Service Oriented Computing: Introduction

(http://users.exa.unicen.edu.ar/~cmateos/cos)
ISISTAN-UNICEN-CONICET

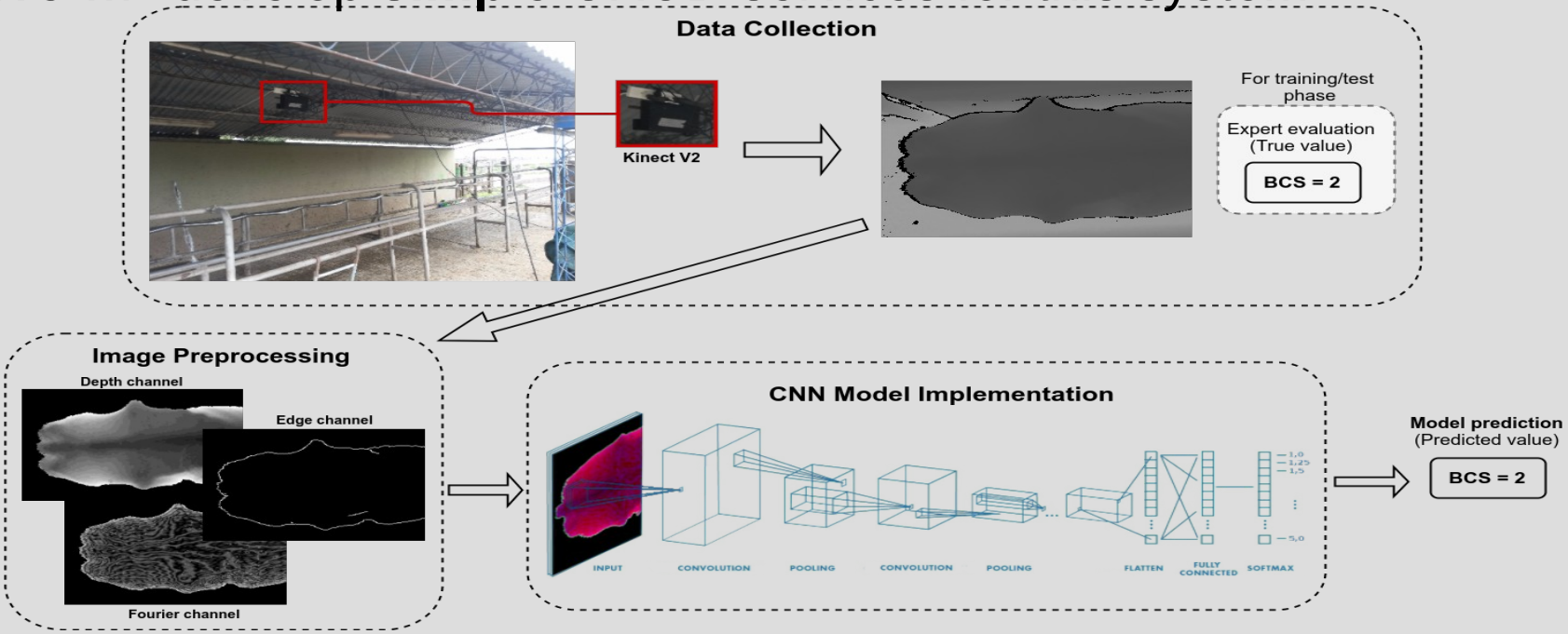
Course overview

- Goals of the course
  - To understand the philosophy behind SOC
  - To discuss the role of XML/JSON in SOC
  - To get a glimpse of the existing SOC technologies
  - Learn to code SOAP and Rest services :)

- Prerequisites
  - Object-oriented and Java programming
  - Web **back-end/front-end** (platforms, frameworks, libraries... all you can remember will help)

This year’s application domain: Body Condition Score for cows

- Joint project Uniagro – ISISTAN
- We will develop **simple** CRUD services for this system



Useful resources

- Some interesting links

  - W3C Web site: *http://www.w3.org*
    - *“The World Wide Web Consortium (W3C) is an international community that develops open standards to ensure the long-term growth of the Web”*
    - *Led by Tim-Berners Lee*
    - *Some members: AliBaba, Facebook, MS...*

