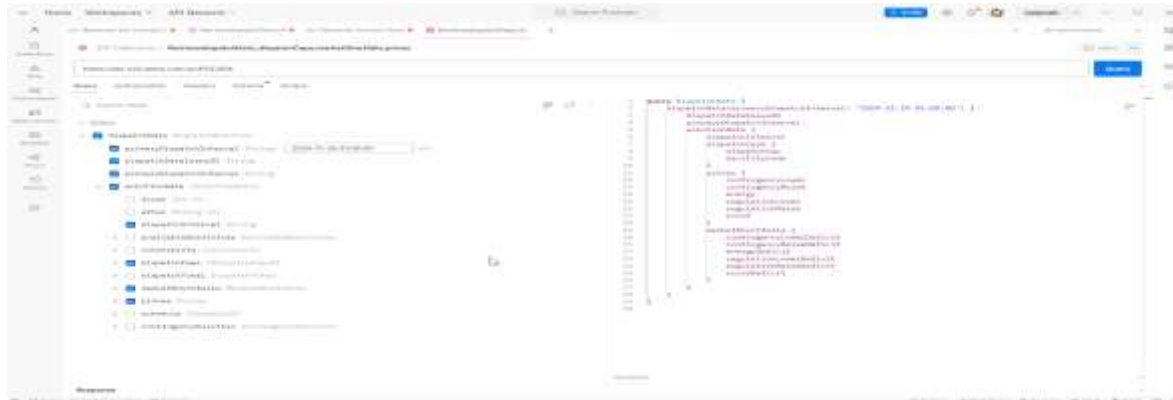
Note: REST API returned 6.5 MB of data while GraphQL API response had 2.2 KB of data.

Testing Outcome – Screenshots(contd..)

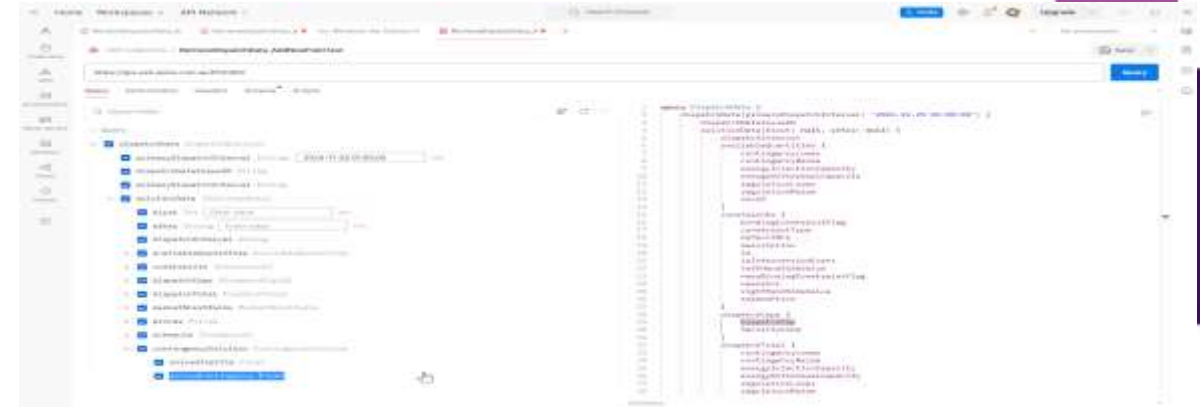
Querying data sub-sets

Schema updates and no impact wrt Service Versioning

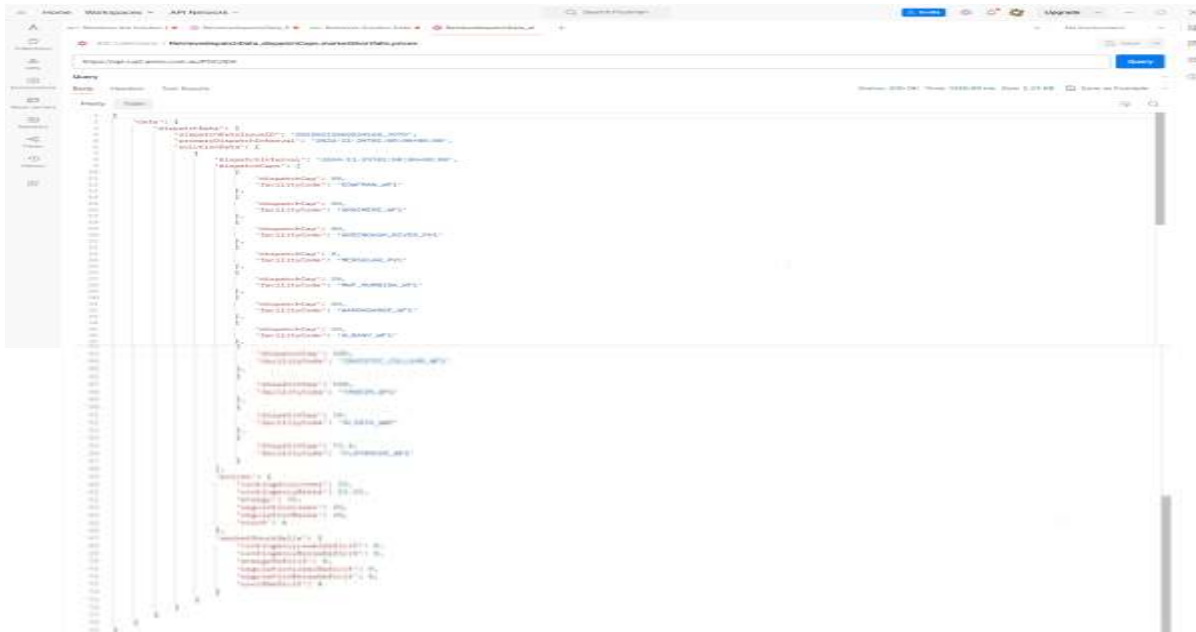
Request



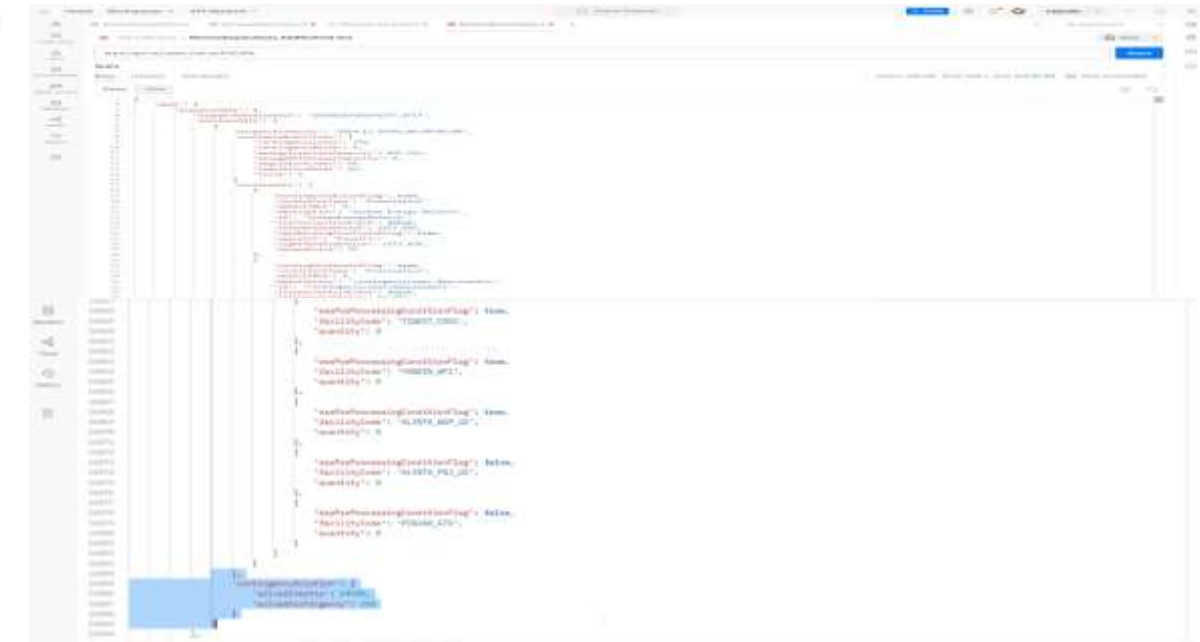
Request



Response



Response



Use Case Outcomes

WEM Dispatch service results against each evaluation criteria have been captured in the below table.

