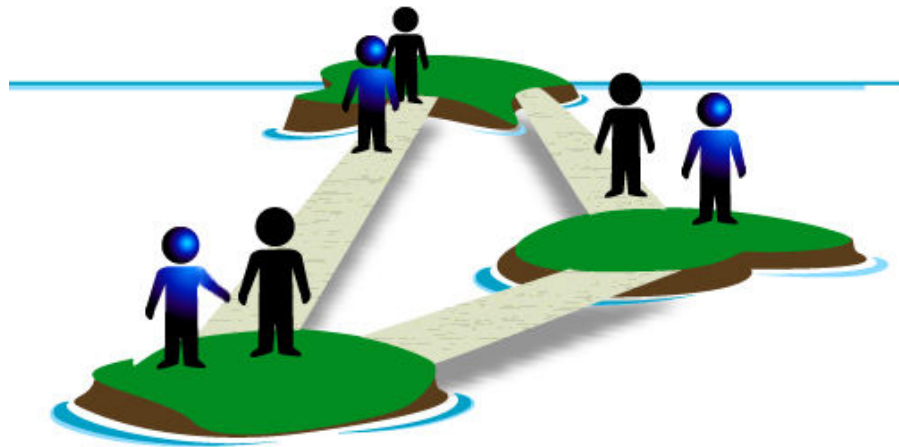# Boundary Objects as a Framework to Understand the Role of Systems Integrators*

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*Supported by LAI consortium members and The Aerospace Corporation

Outline

- **Problem Statement**
- **Definitions**
- **Applications of Boundary Objects**
- **Example**
- **Boundary Object Attributes**
  - **Staleness, Synchronization, Traceability**
- **Implications for System Integrators**
- **Next Steps**

Problem Statement

- **Technical and organizational interfaces**
- **Programs and projects suffering from "organizational" disconnects**
- **Cost of unclear documentations and rework**

- **Hypothesis**
  - **Organizational interactions can be improved and disconnects can be reduced by effectively using and representing knowledge in boundary objects**

Definitions

- **Community of practice**: **Shared understanding of what the community does, of how to do it, and of how it relates to other communities** (Brown and Duguid, 1998)

- **Boundary Objects**: **Objects that are flexible enough to adapt to local needs yet specific enough to maintain a common identity across different interpretations** (Star and Griesemer, 1989)
  - **Bridge gaps and enables communication, coordination, and collaboration across boundaries**

- **Boundaries**: **gaps or differences in organization structures or entities, political power, relative expertise, knowledge domains, etc.** (Greer, Black and Adams, 2006)

Previous Research Applications

Field	Organization	Boundary object
Social science (Star and Griesemer 1989)	Museum of zoology	Diagrams California map Collecting forms
Design engineering (Henderson 1991)	Engineering firm	Sketches Drawings CAD
Service (Ackerman and Halverson 1999)	Telephone hotline group	Written notes
Product development (Carlile 2002)	Automobile design and manufacturing firm	Drawings Automobile parts Schedule
Software development (Gunaratne et al. 2004)	R&D facility	Storyboard Prototype

