

DERIVATIVES SERVICE BUREAU

TECHNOLOGY ADVISORY COMMITTEE

CLOUD ARCHITECTURE SUBCOMMITTEE - MULTI-CLOUD AND MULTI-REGION PROPOSAL

20 APRIL 2022

CASC PUBLIC FINAL

Agenda

Governance

- Competition Law Reminder
- Roll call
- Minutes

CASC Presentation

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- CASC Approach
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- Breakdown of CASC Conclusions
- CASC Proposal
- Global Agile Architecture (GAA)
- Why are we doing it?
- What will the programme deliver?
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- A - Regulatory Cloud Risk
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Governance I of IV - Competition Law Reminder I of II

The purpose of this protocol is to remind attendees of Derivatives Service Bureau (DSB) Limited (“DSB”) Cloud Architecture Sub Committee, that all discussions at such meetings are subject to the application of EU, UK and other applicable national competition law (“Competition Law”).

Individual attendees are responsible for observing the requirements of Competition Law and should make themselves familiar with their legal obligations and their own organization policies.

The DSB is committed to compliance with Competition Law and advises that CASC participants follow the guidance set out below in order to ensure that all meetings remain in compliance with Competition Law.

1. A meeting agenda will be circulated in advance of a meeting. Any objections to, or potential concerns about, the proposed agenda in relation to Competition Law compliance should be raised prior to the meeting if practicable
2. Attendees must stick to the prepared agenda during the meeting and avoid discussion about other topics
3. Attendees must not seek, discuss, communicate or exchange any commercially or other business sensitive information about their organization or relating to competitors (whether before, during or after meetings). This includes, for example, any non-public information relating to prices, costs, revenues, business plans/marketing activities, individual terms and conditions, risk appetite or any other information which is likely to reduce strategic uncertainty in the market (i.e. which might result in less intensive competition than would normally occur)
4. Attendees must not reach any sort of agreement or understanding that is unlawful due to competition law (e.g. unlawful horizontal agreement, unlawful vertical agreement)

Governance II of IV - Competition Law Reminder II of II

5. The CASC Secretariat will take minutes of the meeting, and supply these to each attendee in due course.
6. If the Chair considers that a discussion at the meeting may be inappropriate from a Competition Law perspective, he or she shall raise an objection and promptly bring that part of the discussion to an end. If another attendee, or the DDO, is concerned about a discussion from a Competition Law perspective, he or she shall bring it to the attention of the Chair, who will promptly bring that part of the discussion to an end. If other attendees attempt to continue that discussion, the Chair shall bring the meeting to an end. Every attendee is allowed to immediately leave the meeting in such situations. All such situations must be properly recorded in the minutes.
7. The minutes of the meeting must subsequently be read and approved by the attendees. If any matter discussed is not recorded in the minutes, or is recorded incorrectly, any attendee may raise an objection in writing and request an amendment.
8. Similar principles should be observed for any group email exchanges or other online group discussions operated by DSB, including those pertaining to CASC matters.

We remind attendees that breaching Competition Law has serious potential consequences for them as individuals and their organizations. Such consequences may include heavy fines, liability to pay compensation to affected individuals and businesses and, in certain cases, the imposition of criminal penalties, director disqualification orders and disciplinary action.

Governance III of IV – Roll Call

The TAC Secretariat will undertake the roll call.

Governance IV of IV – Minutes

The minutes from the CASC meeting held on Thursday 2nd December 2021 were sent out to the members on Thursday 9th December 2021, feedback was requested by Thursday 23rd December 2022. The final minutes were distributed to the CASC members along with the full set of CASC papers on Friday 24th December 2021.

The CASC documents were shared with the TAC members on Tuesday 29th March 2022.

CASC Deliverables

The CASC was formed out of the existing TAC membership in 2021 under guidance from the DSB Board to provide governance and oversight in relation to the analysis being undertaken by the DSB in response to two 2020 Industry Consultation questions.

