Information Architecture for SOA

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THE Open GROUP

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Objectives

- To create a framework that enterprises can use to help them to develop information architectures for SOA.
- To make recommendations for the integration of this framework with TOGAF, ideally without making significant changes to TOGAF.

Context for Objectives

- We will not succeed in developing a finished framework in one weekend
  - We should aim to produce a base document that can be developed to produce the finished framework
- This is an area where ideas are moving fast and technology is developing
  - The finished framework will be Version 1 and we expect further versions to follow

Objectives for This Presentation

- Present the conclusions from the Saturday-Monday members meetings
- Discuss and obtain feedback

Agenda

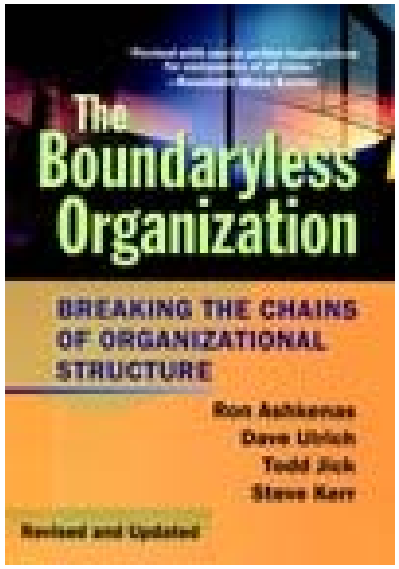
- Business drivers
- Actors
- What an information architecture for SOA should include
- Development of Information Architecture Within the TOGAF ADM
- Next Steps

Business Drivers

Business Background

- There is a growing market for information products delivered as web services
- SOA is being adopted by enterprises internally to deliver business agility and improve information flow

Boundaryless Information Flow



- Permeable boundaries between
  - Nations
  - Enterprises
  - Organizational levels
  - Departments
- Deliver
  - Productivity
  - Agility

But traditional IT architectures hinder this!

The Semantic Interoperability Problem

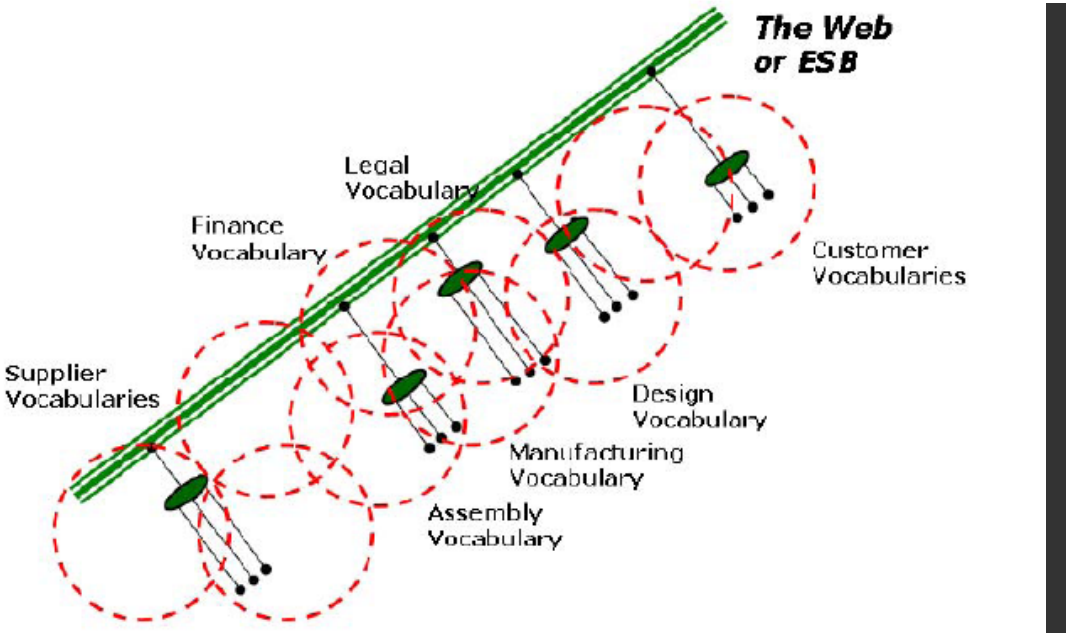


Figure 5: The Problem of Semantic Interoperability

At present, this problem is typically addressed within the services, and by use as far as possible of enterprise-standard and industry-standard vocabularies. In the future, it may be addressed by semantic technology that is incorporated in the infrastructure, which will be a more scalable way to deliver the ideal of Boundaryless Information Flow.

