ofgem Making a positive difference for energy consumers

Optional Design Advisory Board
Meeting 14

OFG1161

Anna Stacey
25/02/2021

Agenda

1. Introductions
2. AWG recommendation presentation
3. Discussion on Questions
4. Closing remarks

- The DWG TOM is designed for an market where faster, more accurate settlement processing is possible due to the ability to use a significantly larger number of half-hourly readings.

- The market model has large numbers of market participants that need to exchange data in large volumes to execute the business processes.

- Exchange of data is not limited to point to point, but multiple services may consume data produced by a single service.

AWG High Level Goals

AWG set out a group of high-level goals to be considered when assessing architectures:

- The recommendation should seek to minimise costs to market participants. Cost is influenced by complexity and scale for participants and so these should be minimised as much as possible.
- The recommendation should primarily meet current needs but must be extensible to meet future scale without incurring expense of redesign.
- The recommendation should not be a barrier to future market changes, and should allow for transitional MHHS implementation across industry
- Technology modernisation should be used to increase overall efficiency and enable industry standard technology patterns and components for interoperability
- The recommendation should allow for security and governance processes to be configured and applied.

EVENT DRIVEN ARCHITECTURE:

A Reference Model for Market-Wide Half-Hourly Settlement

Author: Architecture Working Group

Date: DAB 25TH February 2021

Version: 0.6 (working draft)

DEFINITION

EDA is an architectural pattern for the production, management and consumption of data events. EDA enables the creation of a responsive/reactive, asynchronous, non-blocking/concurrent and de-coupled systems topology.

MHHS is a distributed network of services and roles that requires constant communication of data for operational purposes.

An Event captures an immutable statement of fact, as represented by the data to be distributed between the organisations of the MHHS market model.

In MHHS, this could be a registration appointment or de-appointment, etc.

EDA is applicable within a connected topology of entities which must transmit events between loosely coupled software components.

In MHHS, these are the IT systems used to execute business processes for Registration, Metering & Data services, Settlement, Distribution and Supplier organisations.

Required Capabilities

Approx. 27 Registration Services must maintain operational data integrity and consistency across approx. 35 Data Services, 85 Metering Services, 17 DNO's and 60 Suppliers.

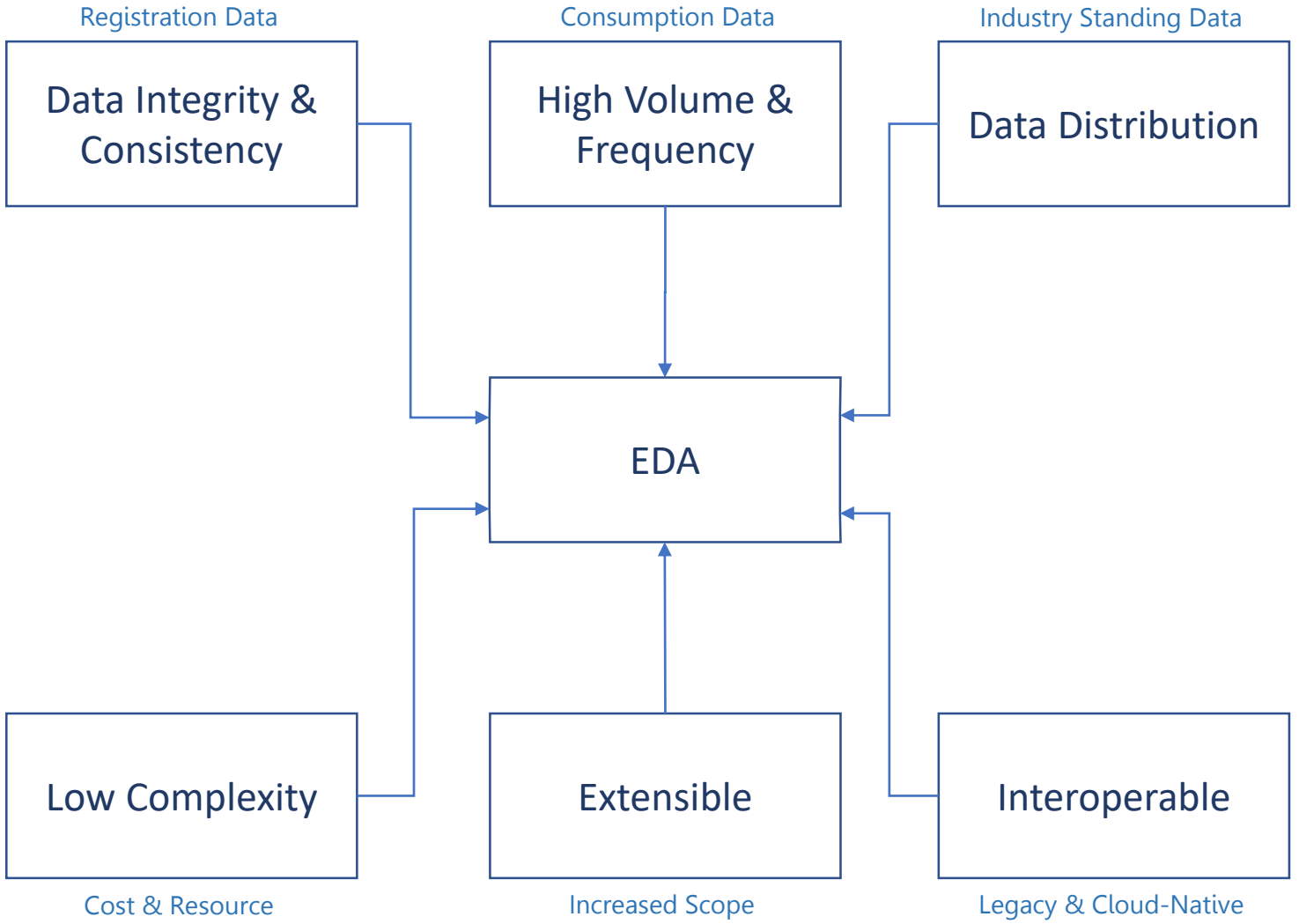
The Data Services must provide an approx. total of 30 Million daily, or approx. 11 Billion annual Consumption events to Central Settlement.

