RSAC Sandbox

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HUMAN ELEMENT

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Industry Standards to Support Supply Chain Risk Management for Firmware

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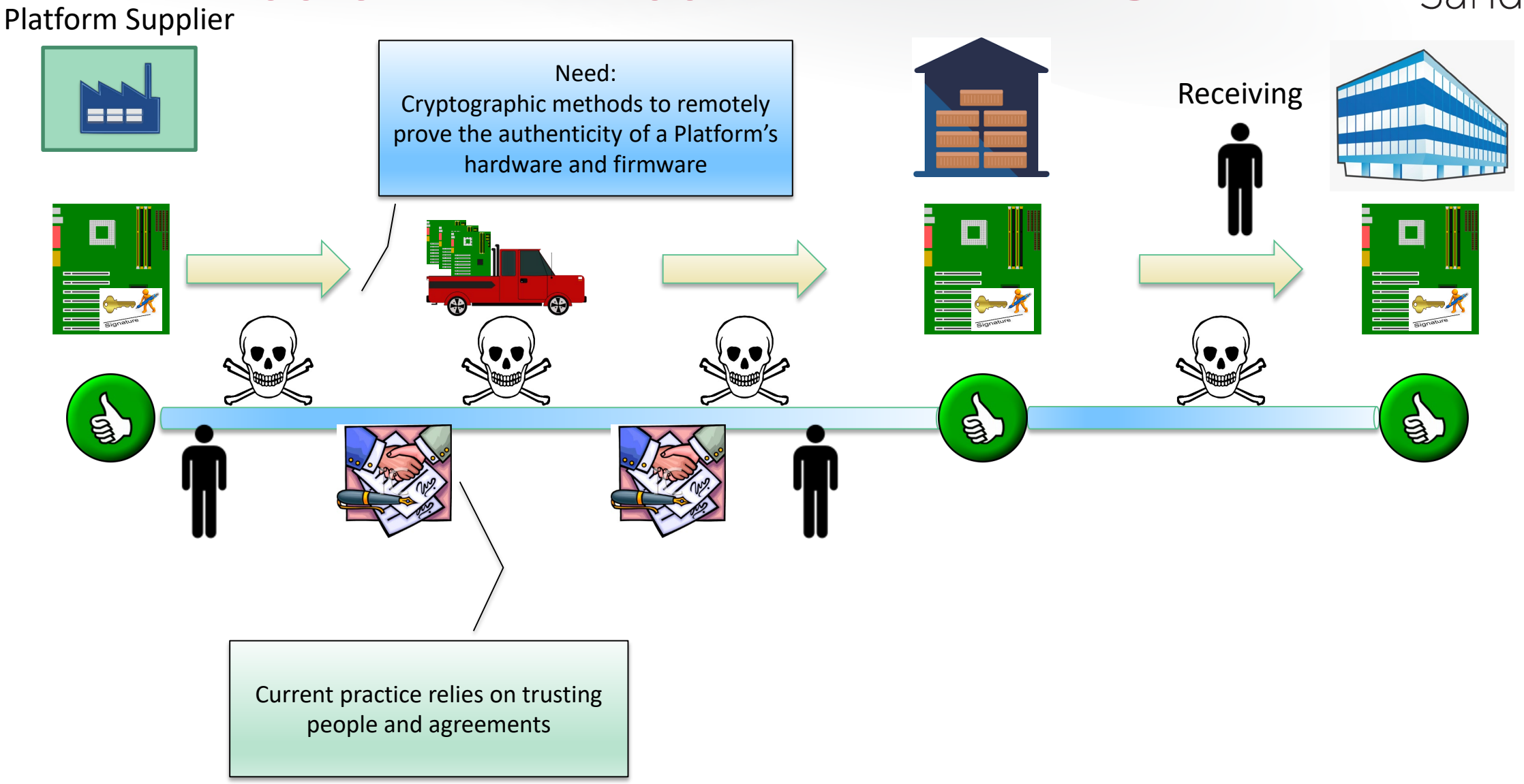
Problem: Trusting the Supply Chain

