

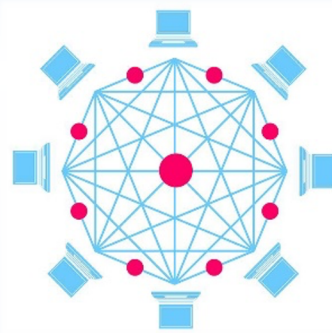


# Blockchain in Transport

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European Transport Security Series  
Session 5 : Emerging Threats to Transportation and  
Innovative Technological Solutions

# What is “blockchain” ?



## ***Distributed-ledger technology (DLT)***

*is the use of replicated, synchronised data shared across multiple ‘nodes’ to track the transaction of assets.*

*Blockchain is a subset of DLT.*

### **PUBLIC**

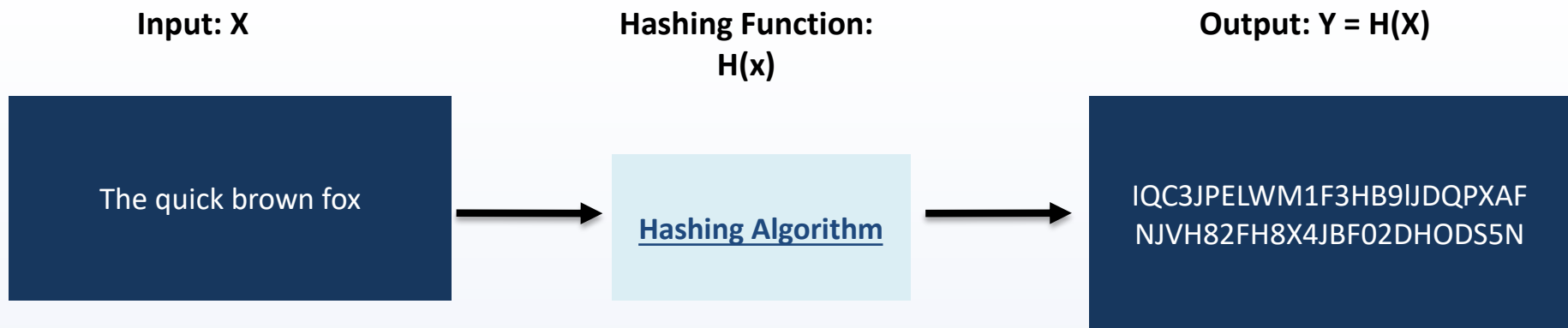
anyone can join;  
vast amount of  
stakeholders

**vs.**

### **PRIVATE**

select stakeholders;  
“permissioned”

