# Trusted Big Data Sharing

## Researching alliances and infrastructure models across multiple autonomous organizations

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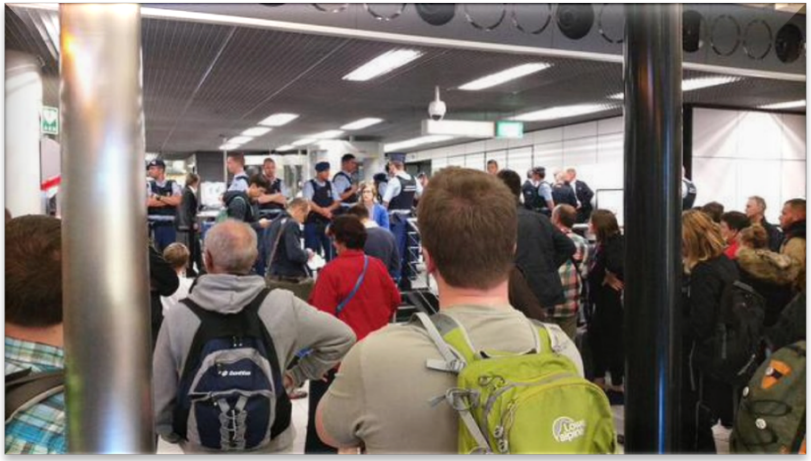
# Data representing value in airline context

Passenger flow handling



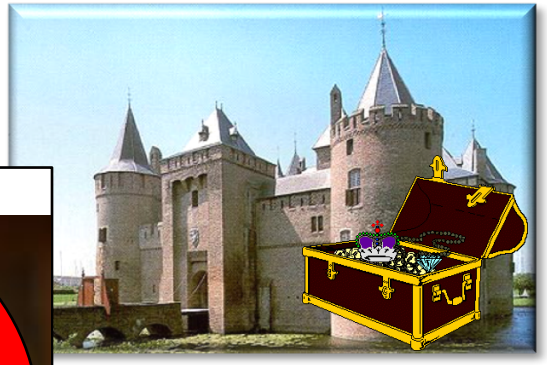
Integrated Vehicle Health Management & Predictive Maintenance


Cybersecurity (NWO-COMMIT/ SARNET project)

Cargo load optimization & scheduling


Passenger experience

# Big Data Sharing in commercial Enterprise environments



# Sharing Big Data assets needs:

Clearly defined and agreed common benefit

Established common rules governing use, access **AND** benefit sharing.

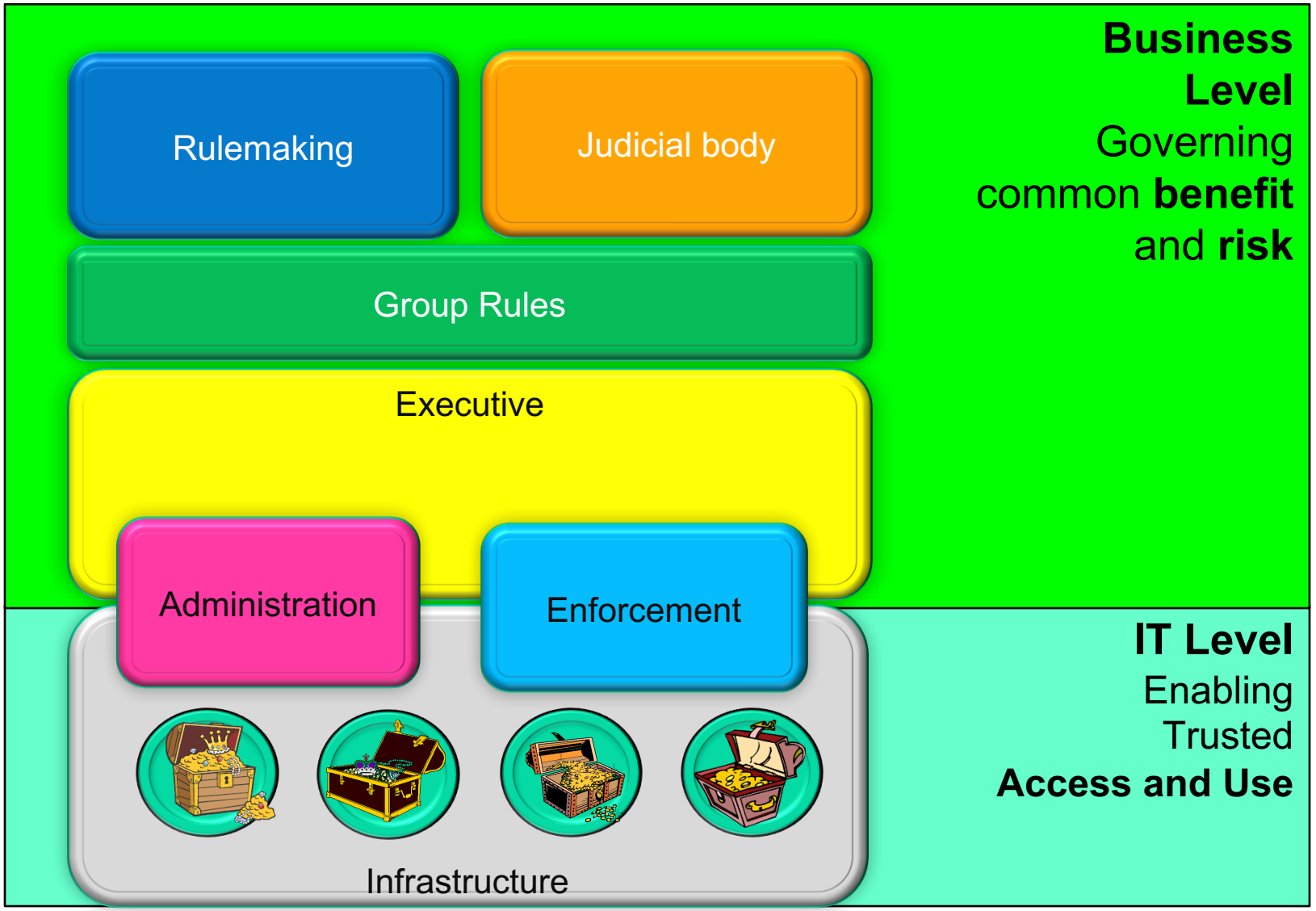
Organizing trust amongst group members as means to reduce risk

Research Topic 1: Cybersecurity Alliance context

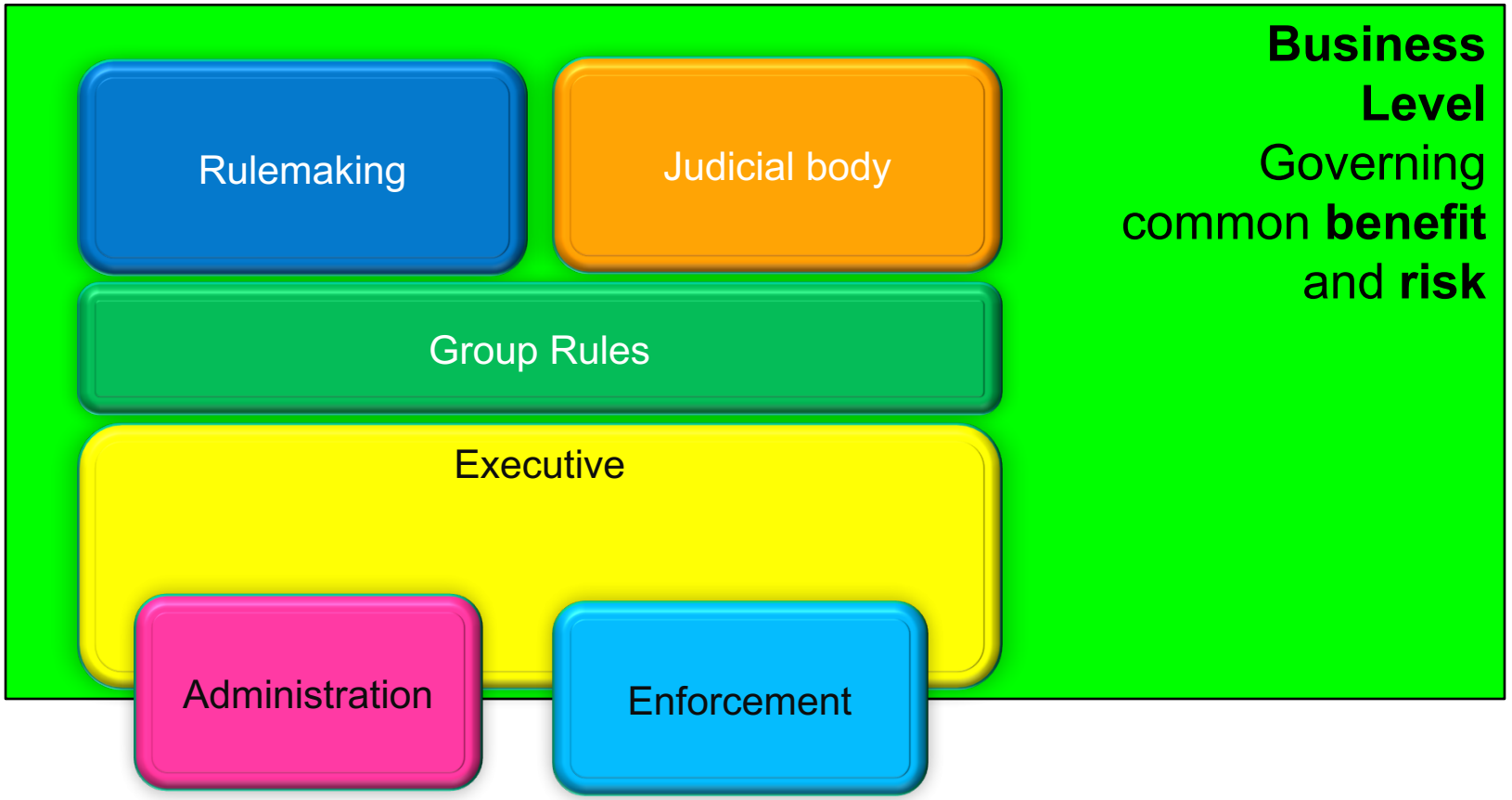
Infrastructure supporting implementation of trust