The CASC considered the following questions:

Q5 - Should the DSB perform a risk assessment on the current single cloud operations, together with a cost-benefit analysis of a potential move to a multi-cloud architecture?

Q6 - Should the DSB perform a risk assessment of its existing model of global connectivity from a single active geographical region, plus analysis of the costs and benefits of mitigating the identified risks?

The CASC consisted of the following members:

Regulatory Observers				
Observers	Name	Position/Title		
JSDA	Eiichiro Fukase	Counsellor to the Chairman (for Fintech, Financial Products and Global Regulation)		
CFTC	Robert Stowsky	IT Specialist		

Committee Members				
Institution	Category	First Name	Last Name	Position / Title
Bloomberg	Industry	Chris	Pulsifer	Software Development Manager
Independent Expert	Industry	Jim	Northey	Ex officio as ISO TC 68 Chair Elect
ISDA	Industry	Ian	Sloyan	Senior Advisor Data & Digital Solutions
SIX Group Services AG	Industry	Richard	Gee	Head of Product Provisioning and Delivery
State Street FX Connect	Industry	Roka	Rajkamal	Head of FX Regulatory Product

The CASC produced the following papers in response to each of these questions:

1. Multi-Cloud Report – A paper summarising the DSB’s analysis and conclusions in relation to Q5
2. Single Active Region Risk Assessment – A paper summarising the DSB’s analysis and conclusions in relation to Q6

The CASC concluded that the outcome of the two papers should be consolidated and presented to TAC prior to presenting back to the DSB Board.

CASC Approach

The DSB approached the two papers in very different ways:

Multi-Cloud - RFI Based Approach

- The DSB undertook an RFI process and approached the following vendors in the diagram below.
- All vendors responded, some formally, some informally, but more than enough information was gathered to arrive at the conclusions.

What?	Who?	Ask
Multi/Hybrid Cloud Platform	[Redacted]	Understand the technical implications in terms of migration and ongoing build on the DSB platform of adopting a multi-cloud platform
Multi-Cloud Support & Billing aggregators	[Redacted]	Identify how 3 rd Party vendors can assist with the Operational and Billing aspects of a multi-cloud platform
Cloud Service Provider	[Redacted]	What are the cloud vendors doing to support the move to Multi-Cloud and distributed infrastructure. Key Risks with approach.
Cloud Connectivity	[Redacted]	Cloud agnostic connectivity solutions
Other Interesting Vendors	[Redacted]	Any additional services of interest to the to the DSB

The Vendors involved in this process will not be made public at this time

Single Active Region - Risk Based Approach

- The DSB currently manages several open risks related to running out of a single active region.
- The CASC investigated what the residual risk position would be if a single multi-active region deployment was adopted.
- This allowed the CASC to objectively assess the risk weighted benefits of a multi-active region solution.

A number of conclusions were identified during the review of the consultation questions:

Summary of CASC Conclusions

#	Title	Relevant to Multi-Cloud?	Relevant to Multi-Region?
1	Agility	✓	✓
2	People	✓	✓
3	Process	✓	✓
4	Immutable Infrastructure (Cattle not pets)	✓	✓
5	Continuous Integration/Continuous Deployment	✓	✓
6	Connectivity	✓	✓
7	Billing & Support	✓	✗
8	Orchestration	✓	✗
9	3 rd Party Products	✓	✗
10	What Clouds	✓	✗
11	Global Traffic Distribution	✗	✓
12	Cloud Exit Strategy	✗	✓
13	Single Database	✗	✓
14	Cloud Native Products	✗	✓

Breakdown of CASC Conclusions

Common Multi-Cloud & Multi-Region Conclusions

#	Title	Relevant to Multi-Cloud?	Relevant to Multi-Region?
1	Agility	✓	✓
2	People	✓	✓
3	Process	✓	✓
4	Immutable Infrastructure (Cattle not pets)	✓	✓
5	Continuous Integration/Continuous Deployment	✓	✓
6	Connectivity	✓	✓

