

Attribute-Based Access Control: Insights and Challenges

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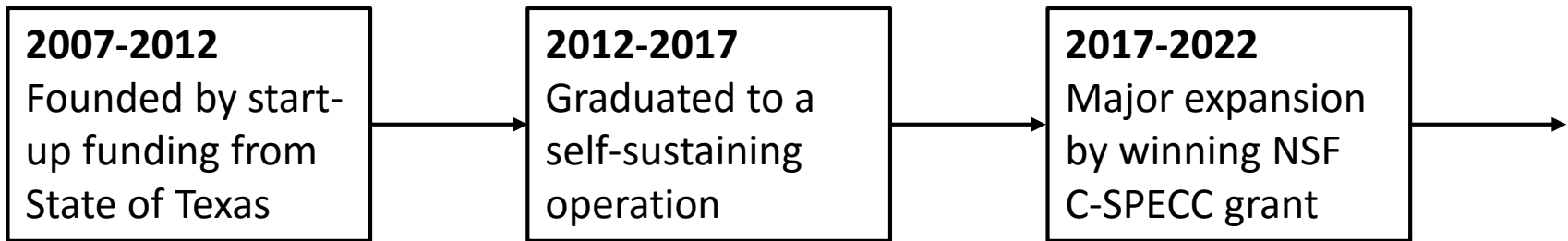
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MISSION

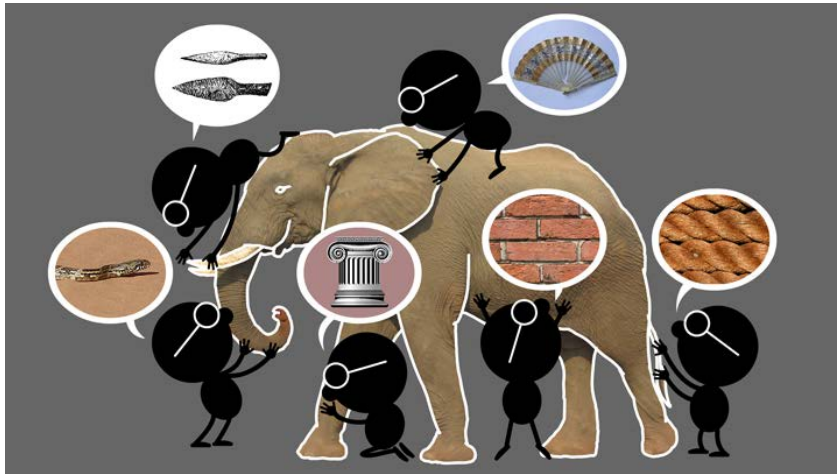
Sustained excellence in graduate-level sponsored research



- Situated in the College of Science, Department of Computer Science
- Established world class laboratories for:
Secure cloud computing and Malware research

In collaboration with:
College of Engineering
College of Business
College of Education
Open Cloud Institute
Cyber Center for Security & Analytics

Elephant Problem



Cyber-Elephant Problem



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

* The New ABCs of Research, Ben Schneiderman, 2016

SECURITY TECHNOLOGIES

- Access Control
- Policy
- Malware
- Detection and Forensics
- Security Dynamics

APPLICATION DOMAINS

- Cloud Computing
- Internet of Things (IoT)
- Social Networks
- Enterprise

Goal: Broaden and Deepen

Objectives

POLICY

ATTACKS

Enable
↕
Enforce

What?

Why?

