Science and Technology Facilities Council
Scientific Computing

GridPP
UK Computing for Particle Physics

WLCG
Worldwide LHC Computing Grid

Host certificates in the modern landscape

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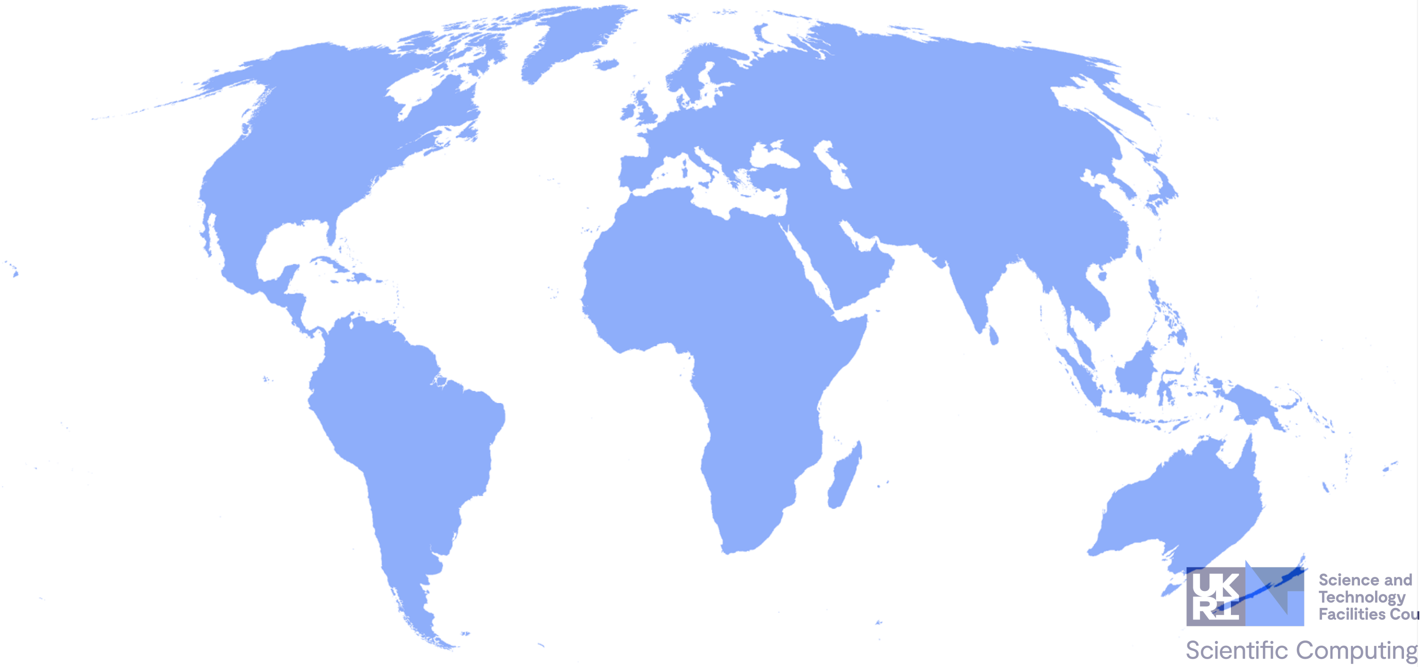
Introduction

- Aim of this afternoon is to discuss the challenge
- Identify key stakeholders and perspectives
  - Frame the question, **not** try to answer it today!
- Important precursor to GDB discussion a week today
  - Maarten Litmaath and Stefan Lüders contributed to these slides
  - I’ll give an updated set at the GDB incorporating our discussion today
    - Not exactly a Pre-GDB but serves a similar purpose
- Particularly welcome a note-taker for this discussion!