# A Simplified Explanation: Building a “trust machine”

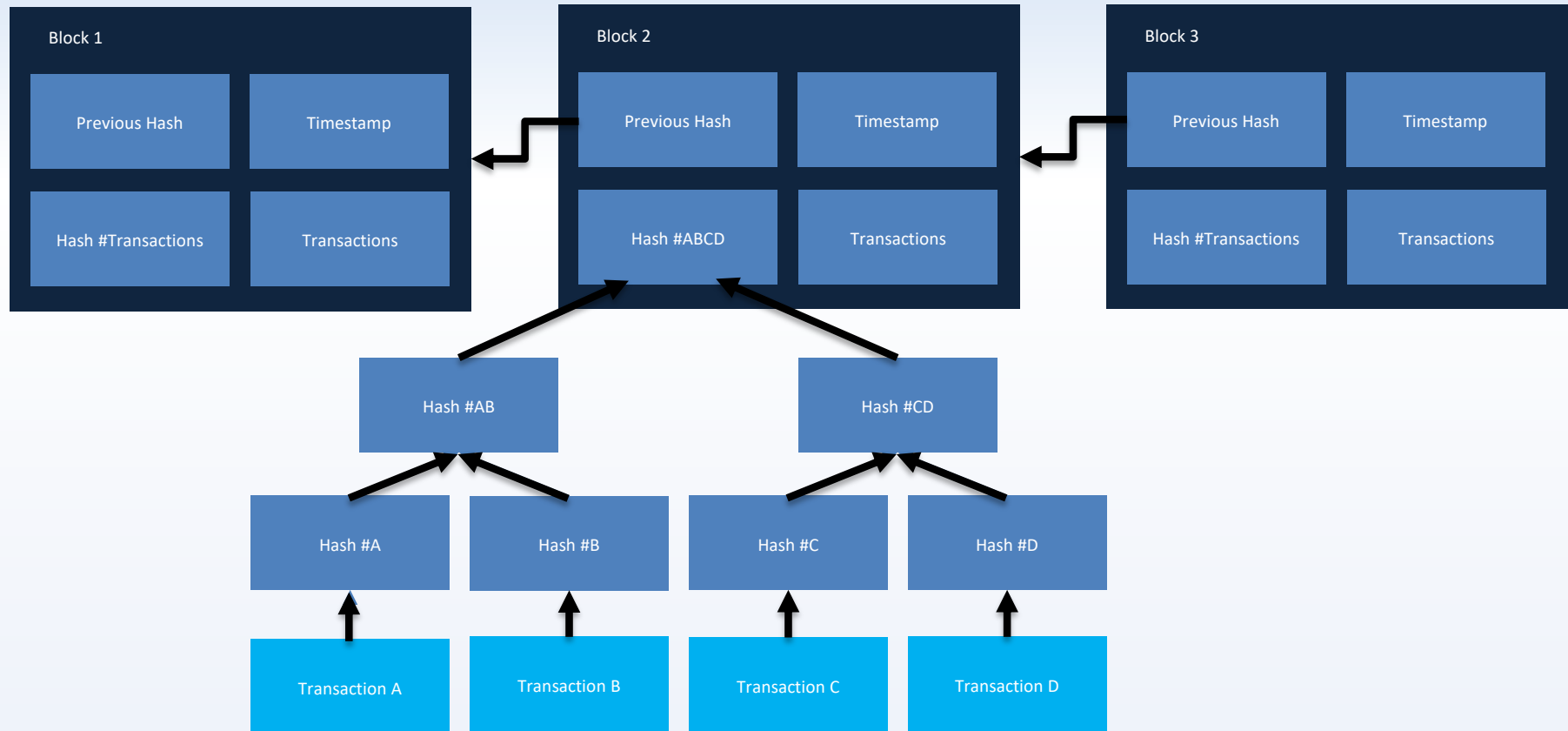


Understanding blockchain requires understanding hashing algorithms

A Hashing Algorithm is a mathematical function which takes an input and generates a ‘hashed’ output