Multi-Cloud Specific Conclusions

#	Title	Relevant to Multi-Cloud?	Relevant to Multi-Region?
7	Billing & Support	✓	✗
8	Orchestration	✓	✗
9	3 rd Party Products	✓	✗
10	What Clouds	✓	✗

Multi-Region Specific Conclusions

#	Title	Relevant to Multi-Cloud?	Relevant to Multi-Region?
11	Global Traffic Distribution	✗	✓
12	Cloud Exit Strategy	✗	✓
13	Single Database	✗	✓
14	Cloud Native Products	✗	✓

CASC Proposal

Background

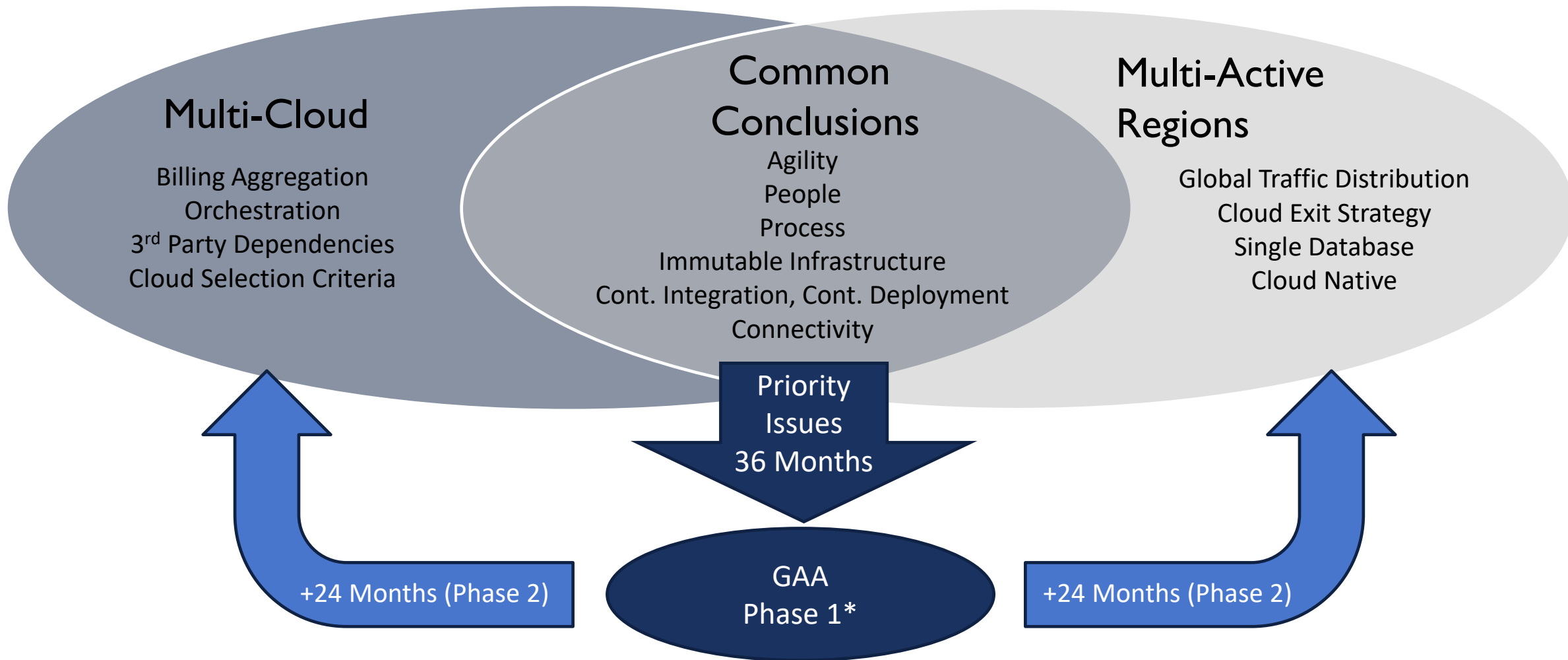
The CASC acknowledged the existing platform and processes have and continue to serve us well in providing the ISIN service but are becoming a limiting factor as the DSB expands. The existing platform and associated processes were originally built around a “banking best practice” model which was appropriate at that point in time for the ISIN service. This is set against a backdrop of an ever-evolving marketplace, including regulators becoming more aware of cloud concentration risk. The CASC also recognised the need to globalise the platform and believed the UPI should be included in the considerations.

