draft-richardson-t2trg-idevid-considerations

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https://www.sandelman.ca/SSW/talks/idevid-considerations

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Let’s talk about Turtles

- Roots of Trust
- Trust Anchors

IDevID considerations document

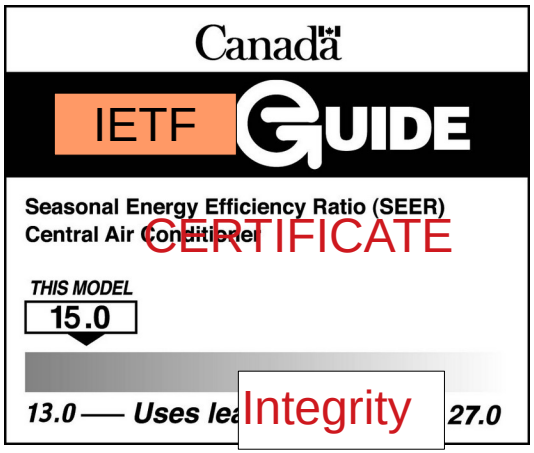
- This document is about the quality of the turtles
  - How do they get there?
  - Can they be trusted?
    - How much?
    - **For what?** (Is the risk mitigation appropriate to the user's threat model?)
- Three fundamental ways to provision initial roots of trust.
- Ultimately, the software update trust anchor **rules everything.**

Roots of Trust

- How are they provisioned?
  - What would be involved in compromising that process?
    - assume: bribery, kidnapping, might be used
  - How can we qualify the different processes?
    - Not every process is appropriate for every end use.
- NDAs abound, but Supply Chain considerations mean some of these things need to get through anyway

Goals of this document

- Enumerate the reasonable, and maybe some less reasonable ways to provision and secure keys, and give them **names**.
- Not just the most secure way, because it is not always worth it.



admin:password

The document so far

Table of Contents

- Trust Anchor
  - a thing a device uses to verify an external entity's identity
- IDevID
  - a thing a device uses to prove an identity to an external entity
  - ways of provisioning key pair

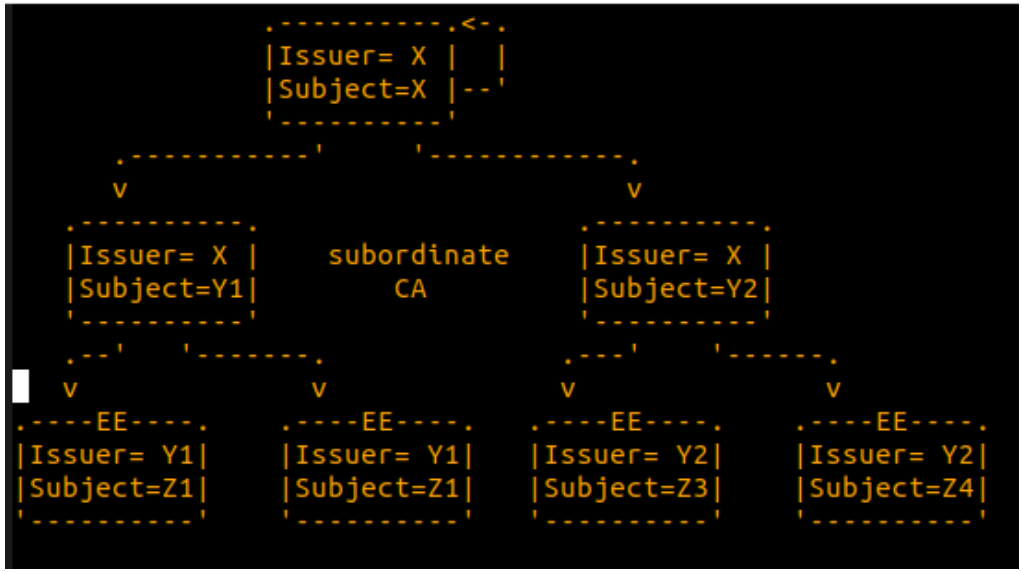
Industry Consultations

- secdispatch said to take this to industry people to get their feedback
- two public presentations on this, and four private discussions

- yet to get any feedback!
- everyone busy due to pandemic, but still persuing feedback.

