Resource Trust Evolution:
Host Certificates in a Dynamic Landscape

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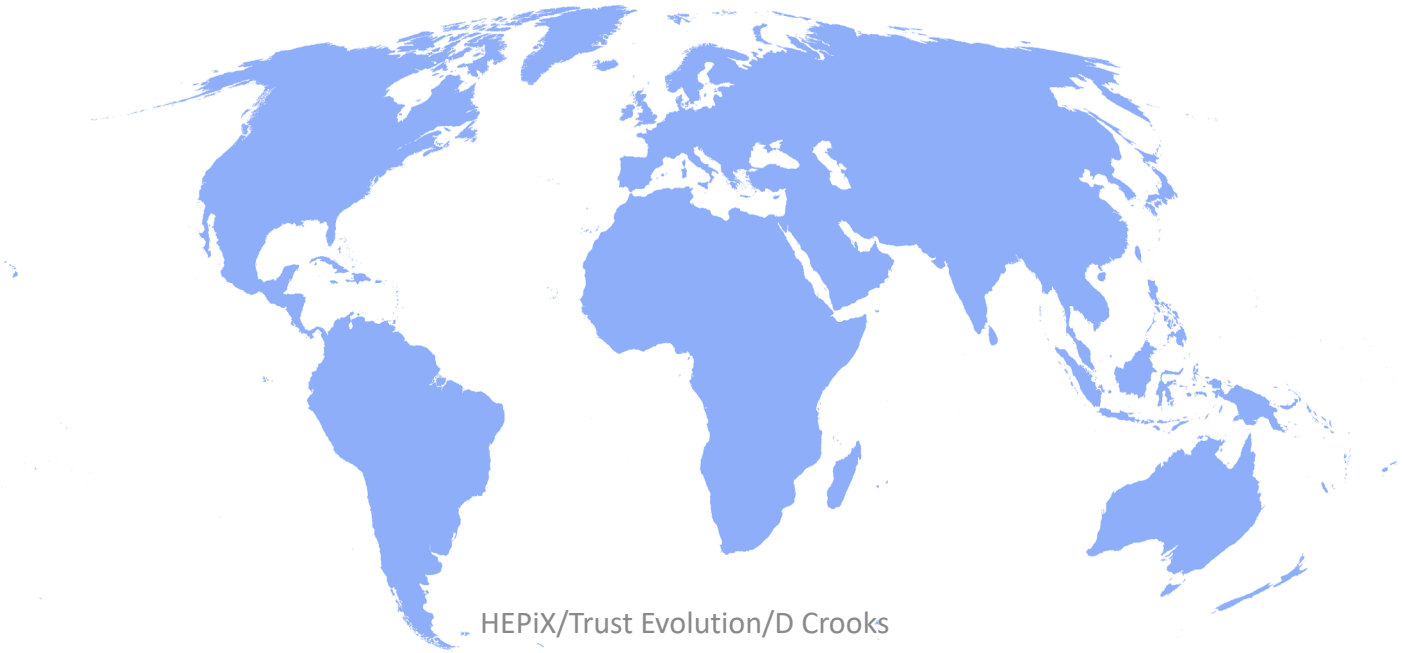
Introduction

- With many thanks to
  - Dave Kelsey, Jens Jensen, Will Furnell, John Kewley (STFC)
  - And to Maarten Litmaath, Stefan Lüders, Hannah Short, Romain Wartel (CERN)
- Aim is to present the main challenges regarding use of host certificates
  - Acceptable authentication assurance policy
- Identify key stakeholders and perspectives
  - Frame some of the questions, **not** try to answer them today!
- A WLCG task force is being formed to work on this
  - Inviting participation to cover all viewpoints and experience

Background

- EGI (and WLCG) has a policy on “Acceptable Authentication Assurance”
  - https://documents.egi.eu/document/2930
- Historically, all certificates used by EGI/WLCG have been provided by the Interoperable Global Trust Federation (IGTF) trust framework



Background

- IGTF Certificate Authorities provide user and host certificates according to a specific set of requirements, peer-reviewed at regular intervals
- To obtain host certificates you often need to provide a user certificate
- The user certificates have “medium” assurance
  - Require F2F (or remote equivalent) with photo ID

The Challenge

- This discussion is **not** around user certificates
  - the token transition is 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)

- Increasing use of cloud resources, and other developments in new workflows, has raised the question of which host certificates are appropriate for different use cases
- Particularly around dynamic provisioning
- CAs being discussed include Let's Encrypt
  - But also Google CA, Amazon, Azure, etc…
  - Larger question of cloud workflows
- Should we trust these?

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 Automated Certificate Management Environment (ACME) interface which can be advantageous
  - "Ease of provisioning"
  - Some IGTF CAs DO offer programmatic interfaces
    - ACME being investigated
- Wildcards are of importance in the use of dynamic resources

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 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
- Trust means trust for any usage **including as client certs**
- Possibility of DNS spoofing
- Not IGTF trusted
- Reapply every 90 days

GÉANT Trusted Certificate Service (TCS)

- 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, research labs and industry partners
- Easier in some countries (paid for service in others)
- Exact attributes present in DNs have changed over time
  - Location/region may be added or removed
  - Impacts myproxy needed periodic updates

IGTF CA

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)

The WLCG task force:
https://twiki.cern.ch/twiki/bin/view/LCG/ResourceTrustEvolution

- Stakeholders
  - Experiments, Operations, Identity management, Security
- Capture specific use cases
- Capture specific security requirements
- WLCG task force is being formed
    - Contain all perspectives to find common way forward
    - May have short term and longer-term goals
    - Some of these workflow changes are very powerful
    - Host certs are only one part of the discussion
- Please get in touch if you'd like to be involved!

Discussion