Industry Standing Data must be provided by Central Settlement to any of the approx. 400 active market participants when ISD is modified.

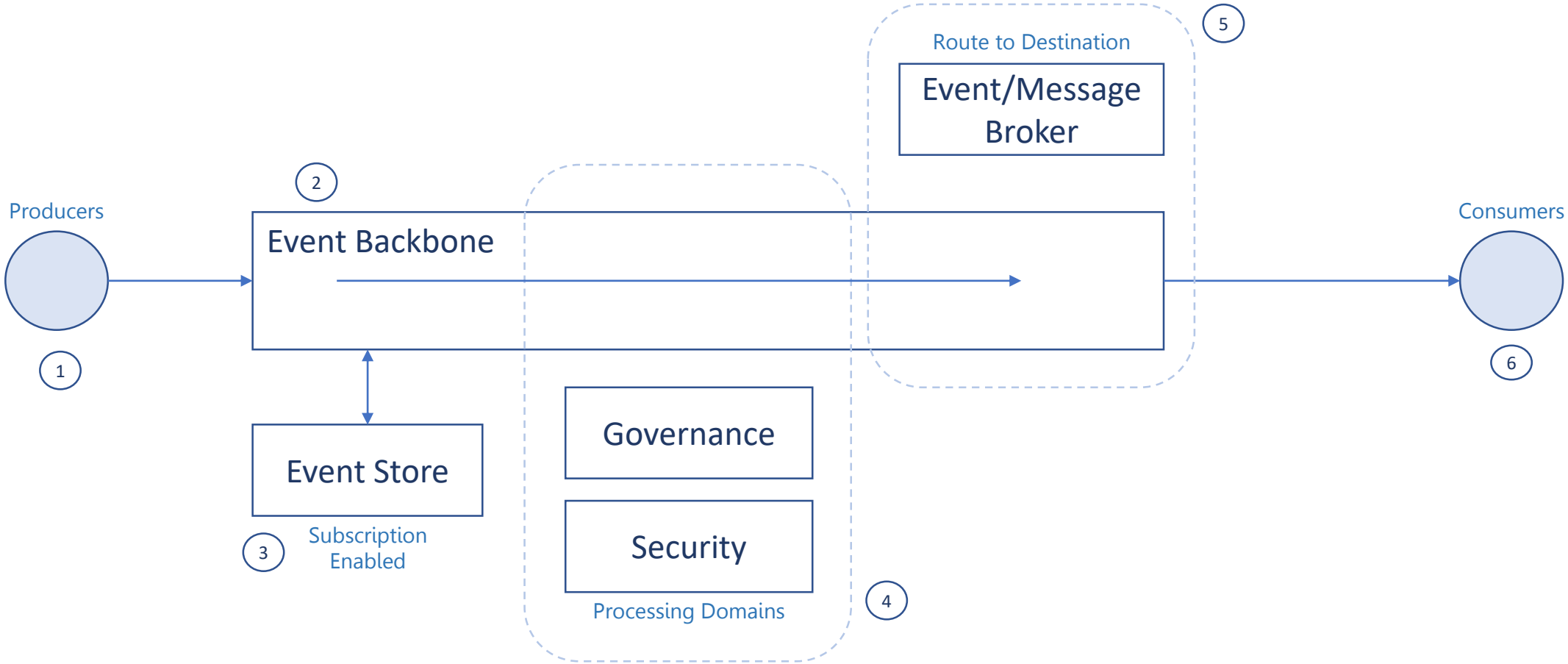
Avoid creation of bespoke point-to-point interfaces which duplicate data distribution costs and effort across the market participants. Avoid creating unnecessary business logic.

Provide a data distribution mechanism that is capable of meeting the future needs and ambition of the industry.

A loosely coupled architecture enables both legacy systems and newer cloud based solutions to be agnostic of each other. This allows for technology transition to be accomplished over time.