Respond
↕
Defend

Mechanisms

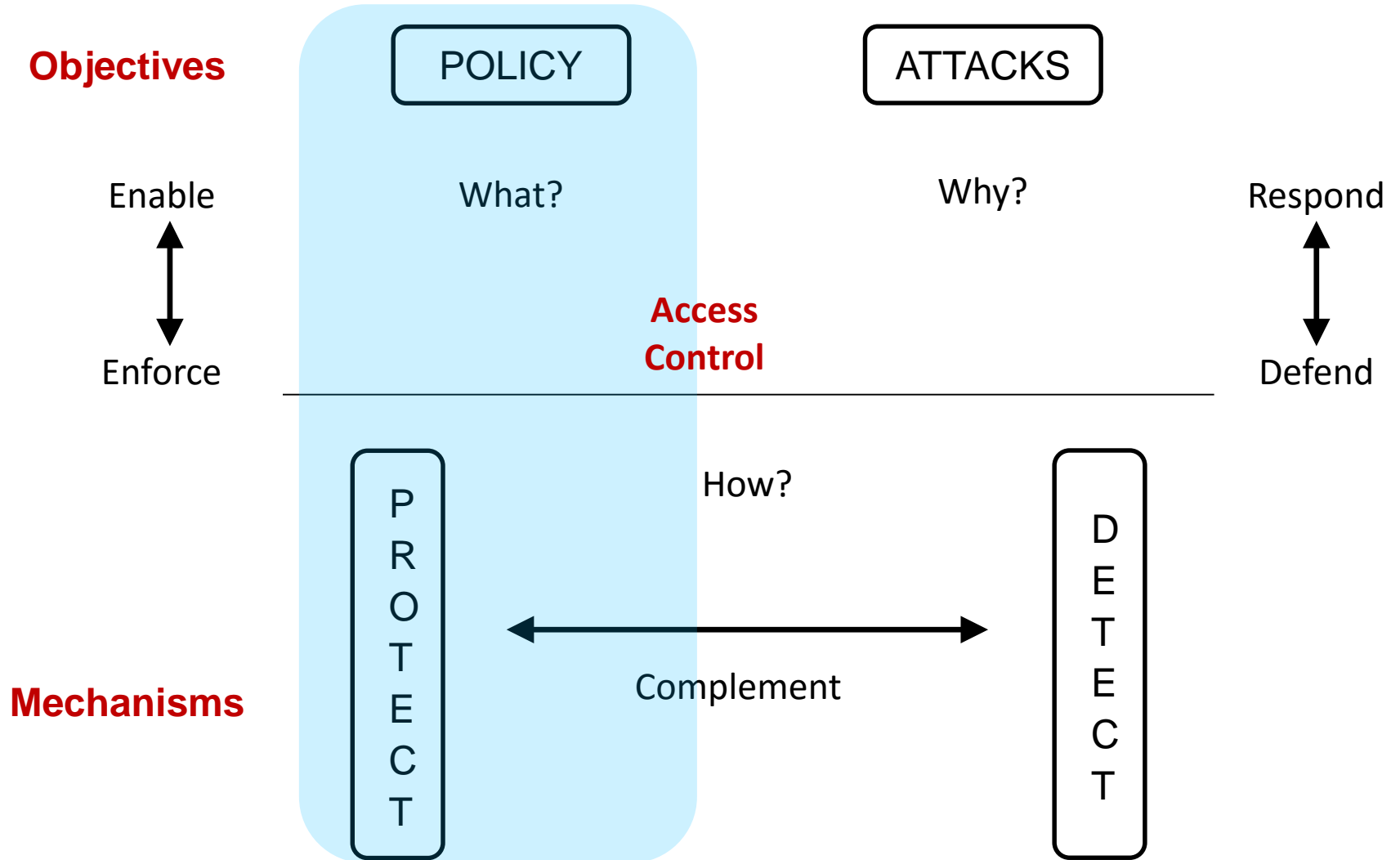
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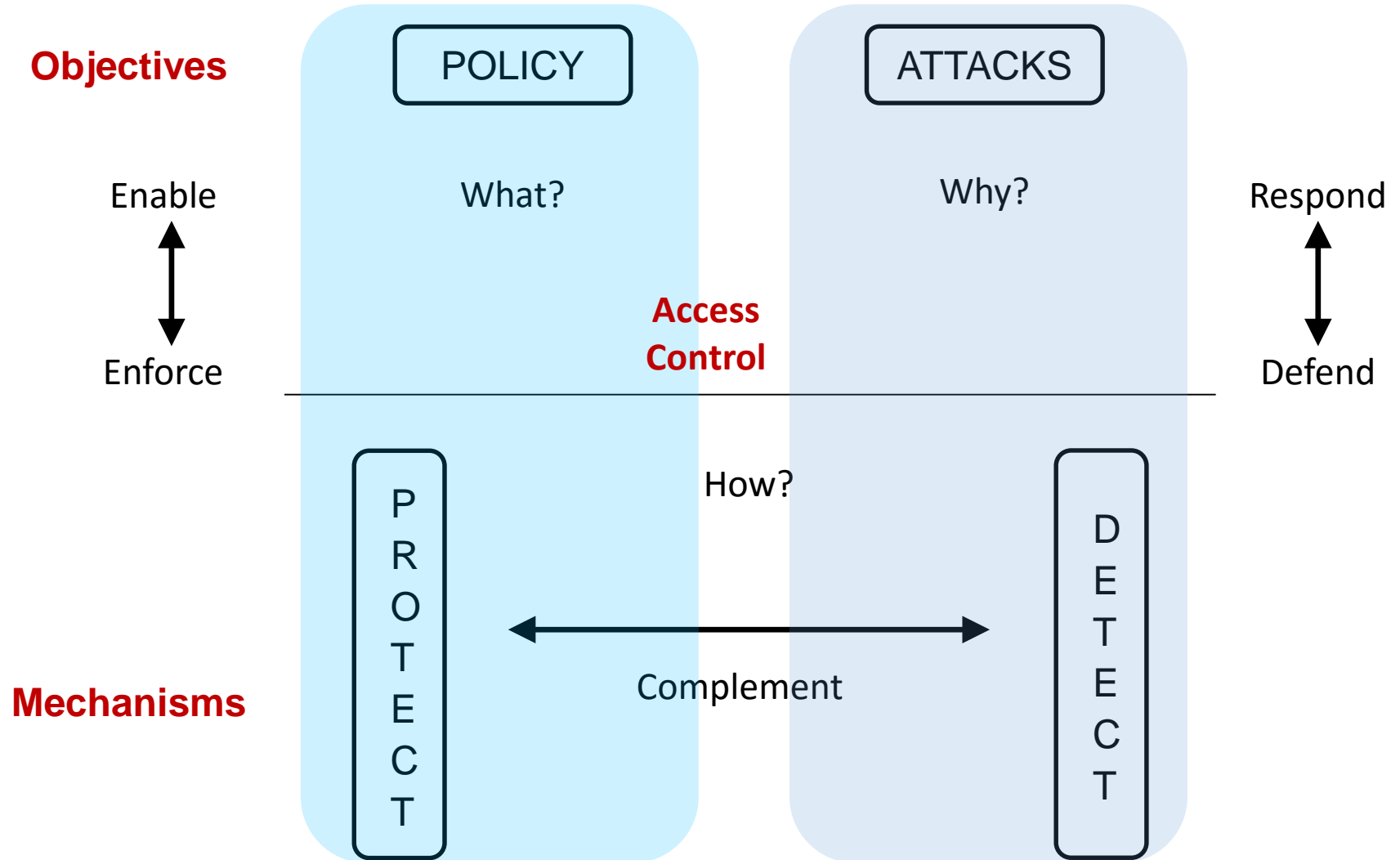
How?