**It is extremely difficult to reverse engineer the input from the output**

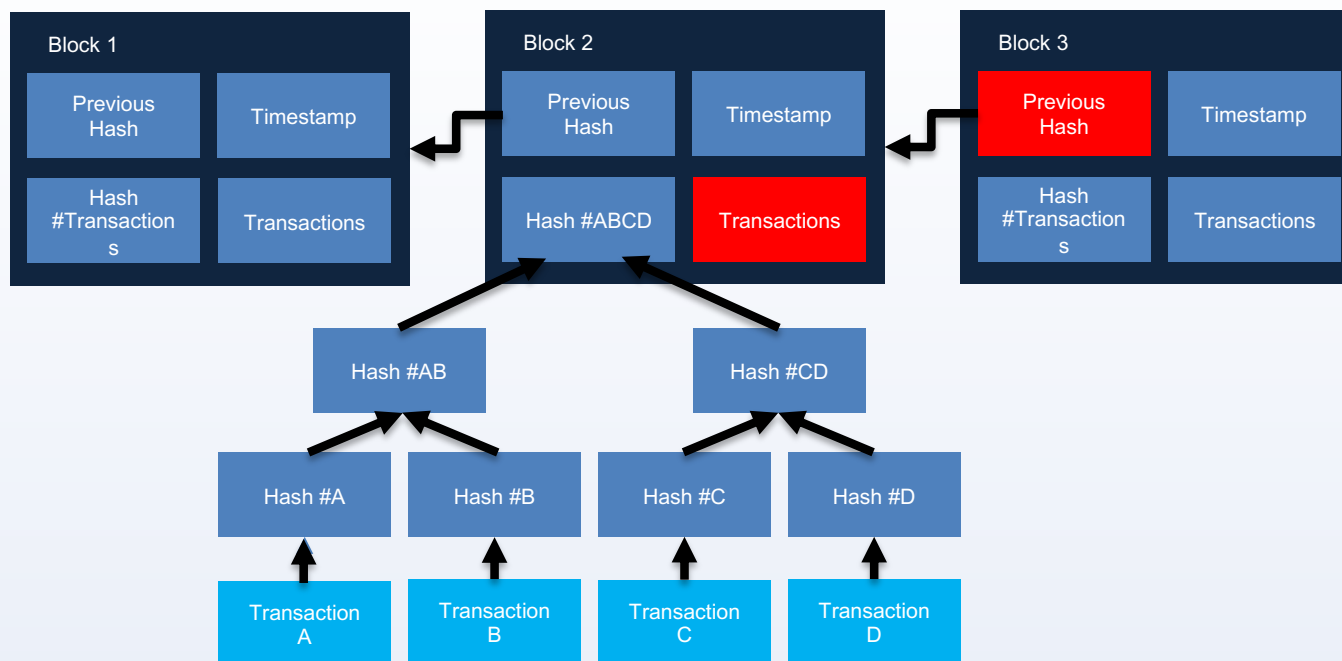
# Blockchain Immutability - I



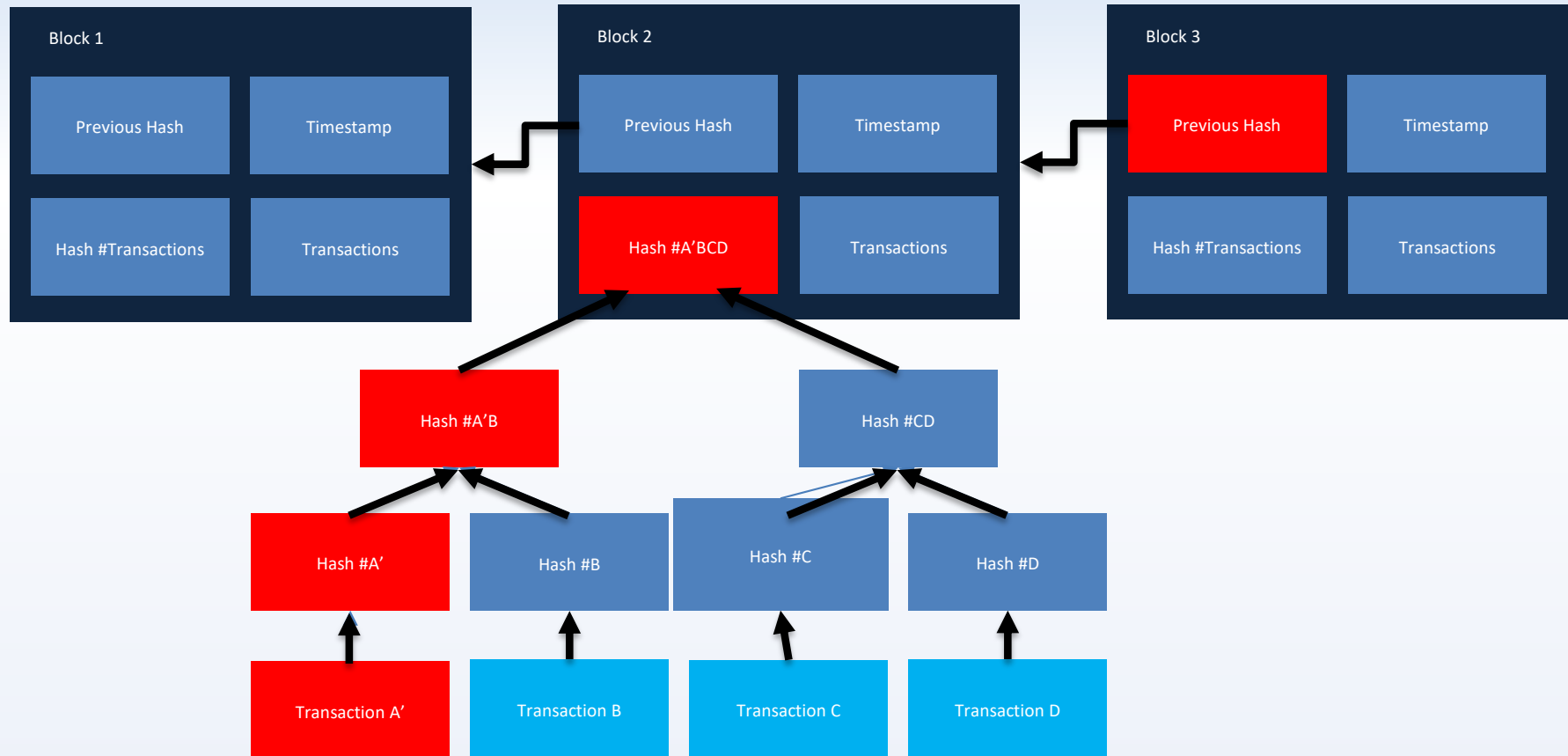
A blockchain is made up of multiple blocks linked together (hence 'blockchain')  
Each block is a collection of transactions as well as certain pieces of metadata, including  
**a hash of the transactions within it and a hash of the previous block**