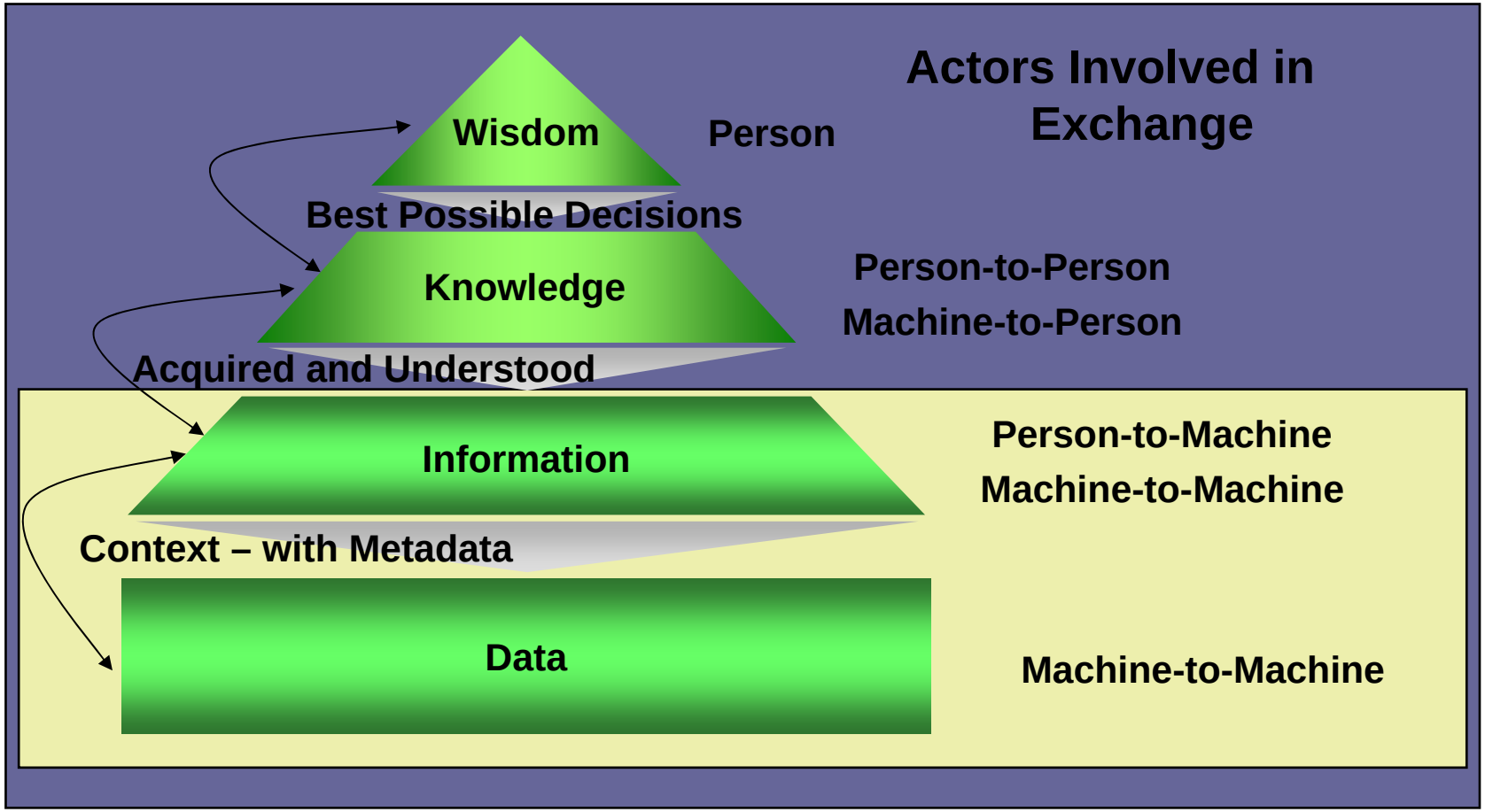
What Is Information?

- ? (suggested but not agreed definition: “Information is what is known”)
- Data is "a re-interpretable representation of information in a formalised manner suitable for communication, interpretation or processing”
  - ISO/IEC 2382-1:1993 *Information Technology - Vocabulary - Part 1: Fundamental Terms*

Data vs. Information in SOA

- **Data services in an SOA solution:**
  - Are front ends to data stores
  - Enable CRUD operations on the data stores
  - Are directly aware of the data stores structure, location, access methods, etc
  - Are concerned about the **syntax** of the interaction
- **Information services in an SOA solution:**
  - Are isolated from the details of the data stores
  - May refer to elements stored in more than one data store
  - Establish context for the solution and for the data services
  - Are concerned with the **semantics** of the interaction

Data, Information, Knowledge, and Wisdom



Pain Points – Different Information Formats

- Service composition delivers business agility. But it is difficult to organize services to support business processes if the services assume different information formats.
  - Expensive bespoke programming is needed to enable the services to communicate with each other
  - It is not possible to change the information formats used by applications bought “off the shelf”
  - Legal and regulatory frameworks sometimes imply information models

Pain Points – Fragmented Information

- The information used by services is often represented by data in many different formats stored in different locations, and may be inconsistent
  - For example, it is common for an enterprise to hold customer data in different databases (with different schema) in different geographical locations

Pain Points – Difficulty of Understanding Service Descriptions

- In an enterprise SOA, discoverable services make service composition easier, and cut costs through service re-use.
- Services sold as products must be discoverable.
- Dynamic discovery is essential for run-time composition which improves agility and can simplify operation and maintenance.
- But it is hard to determine whether a service meets a requirement if the service description and the requirement are expressed in different terms. This means that
  - Dynamic service discovery is very difficult
  - Manual service discovery is slow and expensive

Pain Points – Inconsistent Use of Information

- Inconsistent use of information leads to
  - Poor Design
  - Inconsistent operation

What Information Architecture Does for the Enterprise (1)

- Facilitate exchange of information with services (by services and other entities)
- Facilitate access to information
- Facilitate discovery, selection and re-use of services
- Enable uniform interface to proprietary information models (some of which are unavoidable)
- Facilitate BAM and CEP

What Information Architecture Does for the Enterprise (2)

- Facilitate conformance to legal and regulatory constraints
- Facilitate procurement of information products
- Facilitate provision of services as products, through uniform definition
- Facilitate design of composite services
- Facilitate consistent use of information by services
- Facilitate consistent system behavior

What Information Architecture Does NOT do for the Enterprise

- Identify SOA Services
- Describe SOA service functionality
- The SOA service model is not part of the IA but service naming and description must be governed to be delivered consistently with the IA
  - The verbs are not part of the IA – the nouns are. Eg “Create Customer” is a service – the IA is not concerned with “Create”, but “Customer” must be consistent with the IA.

Actors

Human Actors

- Architects
  - Produce information architectures
  - Use existing information architectures as basis for new ones
  - Use information architectures in development of business, information systems and technology architectures
- Designers and implementers
  - Use information architectures as basis for implementations
- Service Providers and Consumers
  - Use information architectures to help them understand their service environments
  - Use information architectures to enable them to exchange information
- Business People
  - Make better use of information because of the architecture

Technology Actors

- Architecture Tools and Repositories
  - Help architects create information architectures
  - Help create model-driven implementations
- Services
  - Can interpret representations of information architectures at run-time
- Notes
  - Where do we draw the line between information architecture descriptions and metadata?
  - A service taxonomy may be derived from the information architecture but is not part of it.