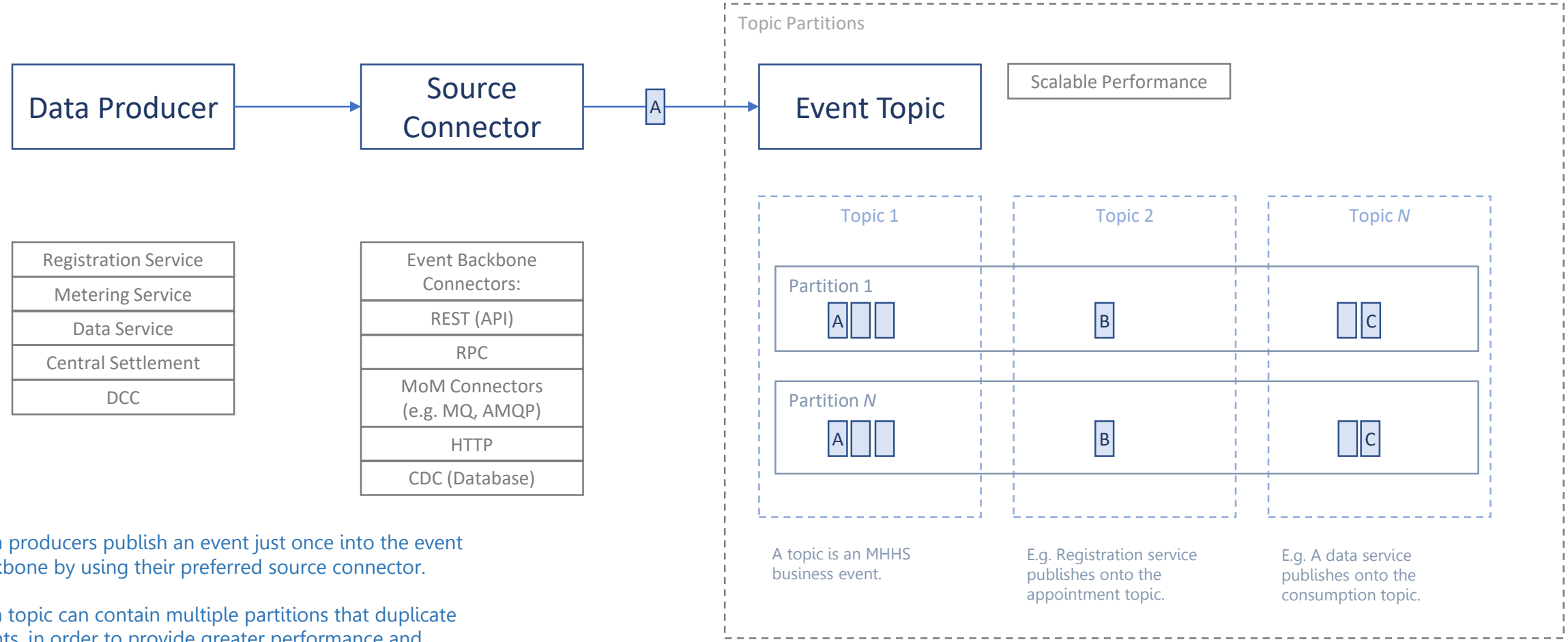
BASELINE


Route to Destination
5
Event/Message Broker
2
Producers
Event Backbone
Consumers
1
6
Event Store
Governance
Security
Subscription Enabled
3
Processing Domains
4

BASELINE

1. Data producers generate immutable events and publish them into event topics within the backbone via a variety of possible technology options.
2. The Event Backbone supports publish/subscribe communications, event log (store), monitoring, policy enforcement and other governance & security process via event stream processing.
3. The Event Store provides a means to persist events for a period of time. These may be replayed via a subscription, for business recovery or for other valid data distribution purposes.
4. Governance and security are executable processes that ensure event validity, technical completeness and relevant security standards & protocols are correct.
5. Broker middleware decouples the source and destination for data distribution and provides the routing logic to ensure that subscribers can receive the correct data.
6. Data consumers handle events from the subscriptions made available to them by the broker. The events may be retrieved by consumers or they may be notified to consumers. Events may be distributed in real-time or by a persistent queue that guarantee's eventual delivery.

1 Data Producers



Data producers publish an event just once into the event backbone by using their preferred source connector.

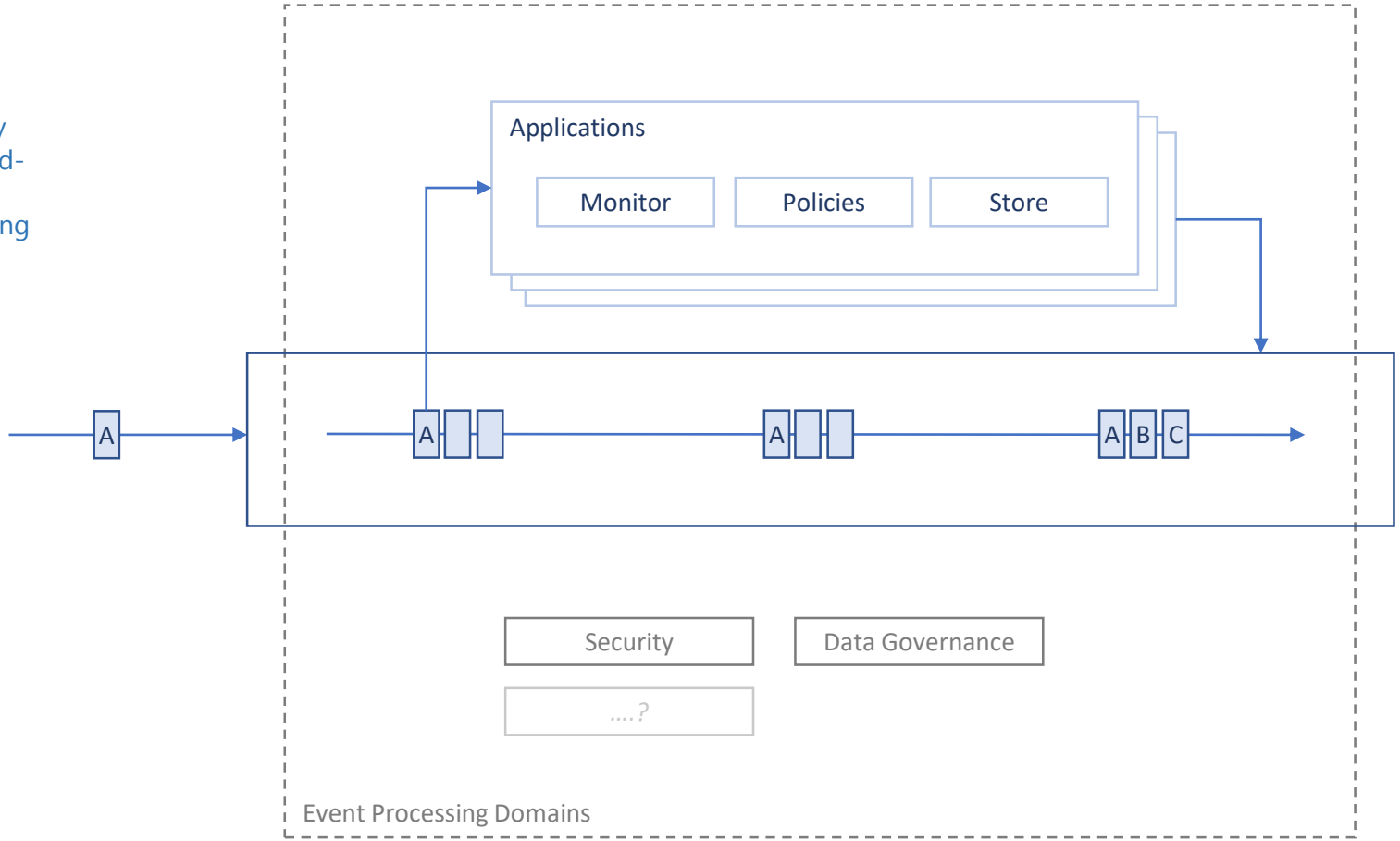
Each topic can contain multiple partitions that duplicate events, in order to provide greater performance and throughput.