# Blockchain immutability



# Blockchain Immutability - II



If someone tried to modify Transaction A to Transaction A', Block 2 will instead store #A'BCD

**Block 2 will no longer correspond with the previous hash stored in Block 3**

# Nuclear Security at the Technological Frontier

**DETER / DETECT / DELAY / RESPONSE**

**Guns Guards Gates  
Computer security**

**PERIMETER-CENTRIC  
CENTRALIZED**



**Improved data governance  
Proactive analysis of environment**

**PERIMETER-LESS  
DE-CENTRALIZED**

**IMPROVING SECURITY IN A POST COVID-19 WORLD**

**Resilience; defense-in-depth; strong security culture**

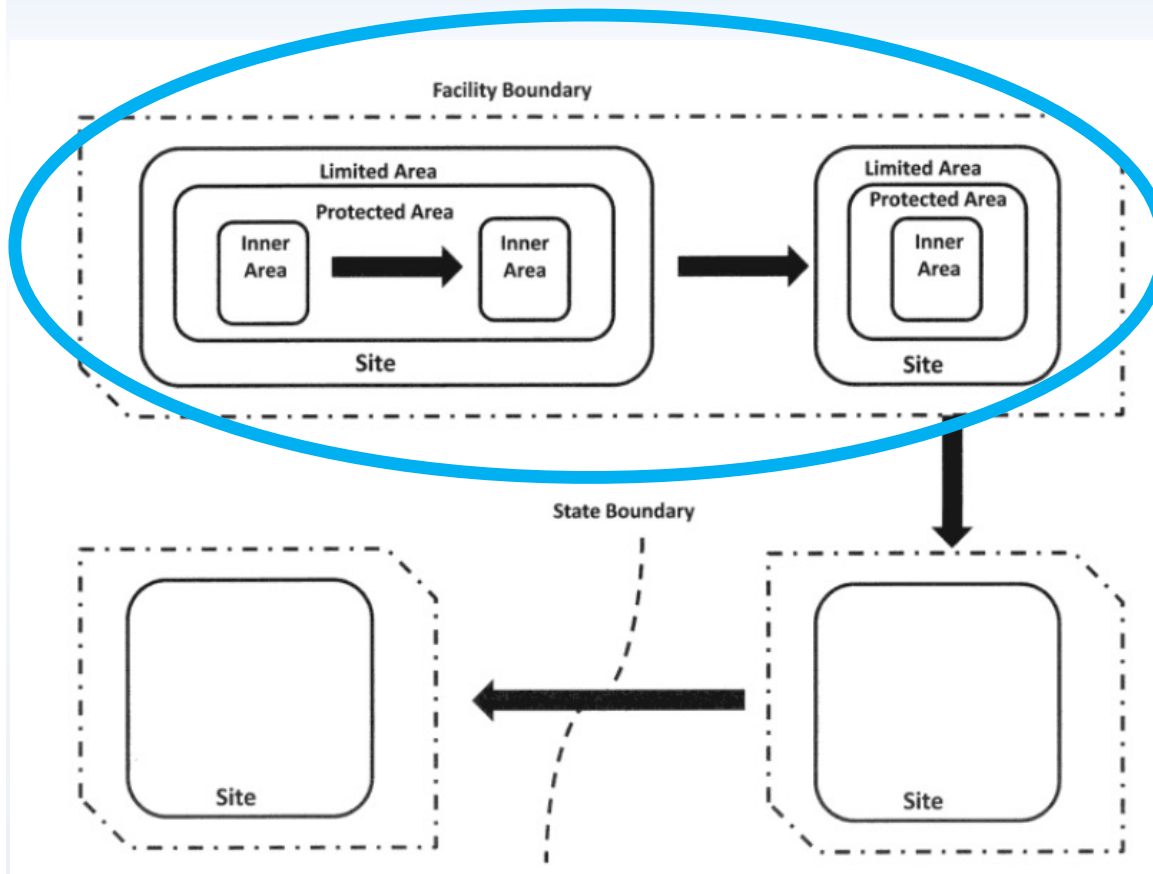
# Transport Security

## DLT Application

- Fidelity of tracking nuclear materials (or other sensitive assets in transit)
  - Provide information on all locations during transport in near real-time
  - Paired with IoT: capture conditions of immediate environment for additional layer of data / analysis of risk
  - **Must be risk-informed**