  - W3C schools: *http://www.w3schools.com*

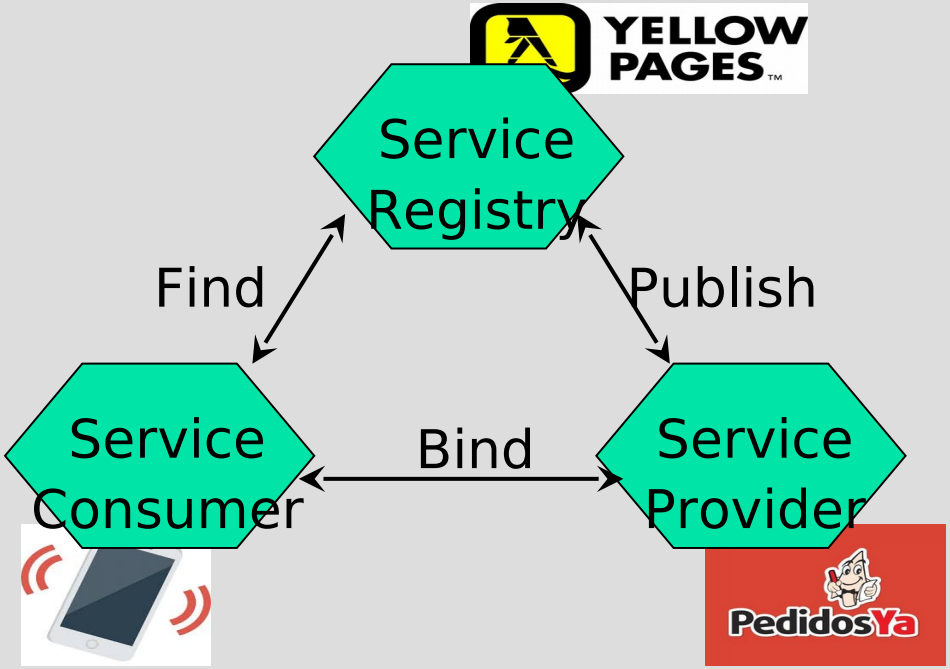
  - SOC@Wikipedia.org: http://tinyurl.com/wmzn9

SOC: Overview

- **Publish/Unpublish**
  Advertising **services** to a **registry** (publishing) or removing those entries (unpublishing)

- **Find**
  The service consumers describe the kinds of services they're looking for, and the service brokers deliver the results that best match the request

- **Bind**
  The bind operation takes place between the service consumer and the service provider



Physical services

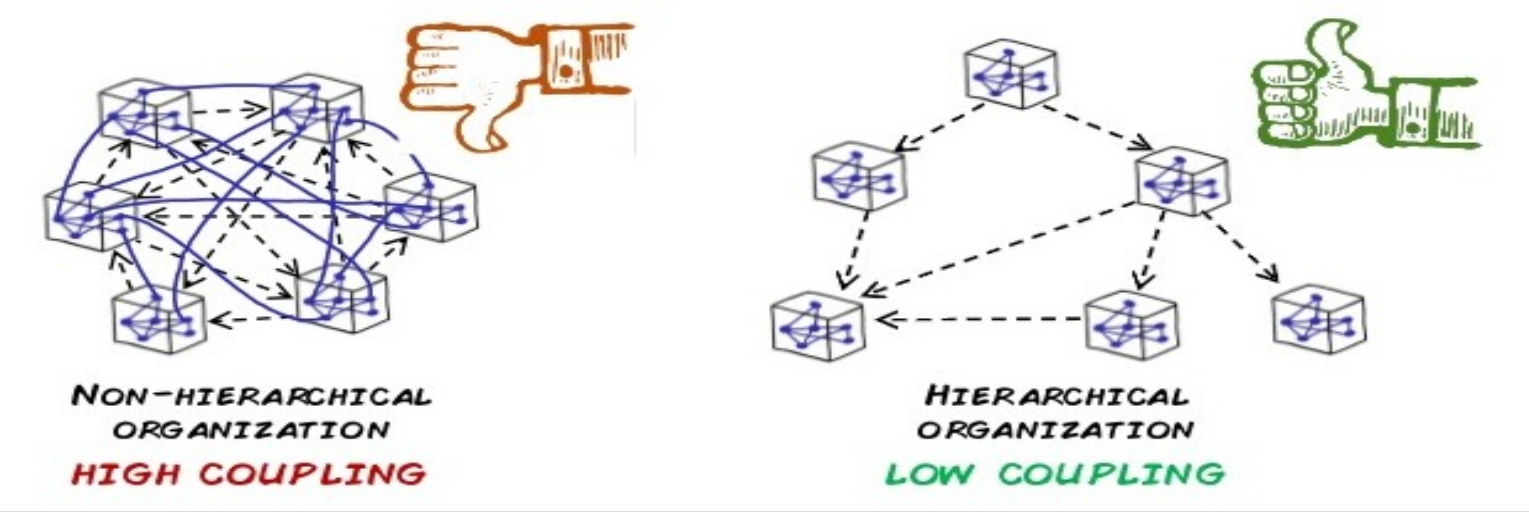
- Clearly defined, easy-to-use (ideally), somewhat ***standardized interface***
    - *E.g. request protocol for food delivery*
- *Self-contained* with no visible dependencies to computational resources or other services
- ***Always available*** (well, almost); idle until requested
- Services are ***coarse-grained***
- New services can be offered by ***combining existing services*** (e.g., airline + hotel bookings, geolocation + POIs)
- Each service has an associated ***quality of service*** (do not compete on what they do but how they do it...)