Hardware and Firmware

Manual Supply Chain–Supplier to Receiving



Inspecting Firmware at Scale

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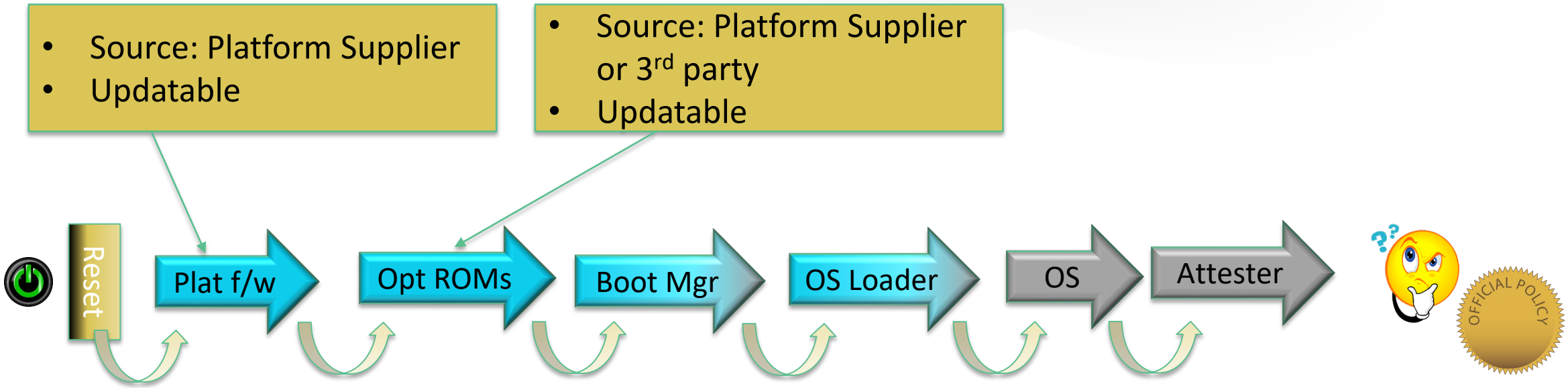


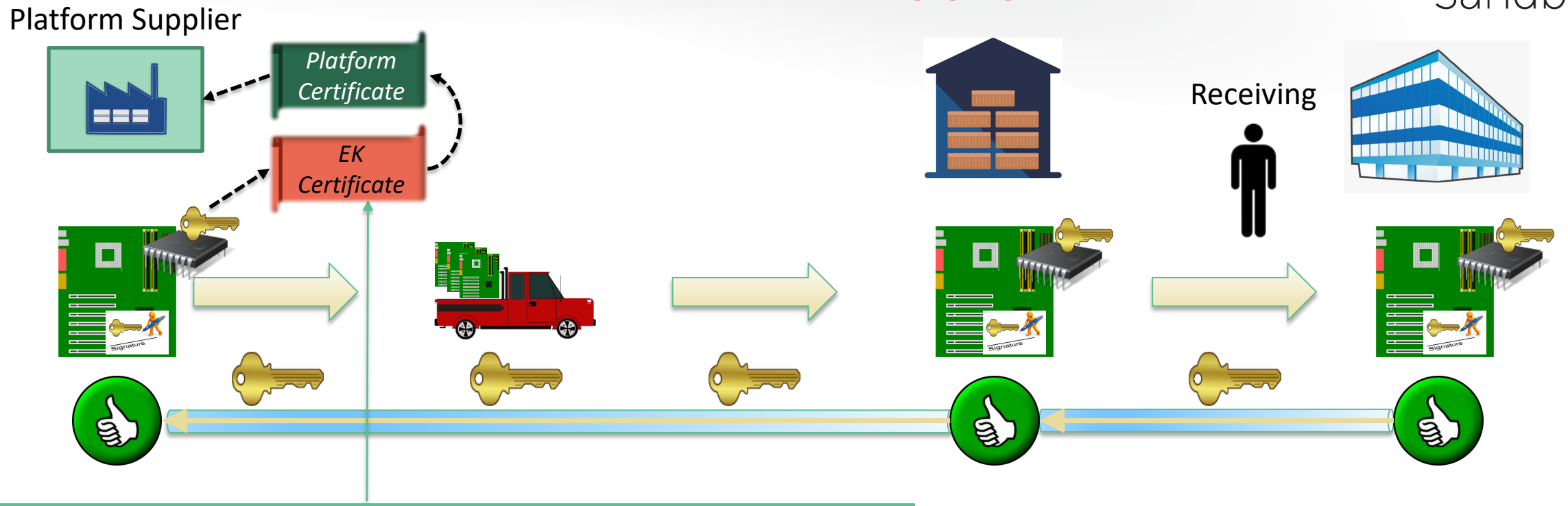
Why do we care?