What an information architecture for SOA should include

Information Architecture Design Considerations

- With SOA, translation of information formats must be done in real time.
- Imposing an enterprise-wide data model (eg saying that every database must have the same structure) often won't work.
  - But a controlled vocabulary is achievable through an incremental definition process
  - Possibly as part of an enterprise information meta-model.

Information Architecture Contents –1

- Information Architecture Stakeholders
  - And their views
- Major Business Information Object Types and Relationships (The information models)
- Information stakeholder vocabularies
- Enterprise controlled vocabulary
  - Derived from a naming convention
- Vocabulary translation mappings
- Intrinsic properties of information objects, eg. quality, access rights, abundance . .

Information Architecture Contents - 2

- Information Governance
  - Information stakeholders
  - Information lifecycle management
  - Information interoperability goals and metrics
- Information Architecture Principles
- Relevant standards
- Intra/Inter enterprise information meta-model

Not Information Architecture Contents

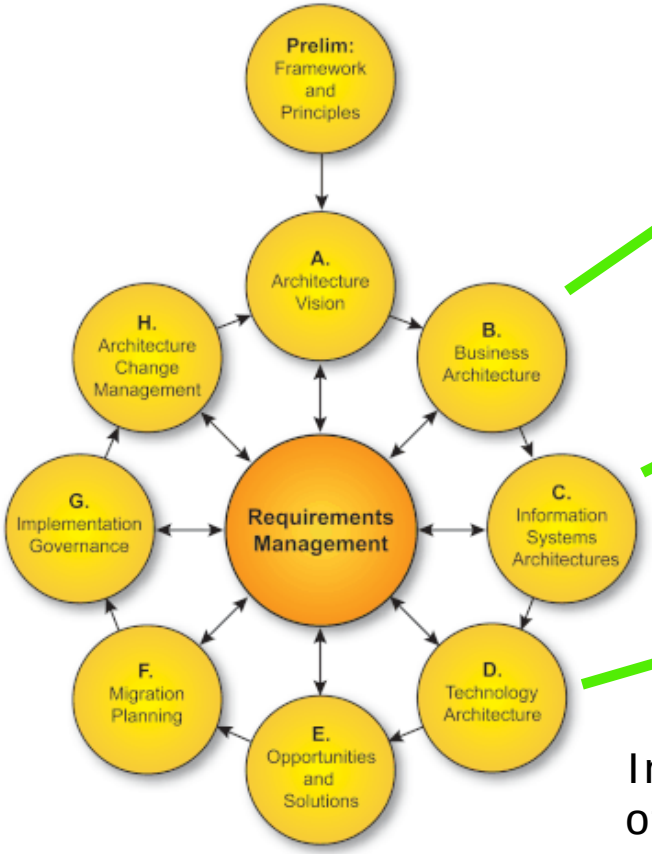
- Information Infrastructure Building Blocks
  - Technology architecture , not part of Information Architecture Framework.
  - Enterprise continuum.
- Information Management Building Blocks
  - Technology architecture , not part of Information Architecture Framework.
  - Enterprise continuum.
- CRUD Matrices
  - Tool used by information lifecycle governance
  - Solution-dependant, not architecture dependant

Contents/Benefits Matrix

	Stakeholders	Information models	Stakeh'e Vocabs	Ent. Vocab	Xlation Maps	Intrinsic Props	Info Gov	IA Princs	Stds	Rep Princs	Meta Model
Facilitate exchange of information with services	I	D	I	D	I	D		I	D	?	D
Facilitate access to information	I	D	I	D	I	D		I	D	?	D
Facilitate discovery, selection and re-use of services	I	D	I	D	D	D	D	I	D	?	I
Enable uniform interface to proprietary information models (some of which are unavoidable)	I	D	D	D	D	D		I	D	?	
Facilitate BAM (CEP)	I	D	I	D	D				D	?	
Facilitate conformance to legal and regulatory constraints		D		D			D	D	D	?	D
Facilitate provision of services as products, through uniform definition	D	D	I	D	D	D	I		D	?	I
Facilitate design of composite services	I	D	I	D	I	D		I	D	?	D
Facilitate consistent use of information by services	I	D	I	D	D	D	I	I	D	?	D
Facilitate consistent system behavior	I	D	I	D	D	I		I	I	?	I

Development of Information Architecture Within the TOGAF ADM

TOGAF – Information Perspective



Phase B is where the *information architecture* is developed. It describes the business *information* aspects of the business environment

Phase C is where the *data architecture* is developed. It defines the major types and sources of data necessary to support the business.

Phase D defines the technical solution necessary to process the *information* and *data* to support the business

Information governance is required in all phases of the ADM. Definition of the information aspects of implementation governance is best treated as a separate architectural engagement.

Preliminary Phase

- Information Architecture Principles. For example:
  - That there will be master data/master information strategy
  - That continual data cleansing will be used

Phase A

- Information Architecture Stakeholders
  - And their views
- Information Architecture Vision
  - Information Architecture components of Version 0.1 of baseline and target Business, Information Systems, and Technology Architectures

Phase B

- Refine Information Architecture Principles
- Identify and define essential aspects and elements of:
  - Intra/Inter enterprise information meta-model
  - Enterprise controlled vocabulary
  - Major Business Information Object Types and Relationships (The information models)
  - Intrinsic properties of information objects, eg. quality, access rights, abundance . .
  - Information stakeholder vocabularies
  - Vocabulary translation mappings

Phase C Already Contains

- Business data model (?)
- Logical data model
- Data management process model
- Data entity/business function matrix
- Data interoperability requirements (e.g., XML schema, security policies)
- Data architecture building blocks
  - And their interface standards

Phase D

- Information Infrastructure Building Blocks
  - Technology architecture , not part of Information Architecture.
- Information Management Building Blocks
  - Technology architecture , not part of Information Architecture.