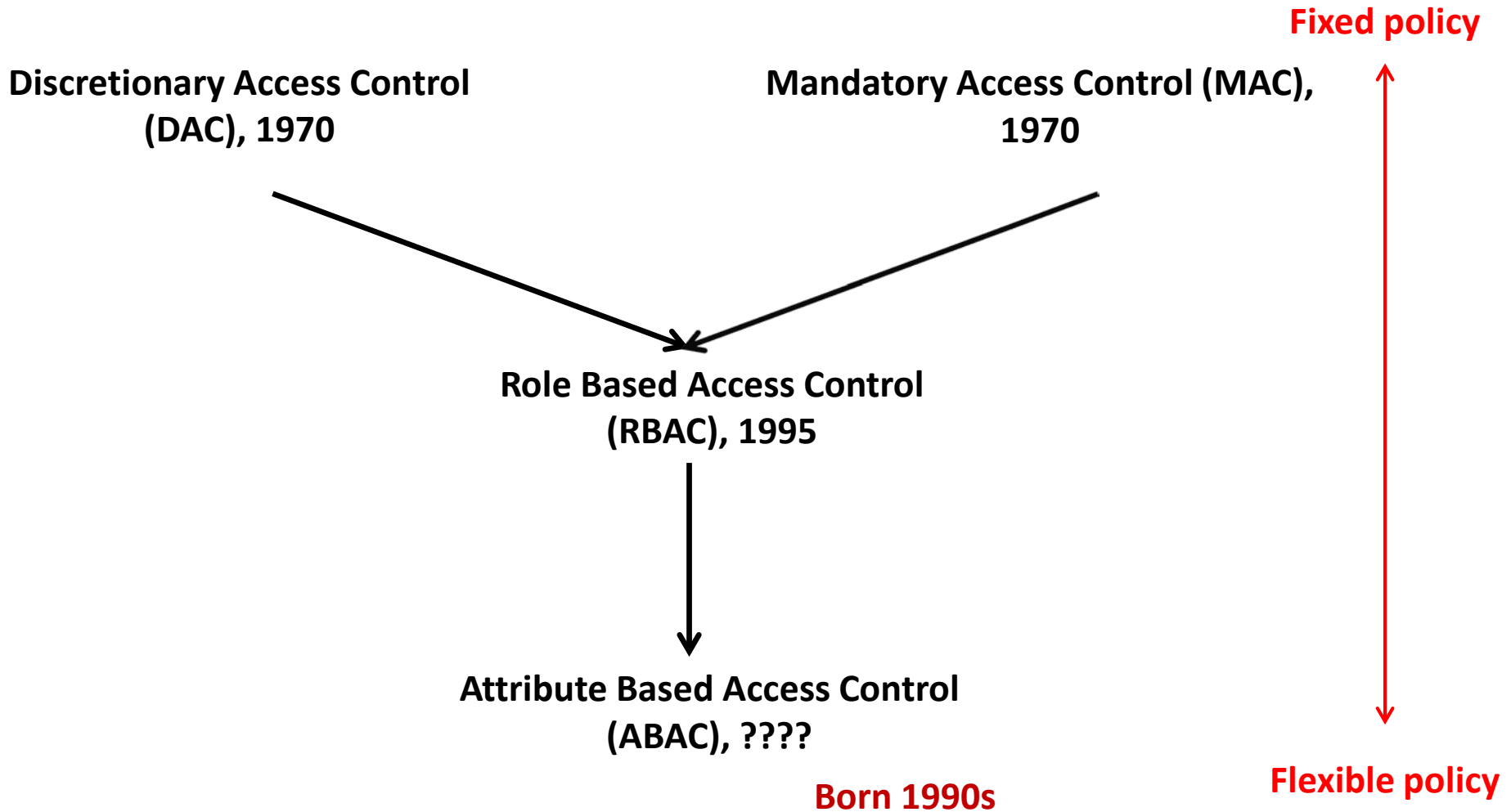
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Complement