- Detecting Counterfeit devices and device components
- Firmware: Malware and Vulnerable Versions of older firmware
  - Autonomous and Invisible Computing
  - Some modules run in parallel to the OS (e.g., SMI) or while the computer appears “off” (i.e., Suspend, Hibernate)
- Firmware signing necessary (e.g. via UEFI Secure Boot) but only verifies module’s source for updates
  - Verification keys are modifiable (in most configurations)
  - Does not provide explicit evidence of f/w integrity to (scalable) remote verifiers
- Plat f/w configures all components (e.g. memory, USB, wireless devices, etc.)

Solving the Problem

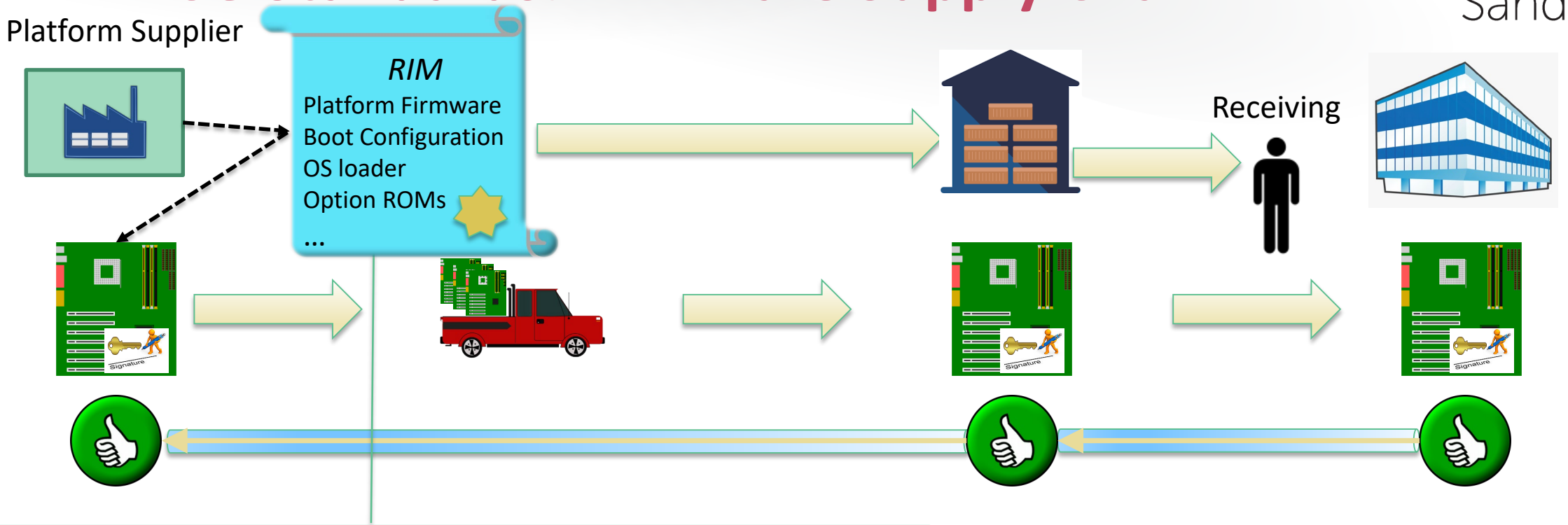
Adding Trust in the Supply Chain (Platform Hardware and FW) using TCG Standards

