A Federation Architecture for DETER

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Outline

The Federation Problem

A Model for DETER Federation

A Simple Prototype

Federation: What and Why

- Sharing Distributed Experimental Resources
- Resource Admin and Policy Creates Specialization
- Examples
  - Many DETER Nodes
  - Customized “Lego” Apparatus
    - Malware Capture Facility and High-containment Testbed
    - Trace Collection Facility and Trace-driven Emulation

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Federation Challenges

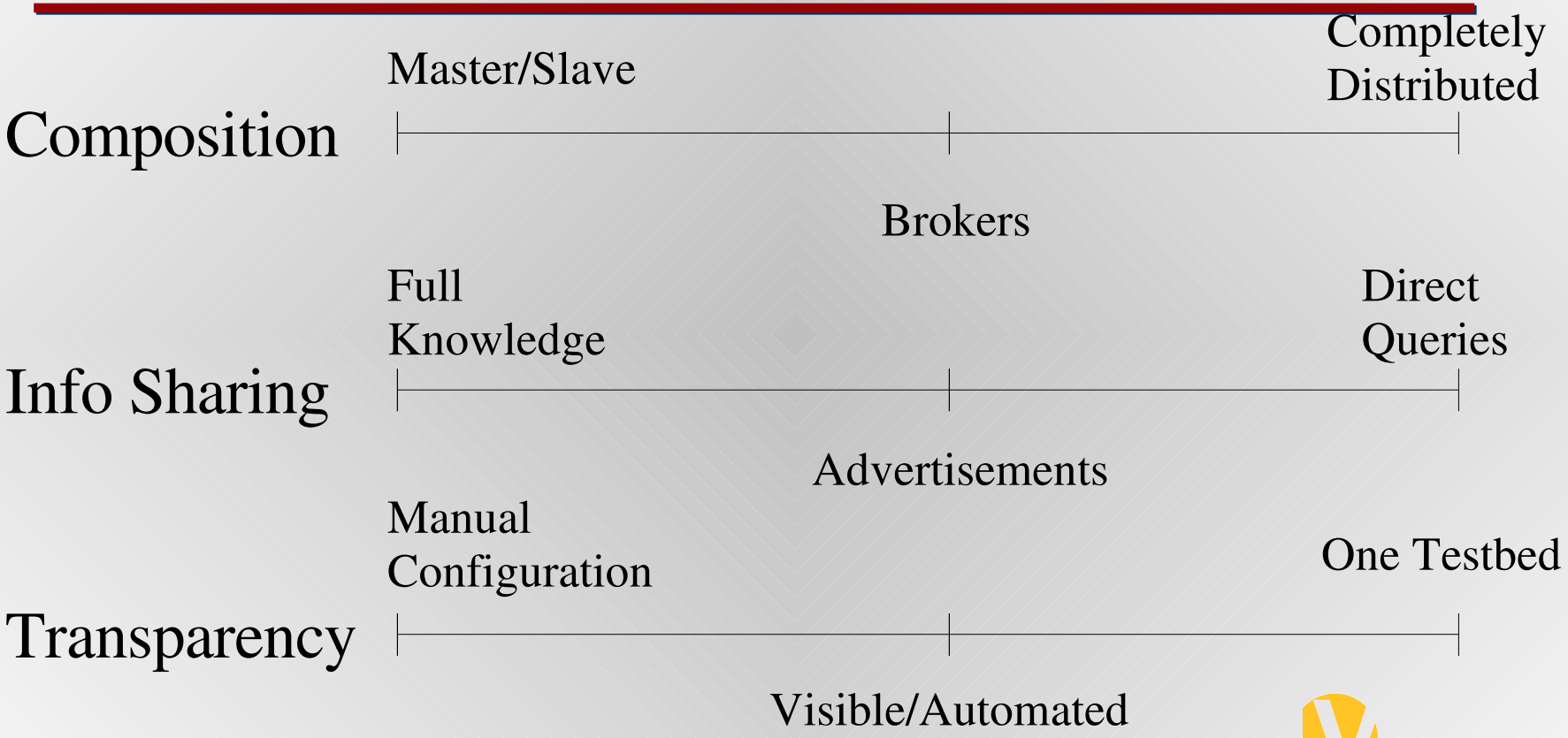
- Shared Control of Resources
  - Respect Local Admin/Policy
  - Compose New Facilities
- Resource Discovery (at Scale)
  - Describe Resources and Properties
  - Find Resources with Properties

More Federation Challenges

Distributed Composition of a Unified Facility

- Create Consolidated Tool from Multiple Testbeds
- Manipulate Distributed Resources Intuitively
- (ISI Prototyping Here)