Criteria	Description
Response Times	<ul style="list-style-type: none">• Response times are within the expected SLA's.
Schema	<ul style="list-style-type: none">• Schema is retrieved through GraphQL Introspection query.• Schema includes documentation for any new or deprecated resources.
Caching(Internal)	<ul style="list-style-type: none">• Payload from backend application is successfully cached.• Subsequent calls used the cached payload data.
Security	<ul style="list-style-type: none">• Followed AEMO security mechanisms for the RESTful/GraphQL API calls.• Additional authorization checks were implemented on the GraphQL server.
Versioning	<ul style="list-style-type: none">• New data elements have been added to the GraphQL schema.• Same version of the API is used to query the newly added data elements.
Logging & Error Handling	<ul style="list-style-type: none">• Implemented Application logging , Error codes, Error messages and retry mechanisms

Schema updates – REST vs GraphQL

A key benefit of GraphQL is limiting schema update impacts. Where client applications use GraphQL versus a service with the same data over a RESTful channel, schema updates have limited, or no impact on client applications using a GraphQL service.



Use-Case

Actor: Call Centre

Scenario: Retailer Call Centre agents managing the churn process:

- a. Call Centre applications use Discovery process (Type 1) to identify the NMI for an address.
- b. Agents may initiate Type 2 Discovery to retrieve the Standing Data of the NMI for triggering the churn process.

Change	Version	Impact on Call Centre	
		RESTful	GraphQL
-	v1	-	-
Schema updates related to any new elements added to CATS_NMI_DATA_STREAM table	v2	<ul style="list-style-type: none"> Application impacted due to Standing Data Schema updates 	<ul style="list-style-type: none"> No impact as Discovery Services do not deliver this attribute.
The length of the value field for “CurrentTransformerLocation” changed in the in CATS_METER_REGISTER table.	v3	<ul style="list-style-type: none"> Application impacted due to Standing Data Schema updates 	<ul style="list-style-type: none"> No impact as Discovery Services do not deliver this attribute.
New attribute GPSCoordinatesLat & GPSCoordinatesLong are added to the schema (CATS_METER_REGISTER)	v4	<ul style="list-style-type: none"> Application impacted due to Standing Data Schema updates 	<ul style="list-style-type: none"> No immediate impact If Participants want to delay accepting these attributes in their systems, they can still work with the current arrangement i.e. by not requesting these attributes. When their system changes are ready to accept these attributes, they can request this attribute to be included in the GraphQL response.
Any Standing data element removed from the schema.	v5	<ul style="list-style-type: none"> Application impacted due to Standing Data Schema updates 	<ul style="list-style-type: none"> No impact to call centre application if that element is not used. Even if key is used a successful response with a null field will be returned.

Feedback



- Feedback on how Inquiry Flexible works
- Feedback from participants on the presented use case regarding Schema updates
- Are there any other recommendations from the participants related to the Inquiry services?

Notes

Udaya walked the group through the worked examples for inquiry flexible and how it works.

Participants asked the following questions:

Q: If the client is requesting all fields via GraphQL, how will AEMO be addressing such requests? Are there any limitations imposed?

A: GraphQL may not be suitable for all fields use cases and would be better using the restful API services to retrieve everything . Participants should align the services to where it makes sense to use GraphQL which is intended for subsets of data .

Conclusion / Next Steps

- Endorsement from WG on the Inquiry service flexible agreed path.
- Are there any other use cases that participants suggest that can be considered for the Inquiry Flexible pattern?

5. Forward Plan

Blaine Miner

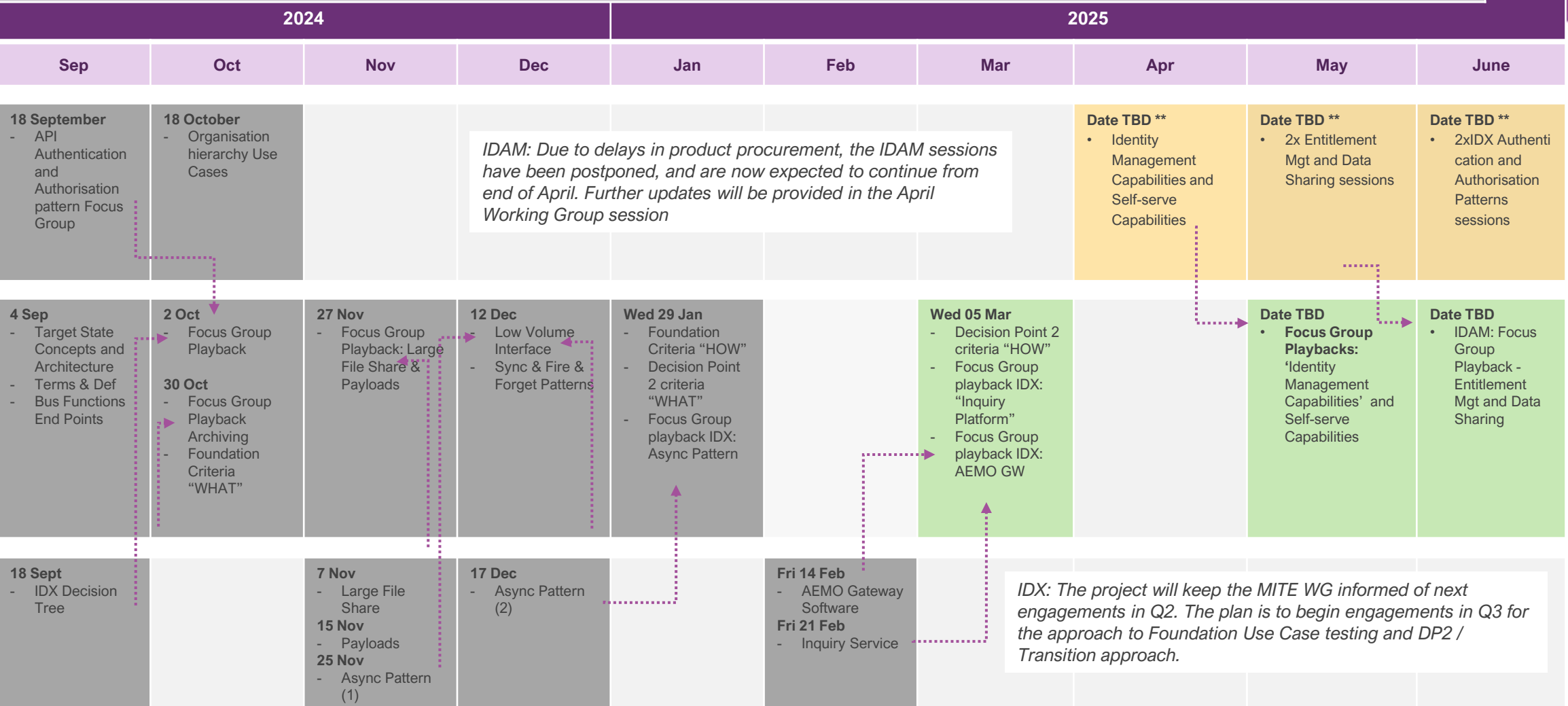


Indicative Timeline for Upcoming Sessions

(as at 26 Feb 2025)

Industry Consultation Status

Significant progress has been made through the content presented to the industry, to continue in 2025.