Next Steps

- Incorporate comments
- Convert presentation to a base document
- Add artefacts
- Develop and Review

Artefacts - Still To Be Done

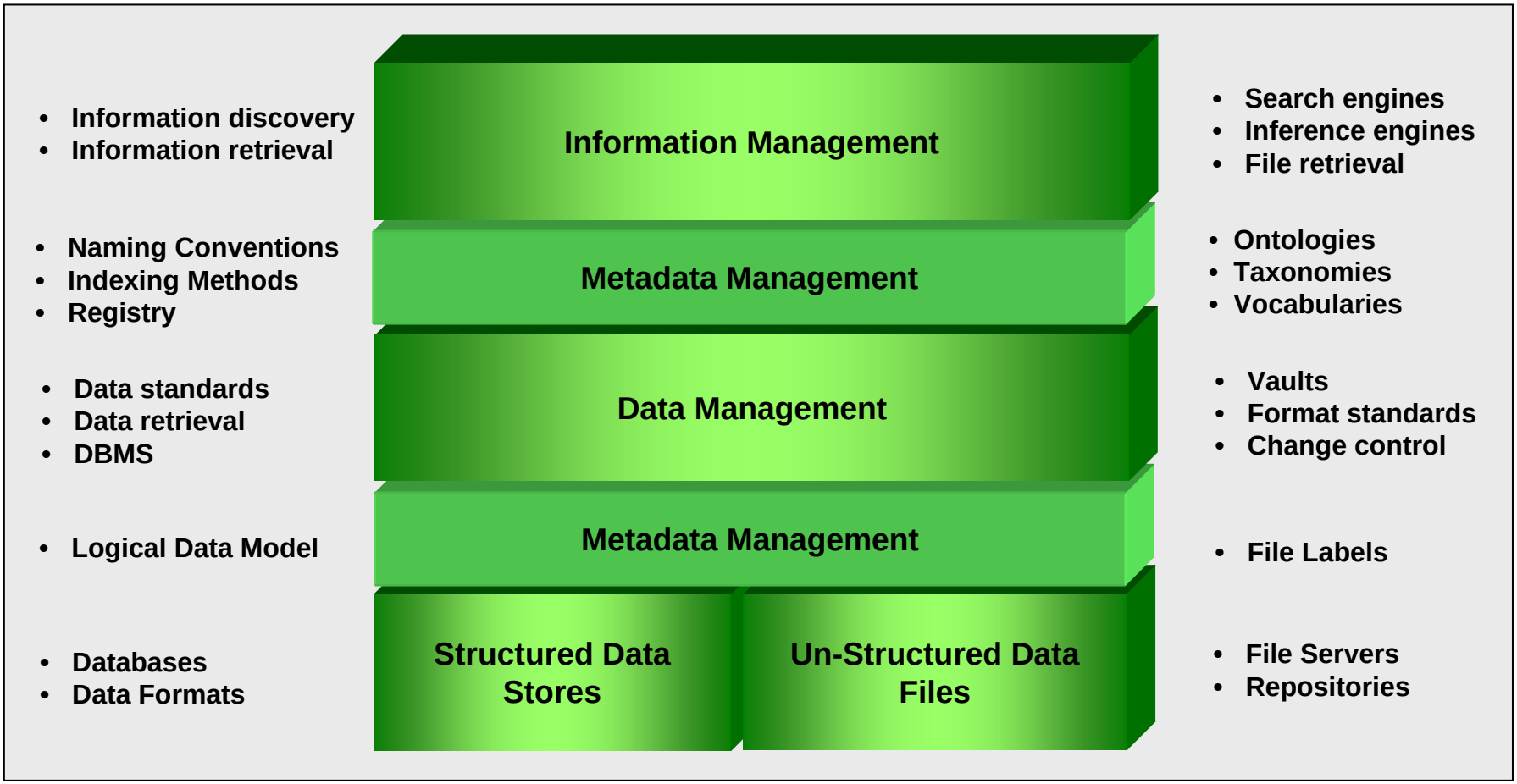
- Define important terms used – eg. Controlled vocabulary
- Develop standard set of information architecture principles
- Develop standard information architecture reference models
- Develop reference examples of controlled vocabulary, stakeholder vocabulary, translation mapping, information model, . .