Federation Solution Space



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A DETER Federation Architecture

Apparatus Configuration Layer

- Resource Discovery Unbound
- Distributed Administration Incorporated

Coordinates:

- (Primary/Secondary, Direct Query, Visible)

Focus On Combining DETER Namespaces/Features

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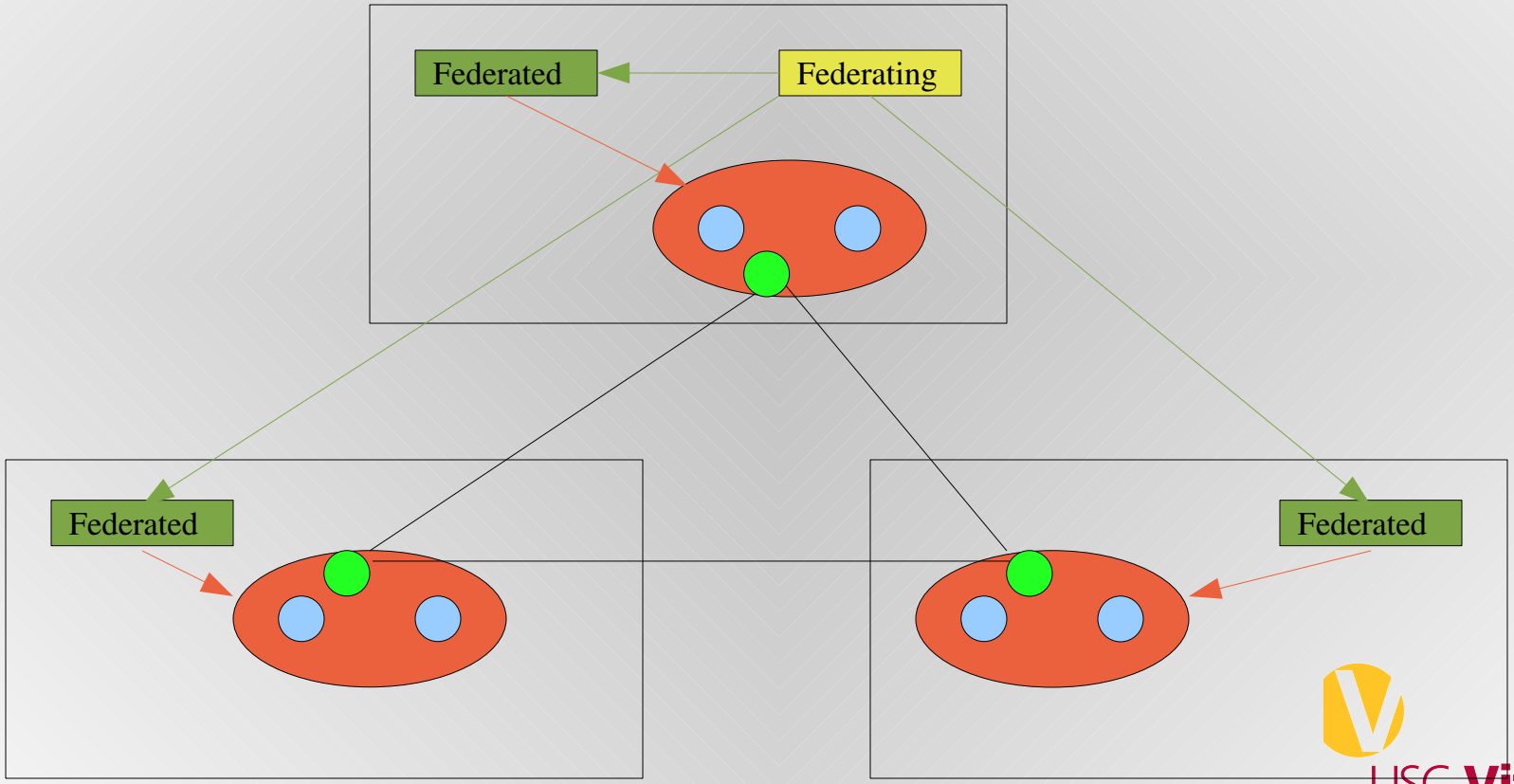
Shape of the Architecture



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Testbed Features to Compose

Features:

- Connectivity (IP addresses & tunneling) (experiment)
- Storage (shared filesystem) (project)
- Principals (user IDs/accounts) (project)
- Host Configuration (system images) (experiment)
- Experiment Control (event system) (experiment)