*These proposed dates are indicative dates

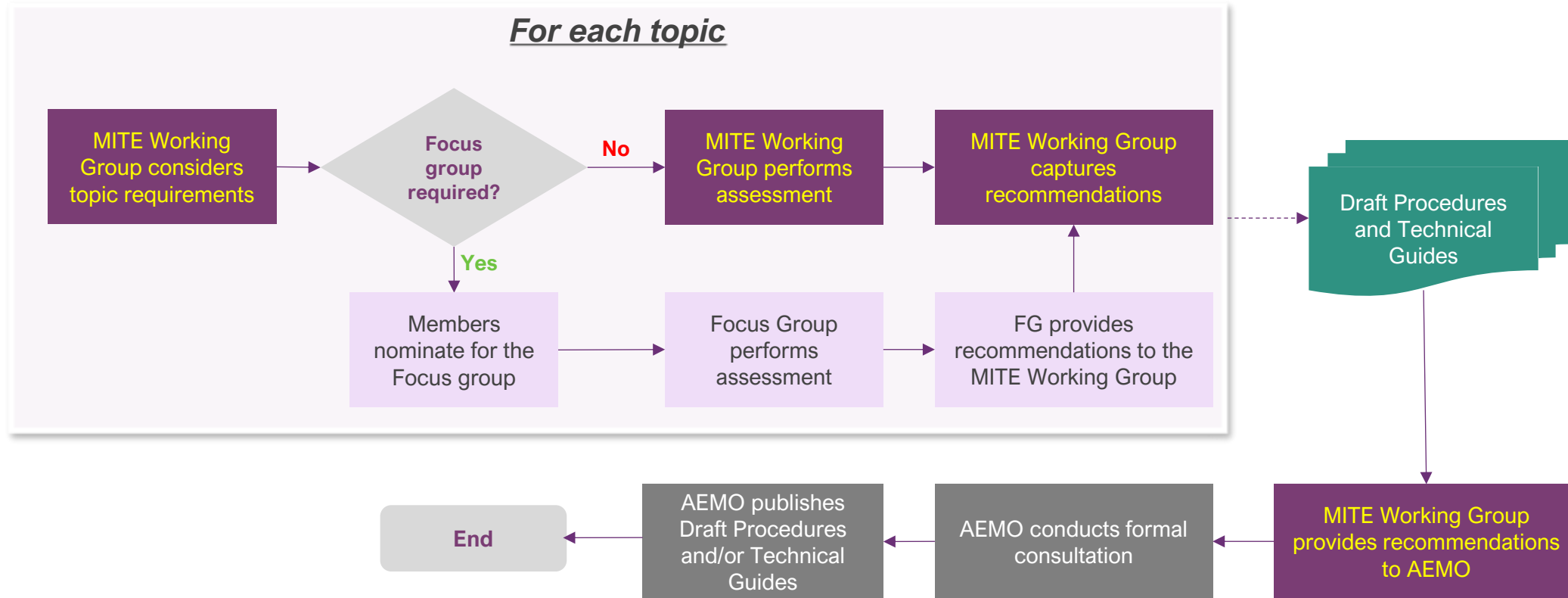
6. General Business and Next Steps



NEMReform@aemo.com.au



Consultation Workshop Structure



MITE Working Group

- **Actively participate** in highly technical workshop discussions to assess options, co-design draft deliverables.
- **Review key drafts** of documentation prepared by the Focus Group.
- **Consult** internally within own organisation to test, socialise and ultimately champion.

Focus Group (as required)

- **Co-design** draft deliverables for consultation with working group members
- **Actively participate** in the Focus Group workshops and activities
- **Participate in highly technical discussions**, including engaging within their business prior, to provide detailed responses to matters under discussion
- **Champion** technical discussions with their peers and within own organisations

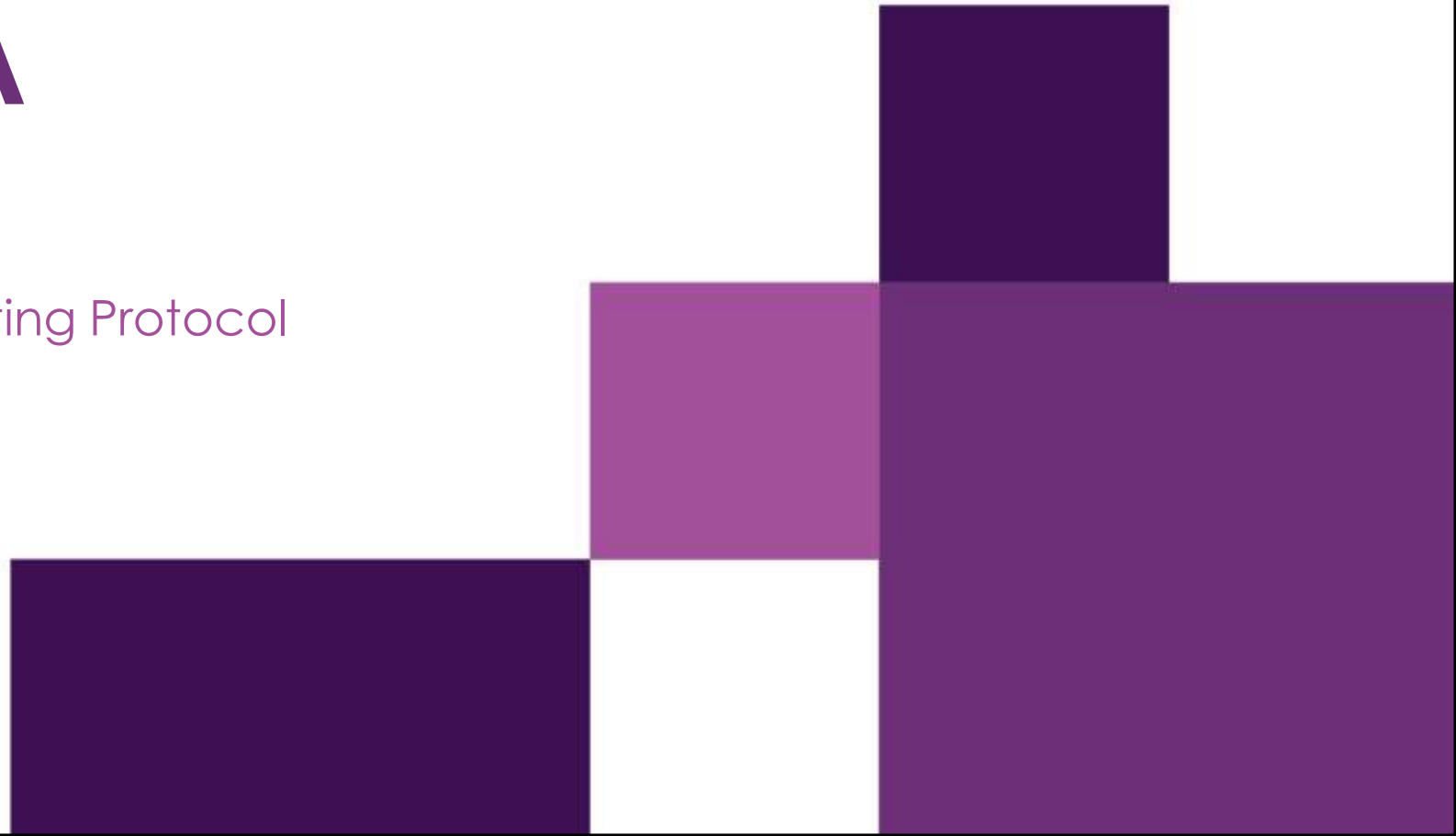


For more information visit

aemo.com.au

Appendix A

AEMO Competition Law - Meeting Protocol



AEMO Competition Law Meeting Protocol

AEMO is committed to complying with all applicable laws, including the Competition and Consumer Act 2010 (CCA). In any dealings with AEMO, all participants agree to adhere to the CCA at all times and to comply with appropriate protocols where required to do so.

AEMO has developed meeting protocols to support compliance with the CCA in working groups and other forums with energy stakeholders. Before attending, participants should confirm the application of the appropriate meeting protocol.

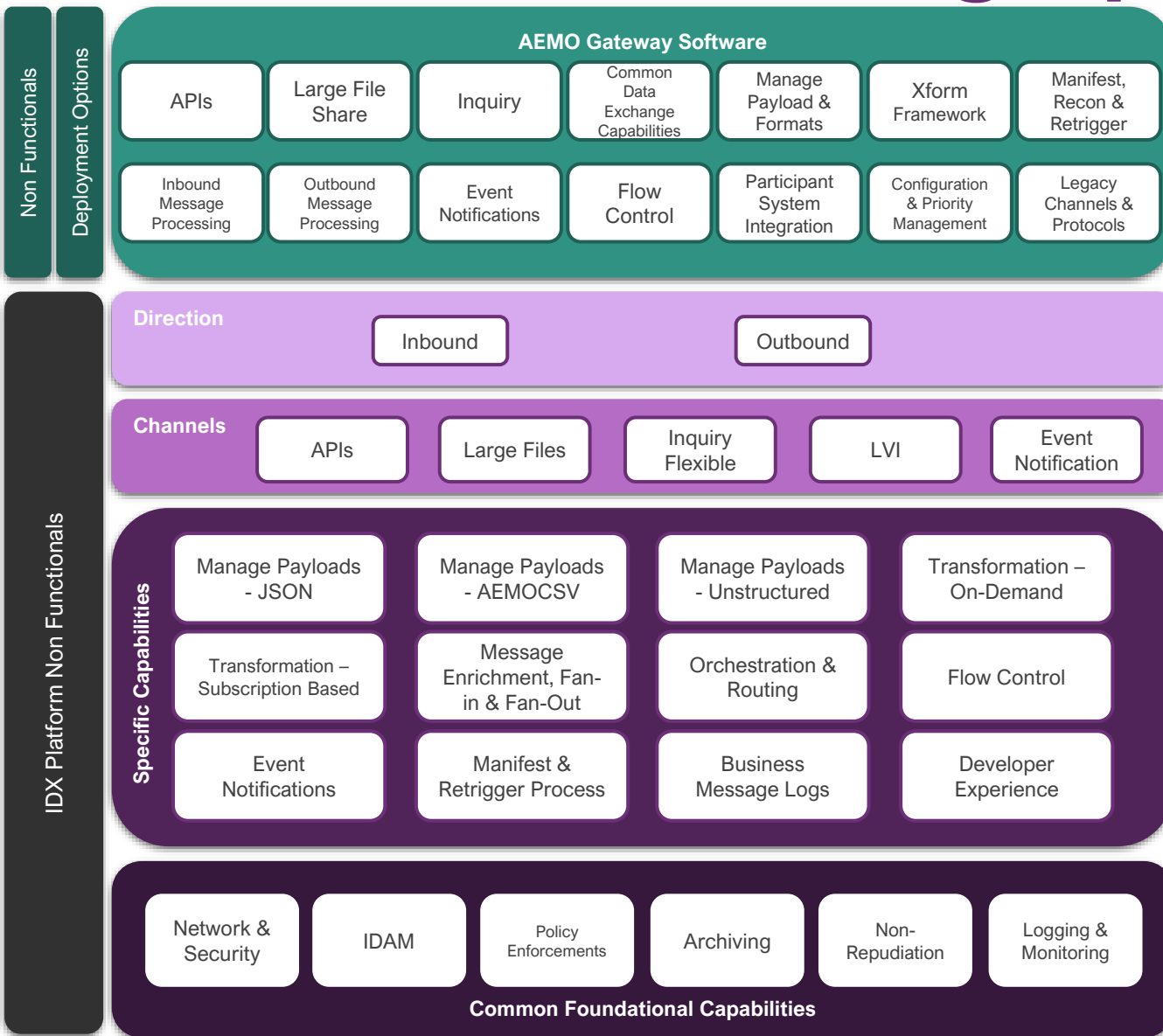
To access the full protocol at AEMO's website, visit: <https://aemo.com.au/en/consultations/industry-forums-and-working-groups>