The CASC has identified a number challenges when considering either a multi-cloud or multi-active region scenario:

- The DSB is architected to meet the needs of industry and primarily focused on stability. By design governance processes and systems are built to be stable, however as regulatory guidance and the platform grows agility has become more important
- The DSB’s technical staff already have extensive knowledge about the current cloud provider, AWS. This knowledge needs expanding to cover additional cloud services and technologies
- The governance processes established by the DSB are focused on containing change to pre-agreed change windows. As we become a more global services organisation those change windows become increasingly restrictive. Intra-day service updates are likely to become the standard operating model
- Existing servers are treated as indispensable, designed not to fail, manually built or deployed using scripts (semi-automated), patched for vulnerabilities and nursed back to health when something goes wrong.
- To support the move to intraday releases, the requirement for advance change delivery tools such as CICD will now become a priority
- Client access to the DSB is Euro-centric and focused around the existing active-passive locations. This model has not been an issue, however, as our user base expands into new regions, so should our connectivity strategy

The CASC proposal is therefore to embark on a 3-year programme of work to address these issues

Global Agile Architecture (GAA)



*The DSB will take into account any aspect of the remaining 8 conclusions that could impact the delivery of phase 1 of the GAA programme.

Why are we doing it?

Although the initial driver for the reviews was driven by a review of the ISIN service and the regulatory guidance around cloud the CASC believed we could not ignore the UPI and the globalisation of the DSB.

Globally the use of the Cloud is of significant interest to Financial regulators and governments, some key risks highlighted are:

1. Lack of unified Data security and governance
2. Cyber attack resiliency
3. Vendor lock-in
4. Operational resiliency
5. Lack of transparency
6. Cloud concentration risk

A quote from UK House of Commons Treasury Committee *“At the system level, some third-party providers (including cloud service providers) may be a key point of concentration and present a single point of failure risk where an operational incident could have a widespread impact on the system”* *

European Systemic Risk Board *“... the adoption of new technologies such as cloud computing creates new interdependencies with entities that may operate outside the boundaries of regulated financial systems.”* *

The GAA will facilitate the DSB in the adoption of a regulatory compliant cloud platform, additionally it will also better position the DSB by:

- Significantly reducing risk
- Improving cost efficiency
- Improving speed of change delivery, demonstrating value as quickly as possible
- Delivering operational efficiencies leading to 0 downtime (more significant in a global service)
- Improved resilience – through designing for failure

What will the Programme deliver?



The ability to move quickly to changing regulatory requirements and easily adopt new technologies which benefit the DSB clients.



A delivery team will be formed that will develop and implement the new ways of working and be retrained in the latest cloud and agile technologies. The delivery team will transition into a support role under a traditional development operations model.



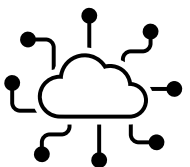
Update governance processes to align with large scale change programmes. The processes including: Change, Governance, Risk, Planning/Delivery and Operational.



The DSB will move away from operating a traditional server model of using large long lived systems and operate a modern immutable infrastructure model, with short lived auto-scaling systems.