Background

- Historically, all certificates used by GridPP have been provided by part of the Interoperable Global Trust Federation (IGTF) trust framework
  - In turn made up of three Policy Management Authorities (PMAs)



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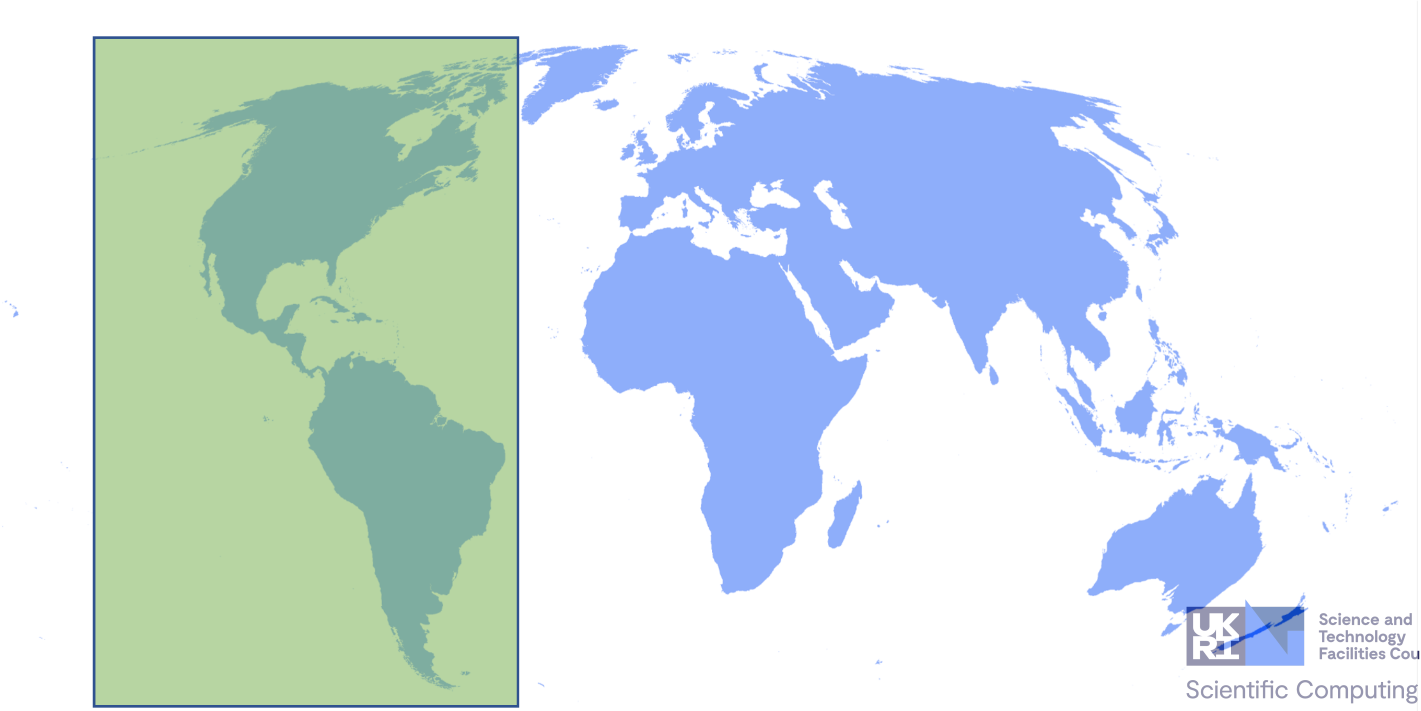