Appendix B

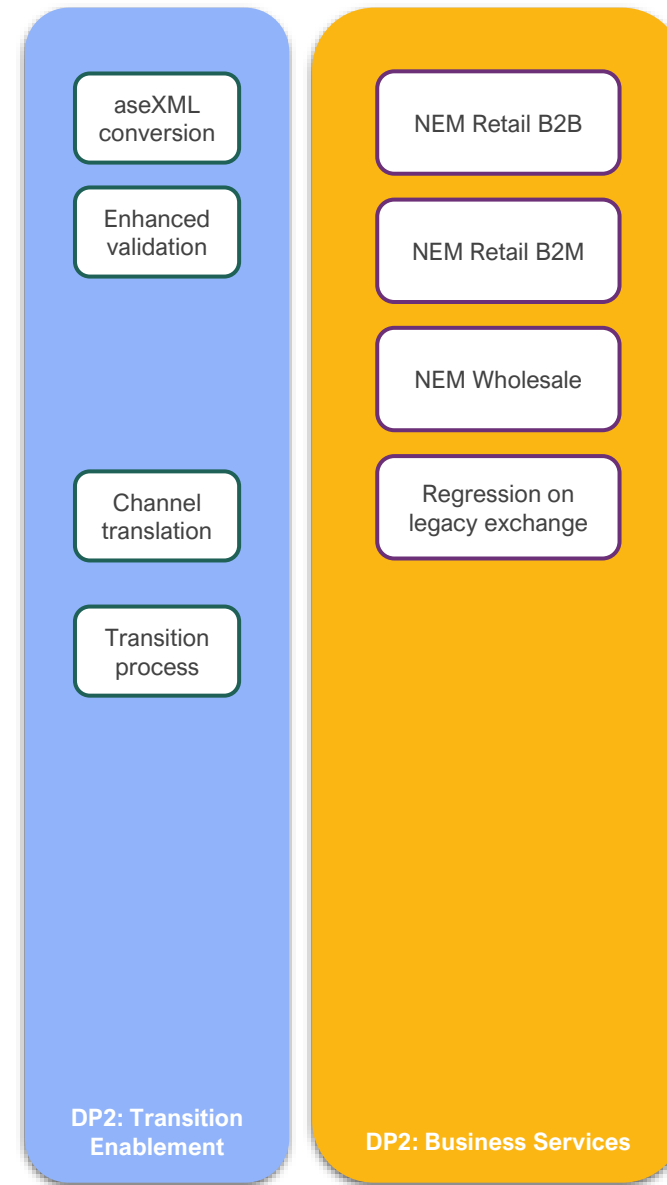
Additional DP2 Criteria considered for the Use Cases



DP2 Criteria building upon foundation



Capabilities validated in Foundation - re-validated in DP2

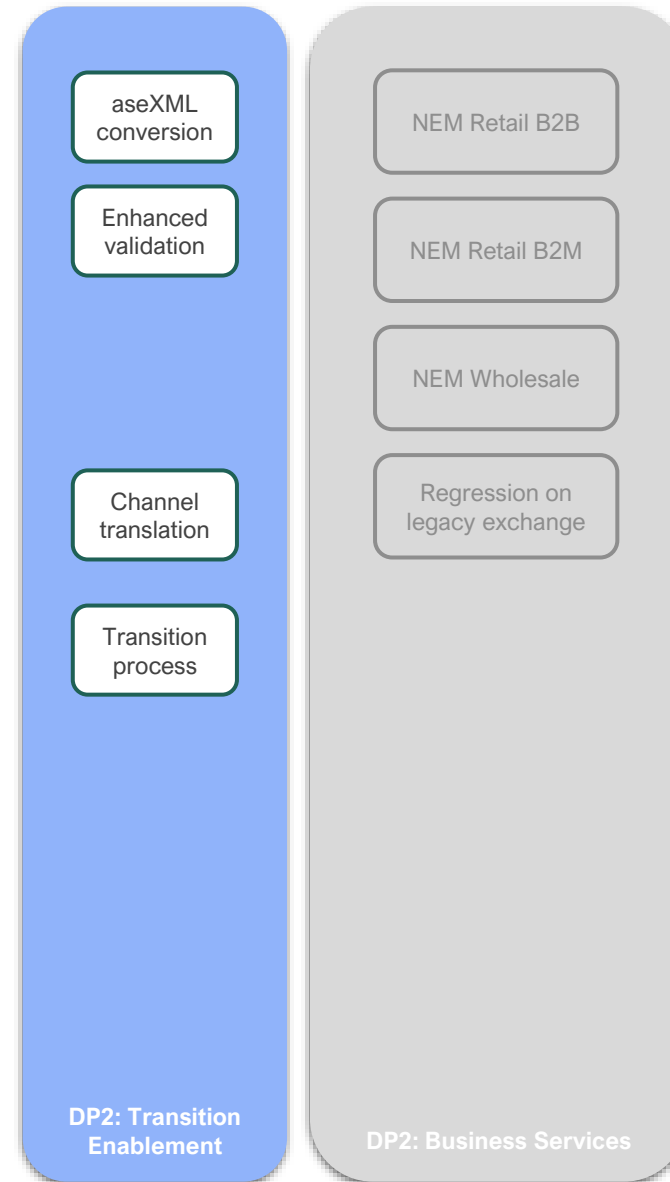
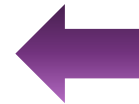