Public Key Infrastructure

- using “subordinate” rather than “intermediate”
- self-signed certificate is a PKI of level “one”
  - not counting from zero
-
- intermediate used in bridge CA use
- see https://fpki.idmanagement.gov/tools/fpkigraph/



- This document about the shapes of these things.
- Recovery and Resilience
- How are private keys kept safe?

Properties of PKI

- initial-enclave-location:
- initial-enclave-integrity-key:
- initial-enclave-privacy-key:
- first-stage-initialization:
- first-second-stage-gap:
- identity-pki-level:
- identity-time-limits-per-subordinate:
- identity-number-per-subordinate:
- identity-anchor-storage:
- pki-level:
- pki-algorithms:
- pki-level-locked:
- pki-breadth:
- pki-lock-policy:
- pki-anchor-storage:

- many attributes shown on left
- not at all complete!

- How to deal with level of secret splitting?
  - business continuity vs risk of counterfeit

Intended vs Unintended Business Continuity

- Use Shamir Secret Sharing on PKI keys
  - 4 out of 7 pieces
    - generallly n of k
- how to distribute pieces?
- do they reconstruct the PKI private key,
  - or do they just restruct the HSM secret that unlocks the private key?

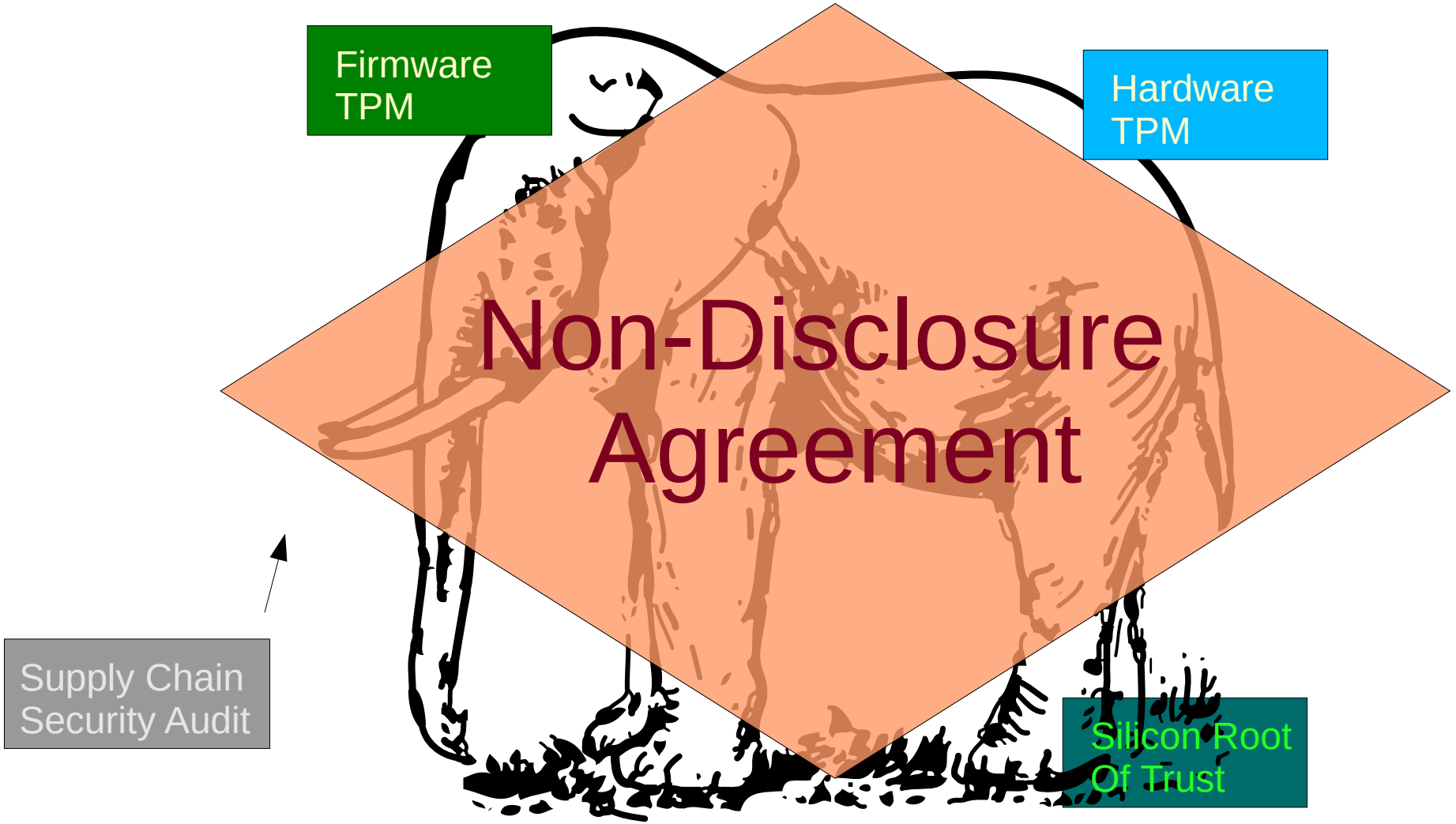
More pieces => more resiliency to “bus events”