7. ABAC Design, Engineering and Applications

5. ABAC Policy
Architectures
and Languages

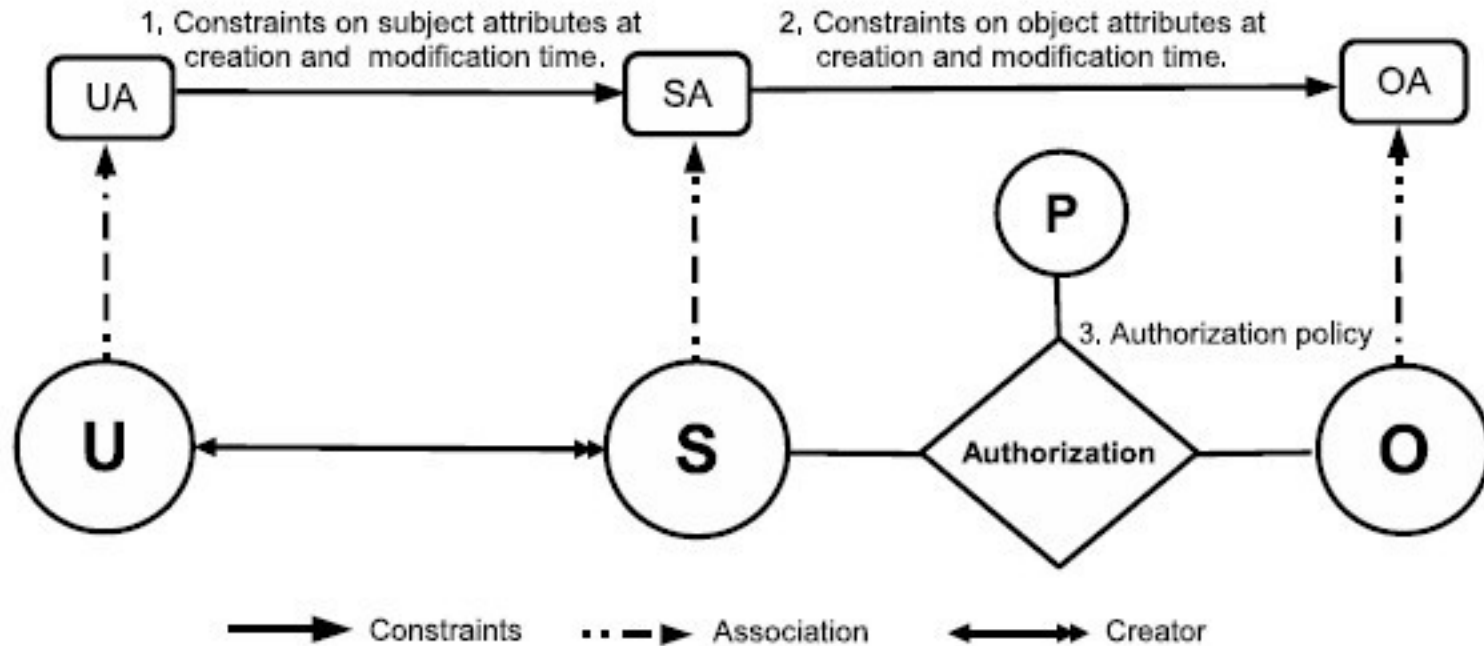
3. Administrative
ABAC Models

4. Extended
ABAC Models

6. ABAC
Enforcement
Architectures

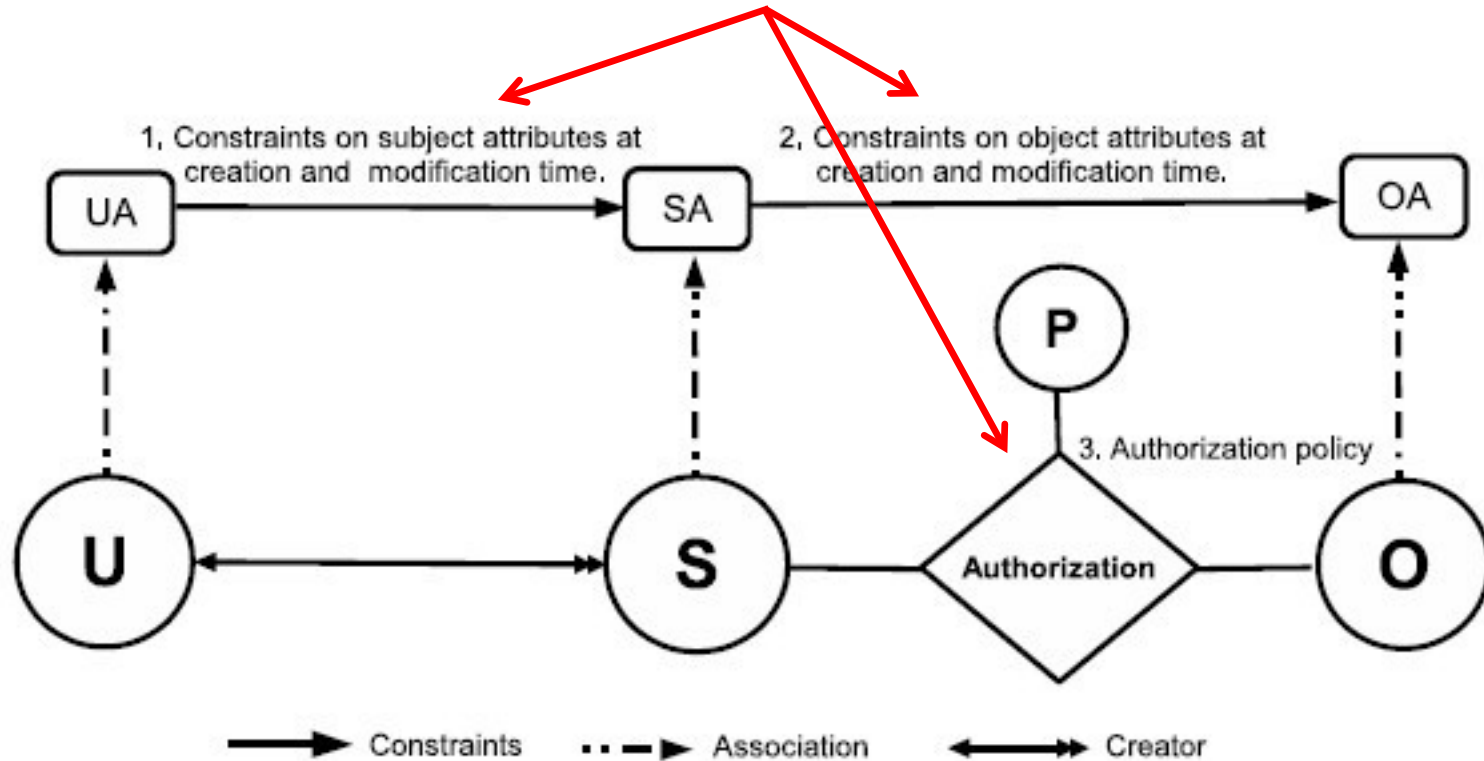