DP2 specific capabilities and business services

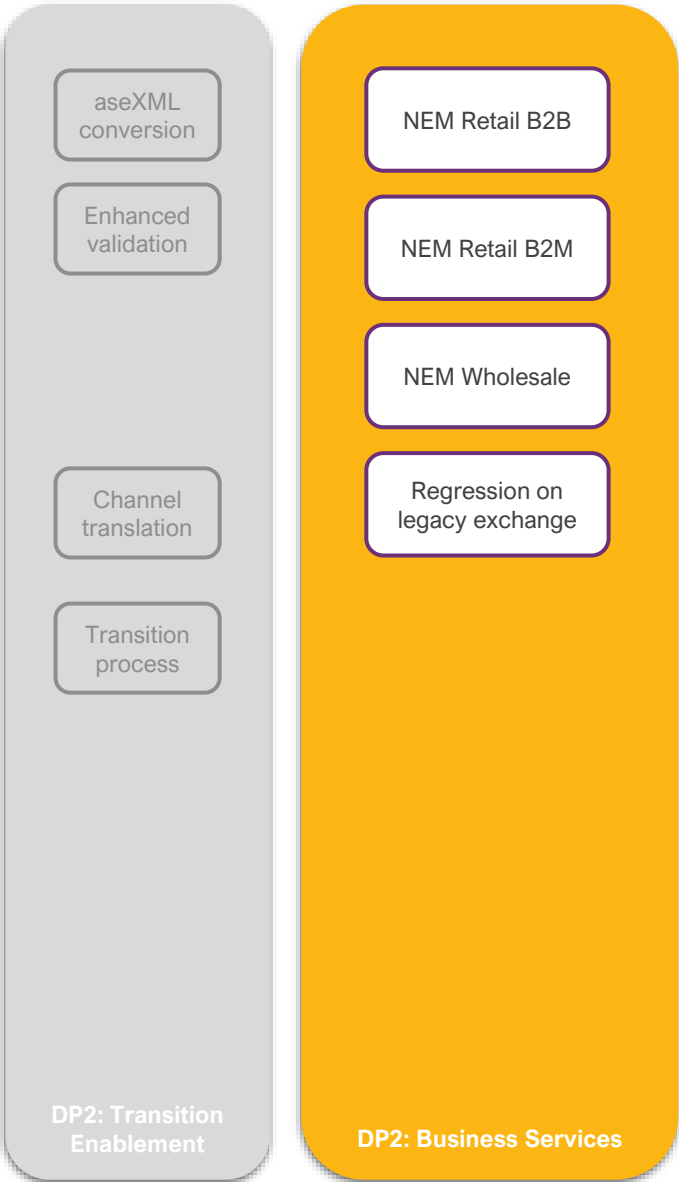
DP2 Transition enablement



Topic	Criteria
AEMO Gateway aseXML conversion	<ul style="list-style-type: none"> AEMO Gateway Software enables backwards compatibility converting new payloads to legacy payloads
AEMO Gateway Enhanced validation	<ul style="list-style-type: none"> AEMO Gateway Software supports deployment of Enhanced Validation Module AEMO Gateway Software supports participant defined enhanced validations
IDX Channel translation	<ul style="list-style-type: none"> IDX enables channel translation between participants on legacy and participants on the new IDX channels and payloads
DP2 Transition process	<ul style="list-style-type: none"> Participants can enable IDX services in the IDX platform to switch from legacy to IDX on a per business service basis Any further transition enabling capabilities identified as required for DP2 operate



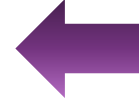
DP2 Business Services



Topic	Criteria
NEM Retail B2B	<ul style="list-style-type: none"> All NEM Retail B2B Services are available, functional and performant across all transaction groups and transactions
NEM Retail B2M	<ul style="list-style-type: none"> All NEM Retail B2M Services are available, functional and performant
NEM Wholesale	<ul style="list-style-type: none"> All NEM Wholesale Services are available, functional and performant
Regression on legacy exchange	<ul style="list-style-type: none"> Existing NEM legacy data exchange continues to operate

Extended non functionals

Topic	Criteria
AEMO Gateway non functionals	Scalability & recoverability for NEM IDX services



Topic	Criteria
IDX Platform non functionals	Scalability – supporting NEM IDX services
	Availability – supporting NEM IDX services
	Recoverability – supporting NEM IDX services
	Responder – supporting NEM IDX services



Non Functionals
Deployment Options

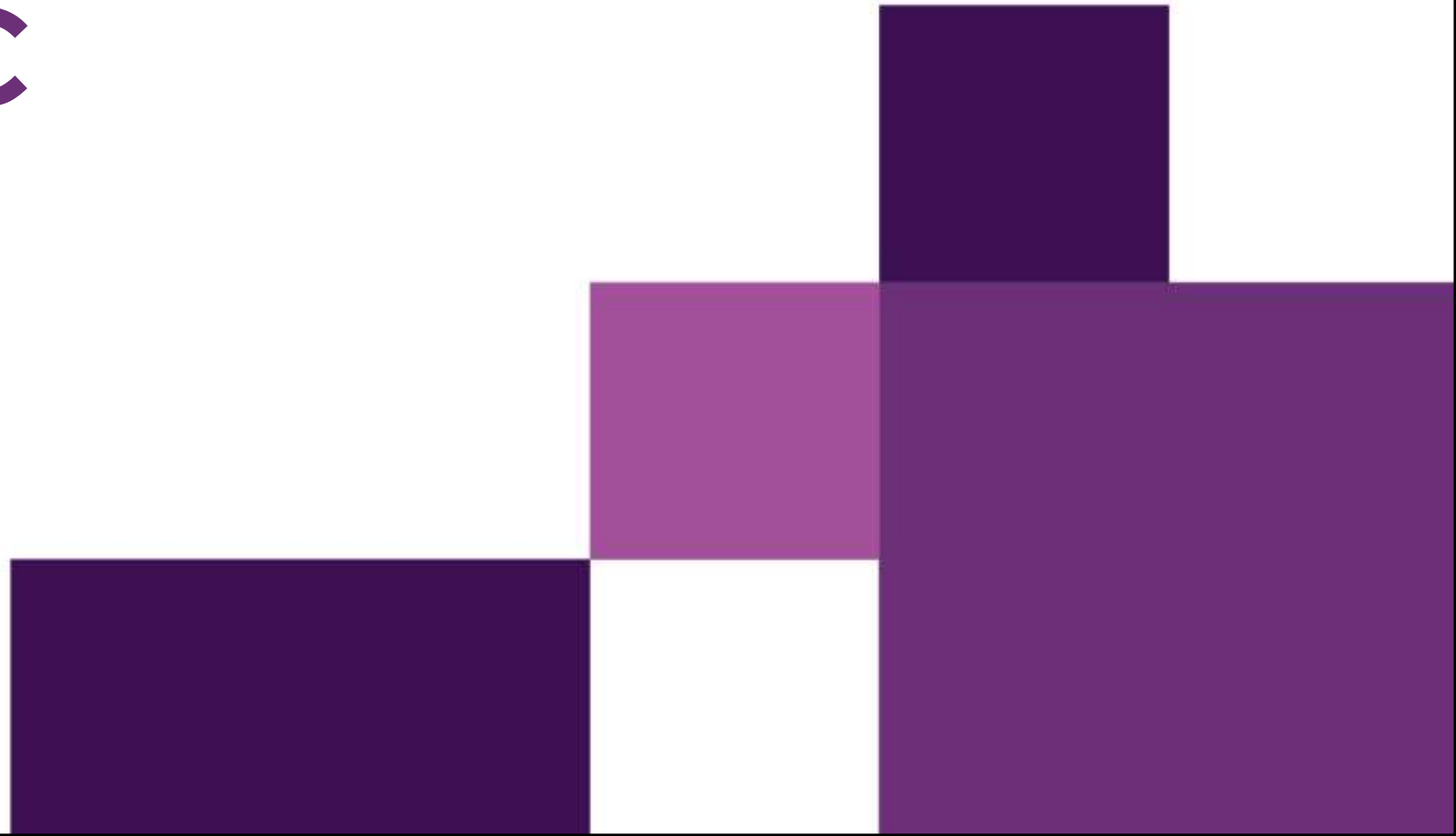
IDX Platform Non Functionals





Appendix C

AEMO Gateway Software



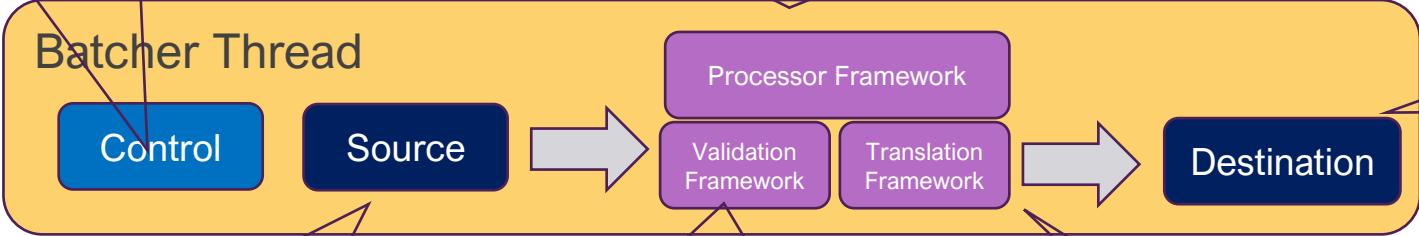
PDR Batcher –Thread Architecture

Thread control mechanisms include:

- Polling, periodic or CRON
- Initiate via API invocation
- On event using eventing sources, e.g. SignalR, WebSockets

A processor is a pattern of information exchange between source and destination. Models include:

Consuming new/changed data at source, with or without acknowledgments	
Detect new/changed data at source	Synchronisation
Purging at source	aseXML hokey pokey



Destination is like source but can also include registered WebHooks supporting a variety of authentication mechanisms

A data source is an abstraction of persistent data store. Supported models include:

Local filesystem	API services, including rest and GraphQL
Cloud BLOB (AWS, Azure, GCP)	eHub services
Message queues	HTML web scraping (e.g. nemweb.com.au)
FTP/SFTP/FTPS	

A Validation is a capability to perform payload Validation. Supported Validations include:

- CRC check for zip files
- Schema validation (Json/XML)
- Custom modules (B2B validation module)

Multiple Validations can be chained in a process pipeline

A translator is a capability to perform payload transformation. Supported translations include:

Zip/Unzip	Format transforms from/to various combinations: NEMCSV, JSON, Plain CSV	JSON transforms
XSLT stylesheets		External scripts
Text manipulation (head, tail, replace, etc)		File rename