TCG Standards: Hardware Supply Chain



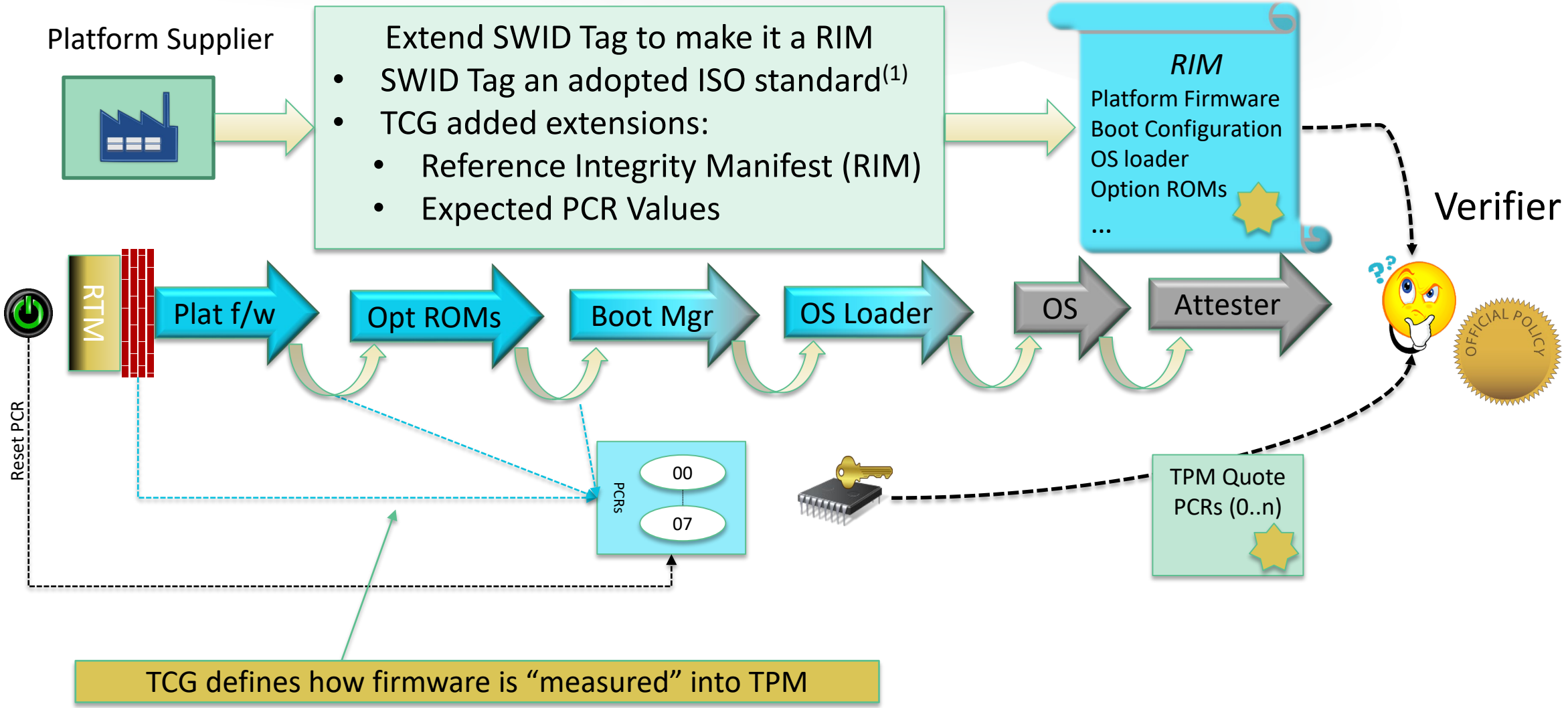
- TCG Endorsement Key & Platform Certs bind Supplier to platform
  - Provides Cryptographically bound Device Identity
  - Hardware Bill of Materials – lists components in device
  - Counterfeit detection
  - Component lists deter parts swapping