Information Architecture for SOA

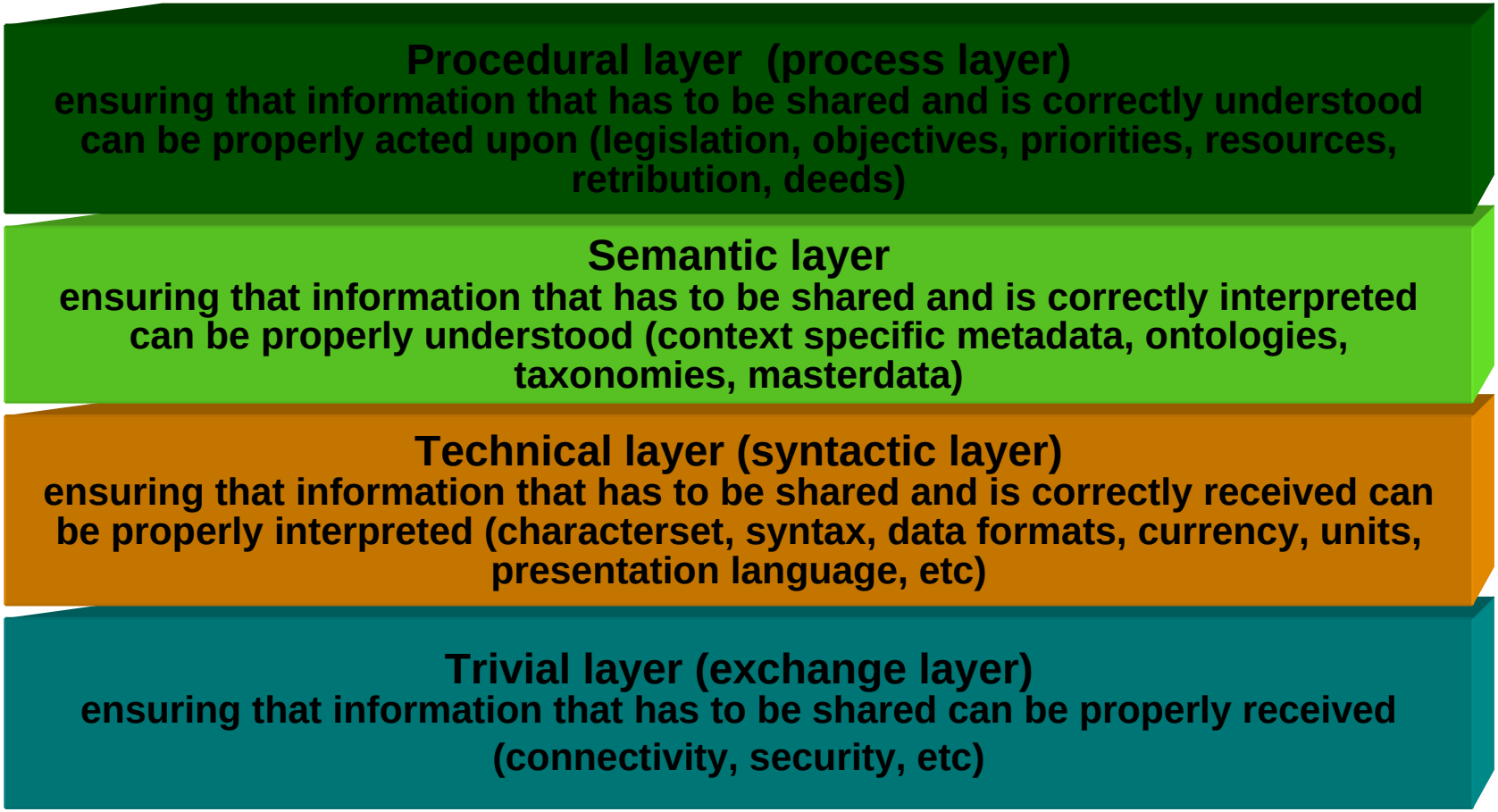
Thank You!