2. Core ABAC Models

1. Foundational Principles and Theory

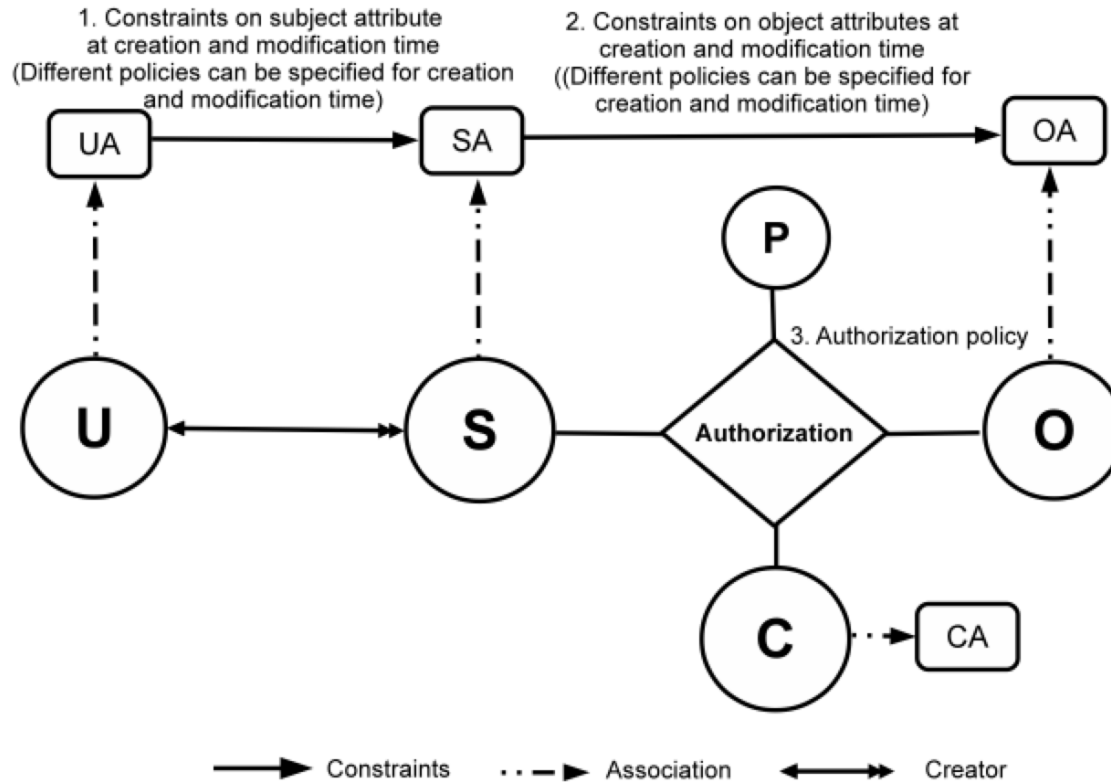


**Can be configured to do simple forms of DAC,
MAC, RBAC (Jin, Krishnan, Sandhu 2012)**

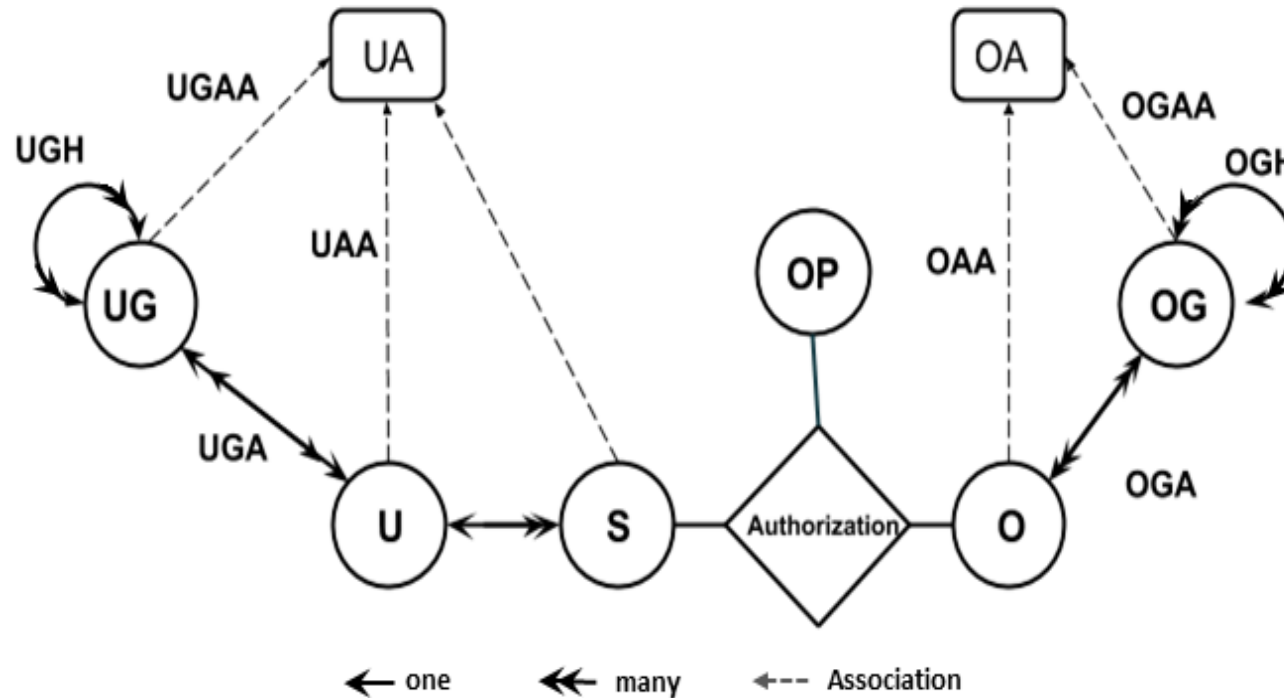