TCG Standards: Firmware Supply Chain



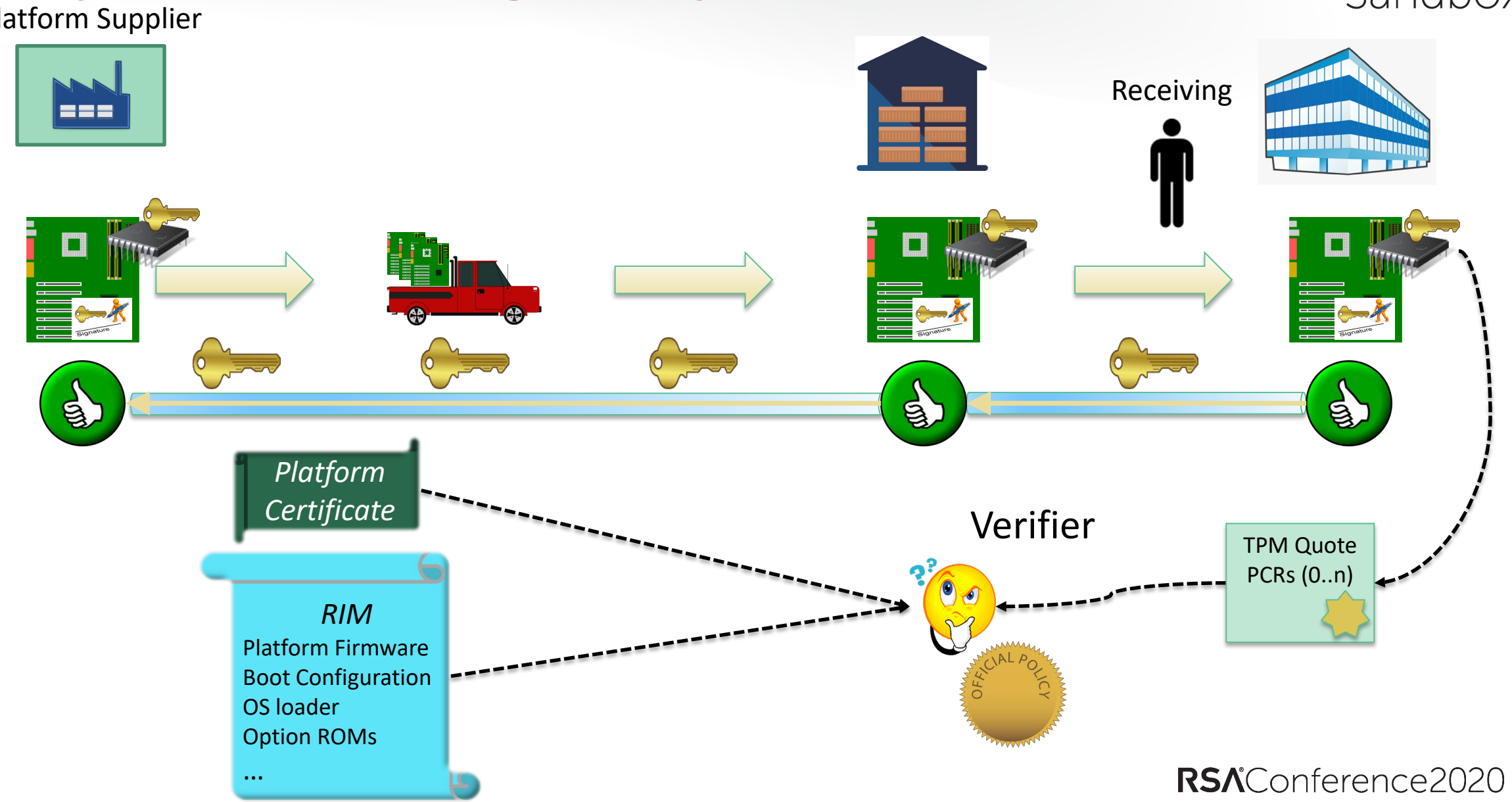
- TCG Reference Integrity Manifests (RIM)
  - (aka Golden Measurements)
  - Provides references for detecting Firmware and Boot Software modifications
  - Provides verifiable factory configuration settings

Comparing Expected (Golden) Values with Delivered



(1) ISO-IEC 19770-2 & NISTIR 8060: https://nvlpubs.nist.gov/nistpubs/ir/2016/NIST.IR.8060.pdf

Acceptance Test Using TCG Specifications



Summary and Demo

Achieving Trusted Supply Chain

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- Trusted Supply Chain can be achieved using open standards
  - Using Trusted Platform Modules (TPM)
  - Using TCG defined Certificates (Endorsement Key & Platform)
  - Reference (Golden) Measurements from a Trusted Source
    - E.g., the original platform supplier (OEM)
- Open source software is available