Multiple translations can be chained in a process pipeline

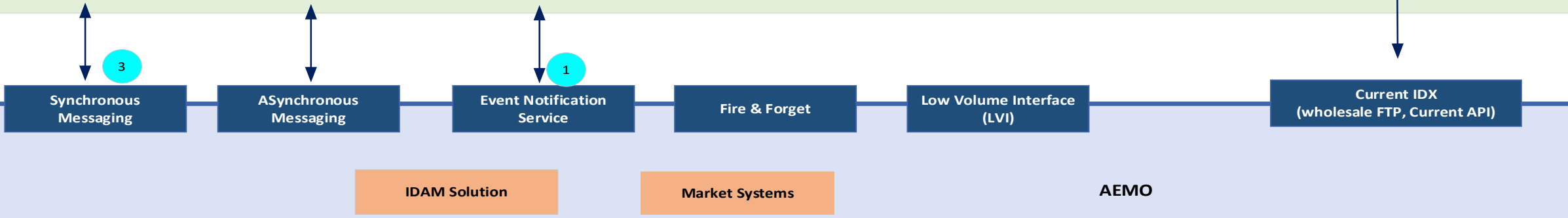
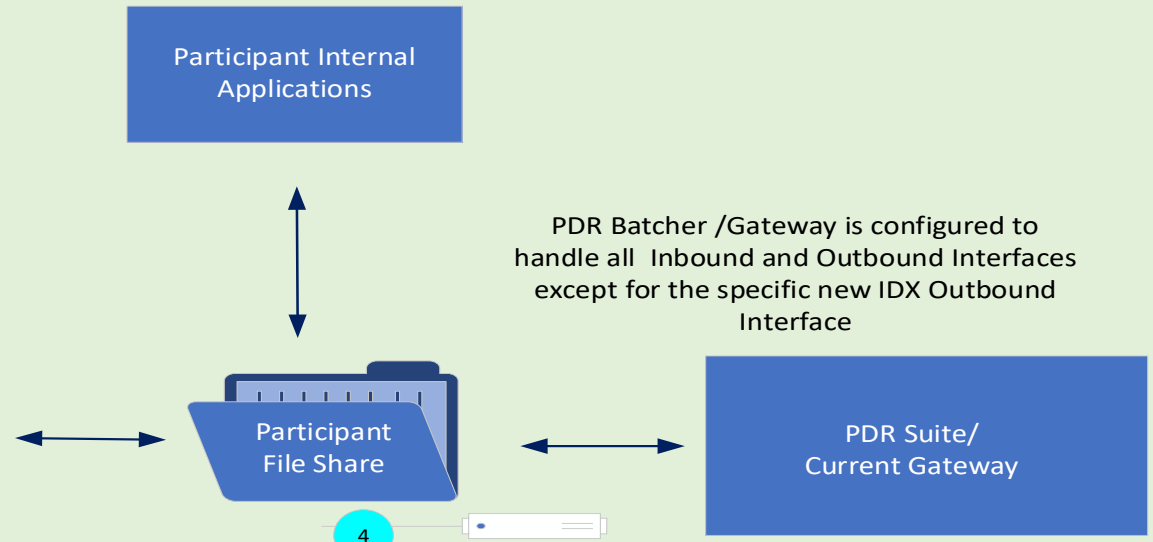
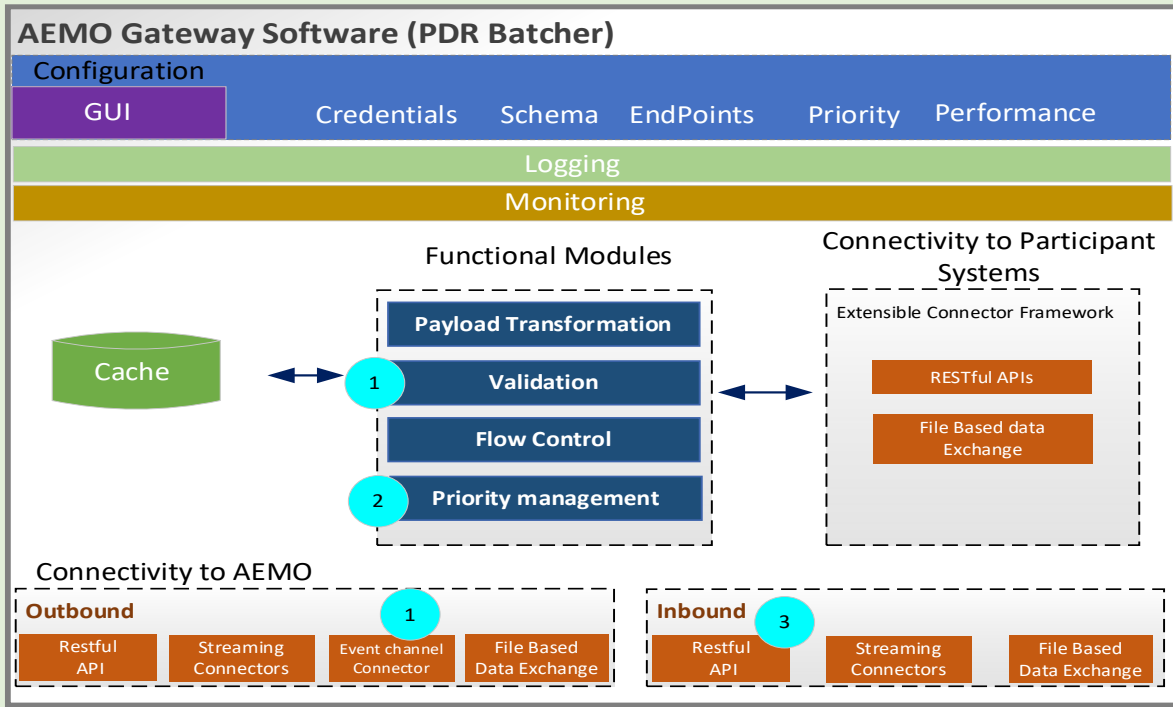
Industry Use Cases – AEMO Gateway Software



Use case: Participant Implementing Outbound Interface(Wholesale) with AEMO Gateway Software