Policy Configuration Points



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



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

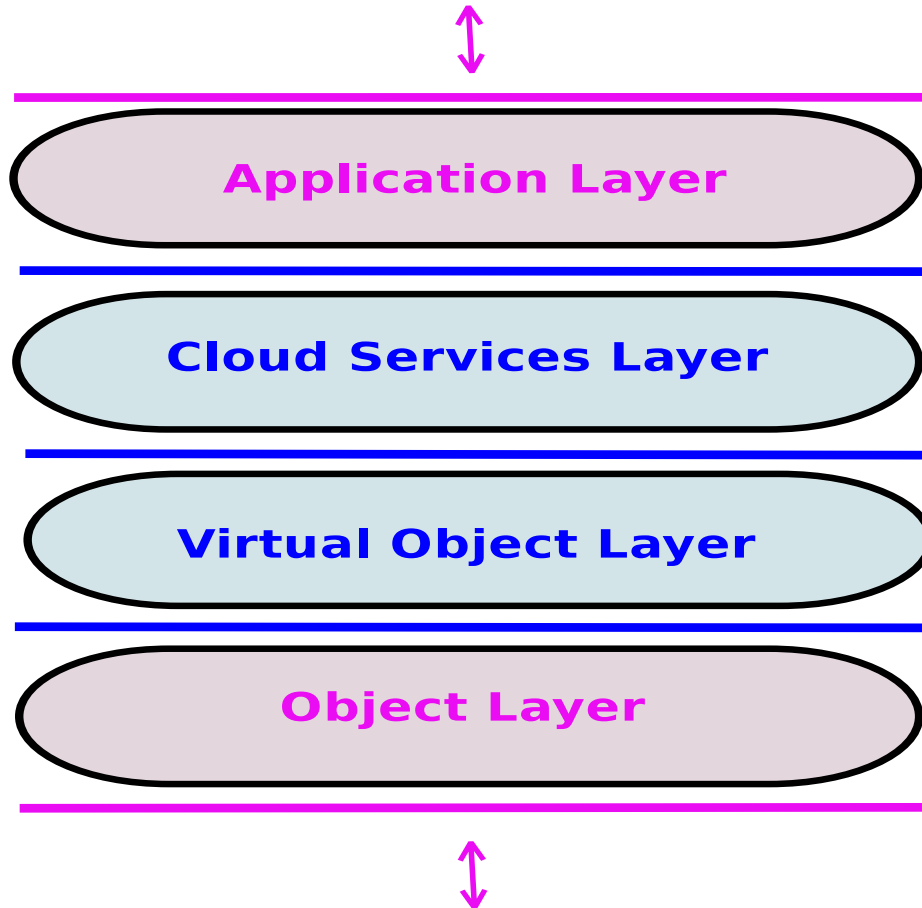


➤ Hierarchical Group and Attribute Based Access Control (HGABAC)

