

An Access Control Perspective on the Science of Security

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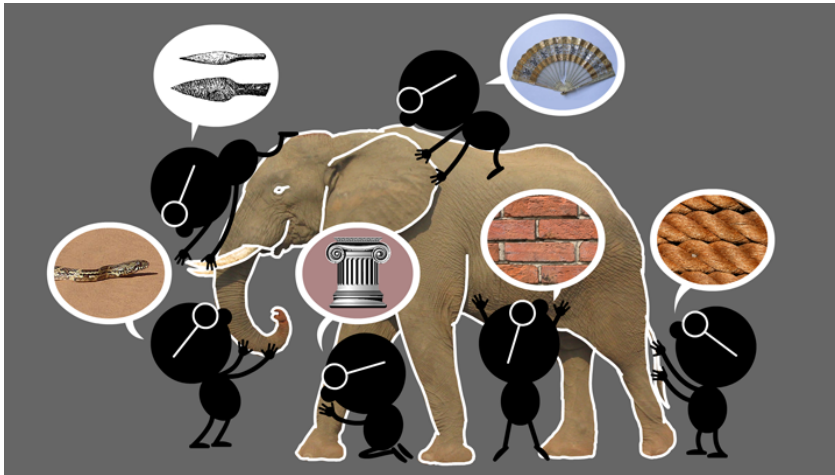
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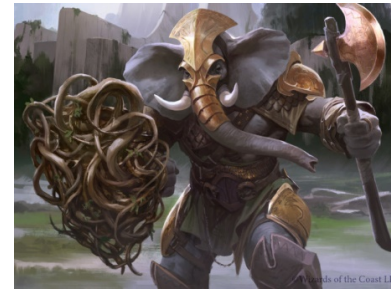
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Elephant Problem