Boundary Object Example
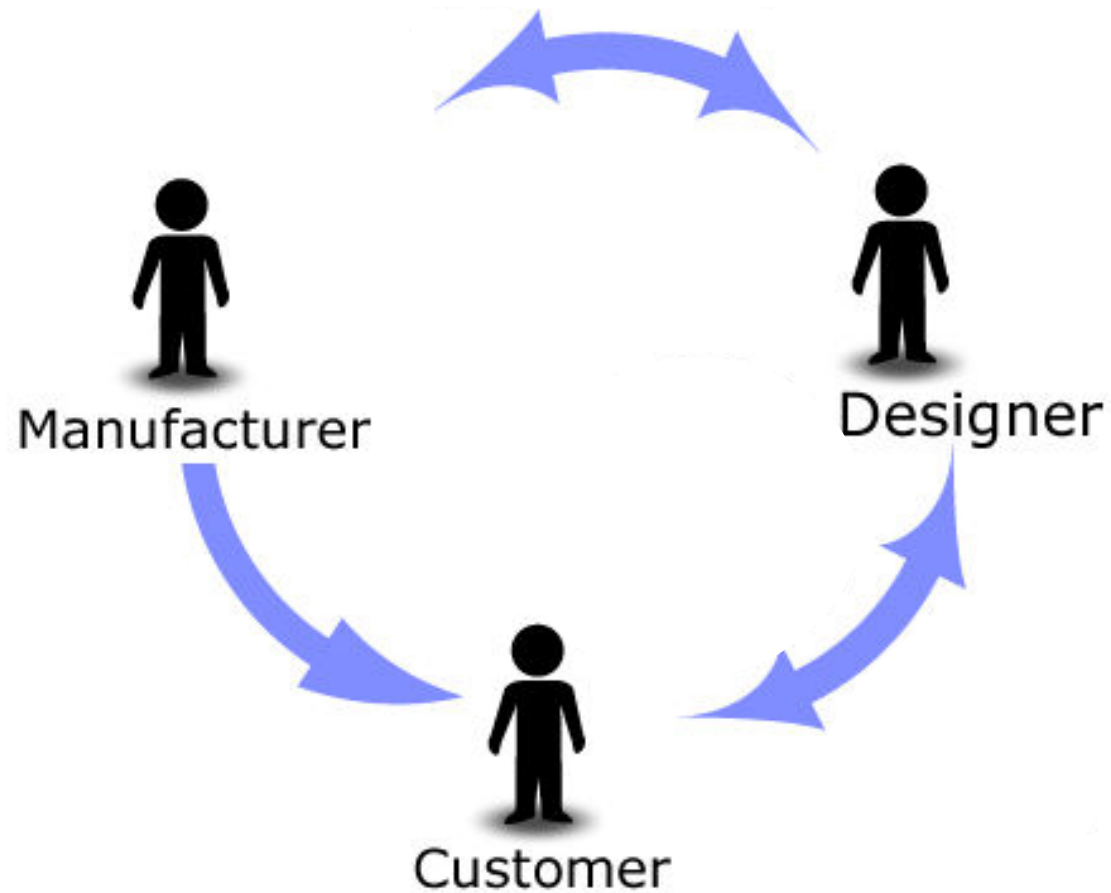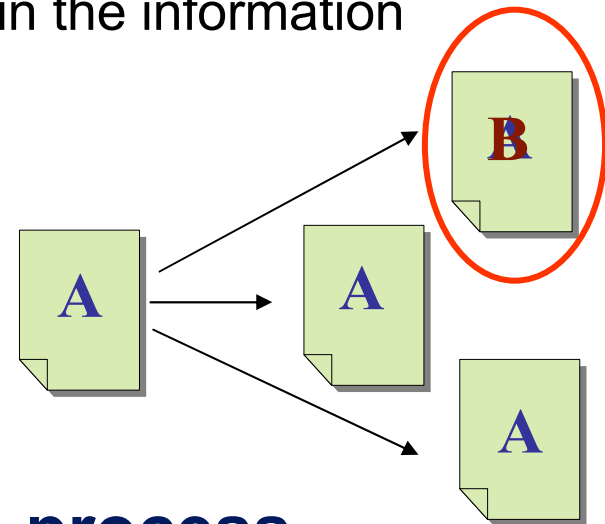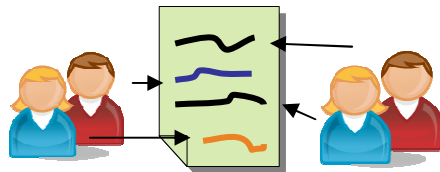
Boundary Object Attributes

- **Medium**
- **Granularity**
- **Staleness Factor**
- **Malleability**
- **Inclusivity**

- **Synchronization**
- **Importance**
- **Layers**
- **Context Type**
- **Traceability**