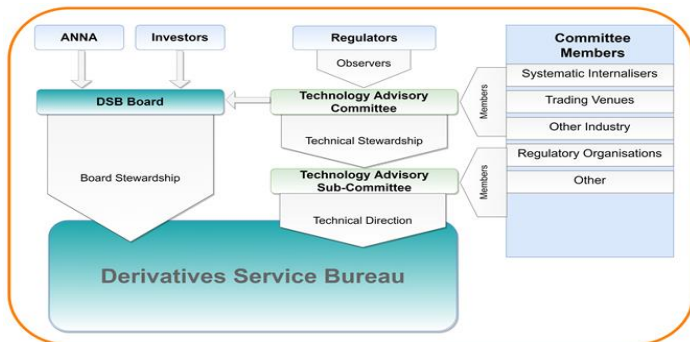


The DSB will adopt small scale, frequent deployments with fully automate code promotion through all environments. Reducing the DSBs risks associated software patching and feature releasing, in a 24/7 global business model.



Modernise client access to the DSB services, enabling the adoption of active-active multi-regions and/or multi-clouds.

Governance and Delivery Model



<p>Strategic, regulatory and financial decisions will be made by the board, supported by data from the programme</p>	<p>Decision DSB Board</p>	
<p>TAC delegated technical and financial responsibility by the board. TAC stakeholder reviews on 6 month cycle</p>	<p>Control TAC/PAC</p>	
<p>Detailed Technical direction will be provided via the TAC sub-committee, Decisions will be made real time via bulletin board and quarterly meetings</p>	<p>Direction TAC SSC</p>	
<p>Delivery will be measured quarterly via the TAC SSC, focused on delivering real value to the DSB clients as early as possible in a iterative fashion. Programme working practices to be adopted more widely into BAU.</p>	<p>Delivery DSB</p>	

The Migration to a new Infrastructure Delivery model,
 Multi-cloud, Multi-Region, Hybrid cloud
 or something else

CASC Update I of II (Since December 2021)

Potential Impact to the CASC Conclusions

- **UPI Regulatory Mandate**
 - The CASC recognised the relevance of the topics to the UPI. As a result the pack was written with a recognition that the DSB would have had a UPI regulatory mandate in place
 - The earliest regulatory mandate is now expected to be November 2023
 - As a result there is little appetite for further UPI investment until the regulatory mandate position is clarified
- ***The DSB's 4 Hour Recovery Time Objective (RTO)***
 - This topic was revisited during the March 2022 TAC meeting as part of the disaster recovery testing discussion.
 - The TAC agreed to discuss this item further as part of the strategic discussion (Action 2203-002)

CASC Update II of II (Since December 2021)

DSB Deliveries Progressing under CASC Guidance (MSP)

New programmes and existing improvement plans have been aligned to the wider CASC strategy
The following details some inflight and future items which are due to be realised by Q4 2022:



UPI onboarding programme has incorporated ideas that we received from vendors and CASC members. The new platform was designed around an auto-scaling immutable infrastructure model using Amazon's Elastic Kubernetes Services (EKS). The new platform has been distributed across active-active regions with geolocation global server load balancing, globally available SaaS services including a centralised scalable identity service have also been delivered.



DSB BAU Website Improvement Plan will introduce active-active regions with a focus on using Amazon CloudFront (Content Delivery Network) and a globally replicated database to accelerate the delivery of content to a global userbase.

CASC Revised Approach

Subject to feedback from the TAC, the DSB plans to raise an Industry Consultation question which will form part of the 2022 annual consultation (relating to the 2023 service provision)¹.

The question will frame the approach to provide the DSB with additional capacity to address service improvements that will directly benefit the OTC ISIN users but are also in line with the longer term strategy as defined by the CASC. The approach provides a new dedicated team to focus on these improvements, the TAC will provide oversight on selection of the items to be progressed.

It is expected that the teams annual operating cost would be €625k which would represent a 7% increase in the DSB's total operating costs (based on the 2022 figures as detailed on the DSB's website ²).

Subject to positive feedback from Industry, the DSB will review the feedback from Industry with the TAC in June 2022 and then take the recommendation to the DSB Board for approval.

The DSB would look to expand on the existing team in late Q4 2022 to ensure the work can commence in January 2023.