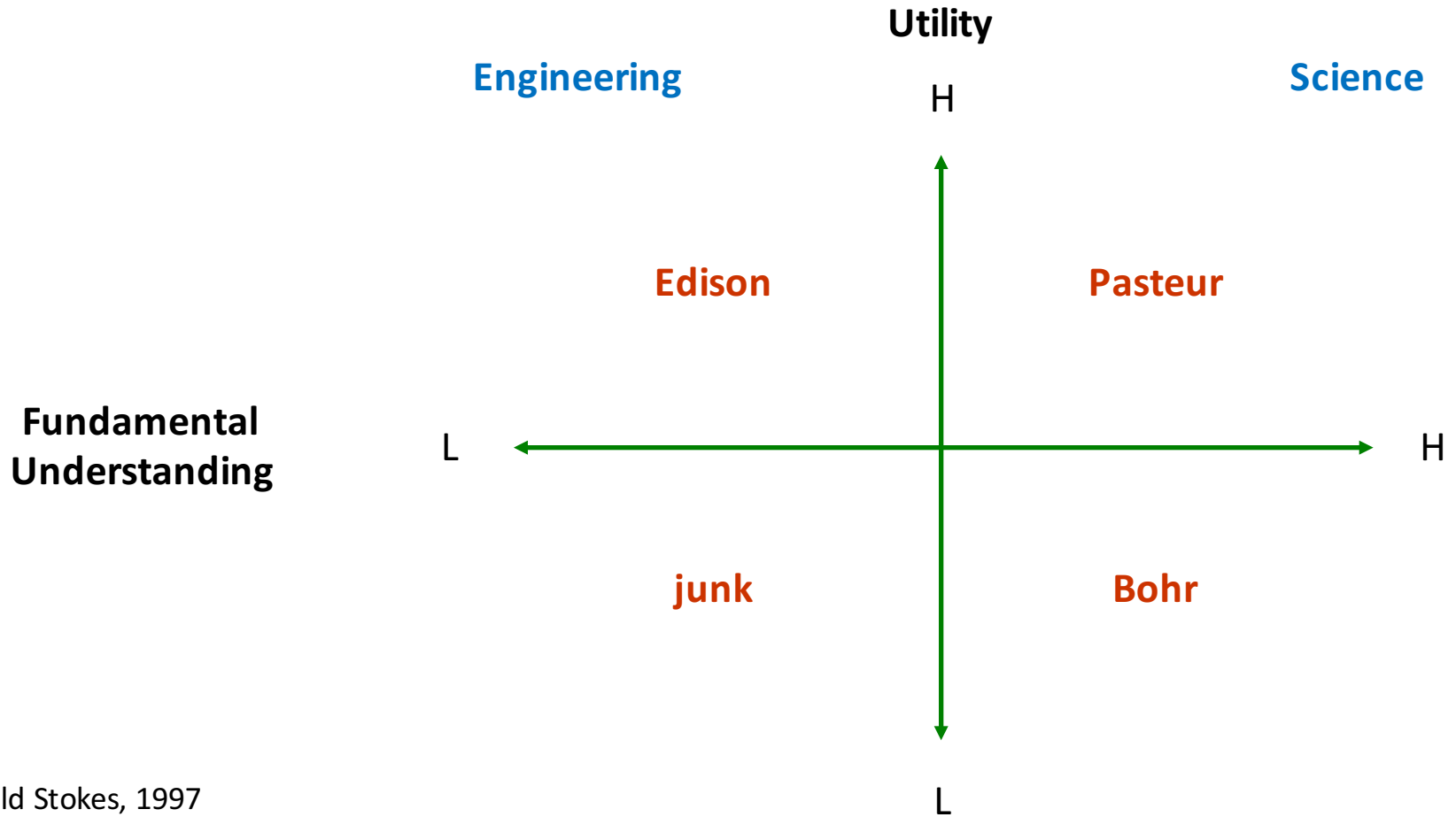


Cyber-Elephant Problem

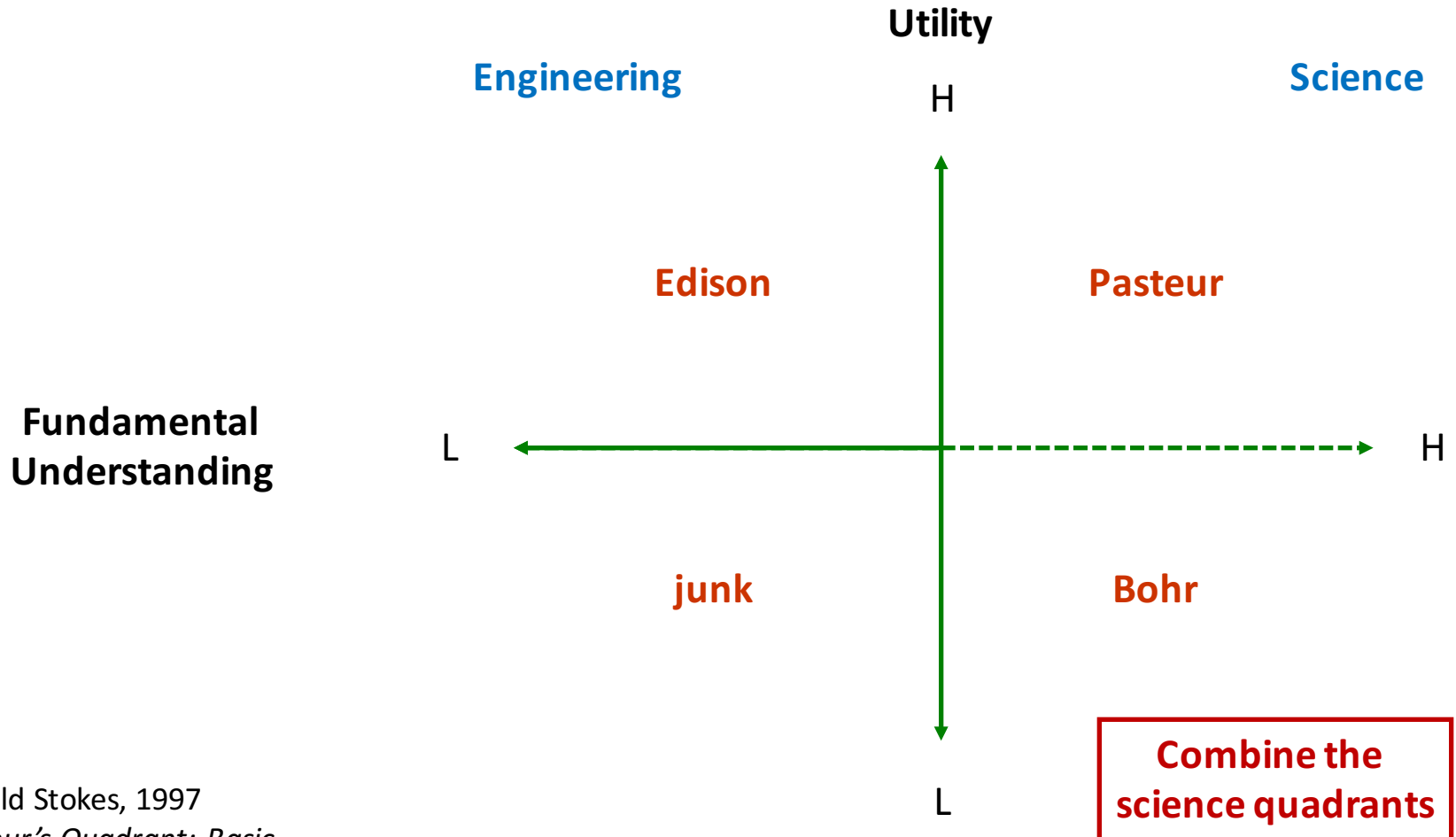


The cyber-elephant problem requires Applied and Basic research Combined (ABC)

* The New ABCs of Research, Ben Schneiderman, 2016



Donald Stokes, 1997
*Pasteur's Quadrant: Basic
Science and Technological Innovation*



Donald Stokes, 1997
*Pasteur's Quadrant: Basic
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Objectives

POLICY

ATTACKS

Enable
↕
Enforce

What?

Why?

Respond
↕
Defend

Mechanisms

P
R
O
T
E
C
T

How?