Staleness, Synchronization, Traceability

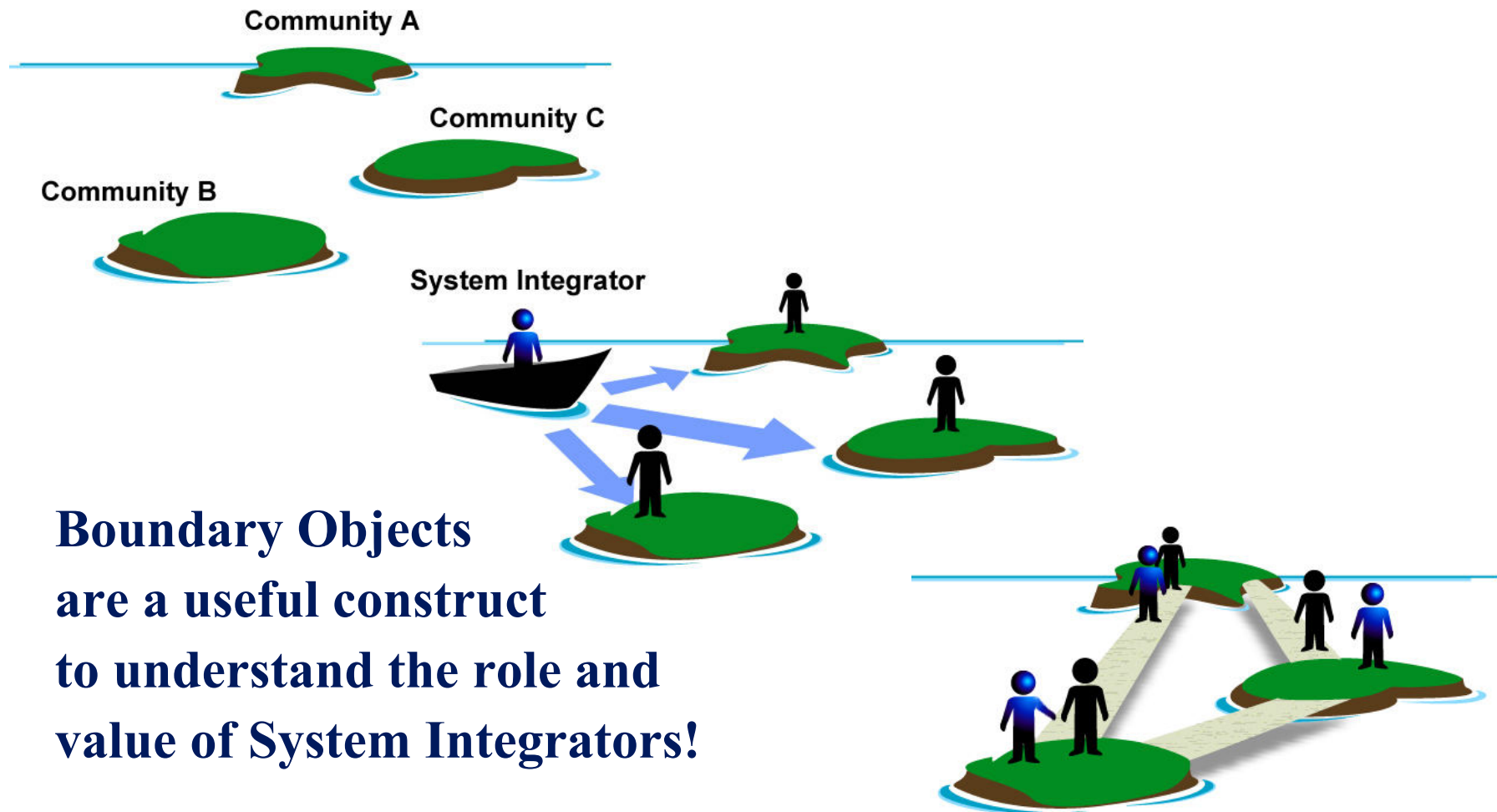- **Staleness Factor: how stale the information tends to be**

$$\frac{\text{Average time to update a boundary object}}{\text{Average time between changes in the information}}$$

- **Synchronization:**
  - **Internal vs External consistency**

- **Traceability: accountability, process transparency**

Implication for Systems Integrators

Community A

Community C

Community B

System Integrator

**Boundary Objects
are a useful construct
to understand the role and
value of System Integrators!**

- **Attribute and characteristic overlaps**

- **Apparent correlations**

- **Trade off between effectiveness and cost/time/resources/effort**

- **How to best design boundary objects to reduce disconnects?**

Questions?