Physical services (cont.)

- Services belonging to the same category provide similar interfaces (***non-proprietary***)
  - Proprietary: A vendor's graphic card API
- Service implementation is decoupled from service interface (*abstraction*)
- Services are mediated through “yellow pages” (*discovery*)...
  - Yellow pages are responsible for finding the best alternative given a certain request (more on this later)
  - These ideas are already present in several distributed technologies: RMI/DCOM, JNDI, CORBA (**broker architectural pattern**)

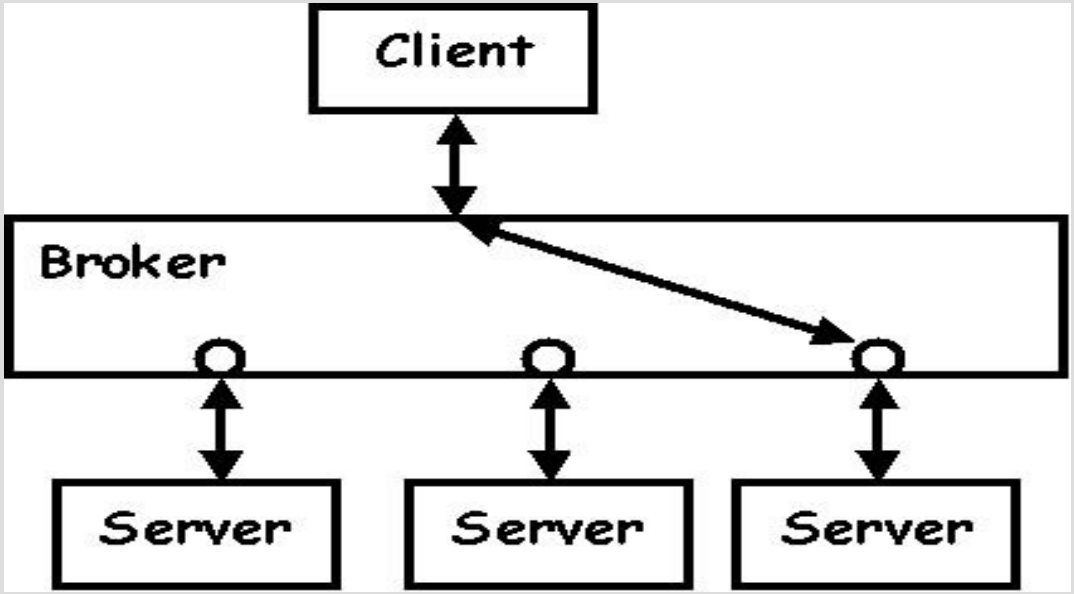
Physical services (cont.) Coupling

- A **decoupled** system allows changes to be made without having side effects
  - Coupling… “a necessary evil”
  - Loose (low) coupling
  - Tight (high) coupling