# Transport Security Prototype

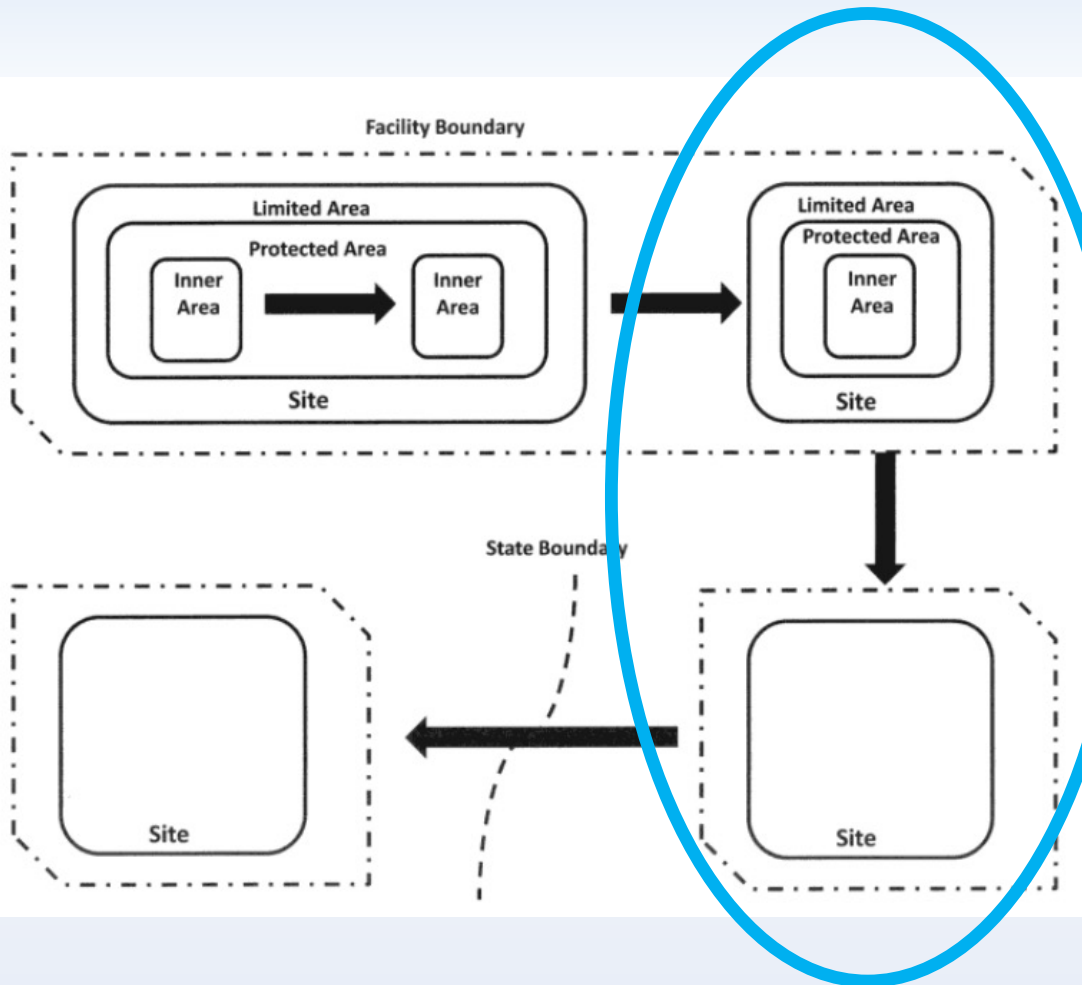


## WITHIN FACILITY

- ✓ Tracking onsite personnel activity at the facility level (certain need-to-know staff handling nuclear material)