Research Topic 2: Trusted Big Data Sharing Infrastructure context

# Organizing trust



# Topic 1: Creating Alliances




Using the Service Provider Group framework describing a way trust could be organized, the main question became how to quantify trust, ie:

*What trustworthiness estimators expresses alliance member behavior influencing risk and benefits for the group of alliance members?*

# Research Approach

Agent Based Models that simulate alliance member behavior trusting the alliance as a whole, based on uncertainty of its environment:

*1. How to model an alliance context using trustworthiness estimates?*
*2. How accurate, robust and reliable are particular sets of trustworthiness estimates?*
*3. Are trustworthiness estimates influenced when agents have limited knowledge about its environment?*
*4. …*

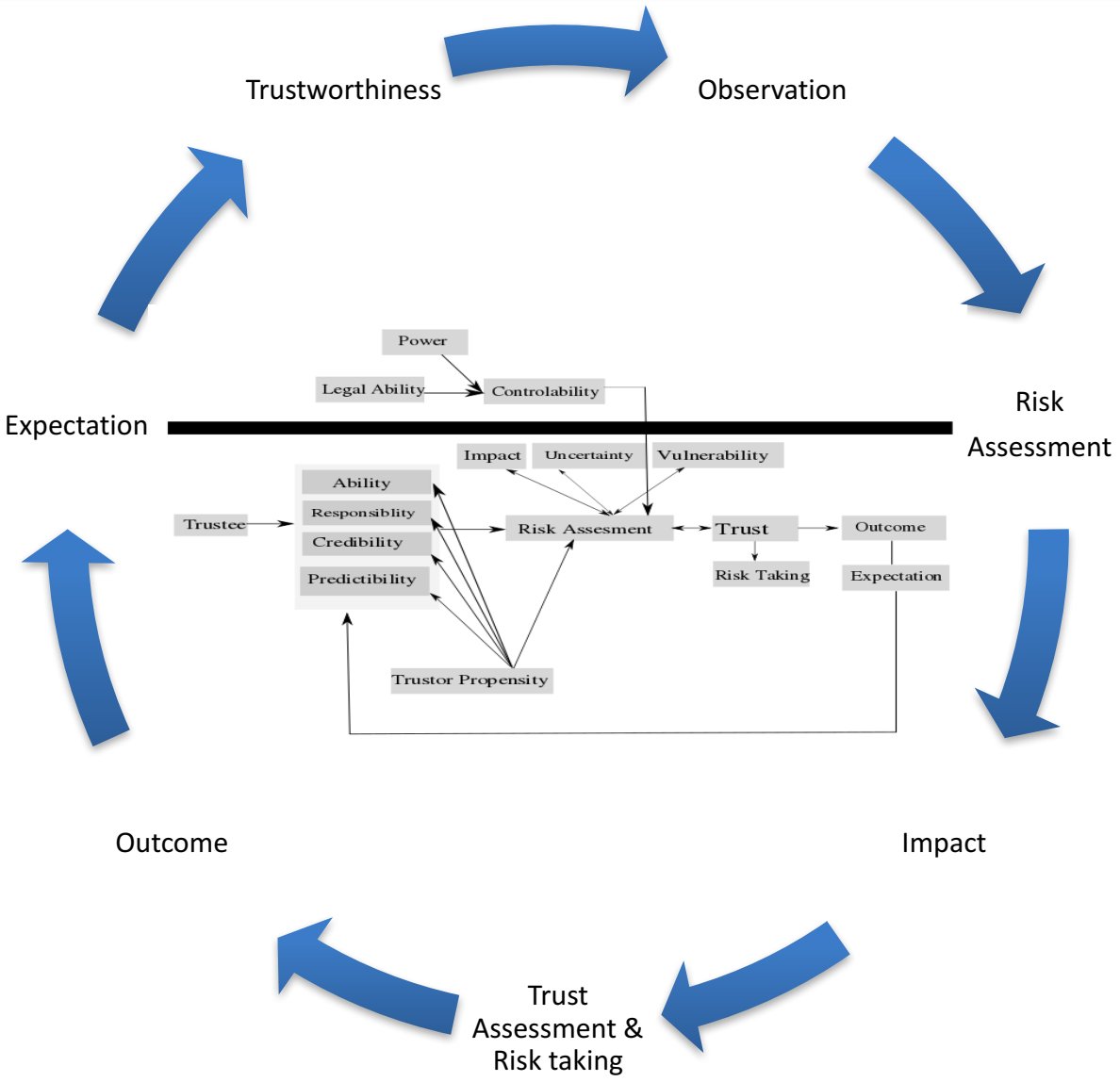
Contributing to general questions:

*Are Agent Based models useful to model trust within organizational networks in open environments, in particular in the cyber security domain?*

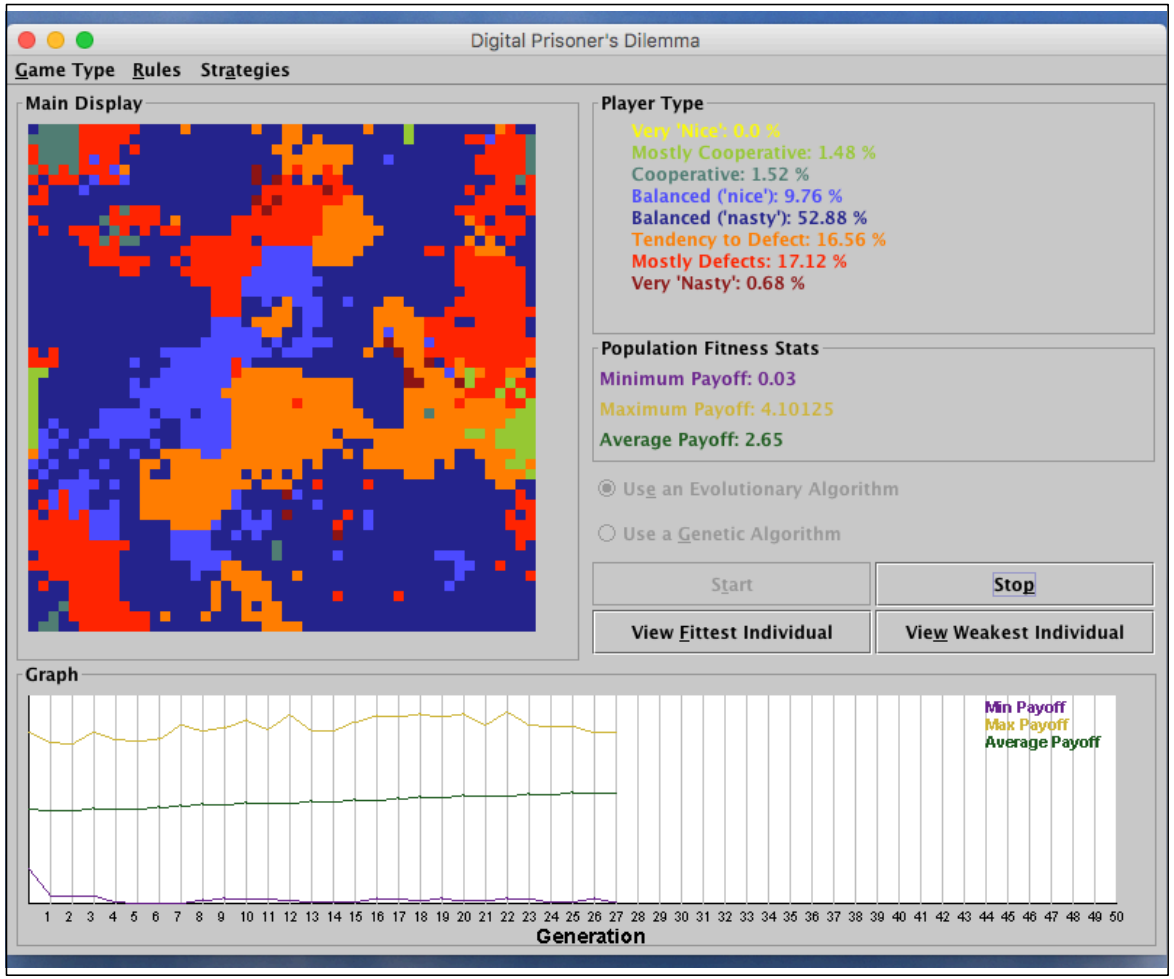
and

*Is it possible to develop a social computational trust model?*

# Agent Model evaluating Trust



# First step: Evolutionary Prisoners Dilemma using ABM Simulation




Agents choose from different strategies:

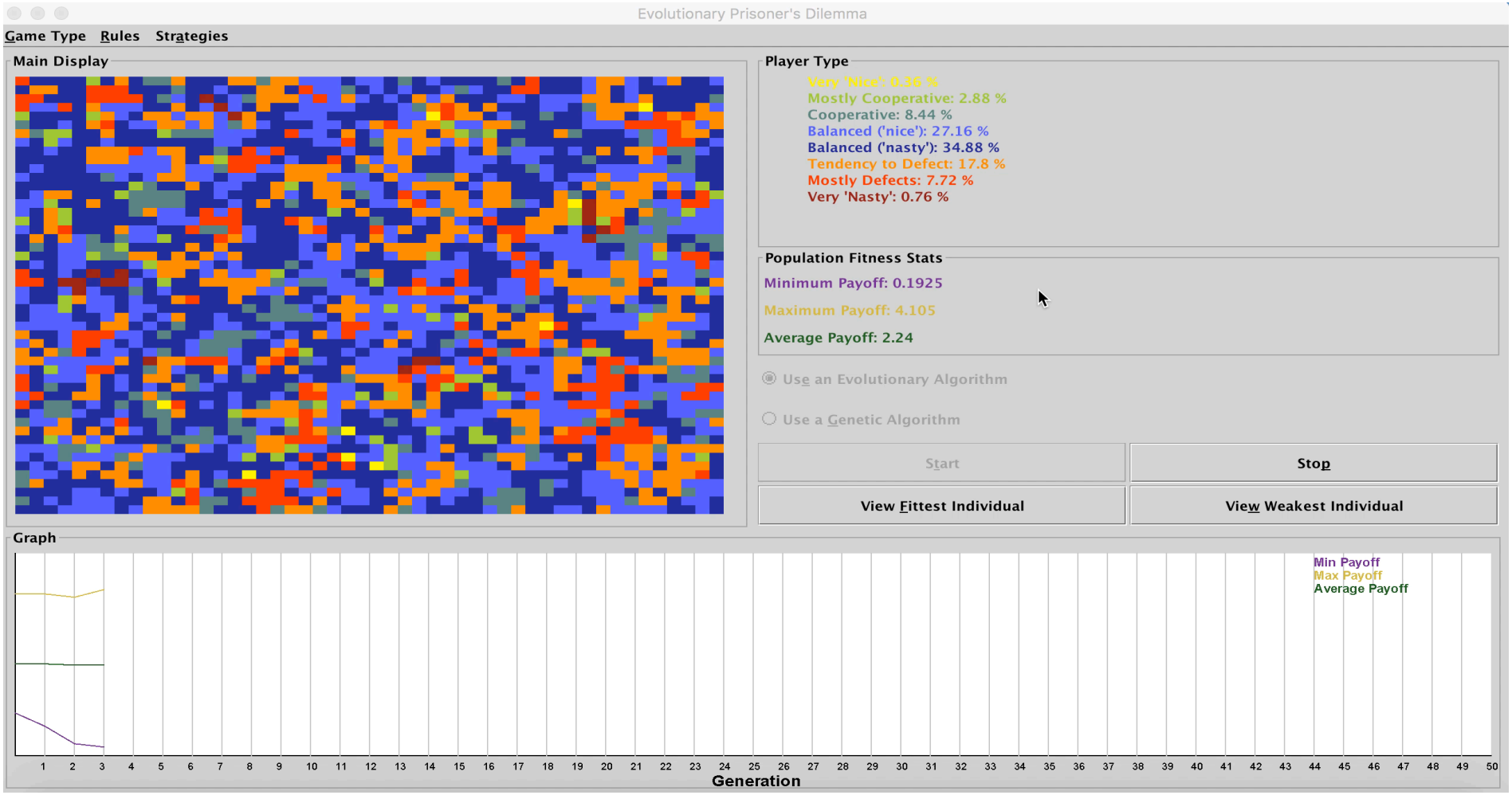
- Collaborate
- Defect
- During simulation: Agents predict next behavior of neighboring agents learned from observing past behavior.

Simulation observes tendency to maximize individual welfare instead of helping the group.

This type of simulation will be base to simulate more complex collaborations of autonomous organizations.

*Research performed by Ameneh Deljoo, PhD candidate University of Amsterdam.*

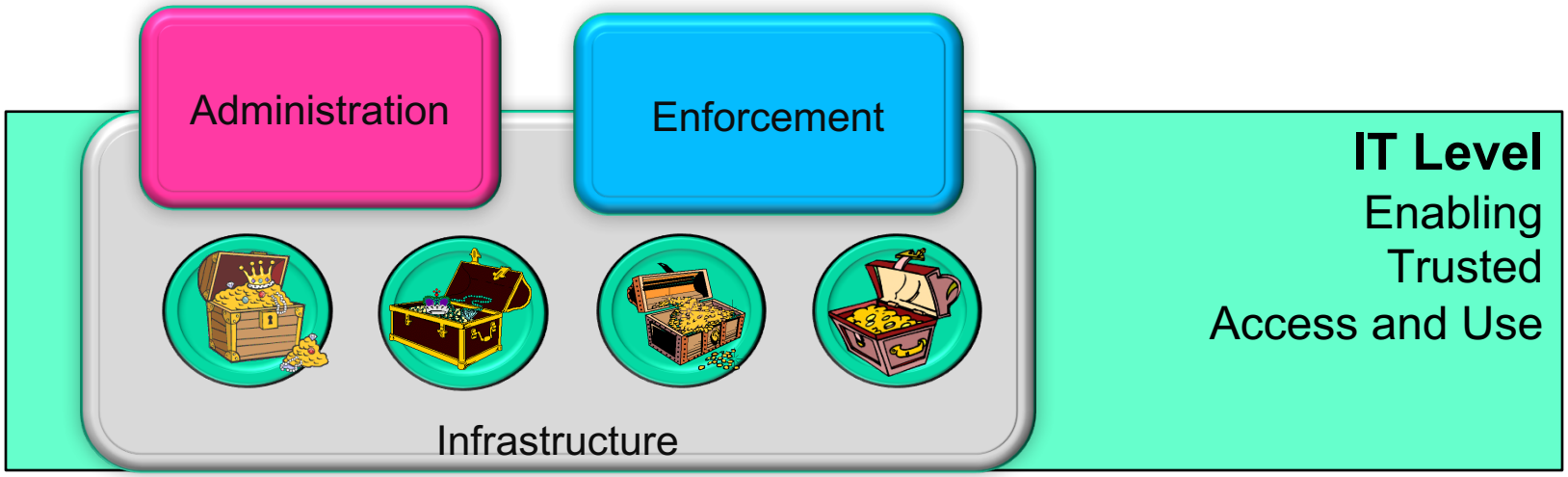
# ABM Simulation



# Alliances supported by a Digital Market Place - Research

- Digital Market Place (DMP) is a member organization as **independent legal entity.**
- Goal of the DMP is to **organize trust between members** wanting to gain a particular common benefit no single member can gain on its own.
- Members of the DMP can be a supplier or consumer of data or both.
- All members have **equal rights** within a DMP
- DMP is **governed by a board of members** in which all members participate
- DMP establishes a regulation consisting of **market rules and the admission requirements**
- DMP appoints a **market master** in charge of market operations
- DMP establishes a regulation for **conflict** settlement .
- DMP appoints an **adjudication committee**
- Members can **obtain rights** (licenses) from the DMP within the framework of the DMP regulation to act in a particular defined market role.
- What elements of the DMP can be digitized?

# Topic 2: Trusted Big Data Sharing Infrastructure




1. Given an agreed benefit to share data within a group of autonomous organizations:

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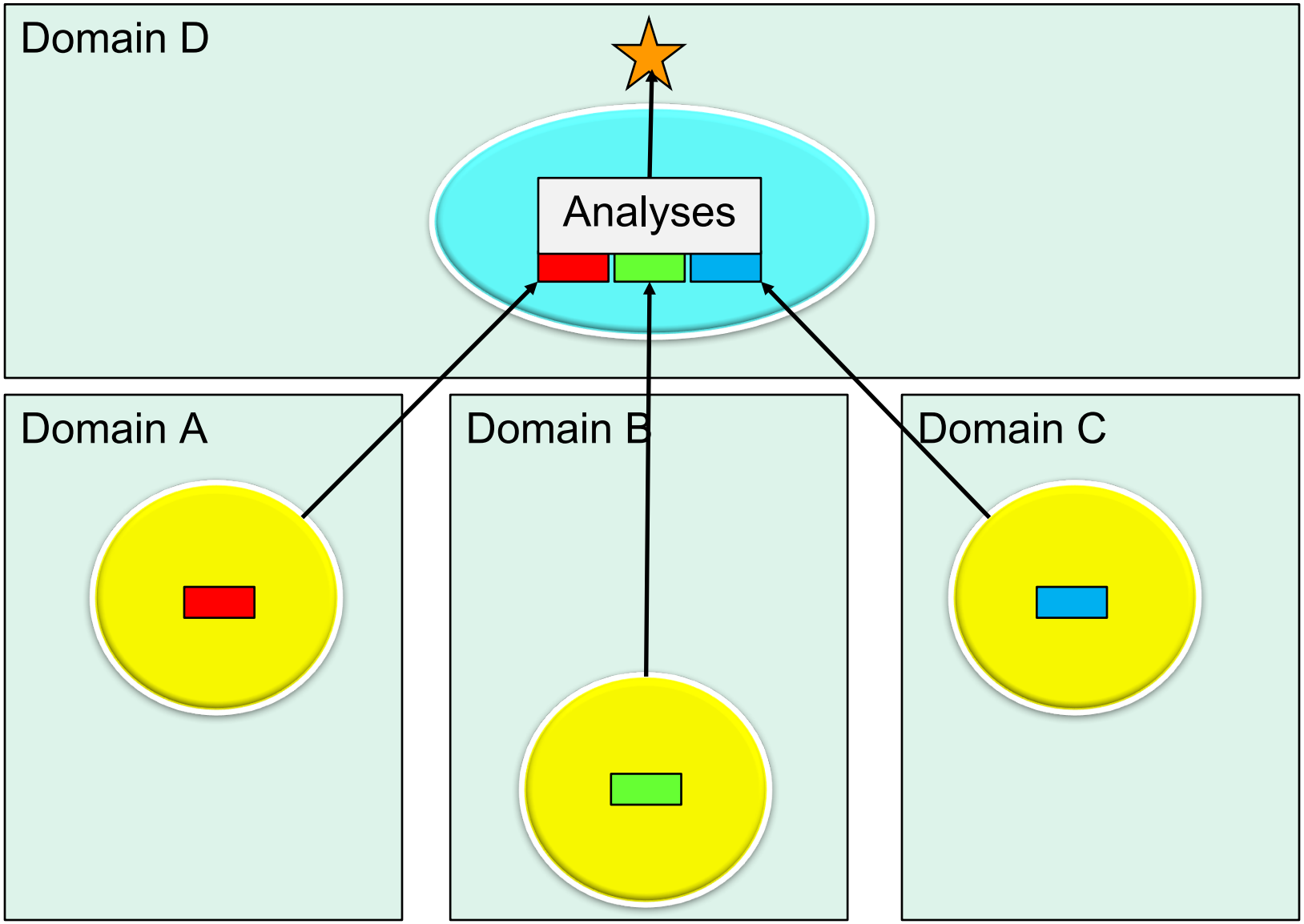
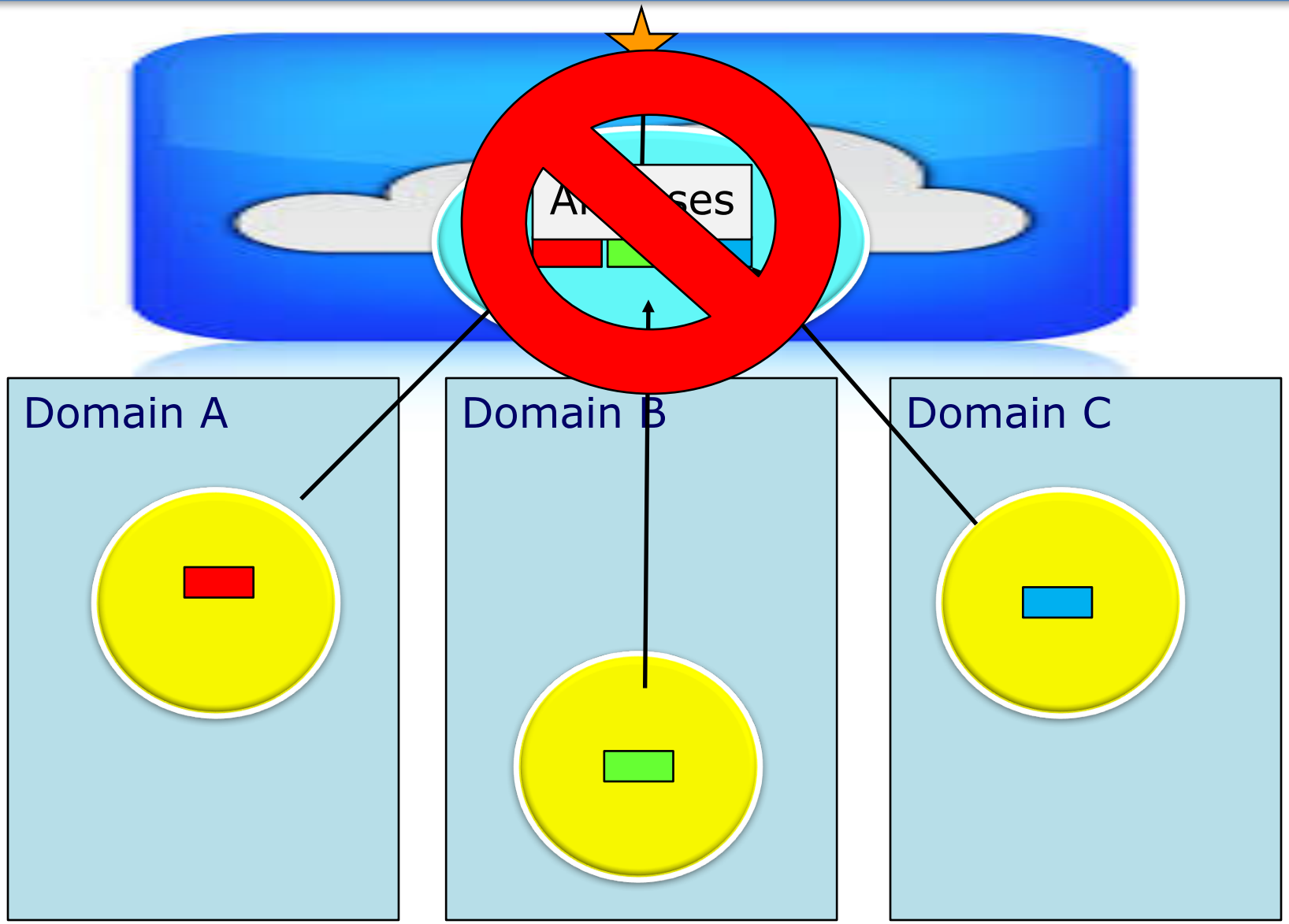
*How can trusted sharing of (big-) data assets be securely implemented in an infrastructure?*