Physical services (cont.) Brokers

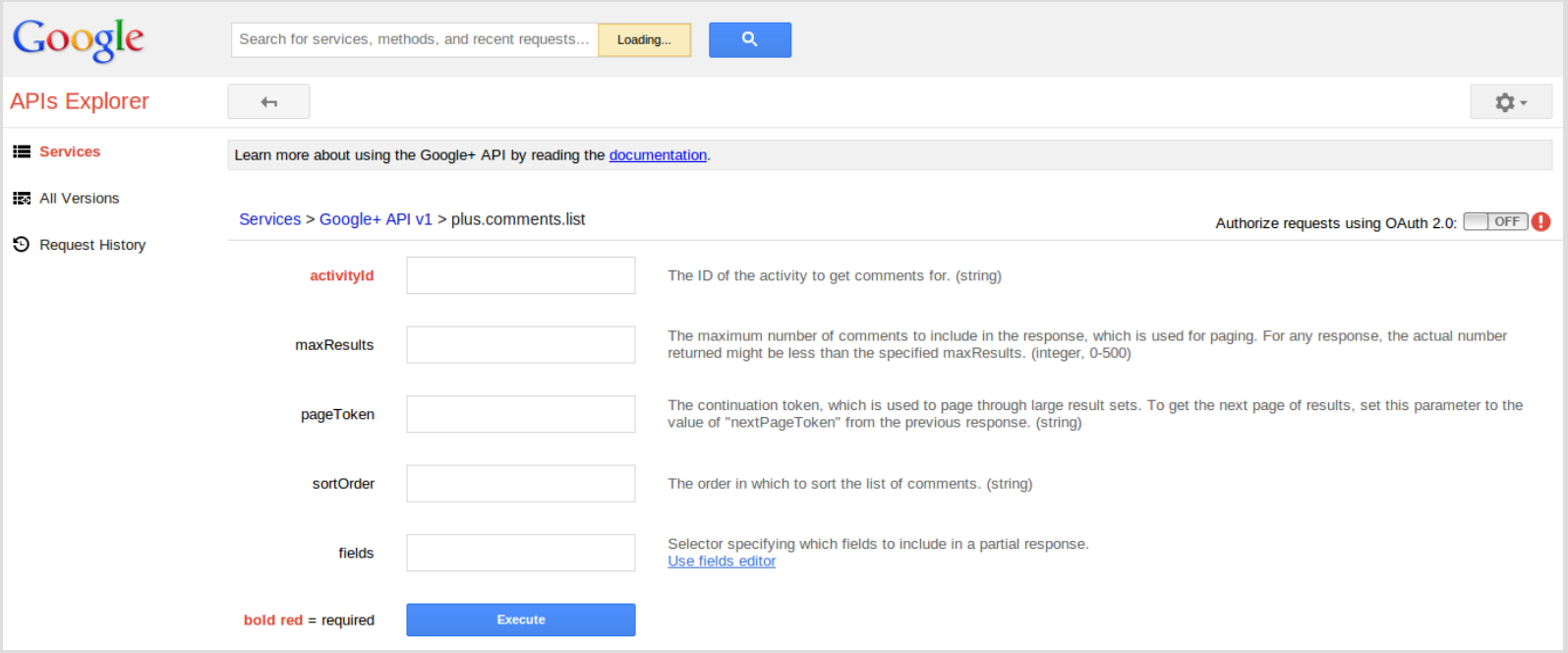
- Broker is an **architectural pattern**
  - A pattern is a recurrent good solution to a known problem (e.g. those of Gamma)



Why SOC? A technical perspective

- It helps to fulfill several desirable **quality attributes**
- Development (reusability) and **deployment**
- **Scalability** due to distribution
- **Interoperability**
- Loose coupling
- Composability
- Pervasiveness:
  - Amazon WS: aws.amazon.com
  - Google APIs explorer: http://developers.google.com/apis-explorer
  - Many, many others!