IMAGE: Sandia Natl Lab Mark S. Soo Hoo

# Transport Security Prototype



## WITHIN STATE, DIFF FACILITY

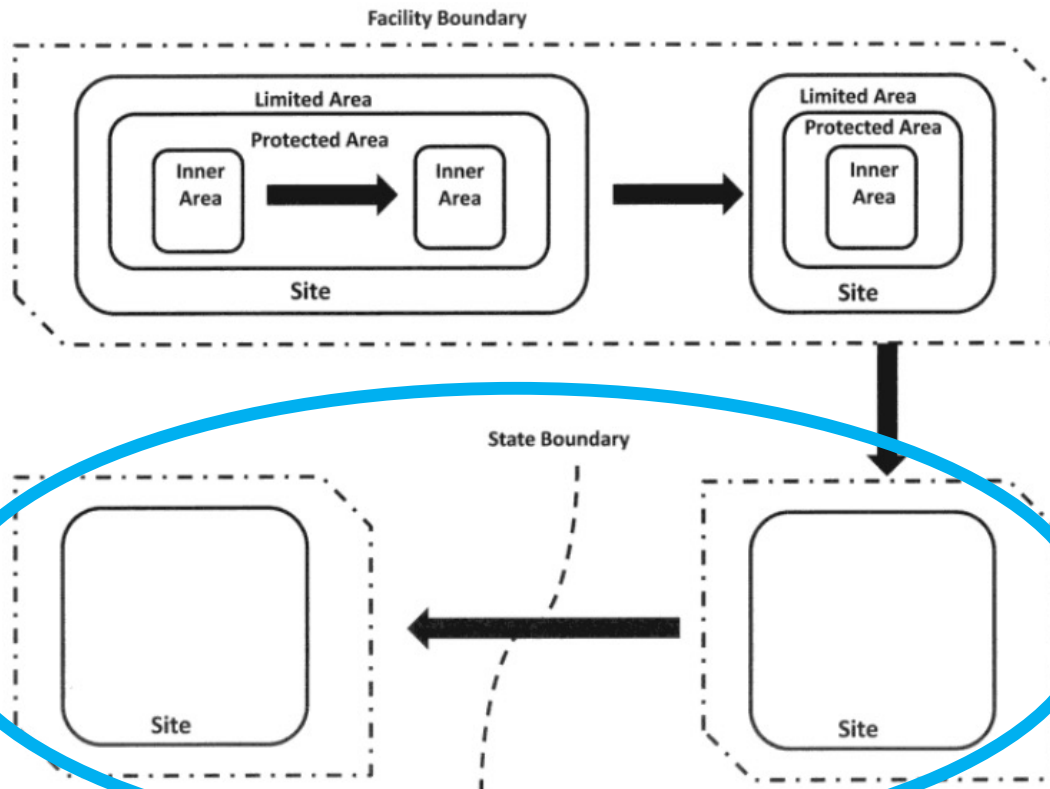
- ✓ Track personnel activity (for respective site)
- ✓ Check required security plan (operator – transporter – operator)
- ✓ Track material status while in transit (log any stops planned / unplanned ; receipt at final destination)