D
E
T
E
C
T

Complement

**Discretionary Access Control
(DAC), 1970**

**Mandatory Access Control (MAC),
1970**

**Role Based Access Control
(RBAC), 1995**

**Attribute Based Access Control
(ABAC), ????**

Fixed policy

Flexible policy

Born 1990s

7. ABAC Design, Engineering and Applications

5. ABAC Policy
Architectures
and Languages

3. Administrative
ABAC Models

4. Extended
ABAC Models

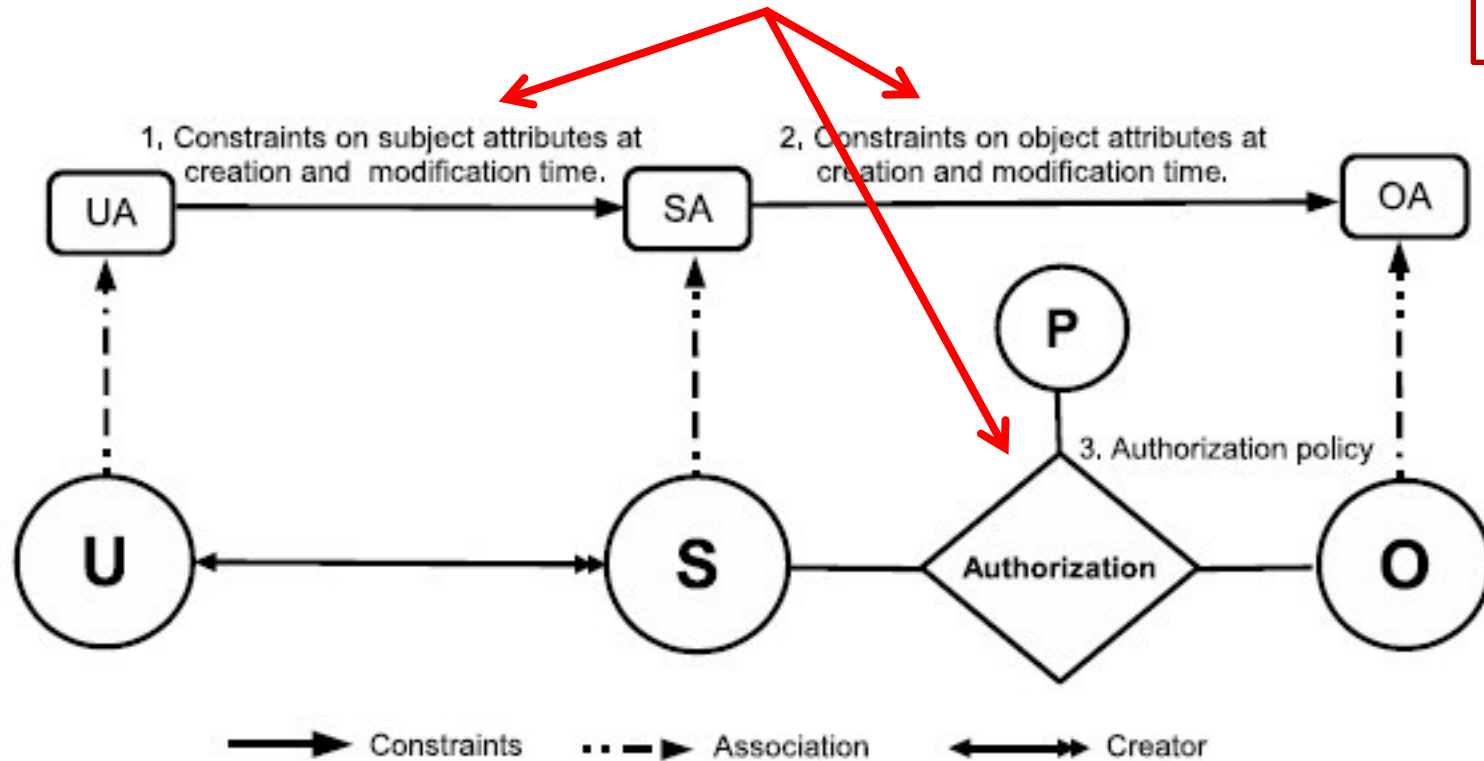
6. ABAC
Enforcement
Architectures

2. Core ABAC Models

1. Foundational Principles and Theory

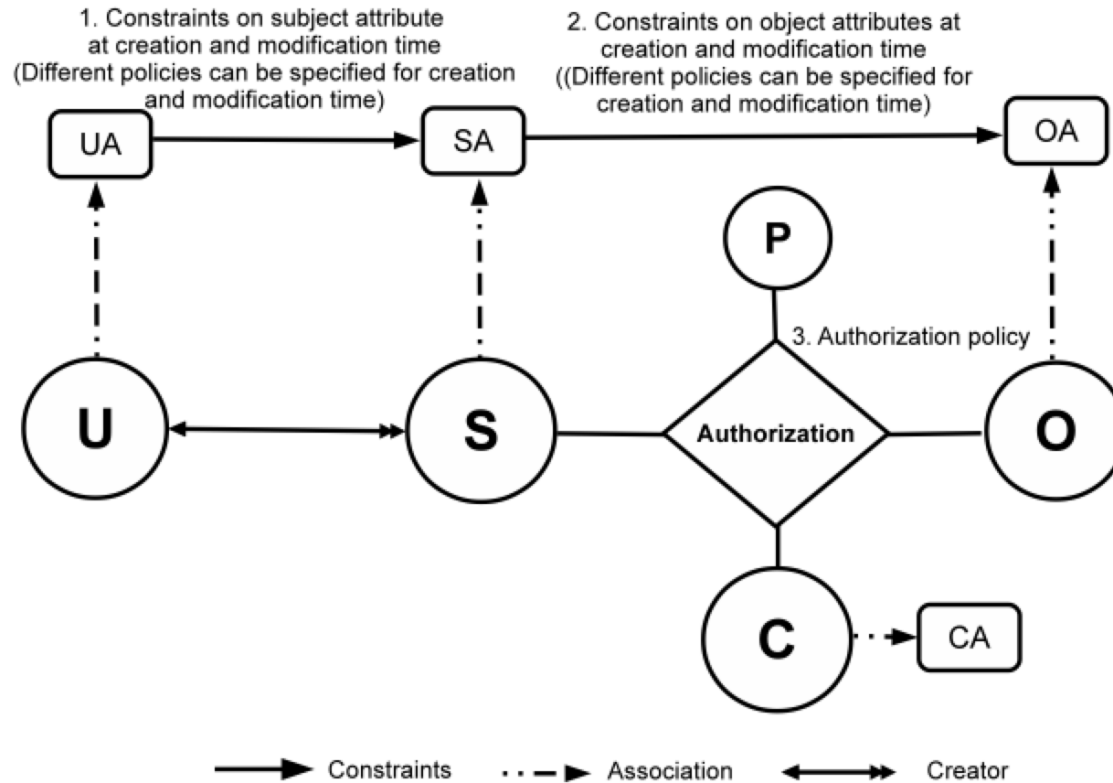
Policy Configuration Points

ABAC_α