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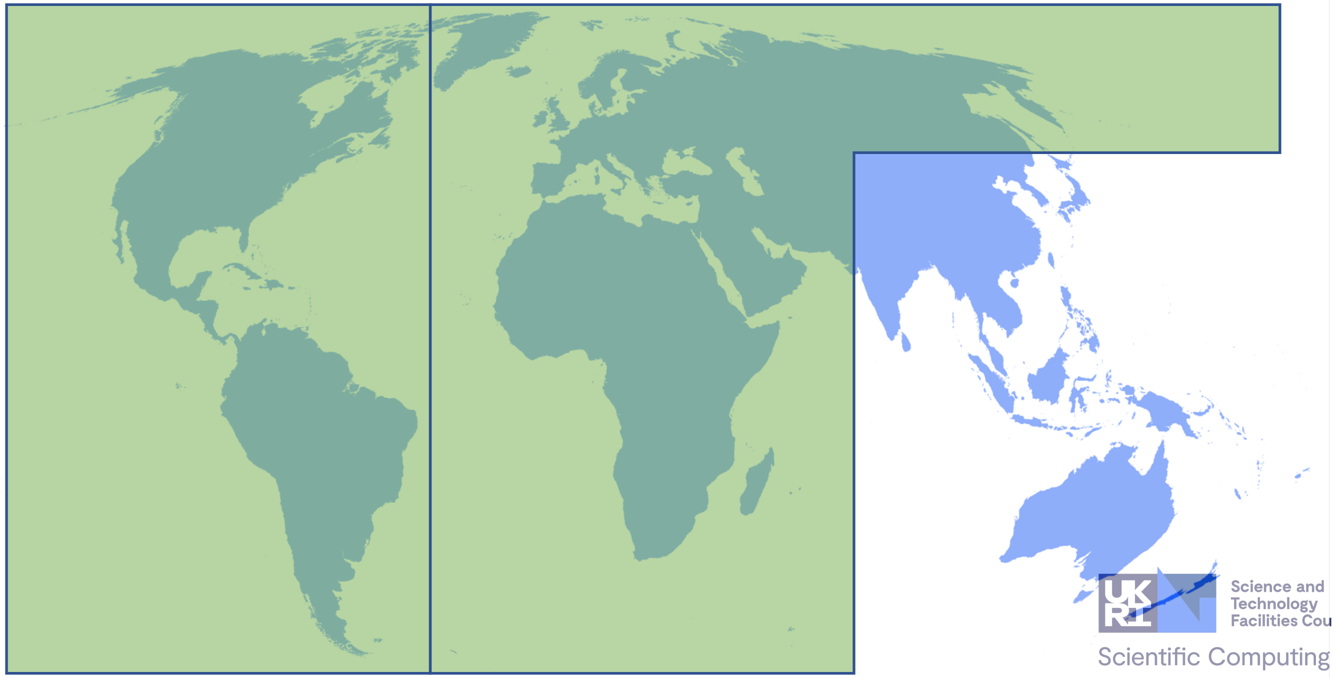
- EUGRIDPMA



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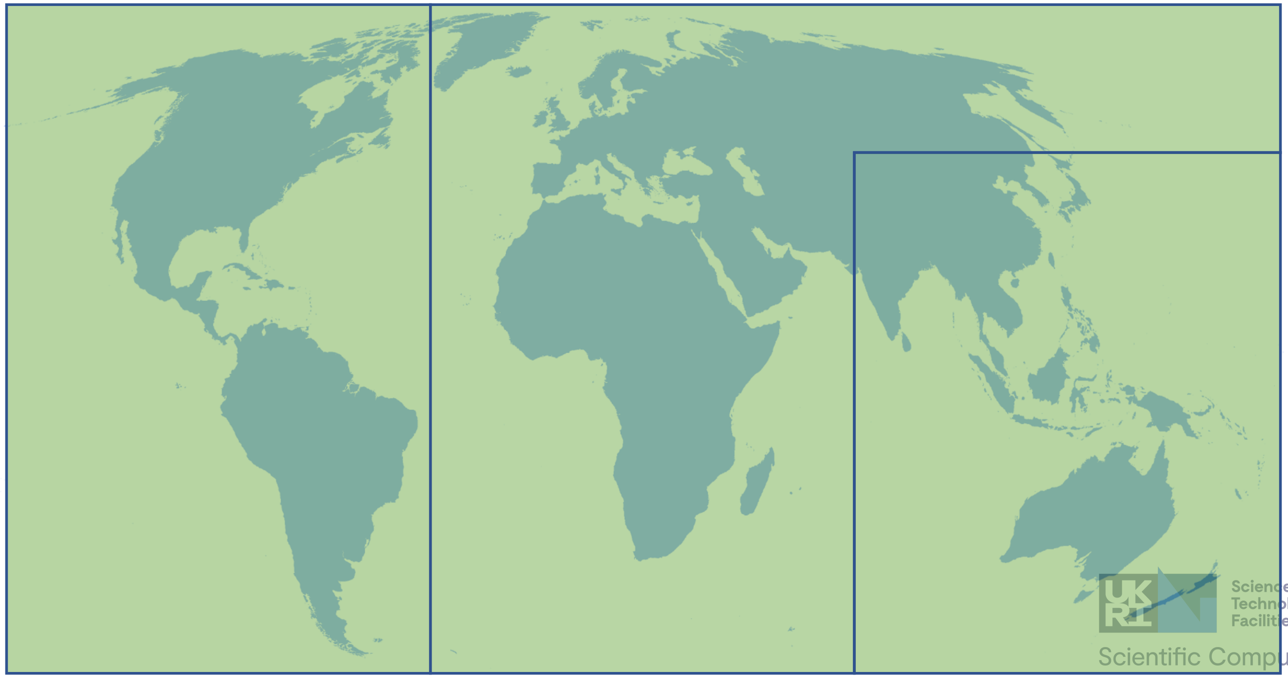