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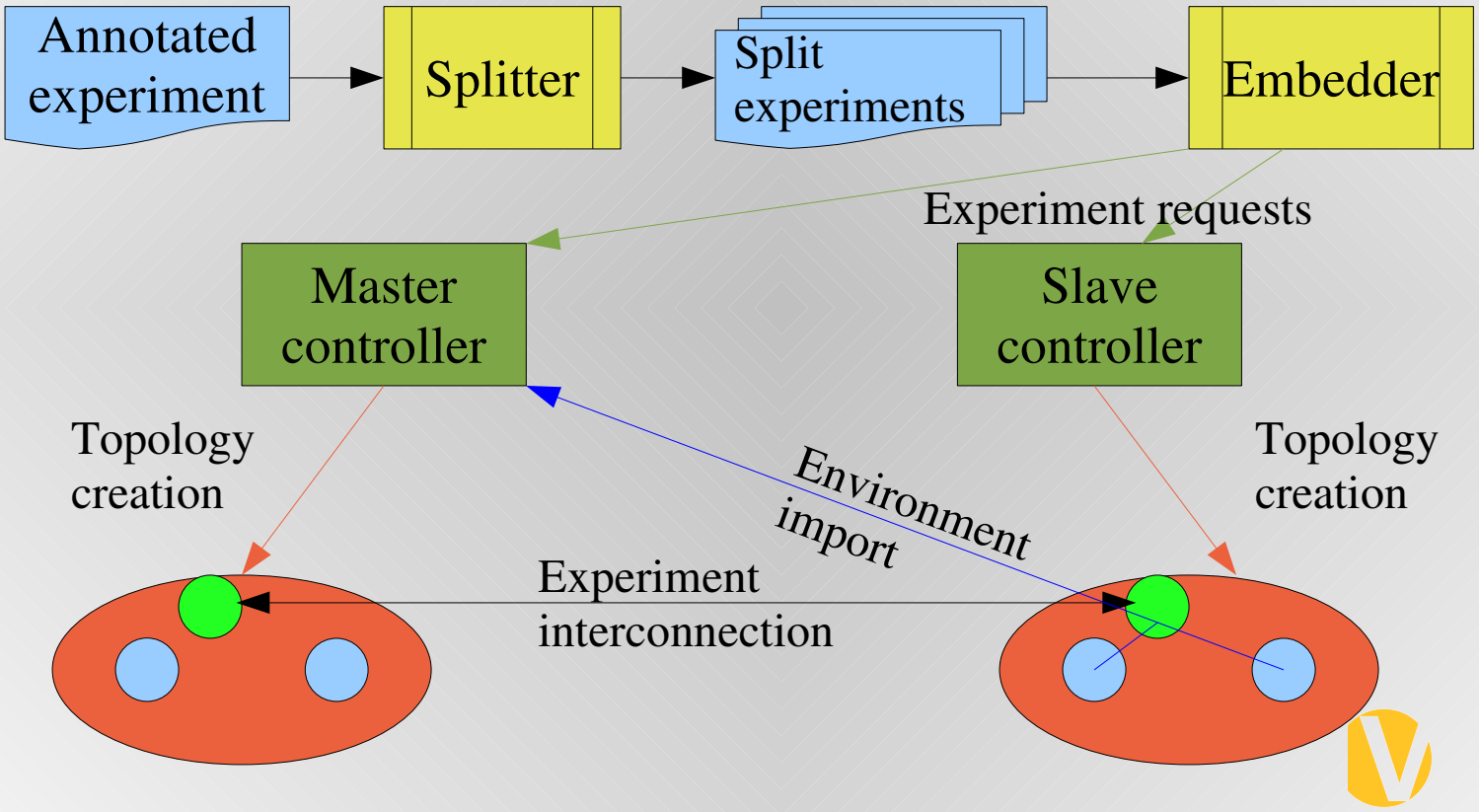
The Prototype



Prototype Components

Experiment Partition

- Parser splits annotated ns files into sub-experiments
- Sub-experiments use local names

Centralized Synchronization

- Testbeds configured through SSH/XML-RPC
- Basic failure handling

More Prototype Components

- Connectors: Experiment and Control
  - IP over SSH tunnel
  - SSH tunnel to Primary Users/Boss
- Node Configuration
  - Import user accounts
  - Mount remote file systems

Conclusions

- Simple Working Prototype
  - Prototype vs. implementation?
- Extending the Prototype
  - Event system
  - Connector interfaces
- Extending the Architecture
  - Multiple simultaneous embeddings/allocations
  - Higher level experiment descriptions

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Prototyped Combinations

- Connectivity
  - Merged IP space – IP tunneling
- Storage
  - Primary filesystem exported
- Principals
  - Primary testbed exported
- Experiment Control (SEER/event system)
- Host Configuration (system images)

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