¹<https://www.anna-dsb.com/2023-otc-isin-and-cfi-service-provision-consultation/>

²<https://www.anna-dsb.com/fee-model-variables/>


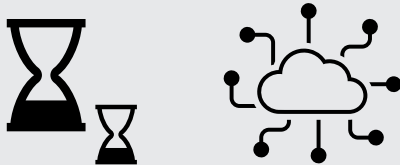
What could we deliver with the dedicated team?

Benefits of a slower start:

- **Establish the Governance Model**
 - As per slide 15, ensure the TAC control the items to be progressed with regular checkpoint reviews
 - Continue to evaluate the approach, long term project, things may change
- **Establish the Agile Team and Processes**



Some first year delivery suggestions for discussion:

Business Outcome	How would we do this?	Alignment with CASC (Slide 14)
Improved situation with respect to Disaster Recovery Testing	<ul style="list-style-type: none"> • Single global database • Synchronous database replication • Real time replicated Search Services • Achieves 50-75% of the delivery required to move to an active-active model 	
Locally Distributed Infrastructure (Region Aligned)	<ul style="list-style-type: none"> • Global Server Load Balancing • Adoption of Distributed Edge Computing • Migration of existing interface servers (ReST, FIX & GUI) to auto scaling immutable infrastructure 	

Next Steps

TAC Question: Are the TAC supportive of the approach presented to establish a new delivery team to focus on these specific delivery items?

If the TAC are not supportive of the proposal then the DSB will not progress this item further at this time, but may raise this again in the future, e.g. when there is further clarity on the UPI.

If the TAC is supportive then:

- The DSB will include the question in the 2022 Industry Consultation exercise for the 2023 service provision
- If Industry are supportive, then the DSB will approach the DSB Board to:
 - Approve the delegation of the technical direction and financial responsibility for this team to the TAC
 - Approve the funding of the delivery team
 - Confirm this work can commence from 2023

If the DSB Board are supportive, we will require the TAC to:

- Review the Charter to include relevant changes
- Decide if this work should be managed by a TAC Subcommittee
- Agree the improvement items to be progressed
- Undertake stakeholder reviews every 6 months

AOB

Appendices

A - Regulatory Cloud Risk

UK House of Commons Treasury Committee. 'IT failures in the Financial Services Sector.' Second Report of Session 2019-20, October 22, 2019.¹

European Systemic Risk Board. "Systemic cyber risk." ESRB, February, 2020²

¹<https://publications.parliament.uk/pa/cm201919/cmselect/cmtreasy/224/224.pdf>

²https://www.esrb.europa.eu/pub/pdf/reports/esrb.report200219_systemiccyberrisk~101a09685e.en.pdf

B – RAID Log

Ref	Type	Description	Mitigation	Target Date
CR1	Risk	There is a risk that the DSB do not undertake any further work in relation to the industry consultation questions. This is because of a lack of agreed funding to support the sizeable project required. This may result in the DSB remaining as-is and unable to embark on either multi-cloud, multi-region or other improvement work.	The DSB will progress the proposal through the DSB governance process.	October 2022
CR2	Risk	There is a risk that the DSB will not be able to progress the CASC project. This is because of the forecast volume of change in the DSB. This may result in delays to the GAA delivery plans.	Once start date is understood, review other plans and resourcing to understand impact and who can complete the work.	Tbc
CR3	Risk	There is a risk that the DSB may not be able to be compliant with regulatory mandates relating to the cloud. This is because the project to address this is estimated in the region of 3 to 5 years. This may result in a risk to the operations of the DSB services.	Consult with regulatory contacts to understand if any guidance or stricter policies will be introduced.	June 2022
CA1	Assumption	There is an assumption that the remediation of the common issues will take a period of 3 years to complete	Initial focus is for a two-year period	June 2022
CA2	Assumption	There is an assumption that the CASC project will be funded via the OTC ISIN cost recovery process	Validate via the OTC ISIN governance process, with a review in two years time	July 2022