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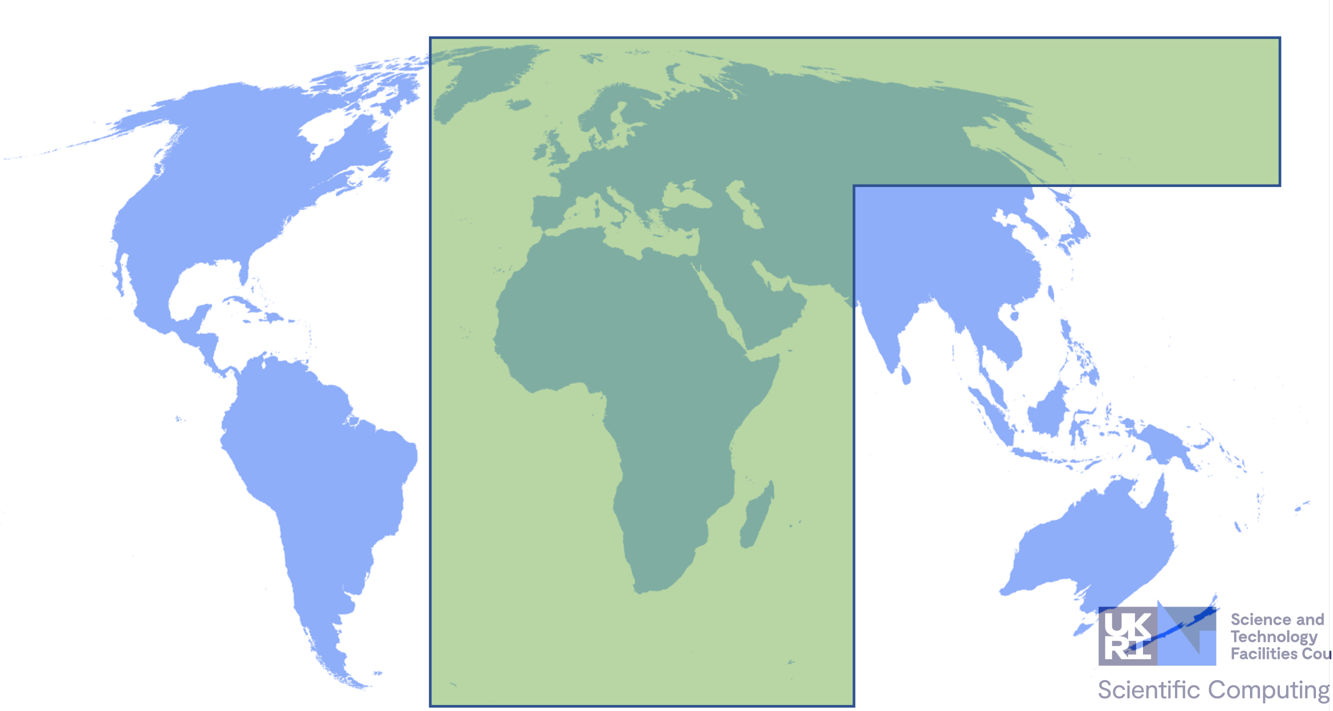