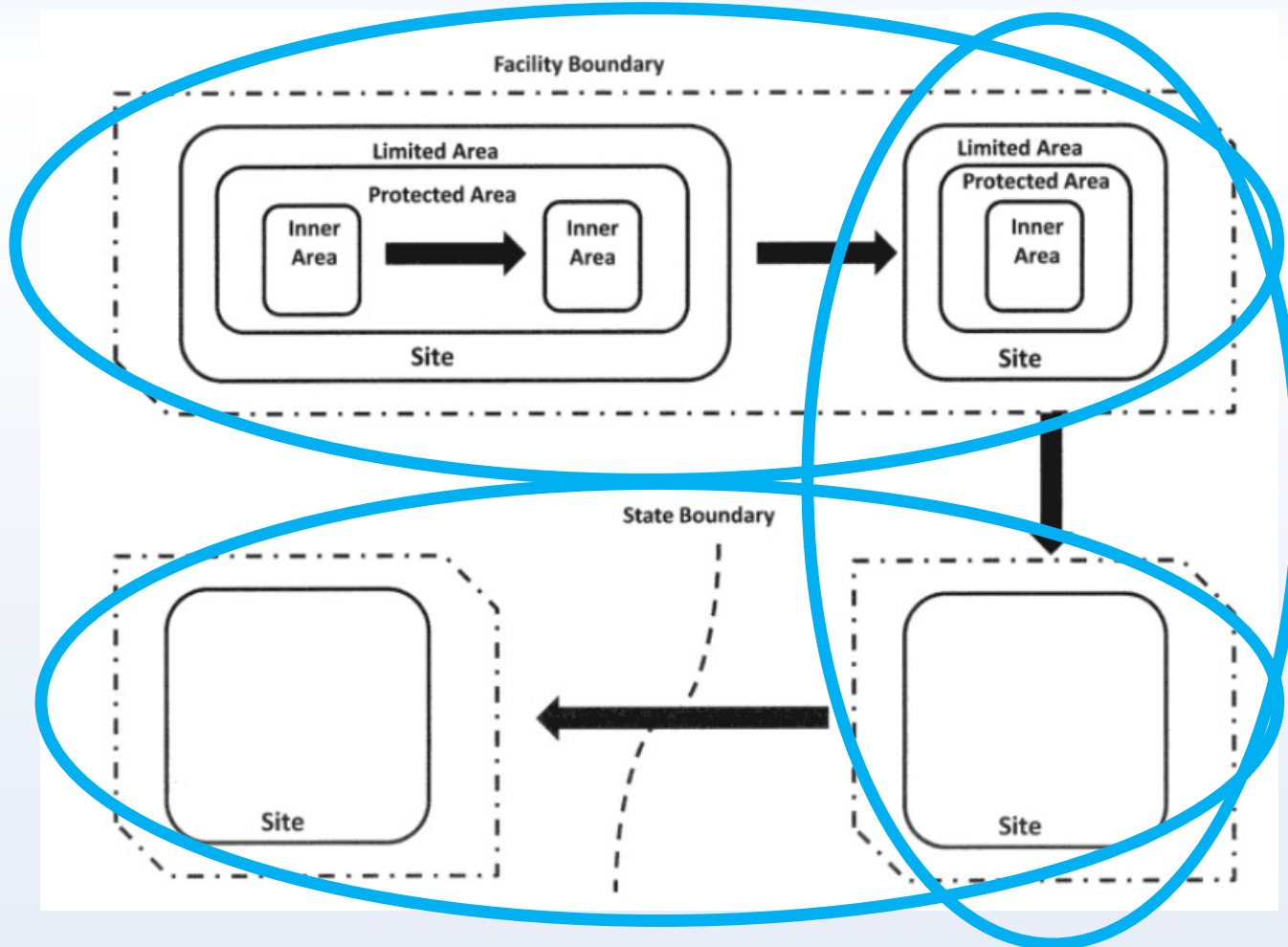
# Transport Security Prototype

## ACROSS STATE BORDERS

- ✓ Check required security plan; bona fides of companies operating in other countries (operator – transporter – operator)
- ✓ Track status of nuclear material (log any stops planned / unplanned receipt at final destination)
- ✓ Information sharing between countries for incident response purposes