Google APIs explorer: Example



This is just one of the many API sources (more on this later)
https://nordicapis.com/api-discovery-15-ways-to-find-apis/

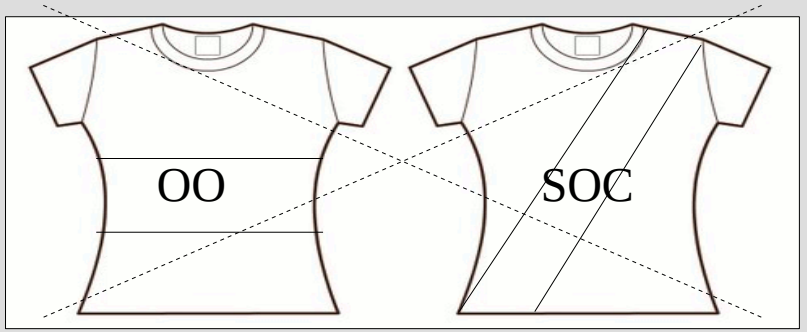
Object “vs” service orientation paradigms

OO World	SOC World
Classes and objects	Services and service instances
Class behavior/interfaces	Service contract
Attributes	No attributes (**stateless** preferred)
Public and **private** methods	Only **public** operations
Messages (invocations)	Message passing (XML, JSON)
Encapsulation, inheritance, polymorphism, composition	Encapsulation, composition

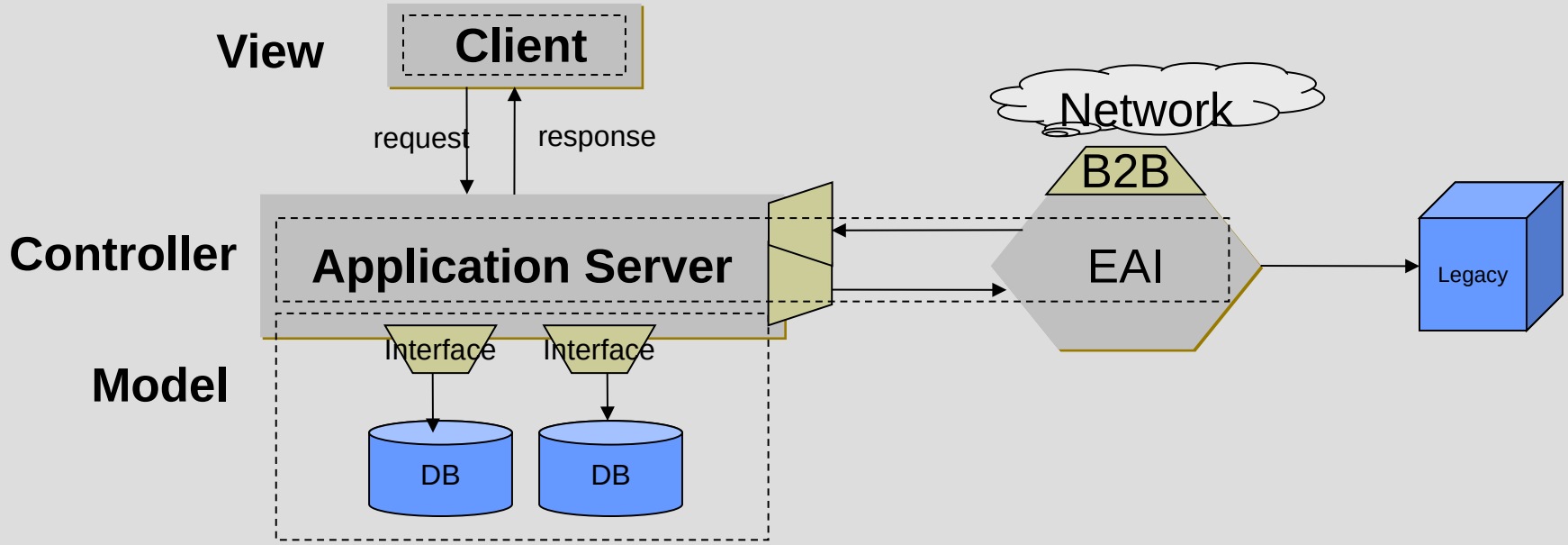
Object “vs” service orientation

SOC shares many similarities with OO, since both:

- Grew out of a need to shape software into units “mirroring” the real world
- Aim to tackle the problem of ever-changing business requirements (and quality attributes)
- Are concerned with minimizing the impact of change upon software programs already deployed and in use (e.g. *microservices*, more on these later)
- Both encompass principles such as Service Loose Coupling and Service Composability
- But... they complement each other!