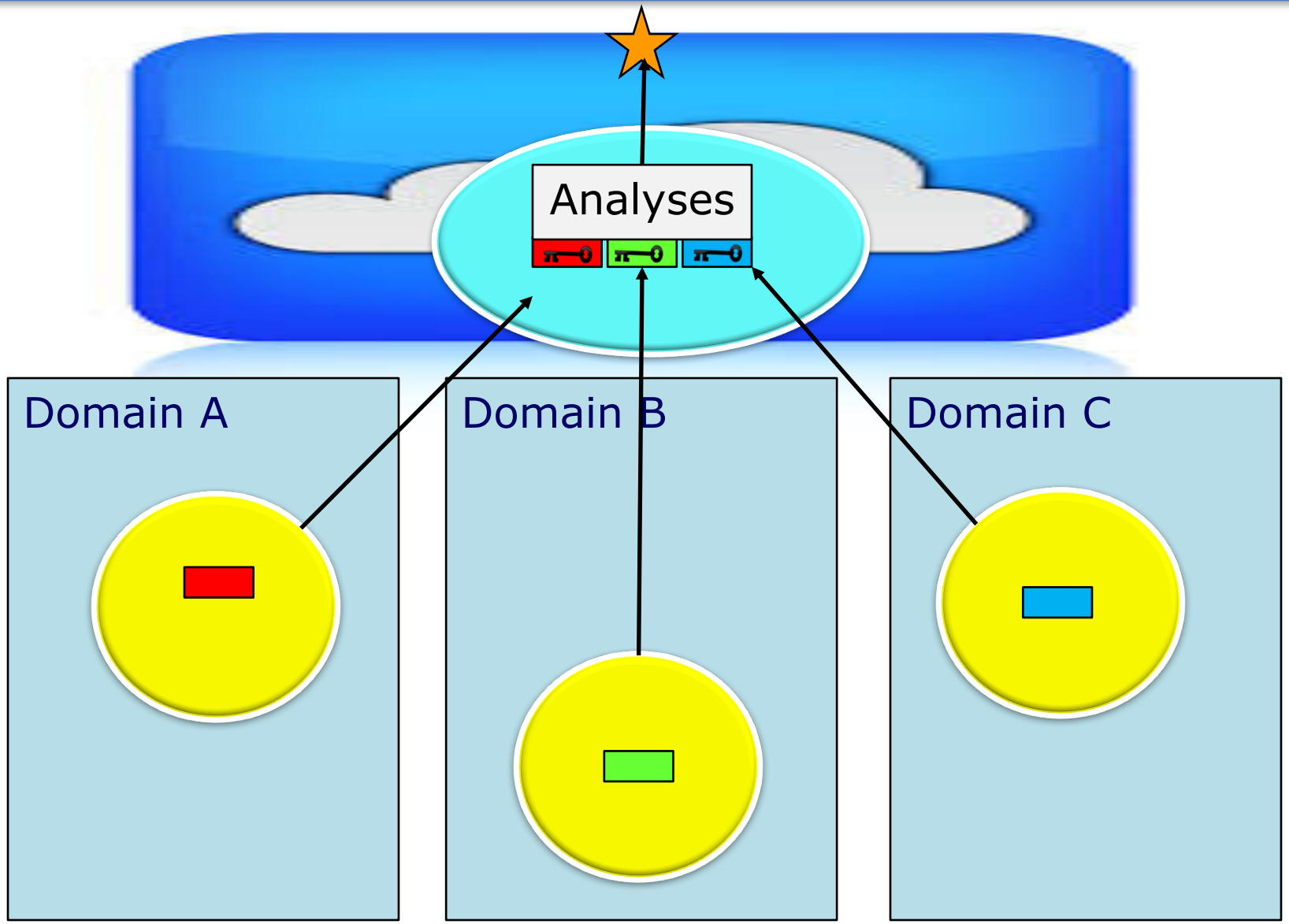
2. Given future, software definable Internet capabilities provides virtually **unlimited** amounts of **dedicated and secure bandwidth**:

*What infrastructure models are best suited to perform (big-) data analyses?*

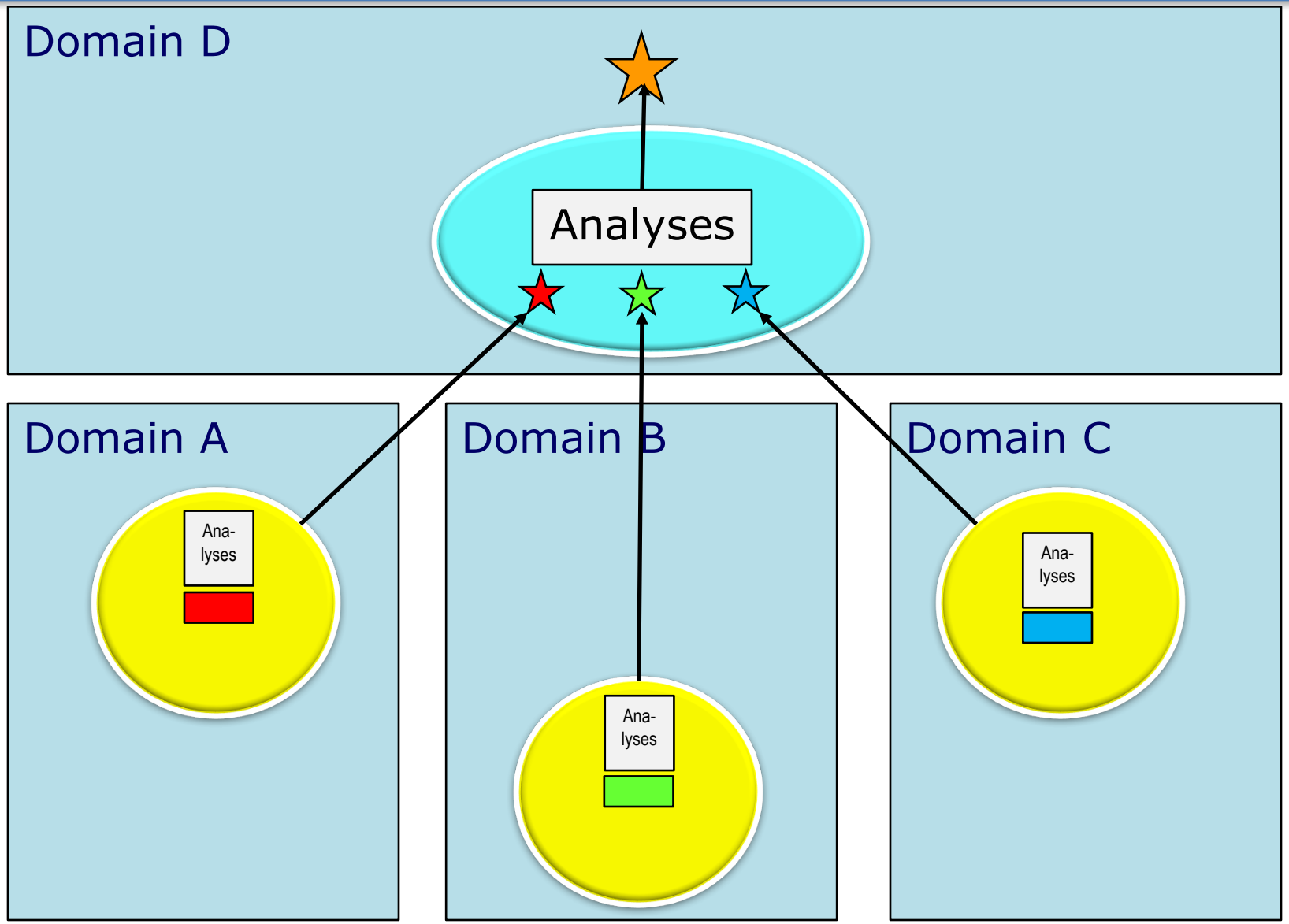
# Traditional Hub Sharing Model



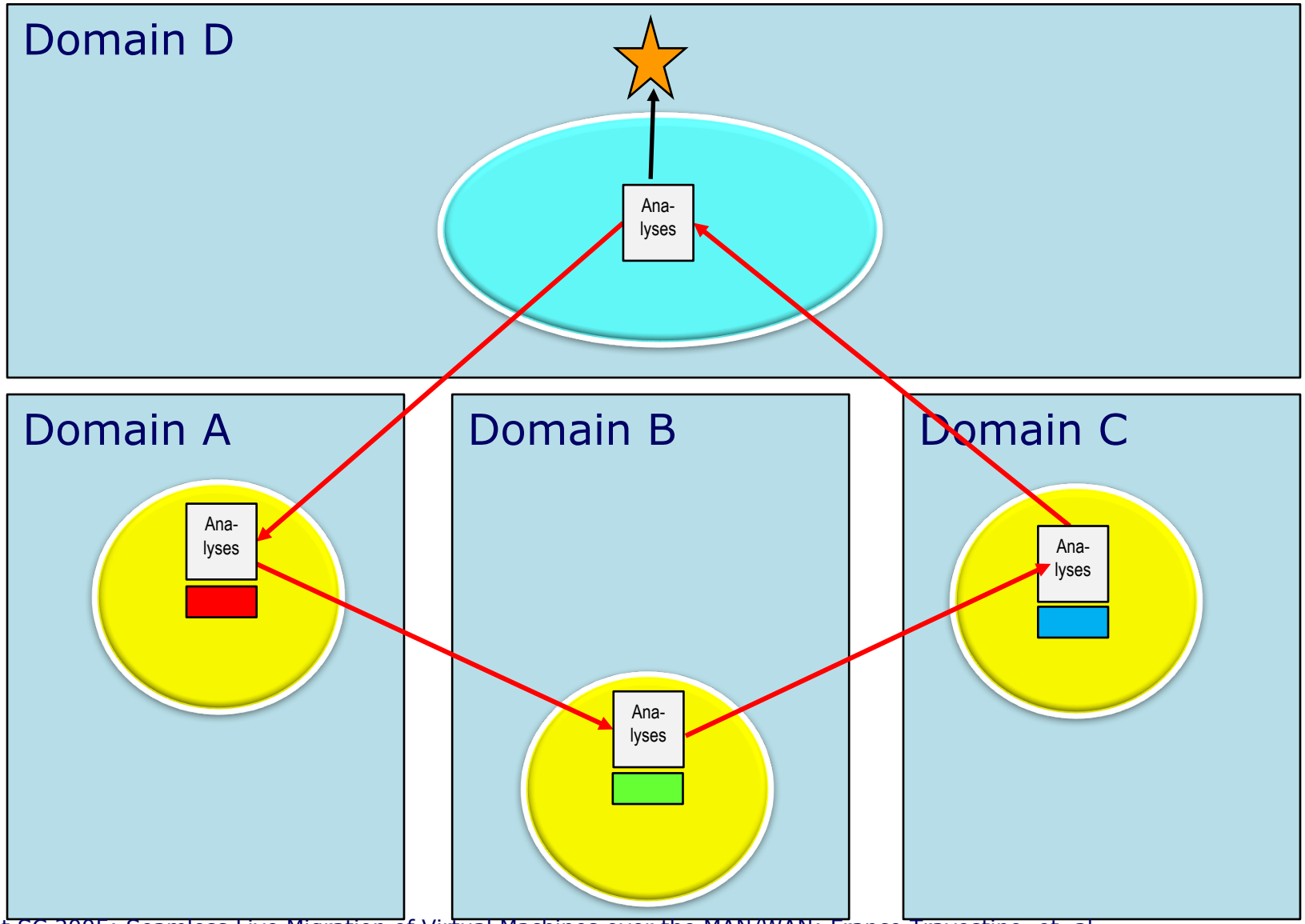

Domain A
Domain B
Domain C


Analyses
Domain A
Domain B
Domain C

# Proces local, share results

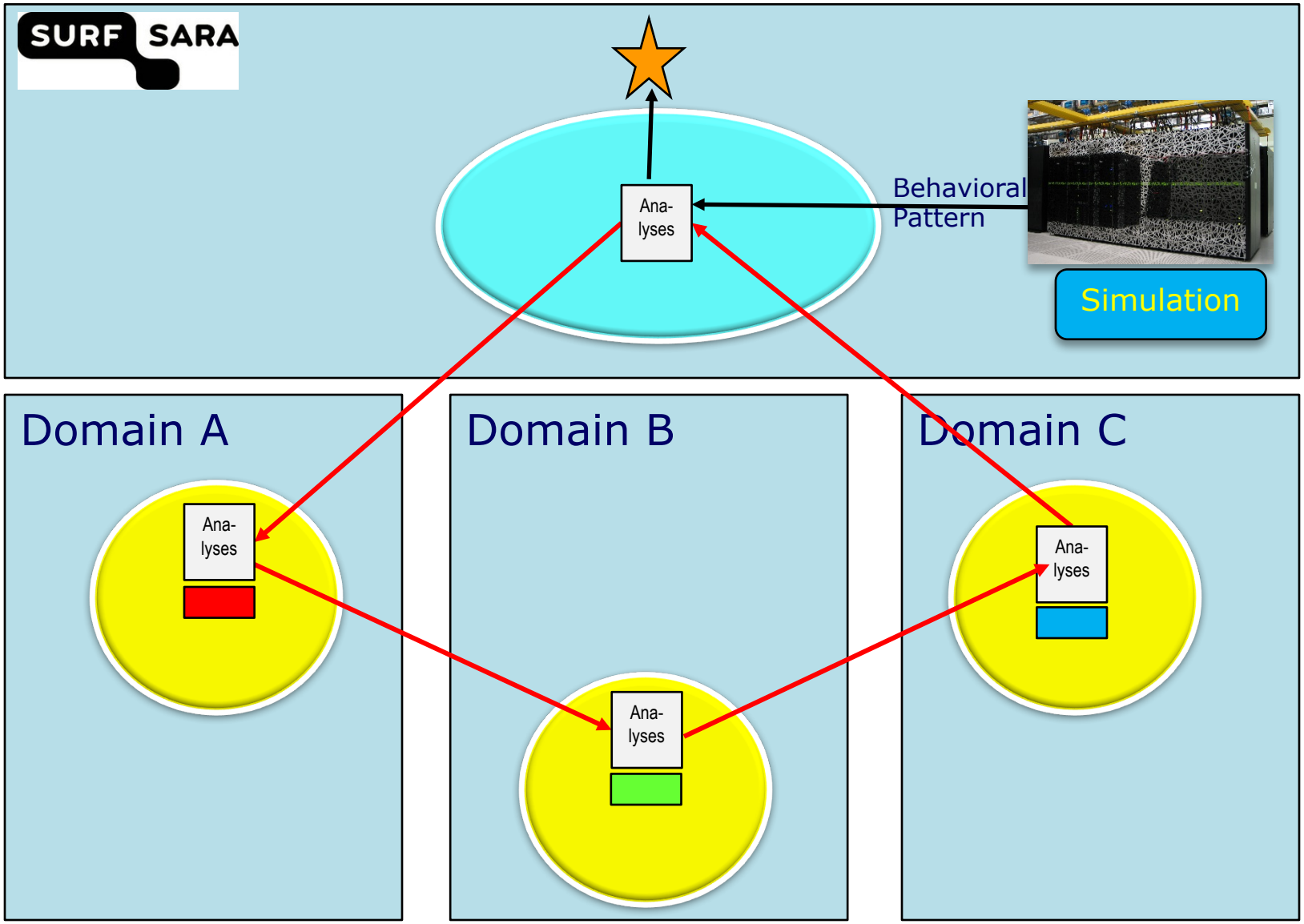