Back-Up Slides

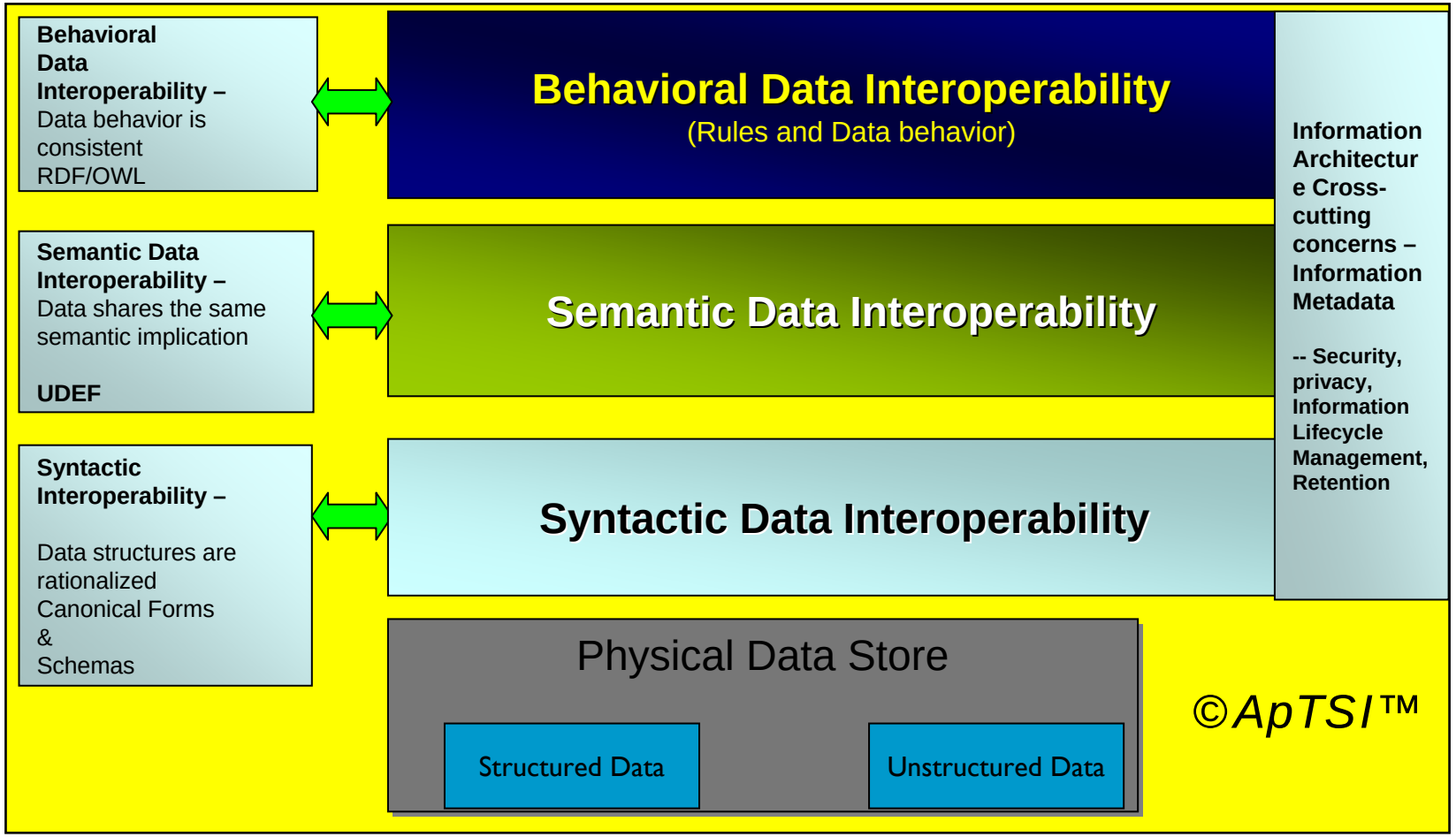
Information Systems View



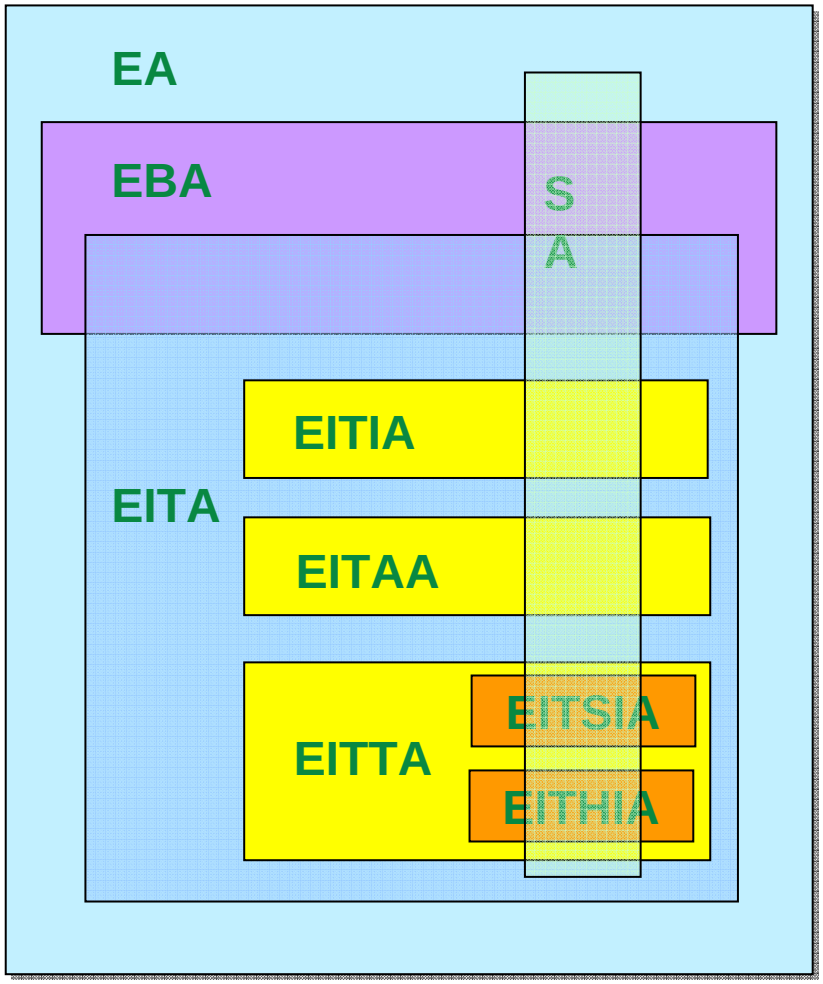
Communications View



Hybrid View



An Architecture of Enterprise Architecture

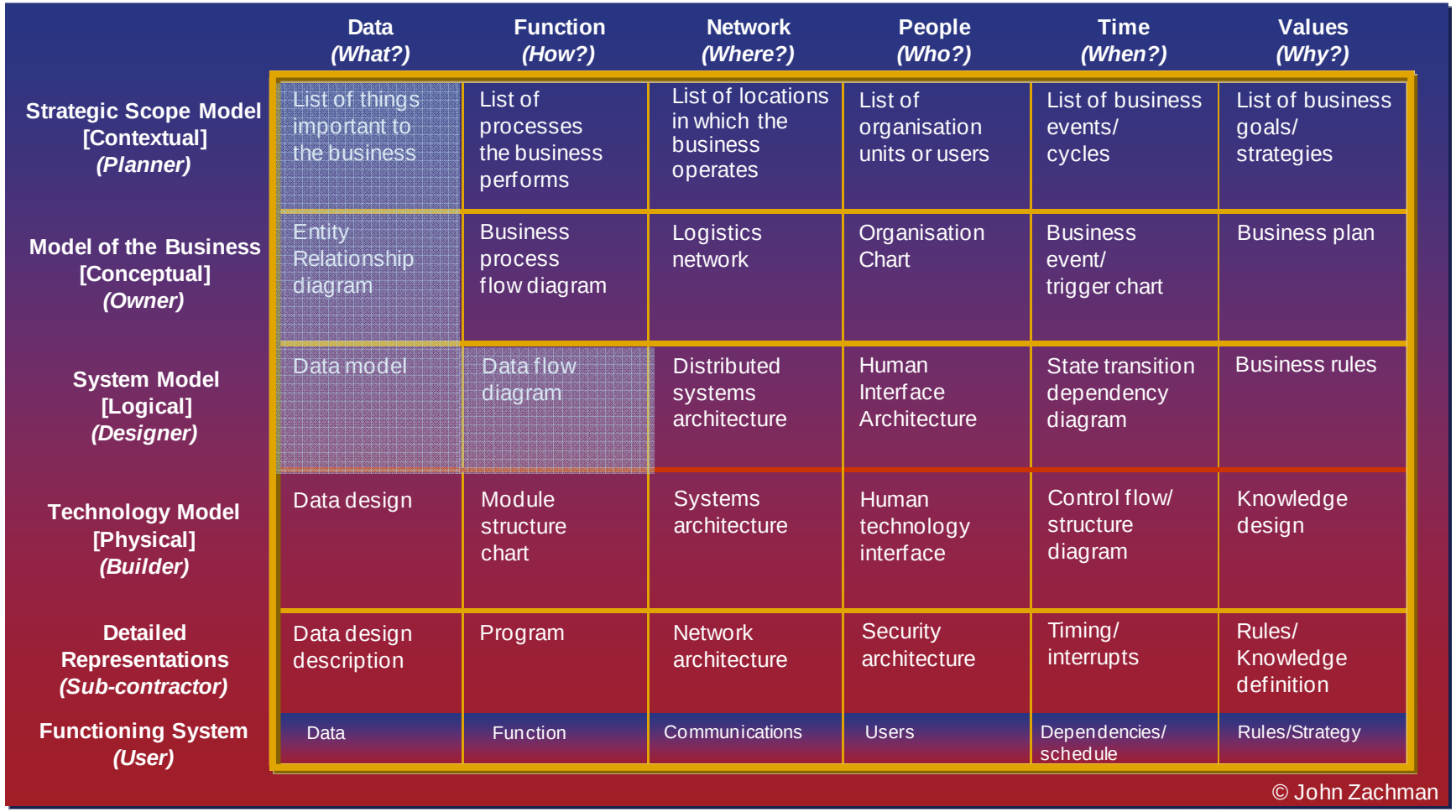


EA:	**Enterprise Architecture**
EBA:	**Enterprise Business Architecture**
EITA:	**Enterprise IT (EIT) Architecture**
EITIA:	**EIT Information Architecture**
EITAA:	**EIT Application Architecture**
EITTA:	**EIT Technology Architecture**
EITSIA:	**EIT Software Infrastructure Architecture**
EITHIA:	**EIT Hardware Infrastructure Architecture**
SA:	**Solution Architecture (one of many)**

TOGAF

Source: Len Fehskens

Zachman Framework



	Data *(What?)*	Function *(How?)*	Network *(Where?)*	People *(Who?)*	Time *(When?)*	Values *(Why?)*
Strategic Scope Model [Contextual] ***(Planner)***	List of things important to the business	List of processes the business performs	List of locations in which the business operates	List of organisation units or users	List of business events/ cycles	List of business goals/ strategies
Model of the Business [Conceptual] ***(Owner)***	Entity Relationship diagram	Business process flow diagram	Logistics network	Organisation Chart	Business event/ trigger chart	Business plan
System Model [Logical] ***(Designer)***	Data model	Data flow diagram	Distributed systems architecture	Human Interface Architecture	State transition dependency diagram	Business rules
Technology Model [Physical] ***(Builder)***	Data design	Module structure chart	Systems architecture	Human technology interface	Control flow/ structure diagram	Knowledge design
Detailed Representations ***(Sub-contractor)***	Data design description	Program	Network architecture	Security architecture	Timing/ interrupts	Rules/ Knowledge definition
Functioning System ***(User)***	Data	Function	Communications	Users	Dependencies/ schedule	Rules/Strategy