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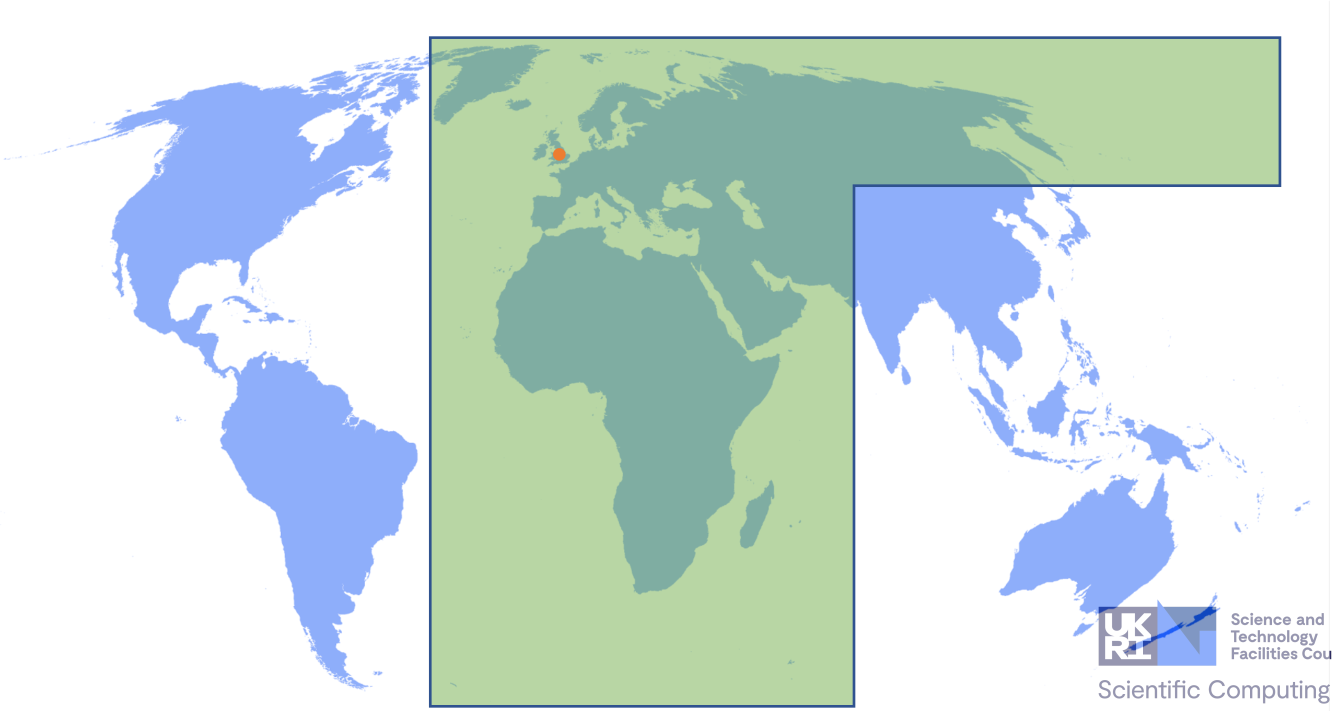
- EUGRIDPMA
  - UK eScience CA



UK eScience CA update

- Will Furnell has joined the CA team
  - ~40% of his time is spent working on the CA
  - His roles include
    - Administering the CA systems and the HSMs
    - Software development: upgrading the CA software
      - Fixing bugs, refactoring the code and adding new features for SANs
    - Also been working on upgrading hardware, improving power redundancy, increasing security and setting up a test environment
- Tom Dack has also recently joined the CA team as well
  - Important strengthening of link between x509 and token experience
    - Tom manages the very successful IRIS IAM identity proxy

UK eScience CA short term roadmap

- Current work in progress
  - Actively improving the host certificate lifecycle
    - Auto-approval of renewals
    - Simple renewal of certs with extra SANs
  - New CA hierarchy
  - Looking at auto-issue of some types of certificate
  - Investigating ACME interface

Background

- These Certificate Authorities provide user and host certificates according to a specific set of requirements, peer-reviewed at regular intervals
- To obtain Host certificates you first need to provide a User certificate
- These User certificates have Medium assurance
  - Require F2F (or remote equivalent) ID

The Challenge

- The challenge is NOT User certificates; the token transition being discussed elsewhere
- We ARE talking about Host certificates which will continue to be required
- The challenge is in how our workflows are changing

The Challenge (Operational Perspective)

- Discussions in DOMA on the use of google, amazon and azure cloud resources: there’s a desire to
  - Set these up efficiently
  - Avoid hacks to work with these providers
- This led to a question of the use of IGTF host certificates vs the use of Let’s Encrypt or the Google CA, etc…

The Challenge (Operational Perspective)