# Turntable model*

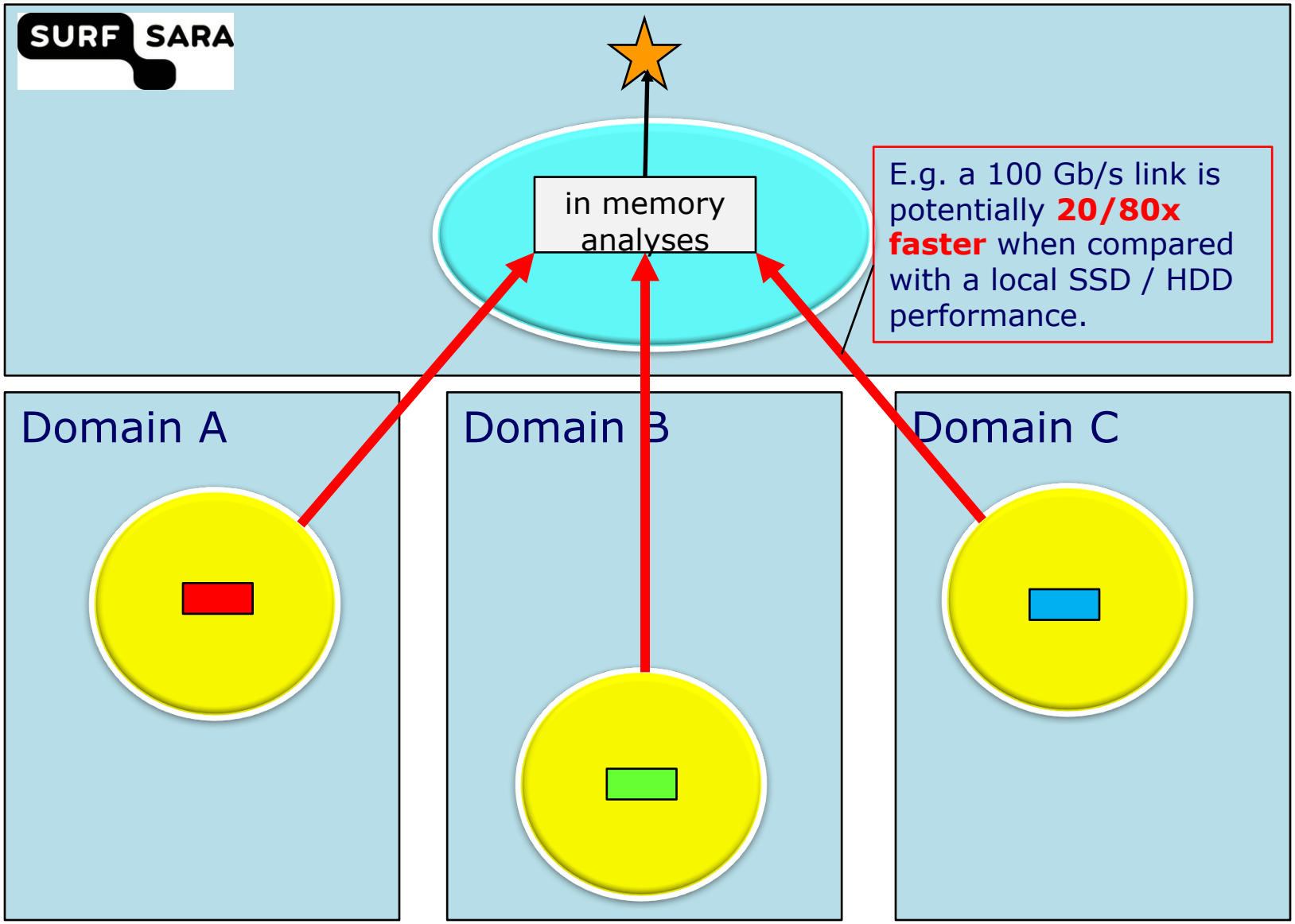



* Demo at SC 2005: Seamless Live Migration of Virtual Machines over the MAN/WAN: Franco Travostino, et. al.

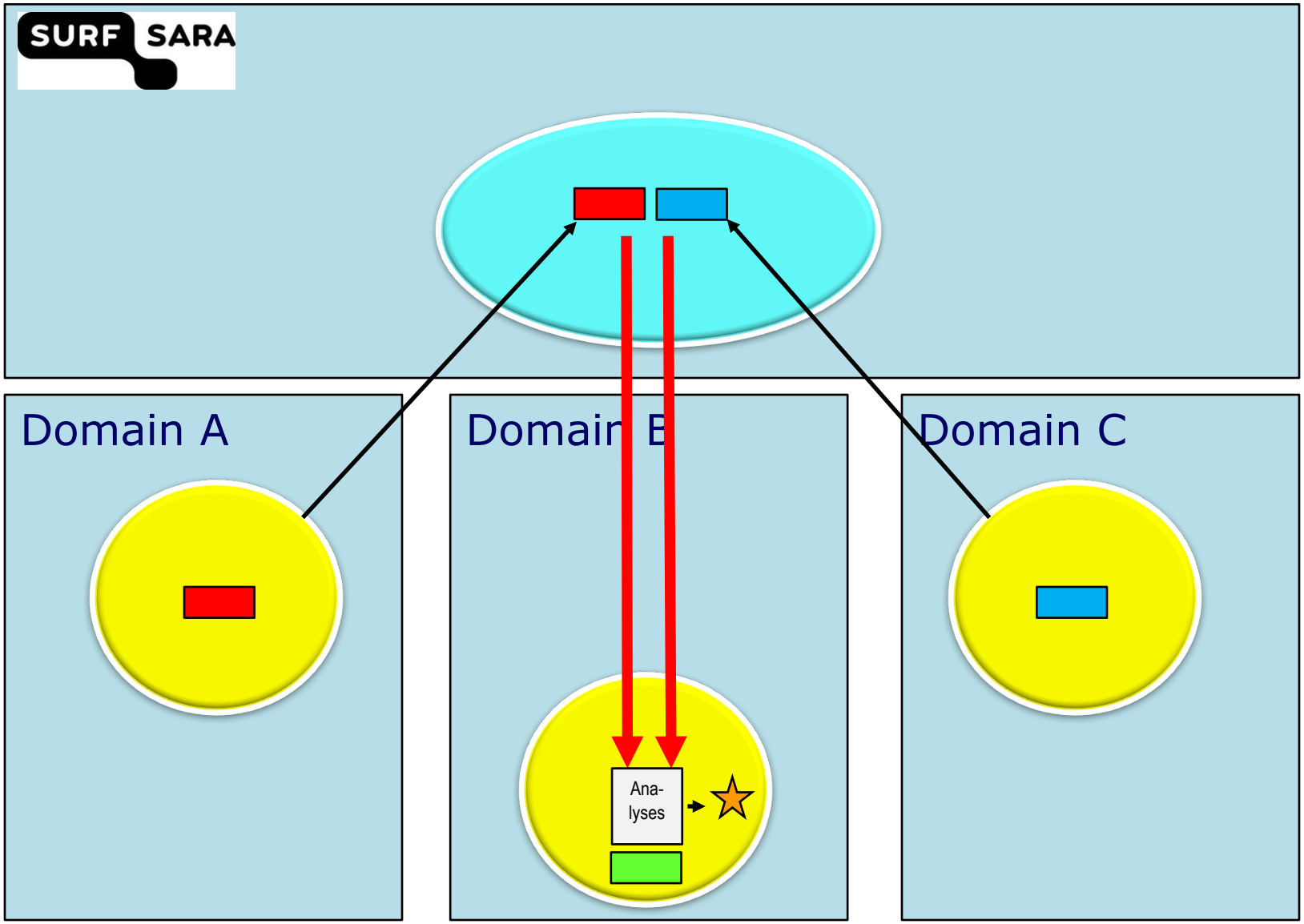
# Searching behavioral patterns



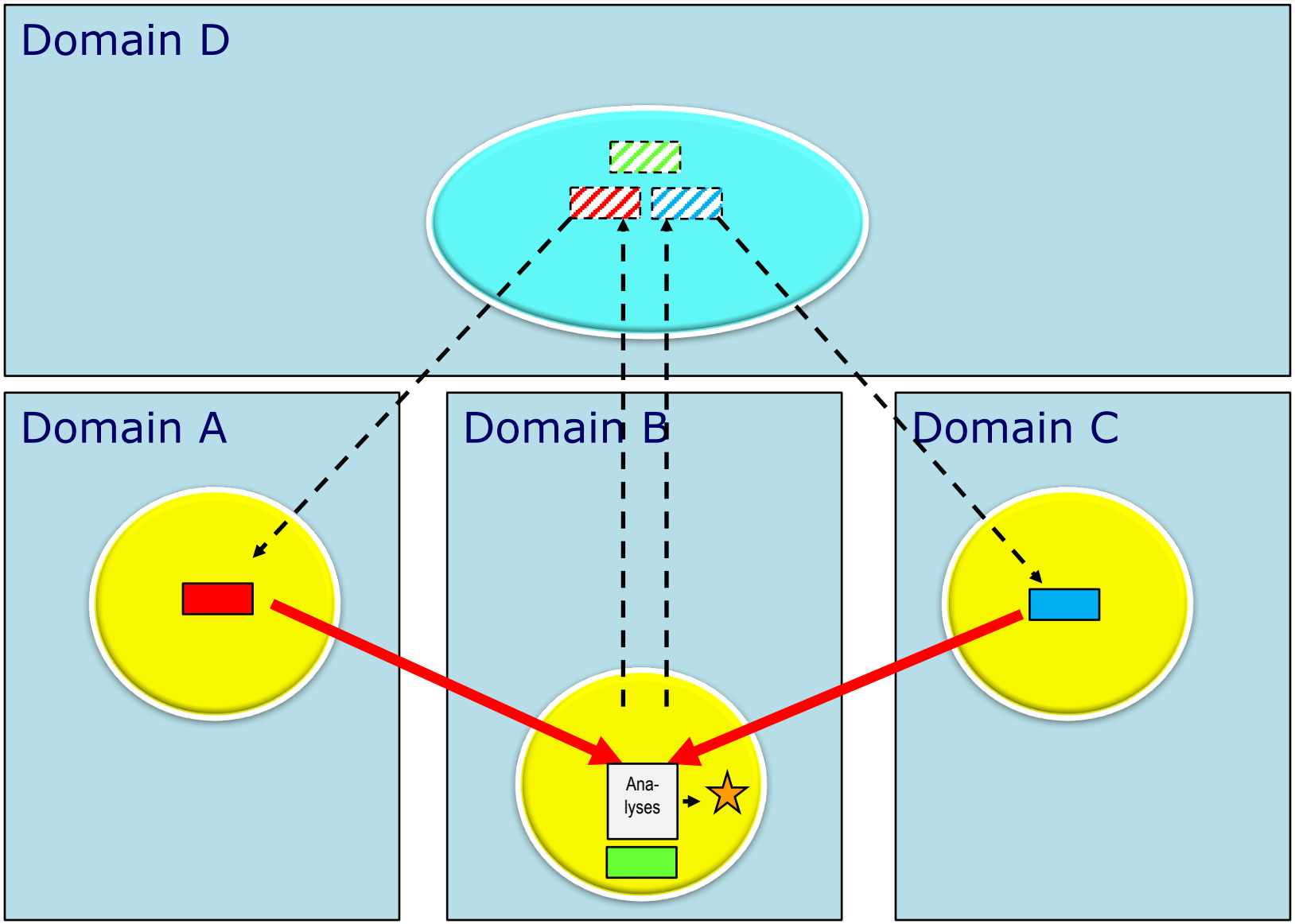
# Separating Data from Compute using High Performance Network links