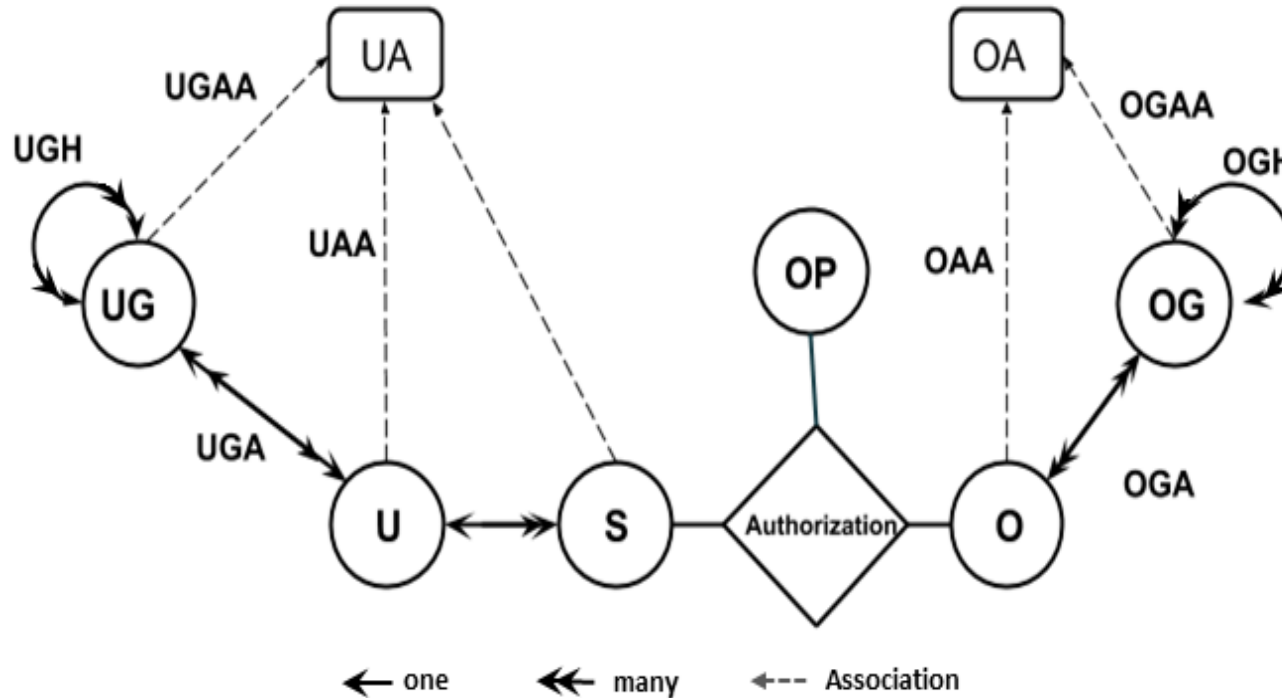
Can be configured to do simple forms of DAC, MAC, RBAC (Jin, Krishnan, Sandhu 2012)

ABAC_β



Can further be configured to do many RBAC extensions (Jin, Krishnan, Sandhu 2014)

HGABAC



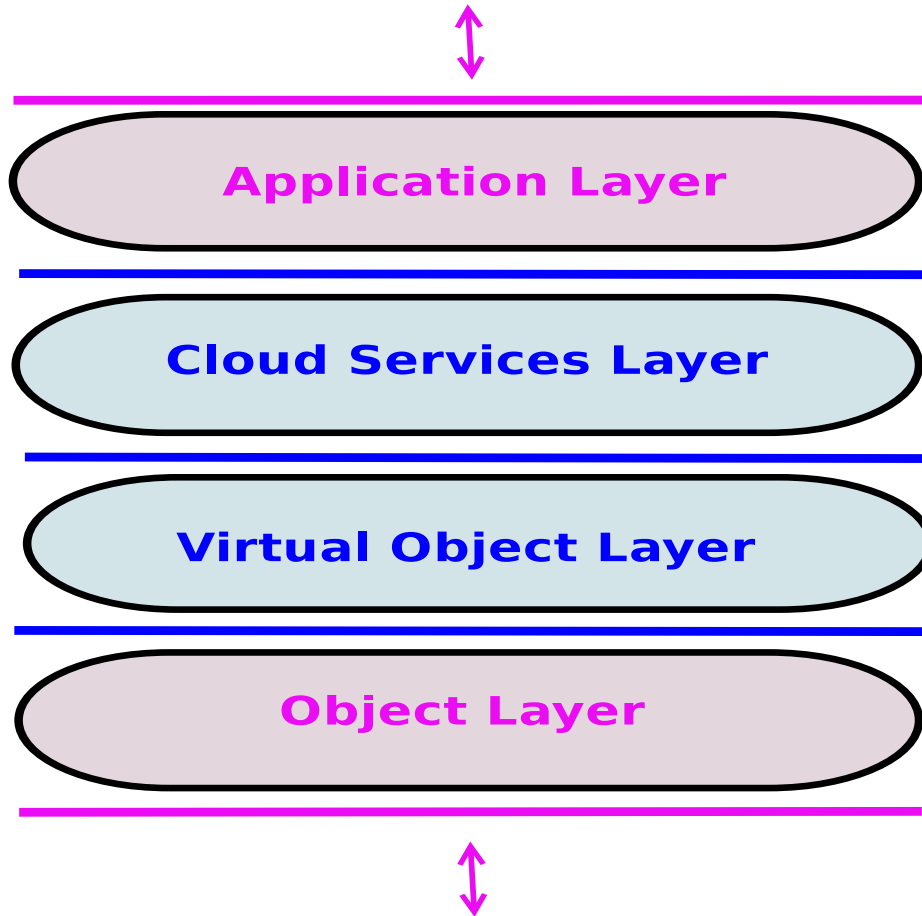
➤ Hierarchical Group and Attribute Based Access Control (HGABAC)