higher threshold => more resitence to corruption, bribery, extortion?

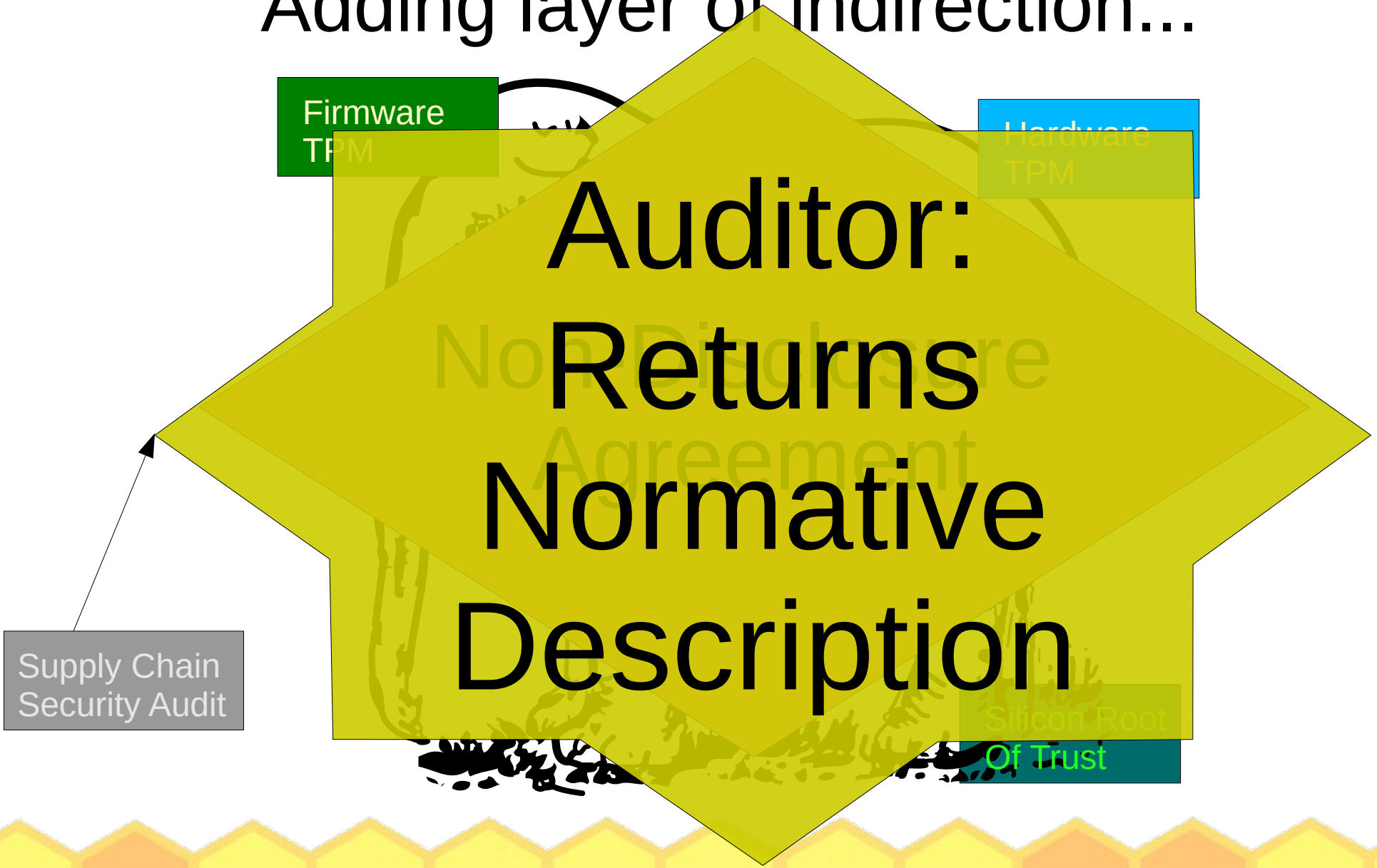
If operations are spread across continents, should key pieces too?