# Transport Security Prototype



# SLAFKA



## SLAFKA - Login

Username

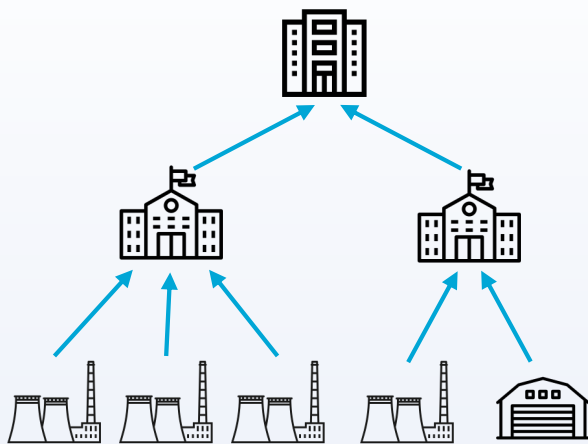
Password

Login

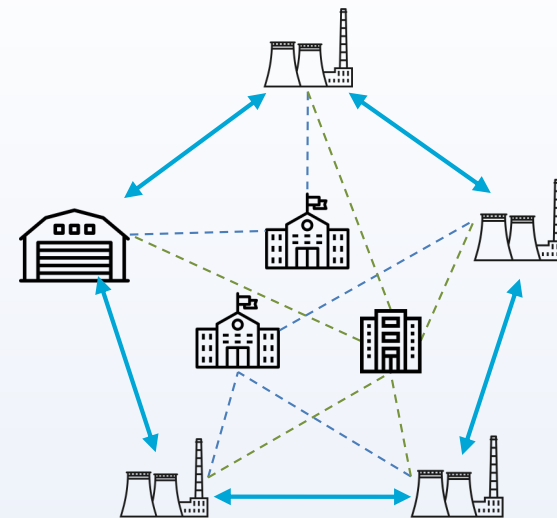
SLAFKA is a prototype created by a partnership between UNSW Sydney, the Stimson Centre and the Finnish Radiation and Nuclear Safety Authority to test the application of distributed ledger technology for improving nuclear safeguards and furthering non-proliferation.

STIMSON

Current reporting

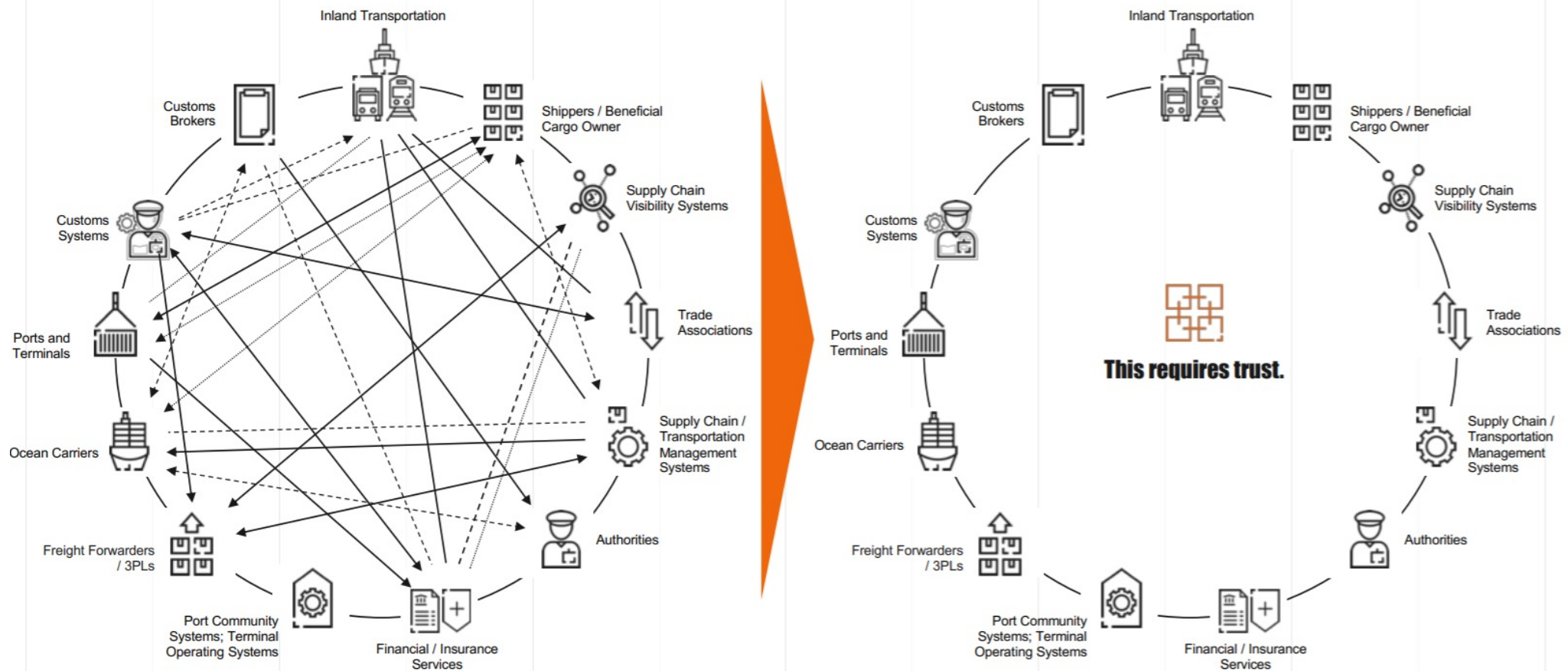


SLAFKA reporting



# TradeLens

## SHIPPER-CENTRIC MODEL TO NETWORK MODEL



# Questions?

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