Demo

Trusted Supply Chain: Hardware and Firmware

Example RIM – Based on DRAFT TCG Specification

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```
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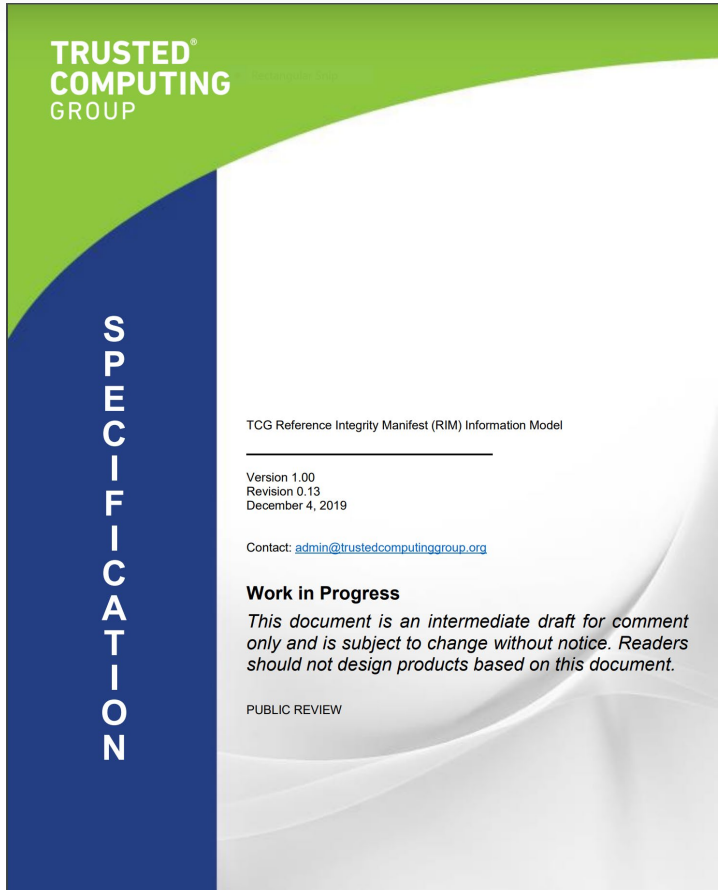

https://trustedcomputinggroup.org/wp-content/uploads/TCG_RIM_Model_v1-r13_2feb20.pdf

Action

Think

- Do you know where your hardware platform “really” came from?
  - Can you identity all computers on your network
  - If they are malicious, will the software really identify itself?
- Do you know if the firmware (or even OS, apps) is authentic?
  - Remember, the firmware’s execution is long before the OS and any anti-malware is running
- Without trusted hardware there is now way to know

Download and Review

RSAC Sandbox

- Industry Specification:
  - TCG Platform Certificate: https://trustedcomputinggroup.org/wp-content/uploads/TCG-Platform-Attribute-Credential-Profile-Version-1.0.pdf
  - TCG Reference Integrity Manifest: https://trustedcomputinggroup.org/wp-content/uploads/TCG_RIM_Model_v1-r13_2feb20.pdf
- Get involved with Trusted Computing Group
  - More standards being developed in this area
- Review Open Source projects
  - HIRS: https://github.com/nsacyber/HIRS
  - Go-Attestation: https://github.com/google/go-attestation

References

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- Software Identification tags
  - SWID tags support software inventory and asset management initiatives
  - ISO-IEC 19770-2
    - Requires purchase
  - NISTIR 8060
    - Describes SWID tags in sufficient detail for our purposes
    - https://nvlpubs.nist.gov/nistpubs/ir/2016/NIST.IR.8060.pdf
  - CoSWID
    - https://datatracker.ietf.org/doc/draft-ietf-sacm-coswid
- Records unique information about an installed software application
  - Its name, edition, version, etc.
  - whether it is part of a bundle and more
- Tools:
  - https://tagvault.org/about/
  - https://github.com/strongswan/swidGenerator
- Other references:
  - https://csrc.nist.gov/Projects/Software-Identification-SWID/management