HSMs are great, but expensive, and one needs two or three vs a bootable CDrom and any PC?

Confidentiality of IDevID private key..



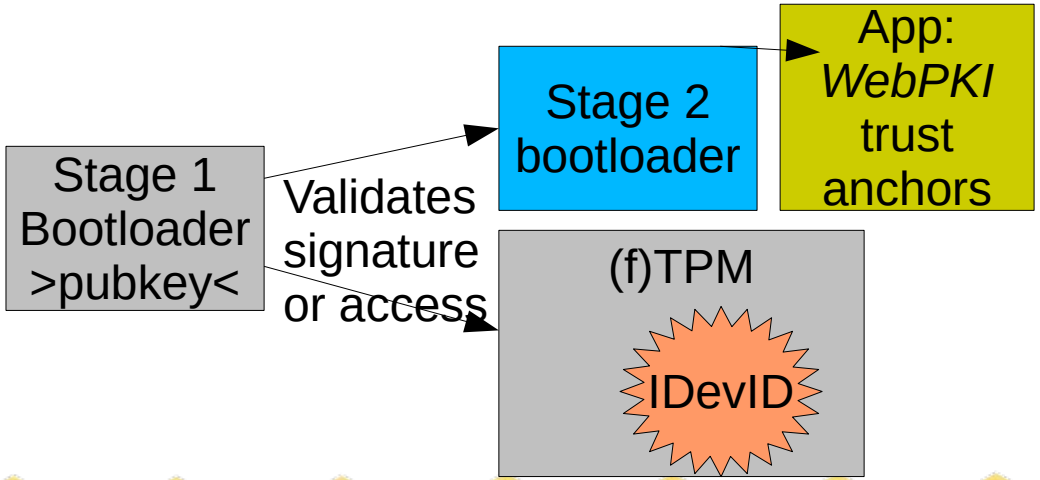
Adding layer of indirection...



Audit Model

Recognize:

Posessor of Bootloader software update key wins all battles.



- However >pubkey< is provisioned determines in-system risk of entire system.
  - This is the bottom turtle, “Mack”, and he’d better not burp.

- Even more critical: how is the private key that can sign code kept?