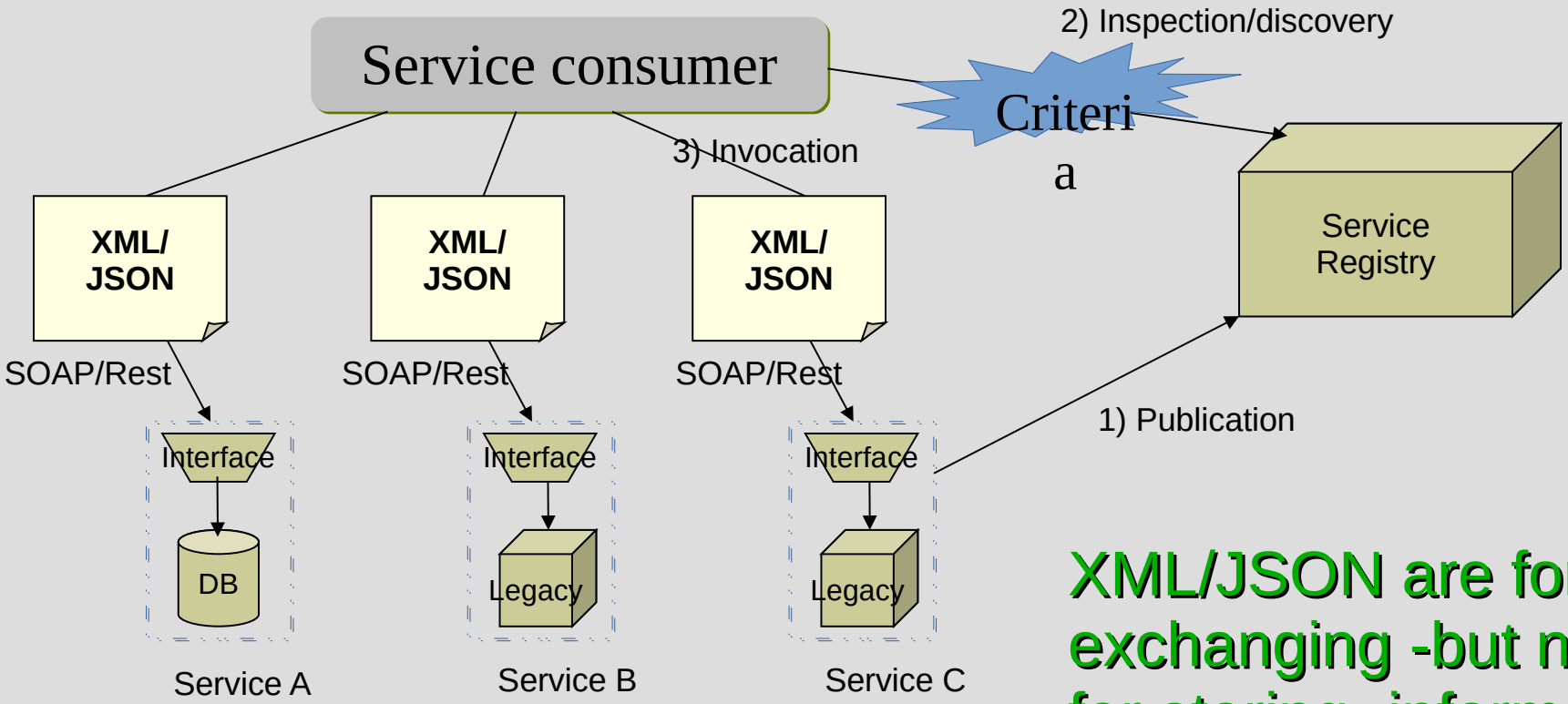


Constructing enterprise software: The way it has been done



- Focus on scalability, 24x7 availability
- Less focus on integration, though some solutions exist (e.g. bus)

Constructing distributed software: The SOC way



XML/JSON are for exchanging -but not likely for storing- information...

SOC: Common Misconceptions

Much of the confusion surrounding the meaning of SOA is caused by how this term has been used in the literature...

- “SOC = SOA”
- “An application that uses Web Services is service-oriented”
  - The sledge hammer anti-pattern...
- “If you understand Web Services you won't have a problem building SOC”
  - SOC requires a change in how business and application logic are viewed, partitioned, automated, deployed...
- “Once you go to SOC, everything becomes interoperable”
  - No! Just like using OO does not mean we ensure reusability...