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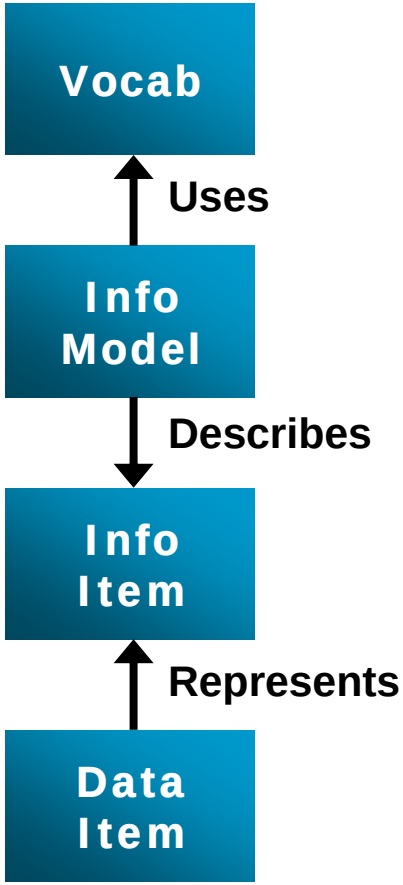
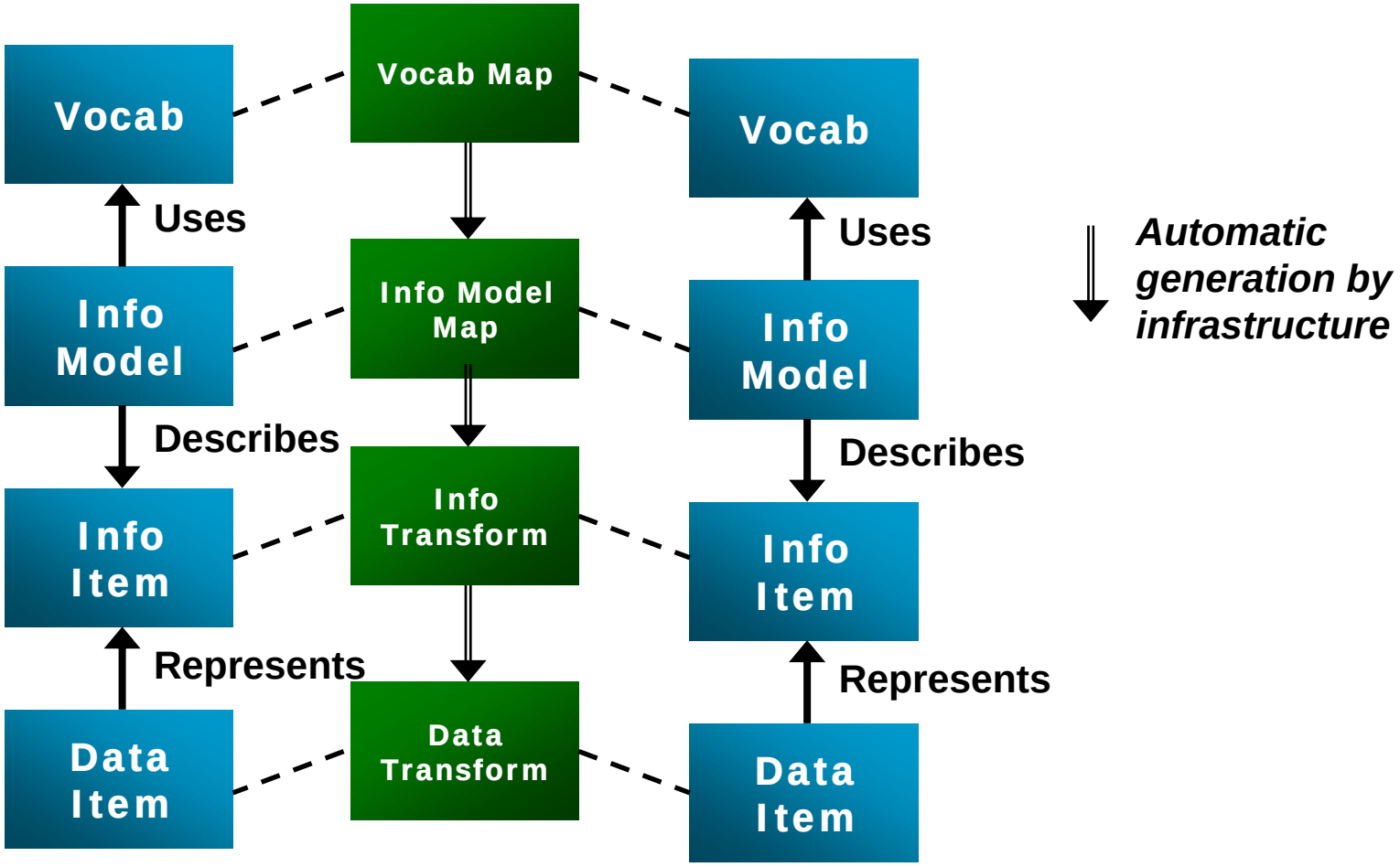
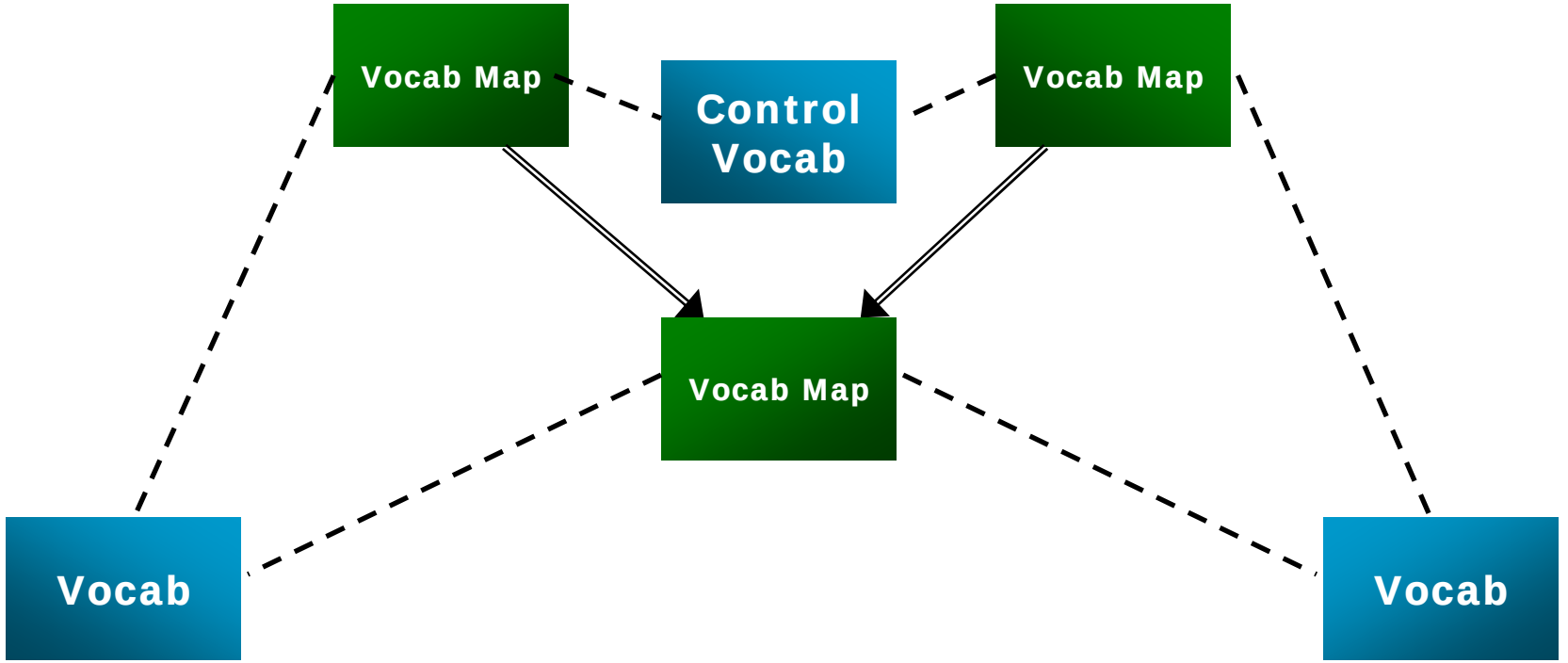
Basic Metamodel



Mapping Metamodel



Controlled Vocabulary Metamodel



Information Architecture Definition (after IEEE 1471)

- The fundamental organization of the information and information-processing infrastructure used by an enterprise, embodied in their components, their relationships to each other and the environment, and the principles guiding their design and evolution