2 EVENT BACKBONE (EVENT STREAM PROCESSING)

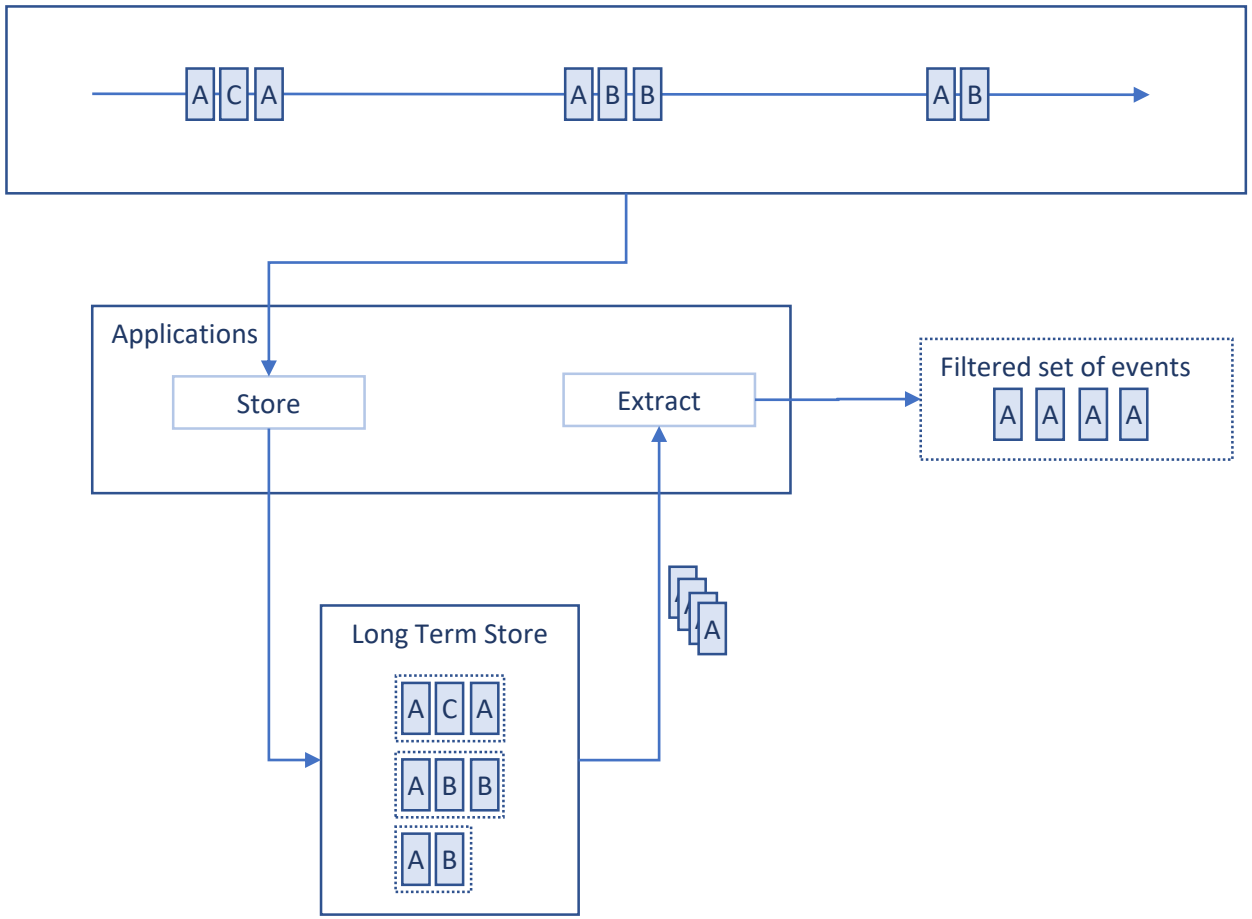
Event inspection can be performed in real-time by scalable demand-driven applications such as cloud-native apps & microservices.
(e.g. to cater for the temporary scale-out processing needs of peak consumption data)

Event sources inject MHHS data into topics. Monitoring and policy enforcement of security & data governance rules can be processed. Events can be persisted to the event store.

Event processing domains can be extended in future to cater for evolving industry requirements.