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

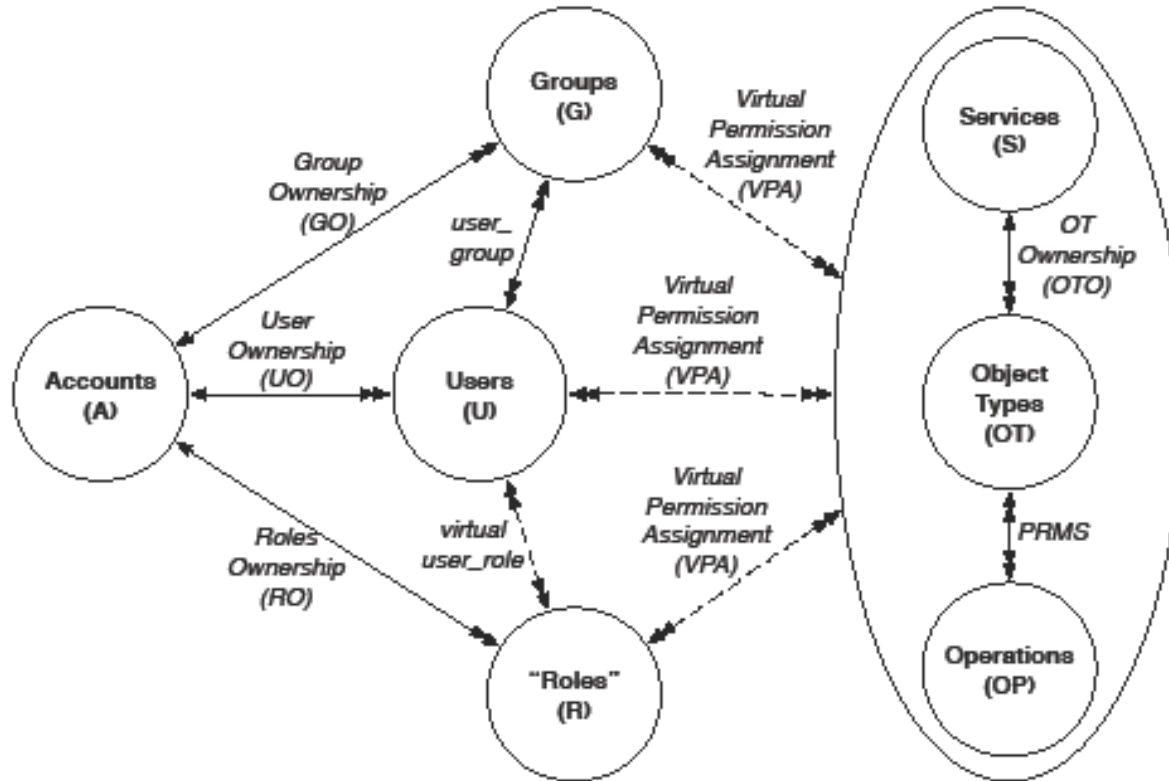
Servos and Osborn, 2015

User and Administrator Interaction



User Direct Interaction

Alsheri, Bhatt, Patwa,
Benson, Sandhu
2016 onwards



* 7. ABAC Design, Engineering and Applications

*
5. ABAC Policy
Architectures
and Languages

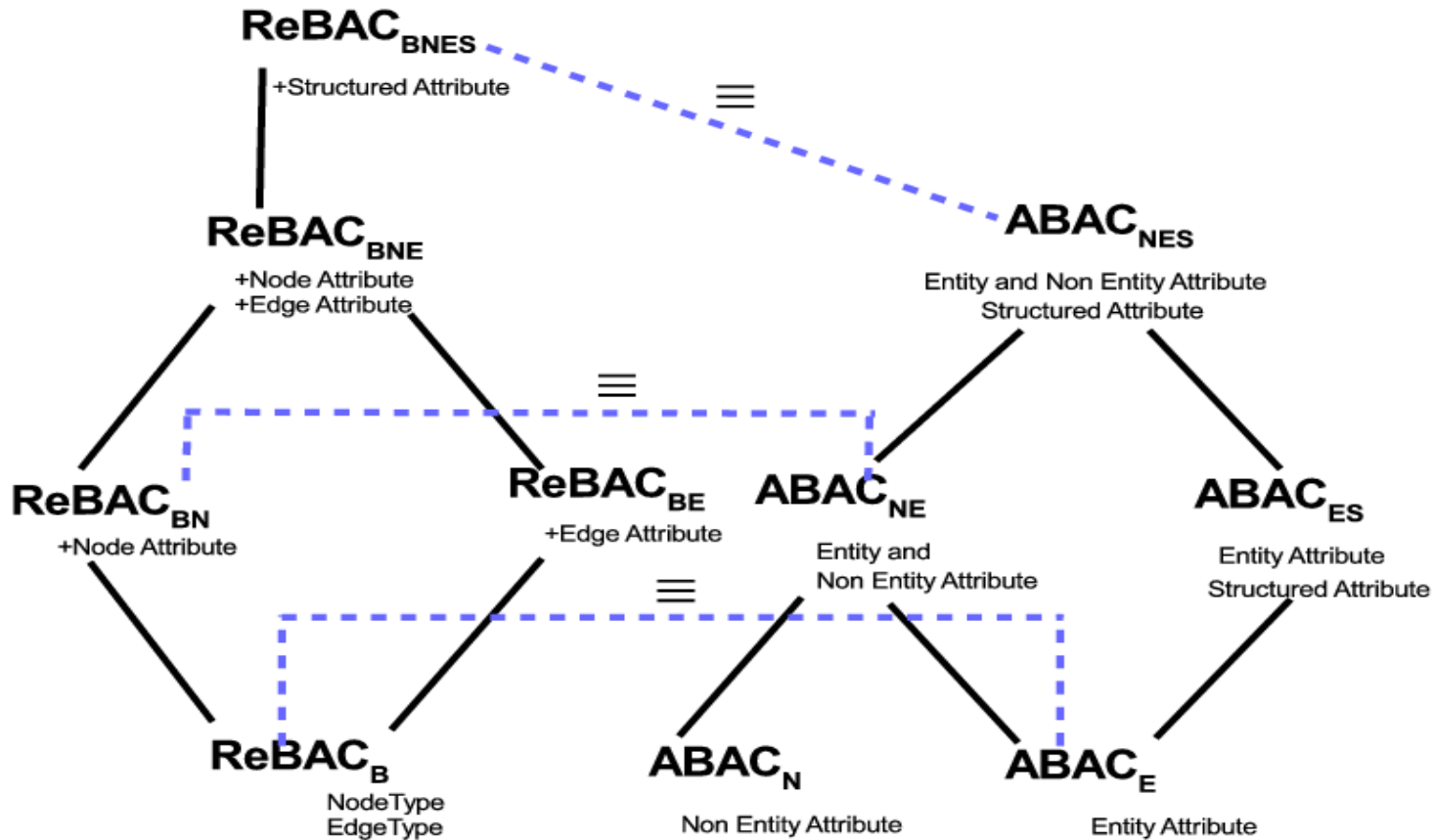
3. Administrative
* ABAC Models

4. Extended
ABAC Models

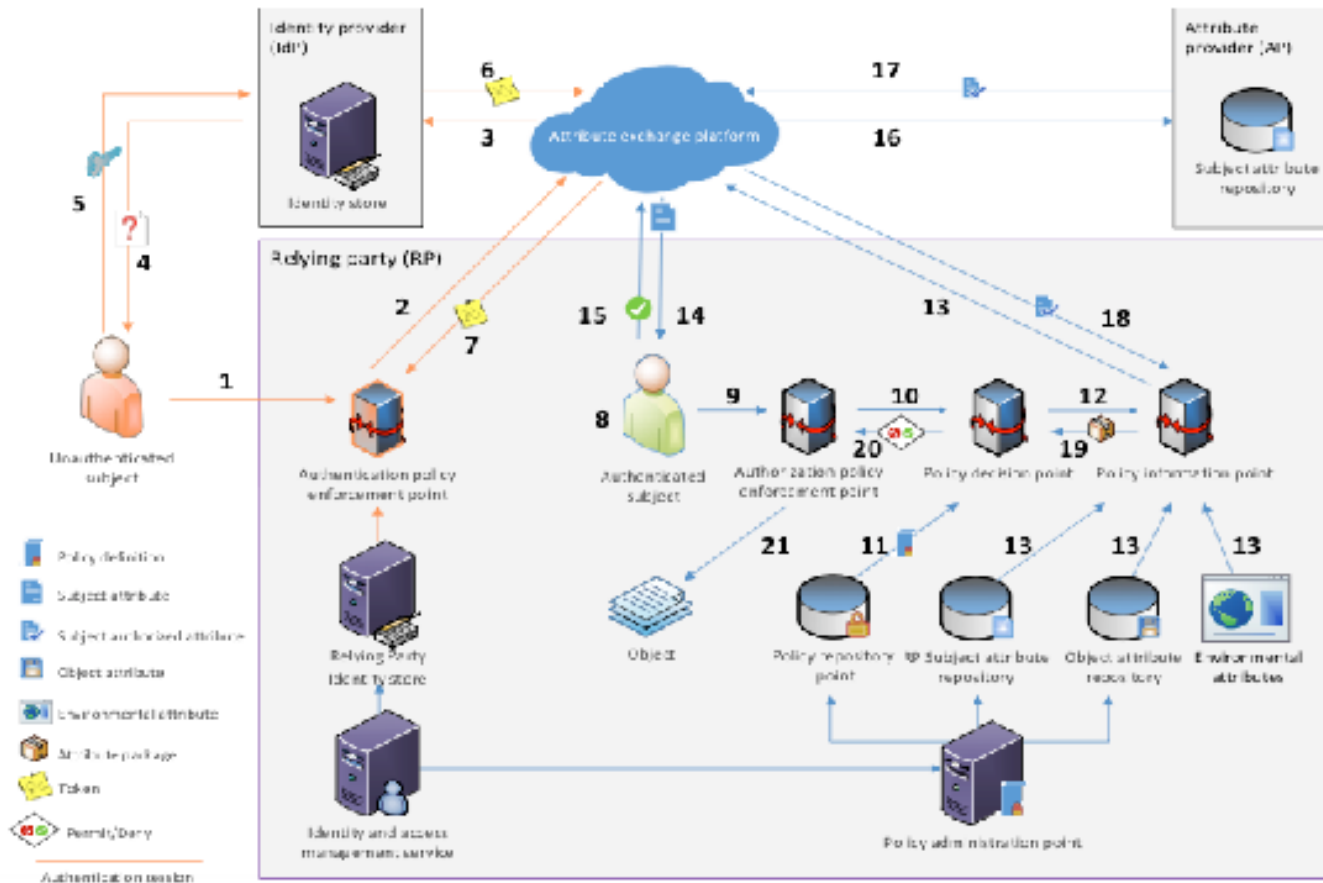
* 2. Core ABAC Models

6. ABAC
Enforcement
Architectures

1. Foundational Principles and Theory



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



Fisher 2015
NCCOE, NIST, Building Block

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

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

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

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

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

**Safety
Complexity**

Ahmed, Rajkumar, Sandhu
2016 onwards