Participant Network

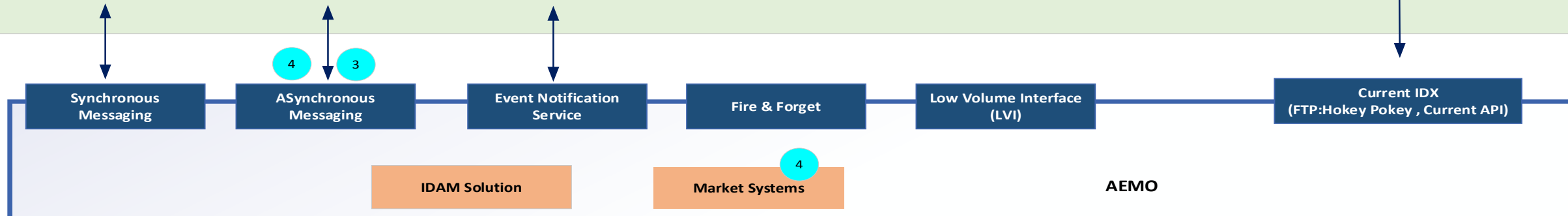
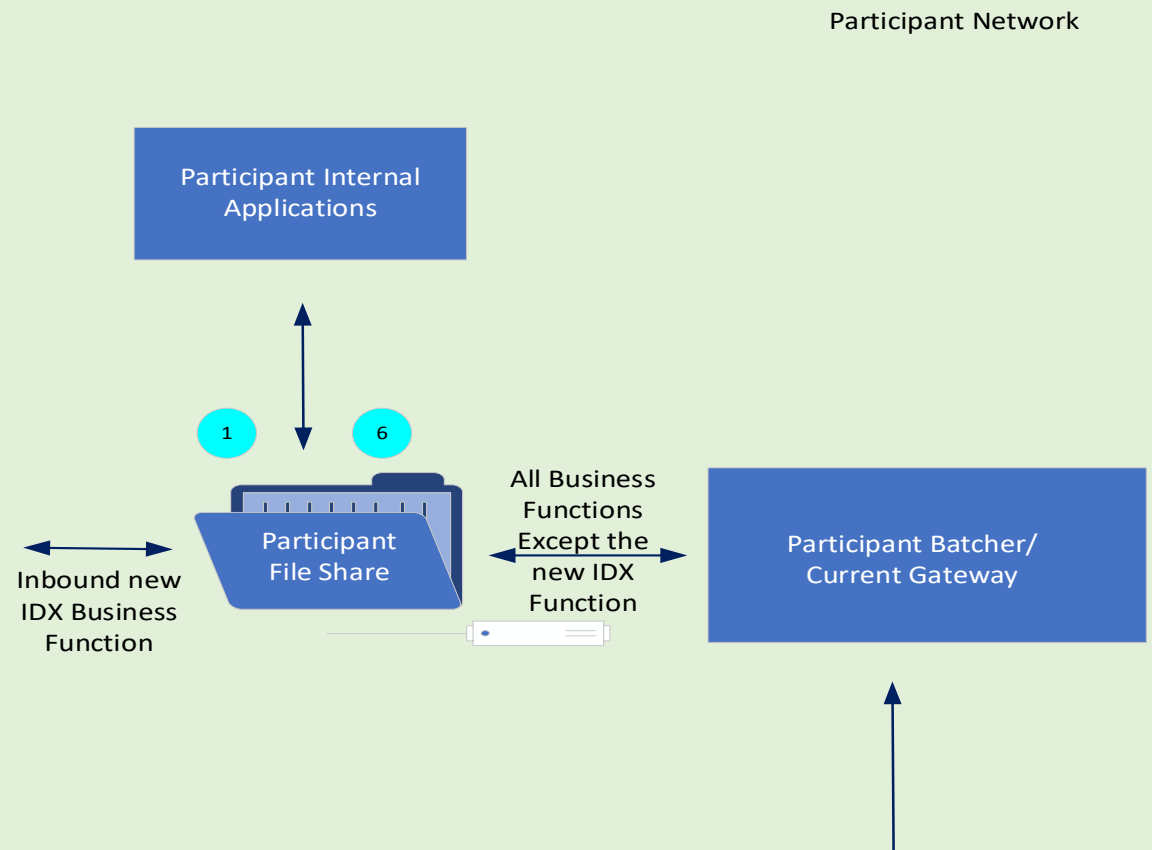
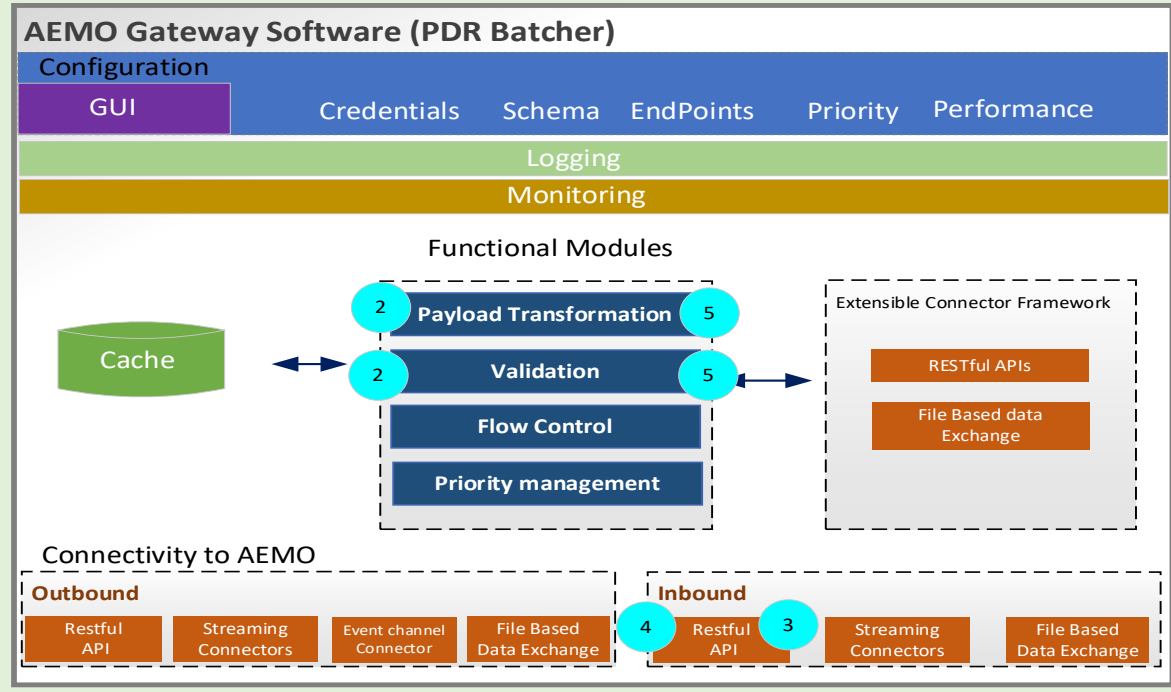


Use case: Participant Implementing Outbound Interface with AEMO Gateway Software



	Description	AEMO Systems	AEMO Gateway Software	Participant Systems
Preconditions	<ul style="list-style-type: none"> The AEMO Gateway software is configured and ready to handle the Outbound Interface. Connectivity between AEMO Gateway software and AEMO Data Exchange environment has been established in PROD environment Authentication has been configured for AEMO Gateway software to AEMO Data Exchange Environment The location for the Participant side Outbound FTP file share folders is configured within the AEMO Gateway Software. Participant accounts and system credentials are established in AEMO's IDAM system. 			
1	AEMO Data Exchange Environment posts the Outbound event notification to the subscribing participants. The AEMO Gateway software on the participant side then receives, validates, acks the event and stores this event notification in cache.	●	●	
2	The AEMO Gateway Software queries its prioritisation rule set, using the metadata of the Outbound event notification to determine the processing order.		●	
3	The AEMO Gateway software retrieves the Outbound payload by calling the Outbound API End Point. Upon receipt, it validates and caches the payload.	●	●	
4	The Outbound Payload is delivered to a designated file share location via the AEMO Gateway software, ready for the participant's system to ingest.		●	●
5	AEMO Gateway software confirms the delivery of the Outbound Payload by sending a message acknowledgment, and the Data Exchange Environment subsequently removes the payload from the list of Outbound Payloads for delivery.	●	●	

Use case: Participant Implementing Inbound Interface(Retail) with AEMO Gateway Software



Use case: Participant Implementing Inbound Interface(Retail) with AEMO Gateway Software

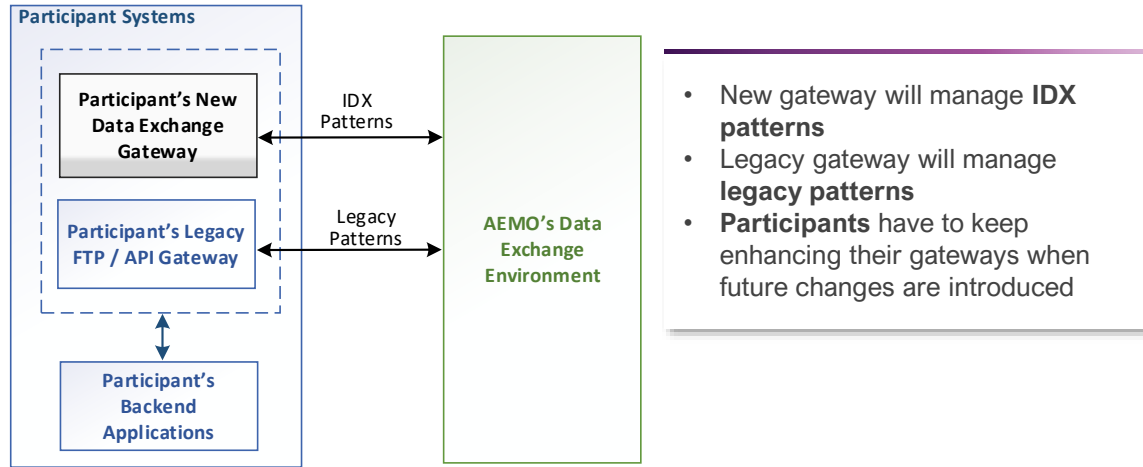


	Description	AEMO Systems	AEMO Gateway Software	Participant Systems
Preconditions	<ul style="list-style-type: none"> The AEMO Gateway software is configured and ready to handle Inbound Interface. The location for the Participant side Inbound FTP file share folders is configured within the AEMO Gateway Software. An aseXML to JSON transform file is configured in the AEMO Gateway Software. Participant accounts and system credentials are established in AEMO's IDAM system. 			
1	The participant system formulates a Inbound Retail payload in aseXML and delivers it to the pre-specified file share folder, which is monitored by the AEMO Gateway Software.			●
2	The AEMO Gateway Software validates the incoming payload against the aseXML schema. Successful validation triggers a transformation to Business Function specific JSON schema, and the payload is cached for upcoming operations.		●	
3	The software establishes an API connection with the AEMO-hosted Business Function API endpoint, subsequently authenticating and authorising the Participant's connection to ensure secure data transmission. The AEMO Gateway software posts the Inbound Payload message to the AEMO Data Exchange Environment's Business Function API inbound resource post-verification.	●	●	
4	AEMO returns a JSON message acknowledgment after storing the message to the Participant through the open API connection. In parallel, the message is archived within the AEMO Data Exchange Environment for record-keeping.	●	●	
5	The AEMO Gateway Software, upon receipt of the acknowledgment, validates its schema, converts the message from JSON to aseXML, and It then drops the acknowledgment into the Participant's file share folder.		●	
6	The participant system, monitoring the Inbox file share folder, processes the acknowledgment message and tags the corresponding Inbound Payload as acknowledged.		●	●