3 Event Store



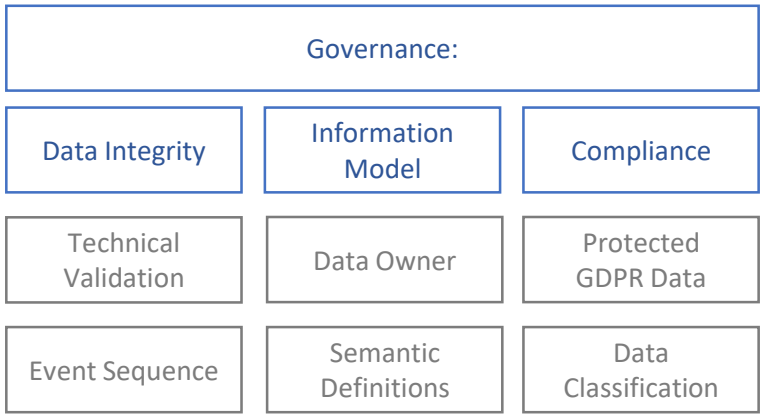
Broker live short-term store used to notify consumers of events as they occur.

Processes can be provided that extract from the store for purposes such as:

- Recovery of consumer systems
- Extraction of filtered sets of events for data quality or fault analysis
- Authorised 3rd party data provision
- Any new business services in future

Secure read-only long term storage of events.
Events organised to support processing applications filtering and extracting sets of events.

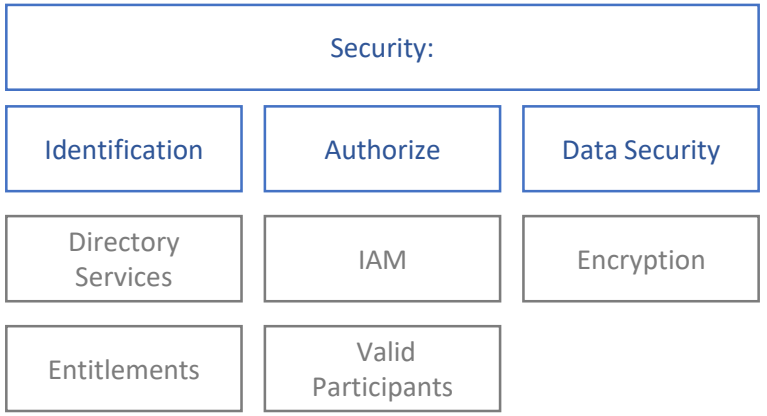
4 GOVERNANCE & SECURITY



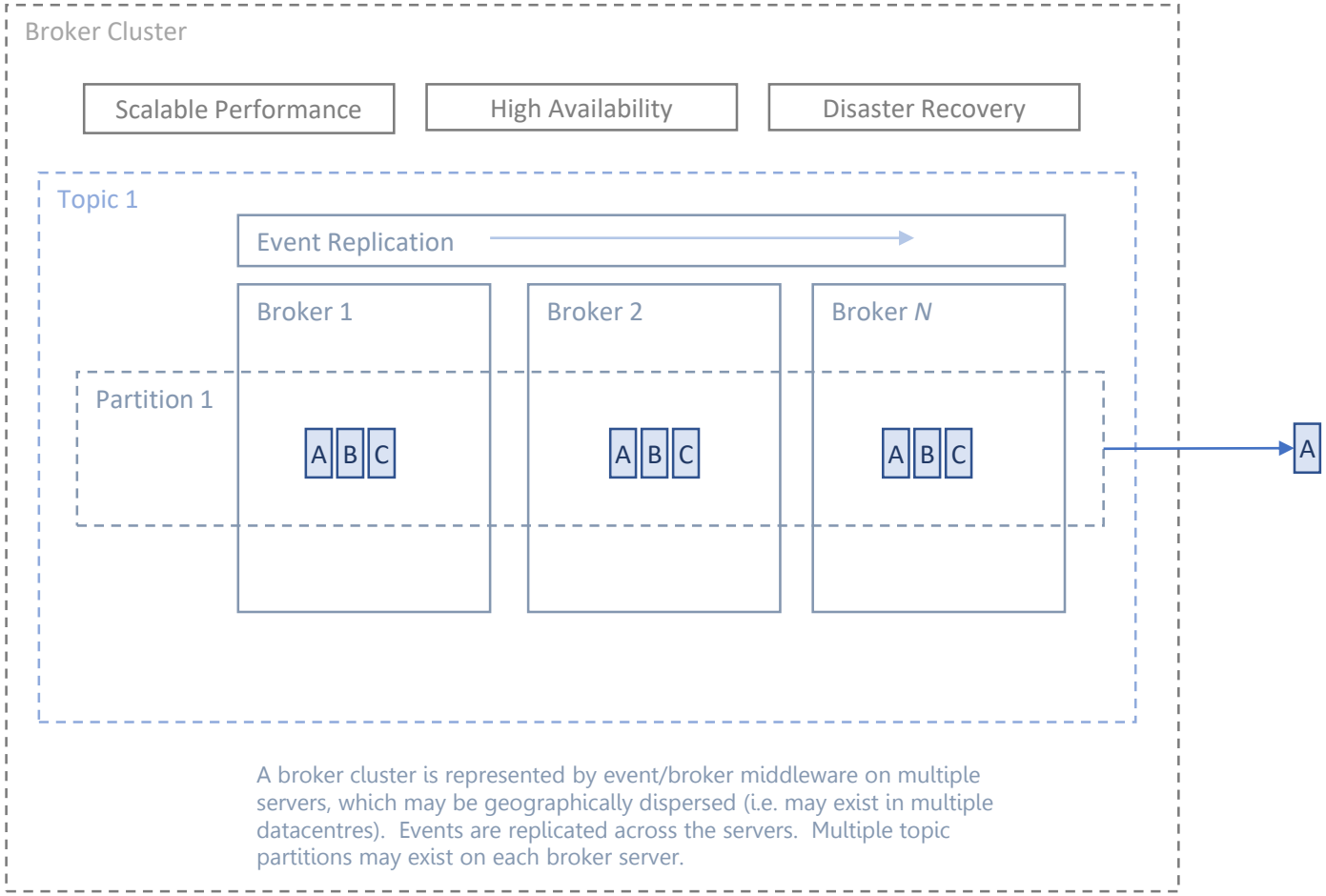
Data producers must be identified, authorized, and their data entitlements for publishing into topics should be validated.