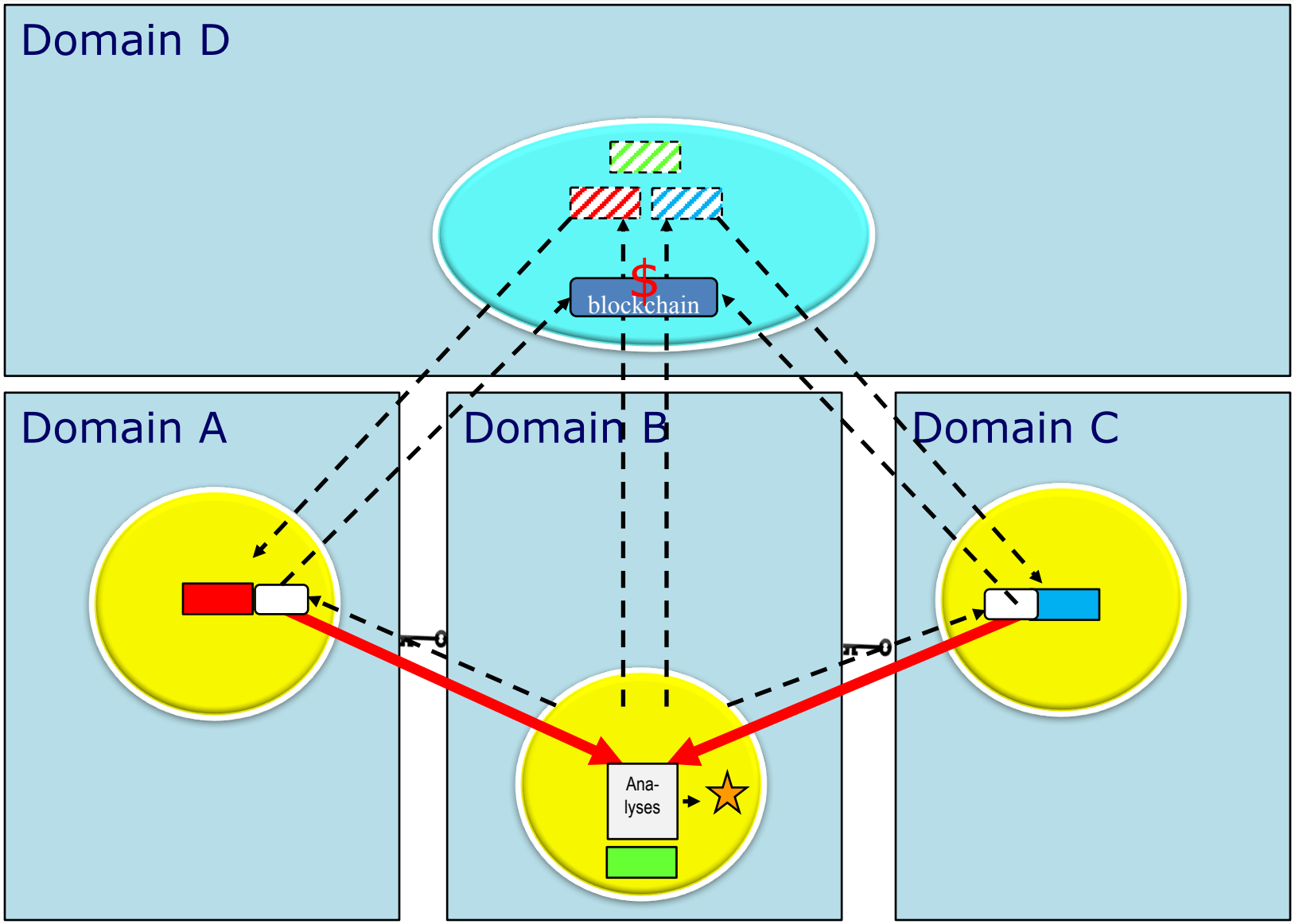
# (Science-) Data Hub



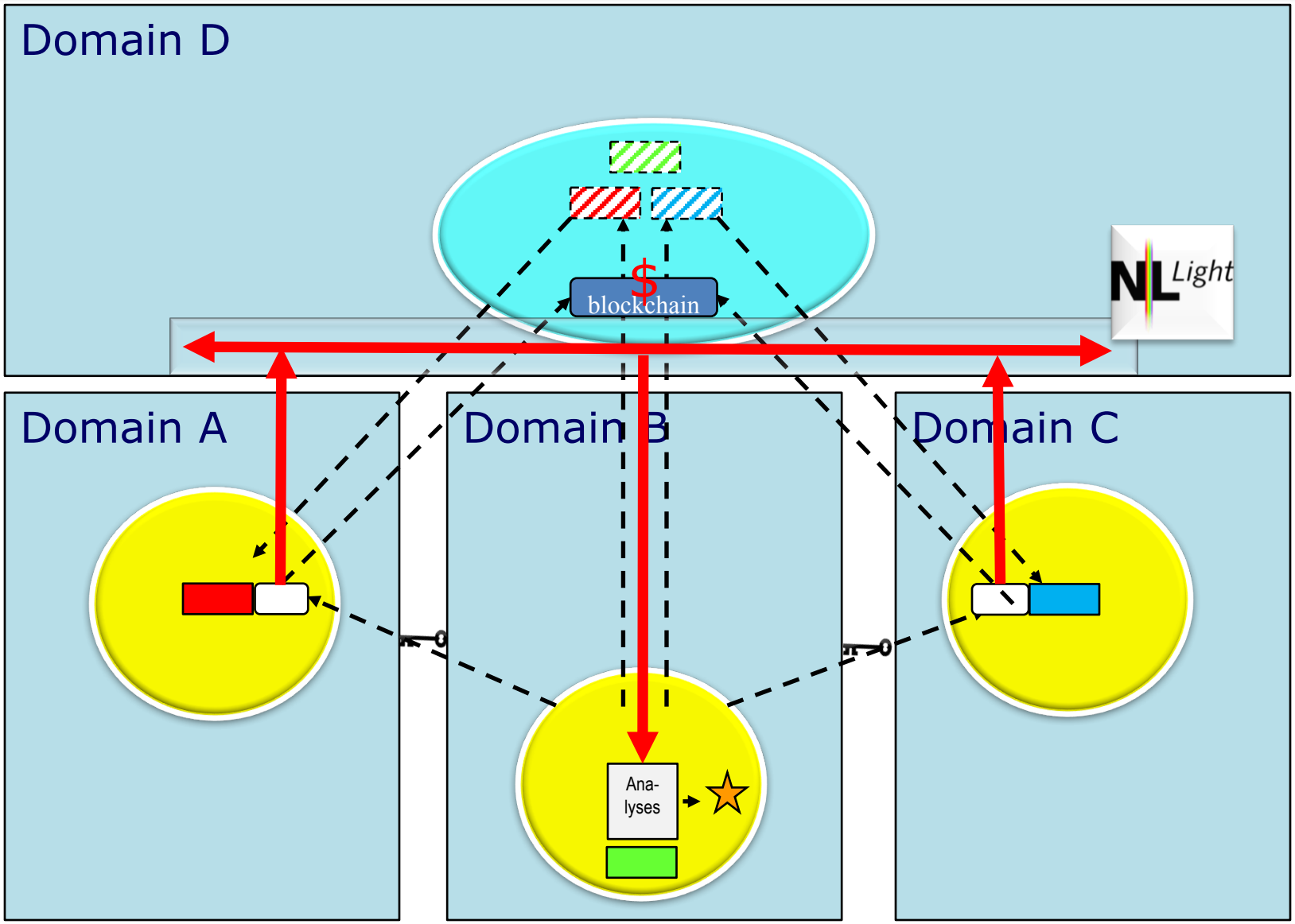
# Meta Data Hub with Peering



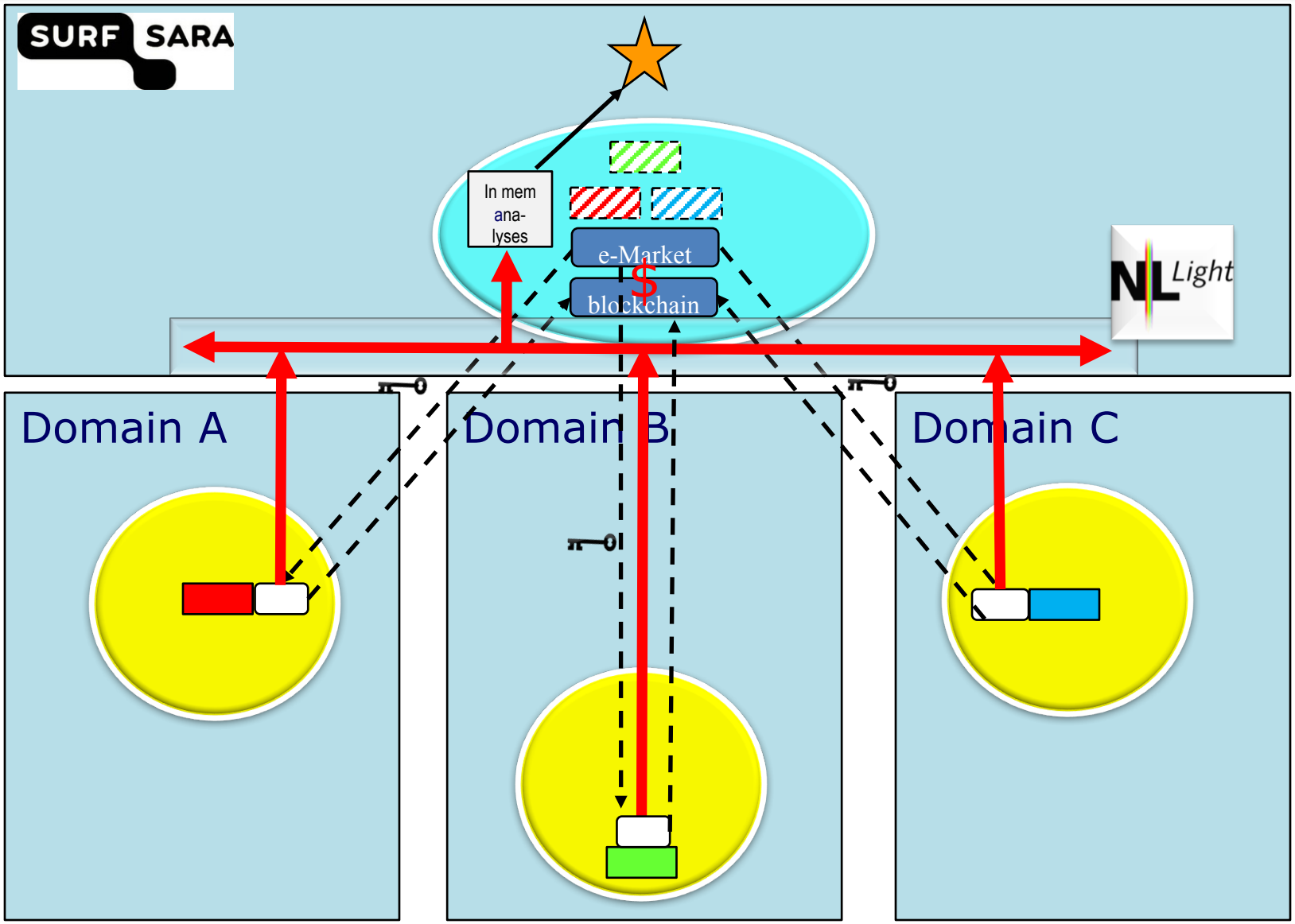
# Acces control based value sharing



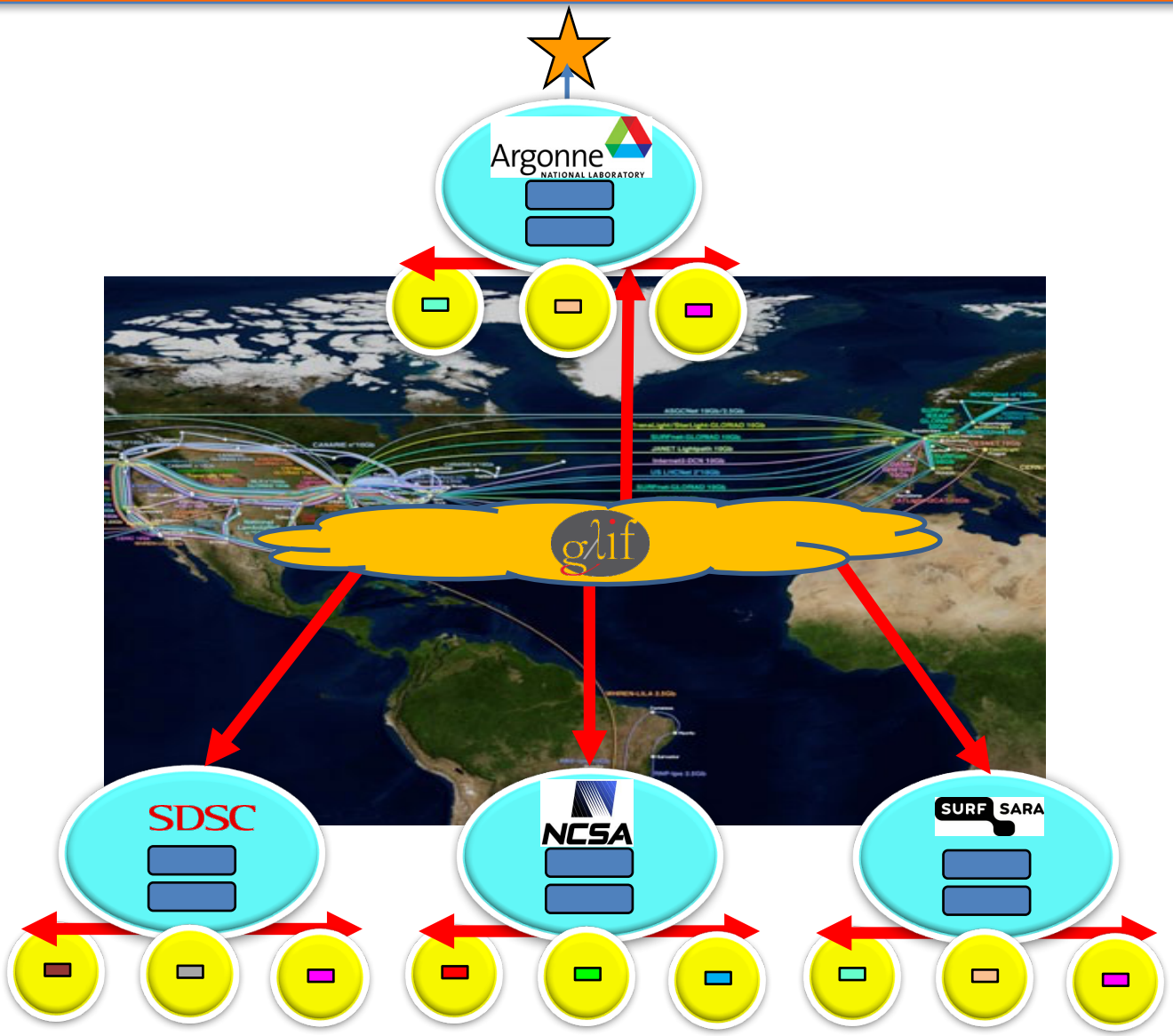