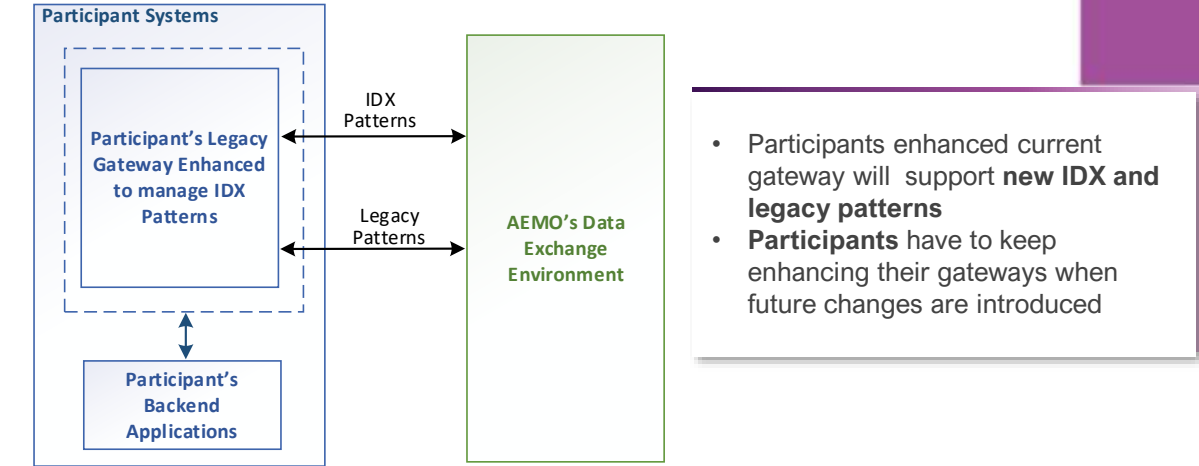
Transition Options and Use Cases

Transition options

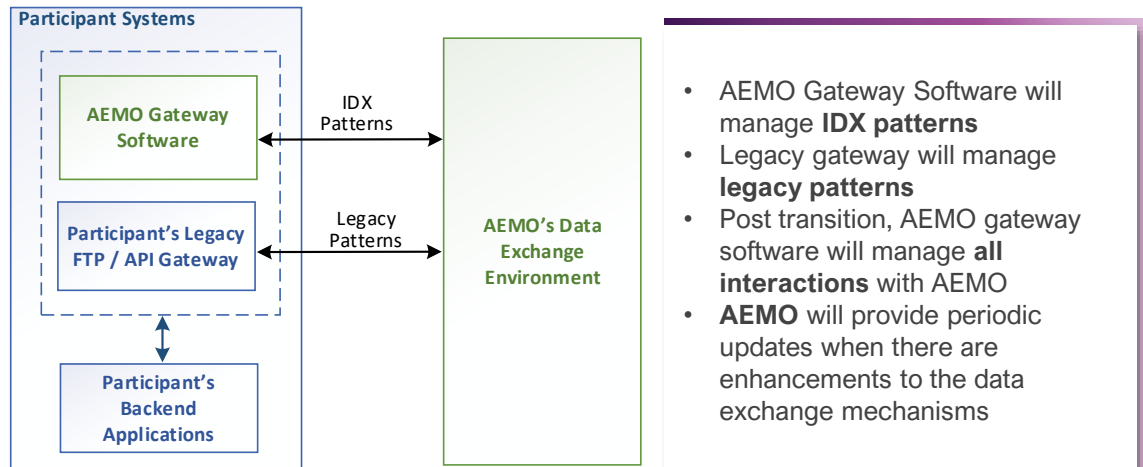
Option 1a: Participants choose to implement their own new gateway



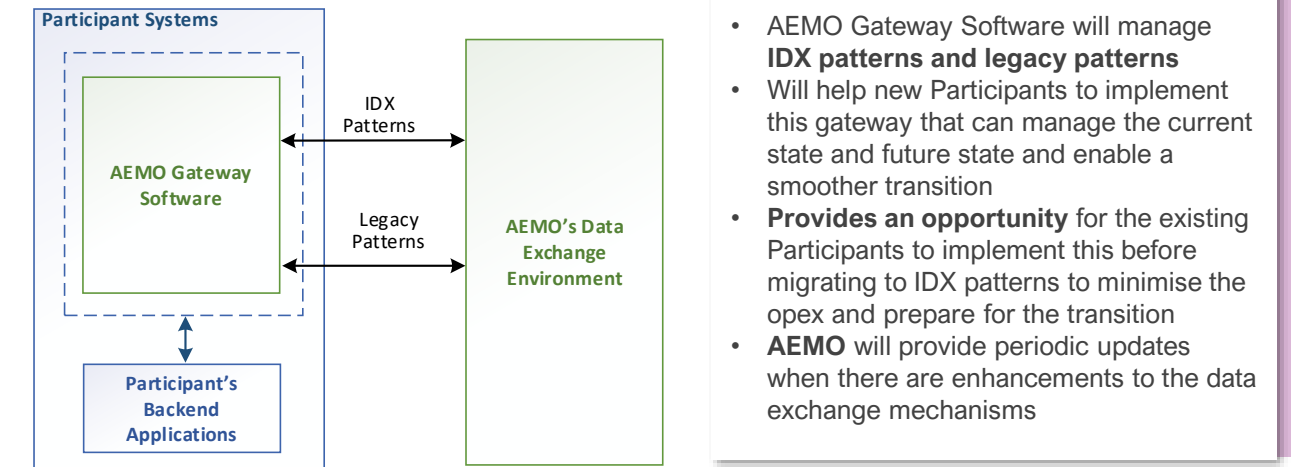
Option 1b: Participants choose enhance their current gateway



Option 2a: Participants implement and host AEMOs gateway software to manage IDX pattern

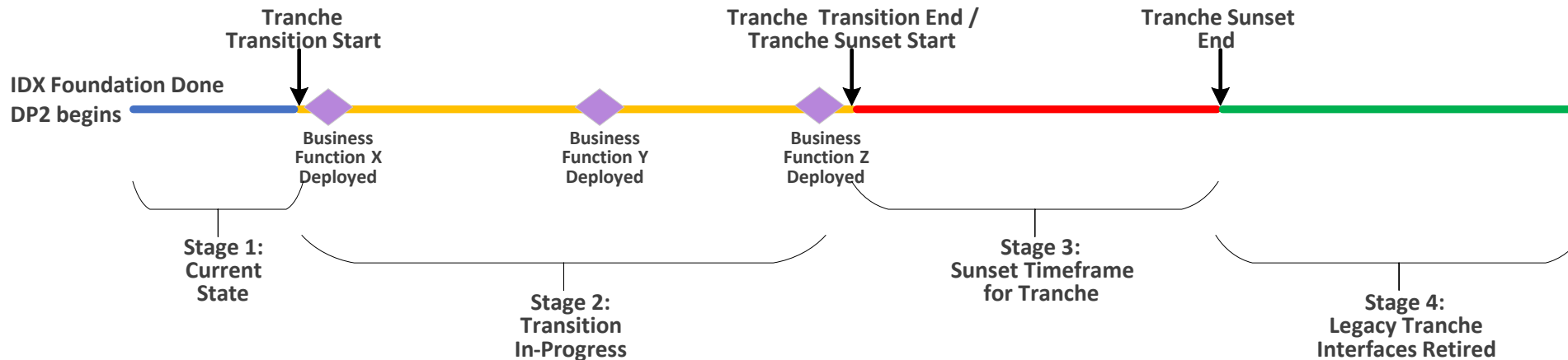


Option 2b: Participants implement and host the AEMOs gateway software to manage IDX patterns and legacy patterns



AEMO Gateway Software – Industry Transition Use Cases

Next, we will present Industry use case views (in the attached use cases PDF) of how participants Gateway Software would likely support the transition from the current state production to the IDX Target State. We will provide a stage sequence that consists of four stages: (1) Current State, (2) Transition In-Progress, (3) Sunset Timeframes, and (4) Post Sunset Timeframes. The ultimate goal is for every participant to transition to IDX Patterns for all NEM Wholesale and Retail Business Functions before Stage 4 commences.



Note: These stages are representative sequences; the actual Tranches and details will be determined with Industry consultation.

We'll discuss two distinct perspectives:

- where Participant A implements a new gateway software (option 1a), and
- where Participant A implements AEMO gateway software (option 2a).

We will focus on a Market Segment view of transition use cases and how the Gateway Software would need to configure to transition to the Target State progressively. To help you visualise and prepare for the transition process in a manner that fits best with your operations and needs.