Data must be secure in transit and at rest in the store.

Only valid data consumers may access events from restricted topics.



5 Event/Message Broker

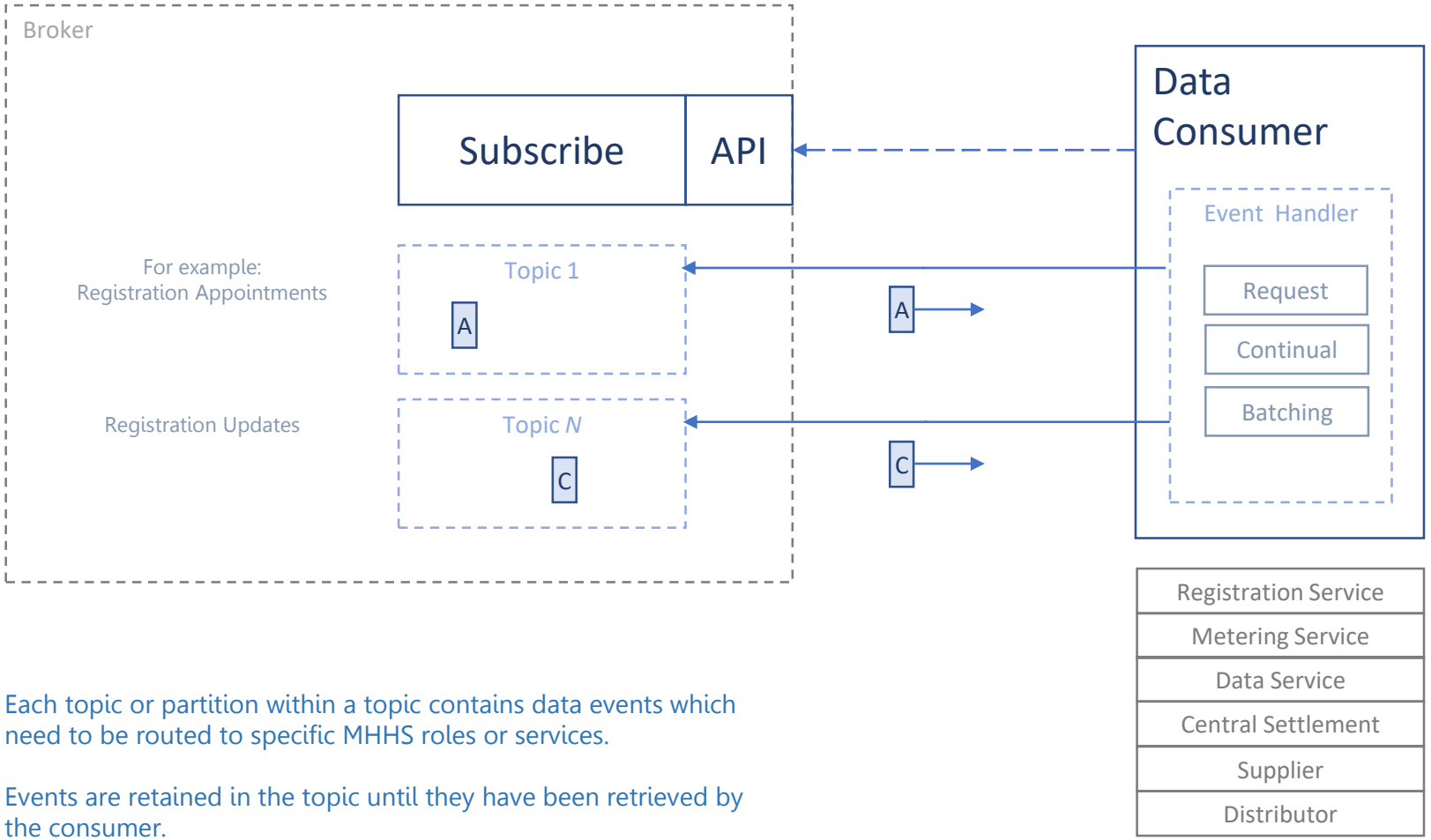


The event backbone utilises clusters of broker servers for high performance, parallelism, fault tolerance and high availability.

The broker cluster configuration provides event replication for each Topic.

The configuration also allows for either an active-active or active-passive operating mode for the cluster.

6 Data Consumers



A consumer must subscribe to events (a topic) by making a request to the broker.

Each valid subscription results in access to the required sequence of events.

Each consumer creates an event handler that can (pull) request for events from the topic.