- ❖ Introduces User and Object Groups
- ❖ Simplifies administration of attributes

Servos and Osborn, 2015

User and Administrator Interaction

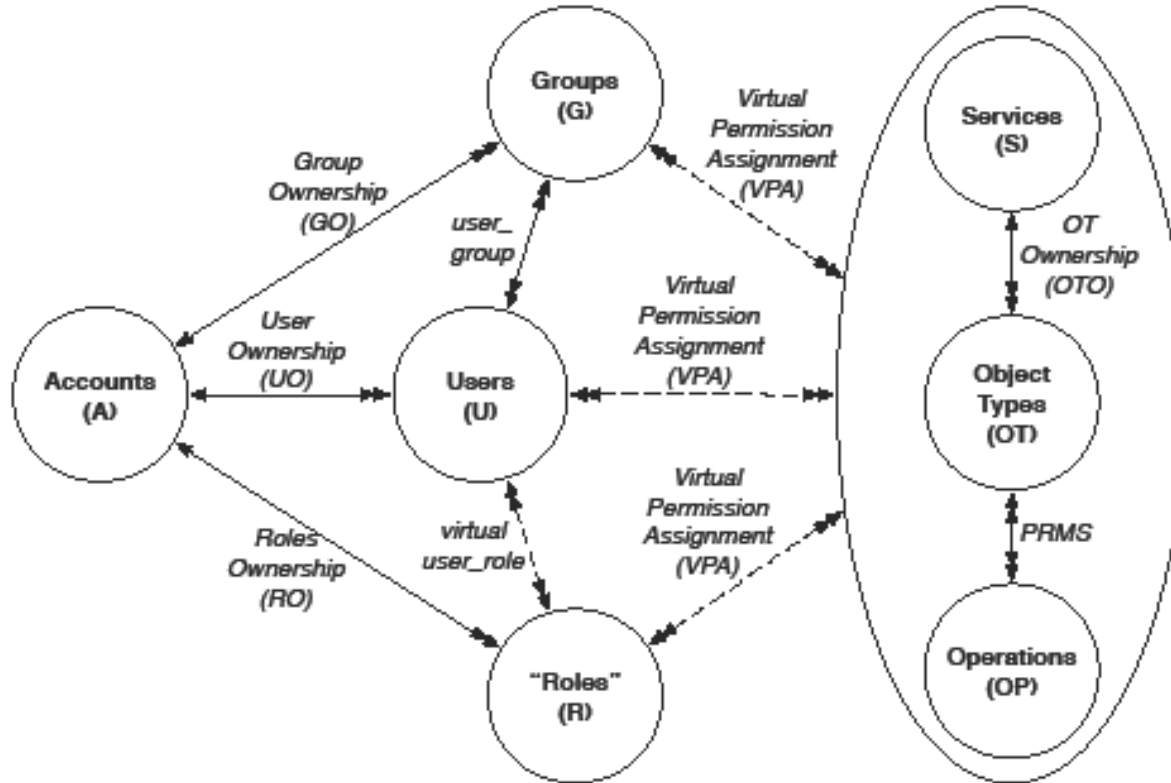
Cloud Enabled IoT



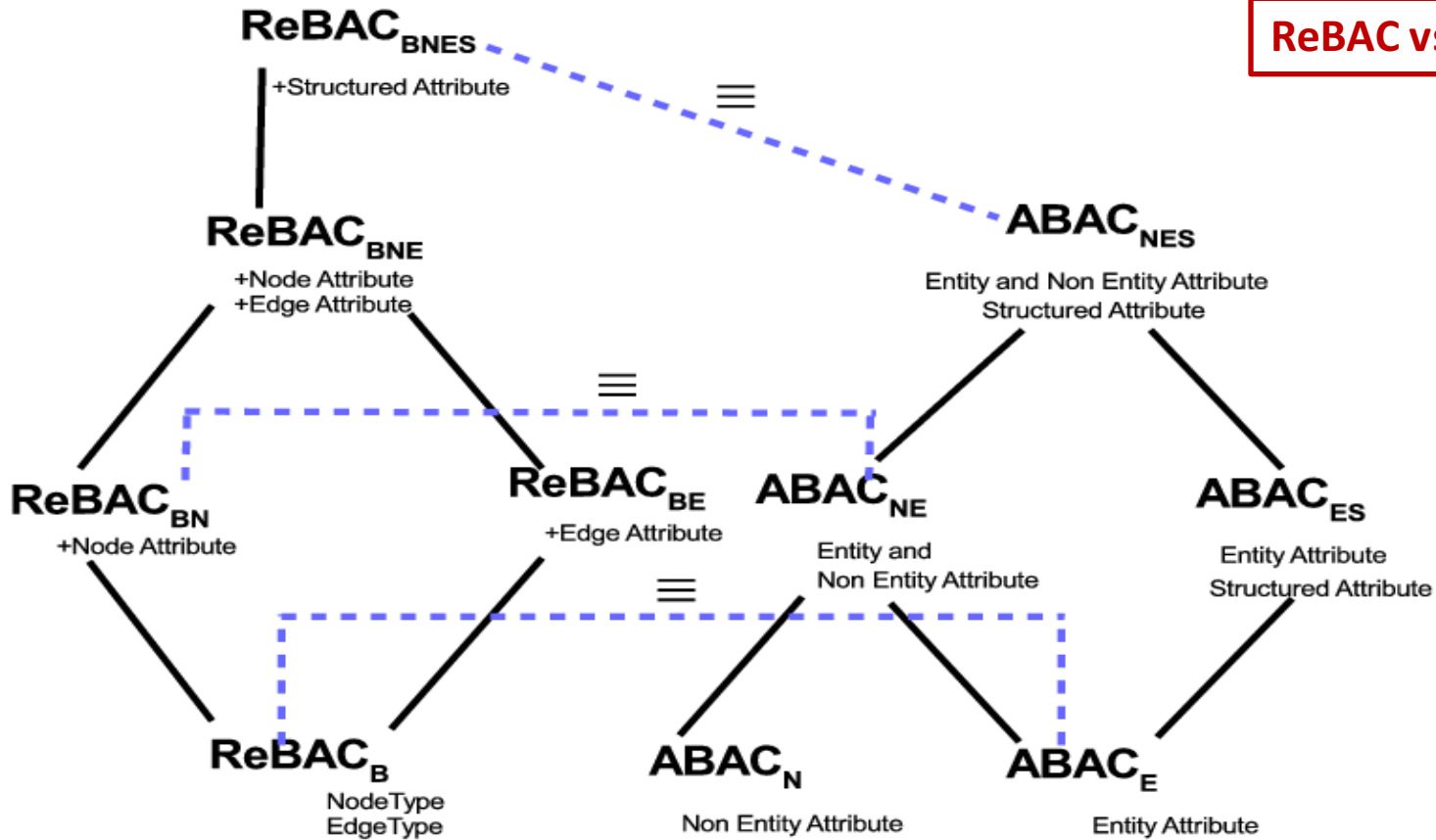
User Direct Interaction

Alsheri, Bhatt, Patwa,
Benson, Sandhu
2016 onwards

Amazon AWS Style

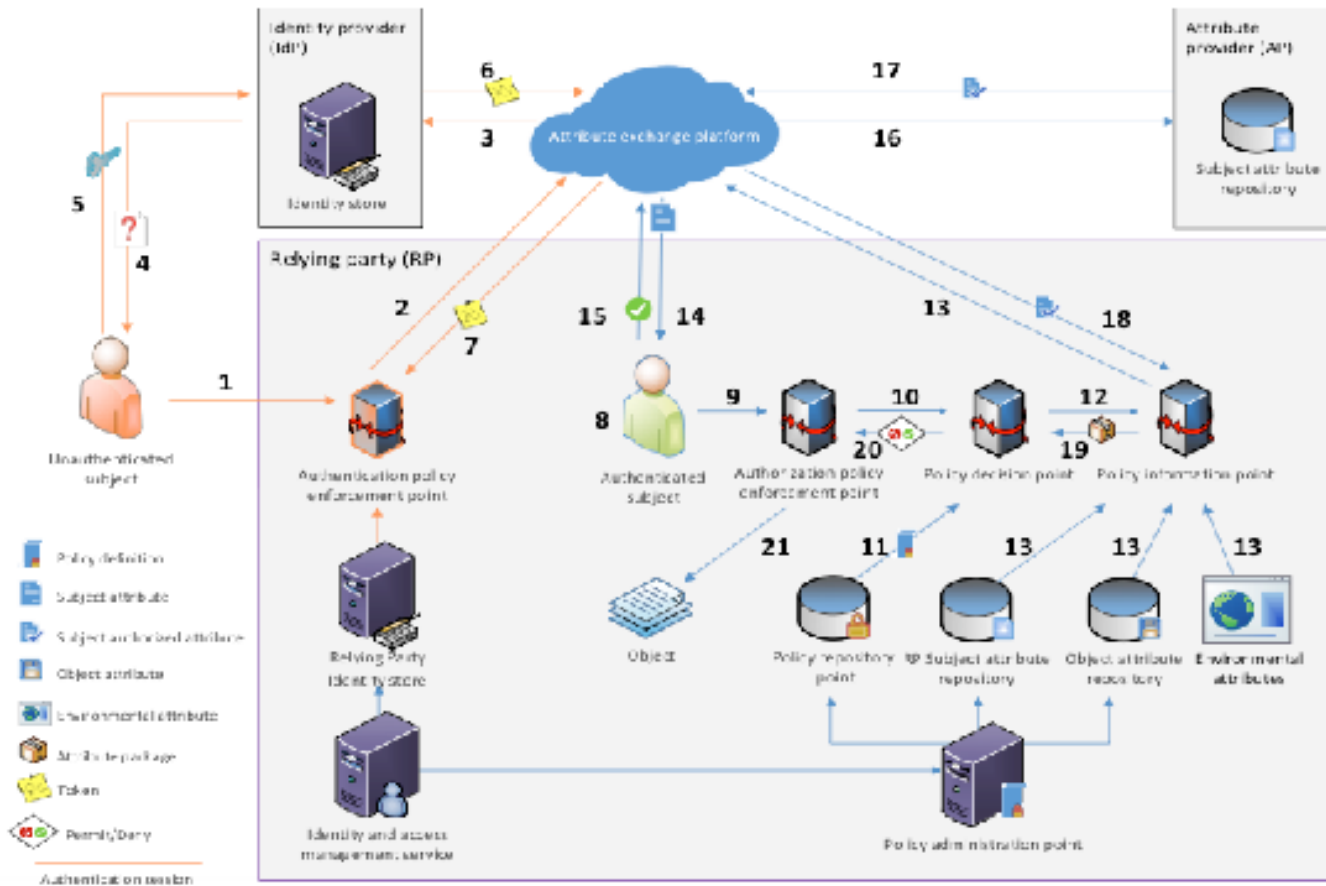


ReBAC vs ABAC



**ReBAC and ABAC are not that different
(Tahmina, Sandhu 2017)**

**Federated
ABAC**



Fisher 2015
NCCOE, NIST, Building Block

Safety Analysis

**Discretionary Access Control
(DAC), 1970**

**Mandatory Access Control (MAC),
1970**



**Role Based Access Control
(RBAC), 1995**

Can subject s obtain a right r on object o ?
❖ Current state?
❖ Some future state?



**Attribute Based Access Control
(ABAC), ????**

**Safety
Complexity**



Ahmed, Rajkumar, Sandhu
2016 onwards

7. ABAC Design, Engineering and Applications

5. ABAC Policy
Architectures
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3. Administrative
ABAC Models

4. Extended
ABAC Models

6. ABAC
Enforcement
Architectures

2. Core ABAC Models

1. Foundational Principles and Theory

- Applied and Basic Combined
- Holistic