# Using an Open Lighpath Exchange infrastructure



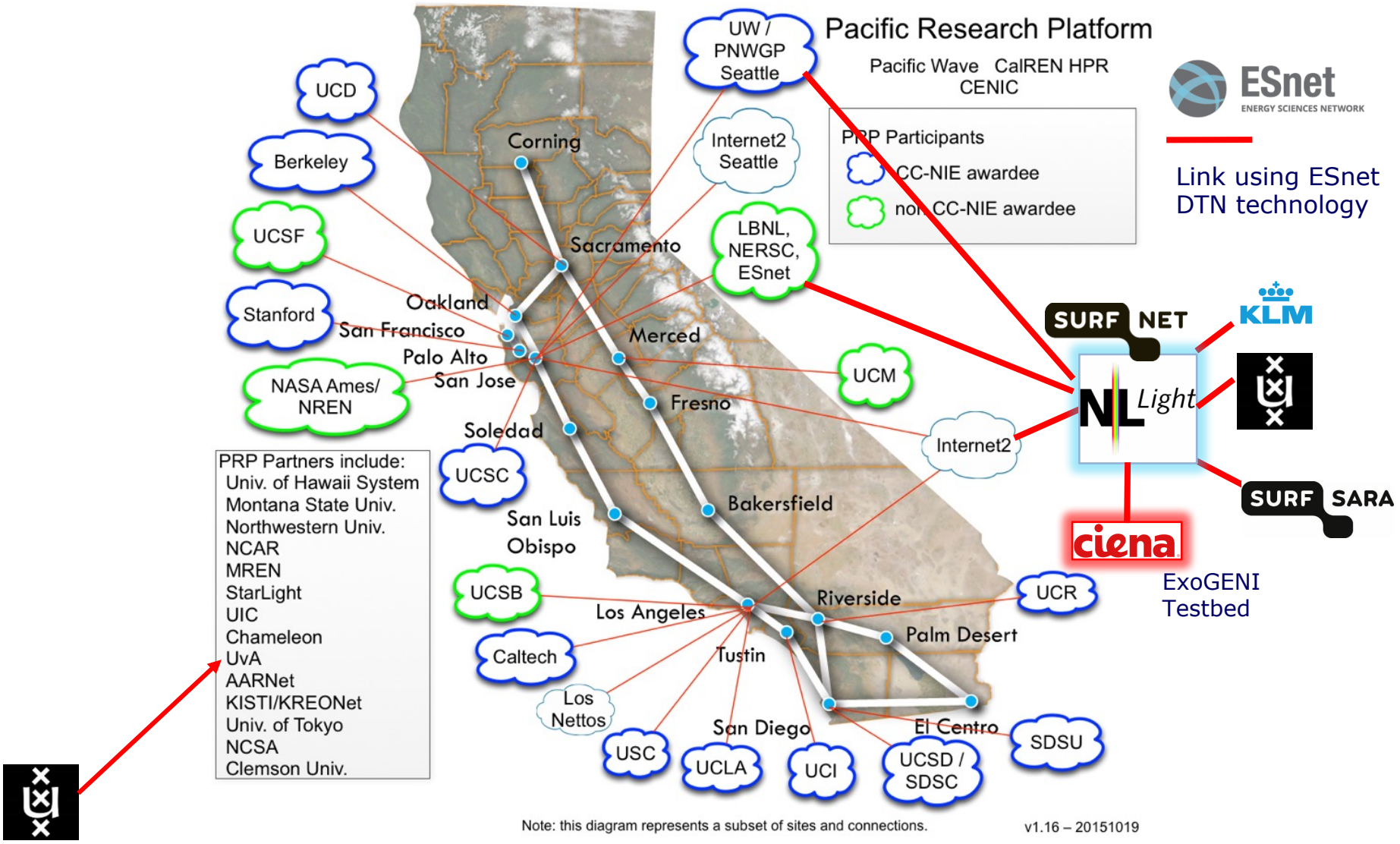
# Digital Market Model



# Imagine a globaly con-federated digital market system testbed..



# Participation in testbeds



# Thank you

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