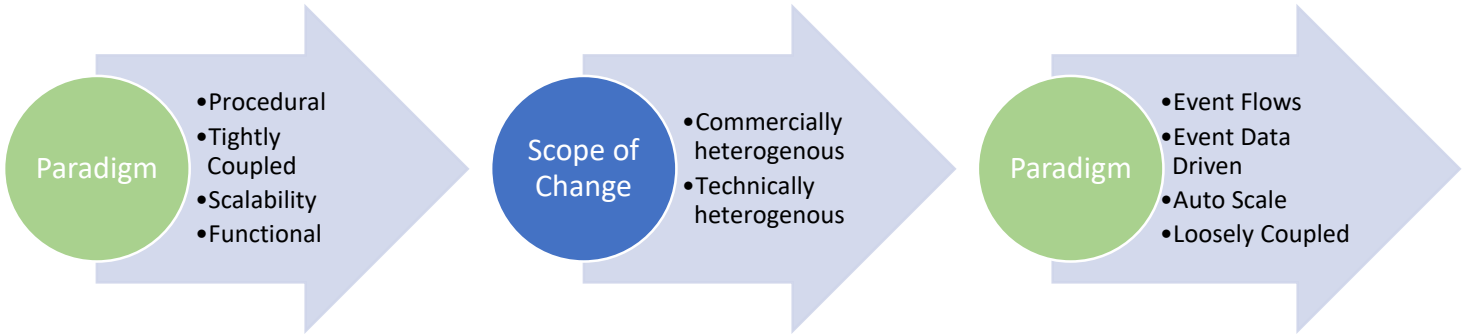
Consumers control the rate at which they may retrieve data (continually or in a batched mode).

Each topic or partition within a topic contains data events which need to be routed to specific MHHS roles or services.

Events are retained in the topic until they have been retrieved by the consumer.

Event Driven Architecture: Adoption Strategy Overview

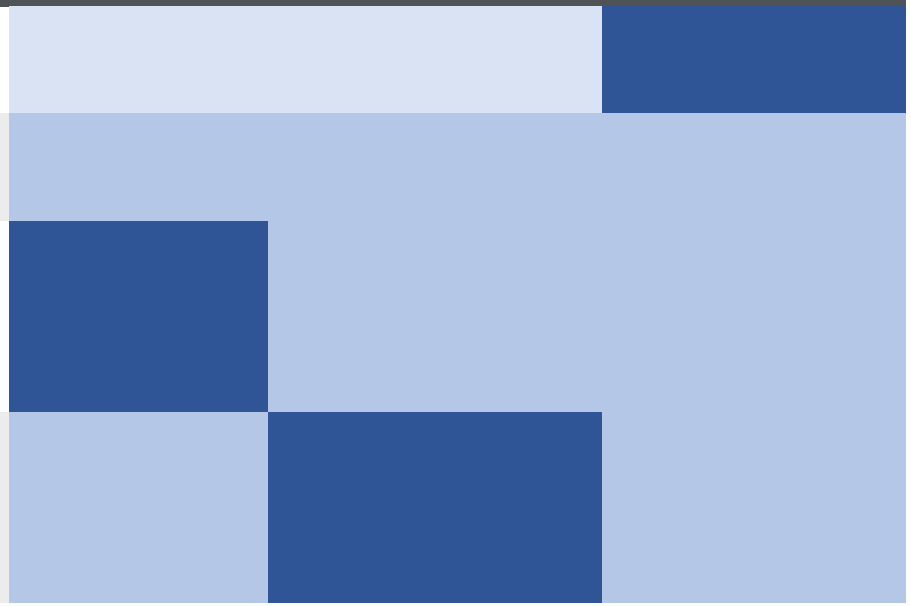
Paradigm shift: 'Procedural' to 'Eventing'



https://solace.com/resources/whitepapers Architects Guide to Implementing Event Driven Architecture

Comparison of integration architecture styles

STYLE	STRENGTHS	WEAKNESSES	BEST FOR	RESILIENCY	PERFORMANCE AT HIGH VOLUME	COMPLEXITY
File Transfer	Batch processing, low velocity	high latency, low performance	ad-hoc data transfers			
API	de-centralised, real-time	low-medium volumes	point to point communications			
Messaging	loose coupling, guarantees	Typically one consumer per message.	Coordinating loosely coupled business processes with commands and transactions			
Event Notification	loose coupling, easy to scale out, high volume/velocity data stream processing	doesn't coordinate business processes or transactions.	Streaming data, notifying many consumers of significant business events.			



1.) What are the boards views on the draft AWG recommendation?

2.) Is the proposed architecture fit for purpose, particularly when wanting to implement something which is flexible to future change and enables innovation & competition

Post AWG Product Description (The Architecture Design Working Group)

The architecture proposed by the AWG is a business event based integration pattern, called an Event Driven Architecture (EDA).

This approach is the next generation integration pattern and affords significant advantages, e.g. flexibility, cost, speed, etc.

The predominate feature that facilitates this is the decoupled nature of the design, using an intermediate broker at the technology level only allowing individual organisations to implement their own business rules

This is important because gone are the days of big, costly end to end testing across the industry for a small change.

The ADWG Product Description deliverables reflect this approach

Post AWG Product Description (The Architecture Design Working Group)

The product description outlines all the deliverables required for the market actors to be able to separately go away and develop their own systems accordingly in isolation.

The product description covers two areas:

- Products required by market actors to develop their own systems
- Products required by Ofgem and the market to approve the design of the event broker service.

Key implications to note are:

- The product description not only includes documentation deliverables, but coded test stubs to allow independent testing
- The design and implementation of the central event broker service in the subsequent phase will require the maintenance of a test interface as well as the production interface (similar to how companies such as WorldPay operate)

3.) Are the outputs of the next phase of work (ADWG Product Description) enough to allow industry to go away and design and build in their own systems?

4.) As the EDA would be a third party service, which would sit alongside the DTN, does the board have views on how this should or could be managed?

- The AWG is continuing to work on the recommendation document, with the intention to publish the recommendation alongside a consultation to industry at the end of April 2021.