- Let’s Encrypt/Google CAs part of web browser trust chain
  - NOT part of IGTF distribution
- Let’s Encrypt (for example) offers programmatic APIs: Automated Certificate Management Environment (ACME) which can be advantageous
  - “Ease of provisioning”
  - IGTF CAs DO offer programmatic interfaces, with ACME being investigated
- Wildcards are of importance in the use of dynamic resources

- Now: need to include identity management and security perspectives…

IGTF Perspective

- Resource Providers have Assurance requirements
  - To what extent have these been discussed at this stage?
- Need detailed consideration of impact of certificates like Let's Encrypt
- An IGTF Working Group has been proposed
- Need to understand approval/renewal/revocation process in all cases
- TCS (Sectigo) certificates (see later) are an obvious option in the UK
  - In the web trust group and IGTF distribution (being careful of which product is used)
  - UK specific: CERN may not be able to use these
- Are certs provided by other CAs drop-in replacements for IGTF certs?

Security Perspective

- Overriding security concern is traceability
- Need to track activity in the context of an incident
    - Increasingly complex in the context of dynamic resources
- Need to understand how this works regardless of way forward
- Examine particular CA workflows in our context
    - Need clear picture of which CAs are included in discussion

Certificate Authorities: Pros and Cons

Let’s Encrypt

- Let’s Encrypt is a free, automated, and open certificate authority (CA), run for the public’s benefit. It is a service provided by the Internet Security Research Group (ISRG).

Pros

- Works with web browser trust chain
- No need for a personal certificate
- Programmatic interface: ACME
  - Variety of clients
- “Ease of renewal” (in fact fresh provisioning)
- Admin ease of use – free, don't have to get approval

Cons

- Uncertainties regarding long-term sustainability
  - Dangers of lock-in
- Rate limits
- Who applies for them (no personal certificate involved)
- “Ease of renewal” may in fact not be that easy
  - Systems inside firewalls
  - Possibility for bulk requests
  - Whether extra SANs/wildcards are all tested
- Trust means trust for any usage **including as client certs**
- Possibility of DNS spoofing
- Not IGTF trusted
- Reapply every 90 days

TCS (Sectigo)

- TCS allows participating national research and education networking organisations (NRENs) to issue unlimited numbers of certificates provided by a commercial CA at a significantly reduced price.

Pros

- Automatically work in both Grid and Browser trust frameworks.
  - if you get the right ones
  - IGTF accredited – with GFD.225 compliance
- EU service, linked to GÉANT
  - Good sustainability
- Also moving to ACME protocol
  - Already have a programmatic interface

Cons

- Funding model may change, and may be different for Universities, UKRI and industry partners.
- Easier in other countries (Paid for service in UK)
  - Can we discuss with Jisc?
- Exact attributes present in DNs have changed over time (eg email addresses)
  - Is this a problem?

UK eScience CA

- A certificate from the UK eScience CA can be used to authenticate to securely access resources worldwide. Certificates are trusted by the IGTF. Any host can have a eScience cert as long as the user controls the host

Pros

- Certificate requests approved by local humans
- Know who made the initial request
- No need for firewall/proxy configuration changes for local certs
- Can apply for a "bulk" of 10s or hundreds in one go – with only 1 approval required.
- Last a year before renewal (rekeying).
- (Largely) common procedures and tools for both host and user certs
- "Better the devil you know" - people are used to their tools and procedures.

Cons

- Certificate requests approved by local humans
    - Adds delay
- Not by default in the Browser Trust Domain (aren't intended to be web-certs)

Wider Landscape: OSG

- Uses Let’s Encrypt for non-WLCG use cases
- Susan Sons, then OSG Security Officer, wrote position paper on Let’s Encrypt
  - One extract:

“Perception of lower assurance level from Let’s Encrypt could make some stakeholders feel exposed.

a. We have separate registration procedures for services on the OSG that verifies the certain organizations; no access is given solely based on the possession of a host certificate.”

Wider Landscape: WLCG

- WLCG does have a current acceptable authentication assurance policy
    - Need to examine this in the context of this ongoing discussion

Questions for Discussion

- Who are the stakeholders
  - Operations, Identity management, Security
- Have we captured the challenge?
- What do we need to add to the perspectives?
- How do we move forward
  - Working group containing **all** perspectives to find common way forward
  - Nuanced discussion – need to have common discussion rather than separate silos that interact occasionally

Over to you!

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