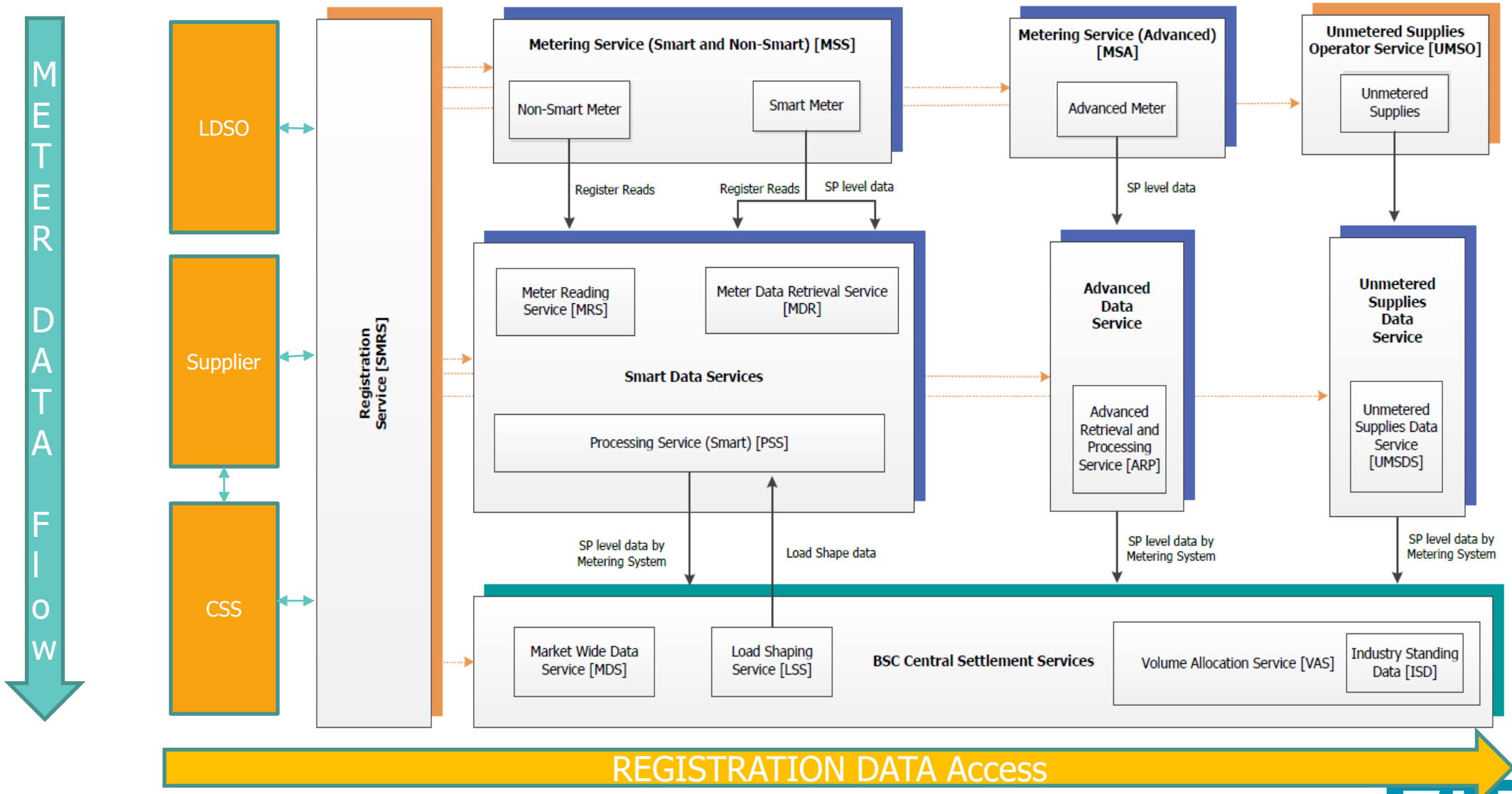
- The AWG will take into account the responses provided and will finalise the recommendation in June 2021.

- The programme will then move into the next phase of the design from July onwards.

Appendix:

TOM: Market Model Requirements

#2 Real-Time Candidates



#2 Real-Time Candidates

Event Driven Architecture: Event Service Classification / Taxonomy

Service	Market	Status	Classification	In	Out	I/O	Notify
Meter Services SMART [MSS]	SMART	Adapted	Metering	12	4	1	N/A
Meter Reading Service [MRS]	SMART	New	Data	-	-	2	
Meter Data Retrieval [MDR]	SMART	New	Data	1	-	3	[2*]
Processing Service SMART [PSS]	SMART	New	Data	16	10	-	
Meter Services Advanced [MSA]	Advanced	Adapted	Metering	3	9	2	3
Advanced Retrieval & Processing [ARP]	Advanced	Adapted	Data	8	8	2	N/A
Unmetered Supplies Operator [UMSO]	UMS	Adapted	Metering	9	8	3	1
Unmetered Supplies Data Service [UMSDS]	UMS	Adapted	Data	6	8	7	5
Load Shaping Service [LSS]	All	New	BSC	2	3	1	4
Market Data Service [MDS]	All	New	BSC	7	10	-	8
Volume Allocation Service [VAS]	All	Adapted	BSC	1	1	3	4
Supplier Meter Registration Service [SMRS]	All	Dependency	SMRA	-	-	-	-
Central Switching Service [CSS]	SMART	Dependency	REC	-	-	-	-

https://www.ofgem.gov.uk/system/files/docs/2019/02/dwg_mhhs_tomv1.0_attachment_a_requirements.pdf