Service Oriented Architecture – Evolution and Characteristics

Web Services

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Evolution of Services

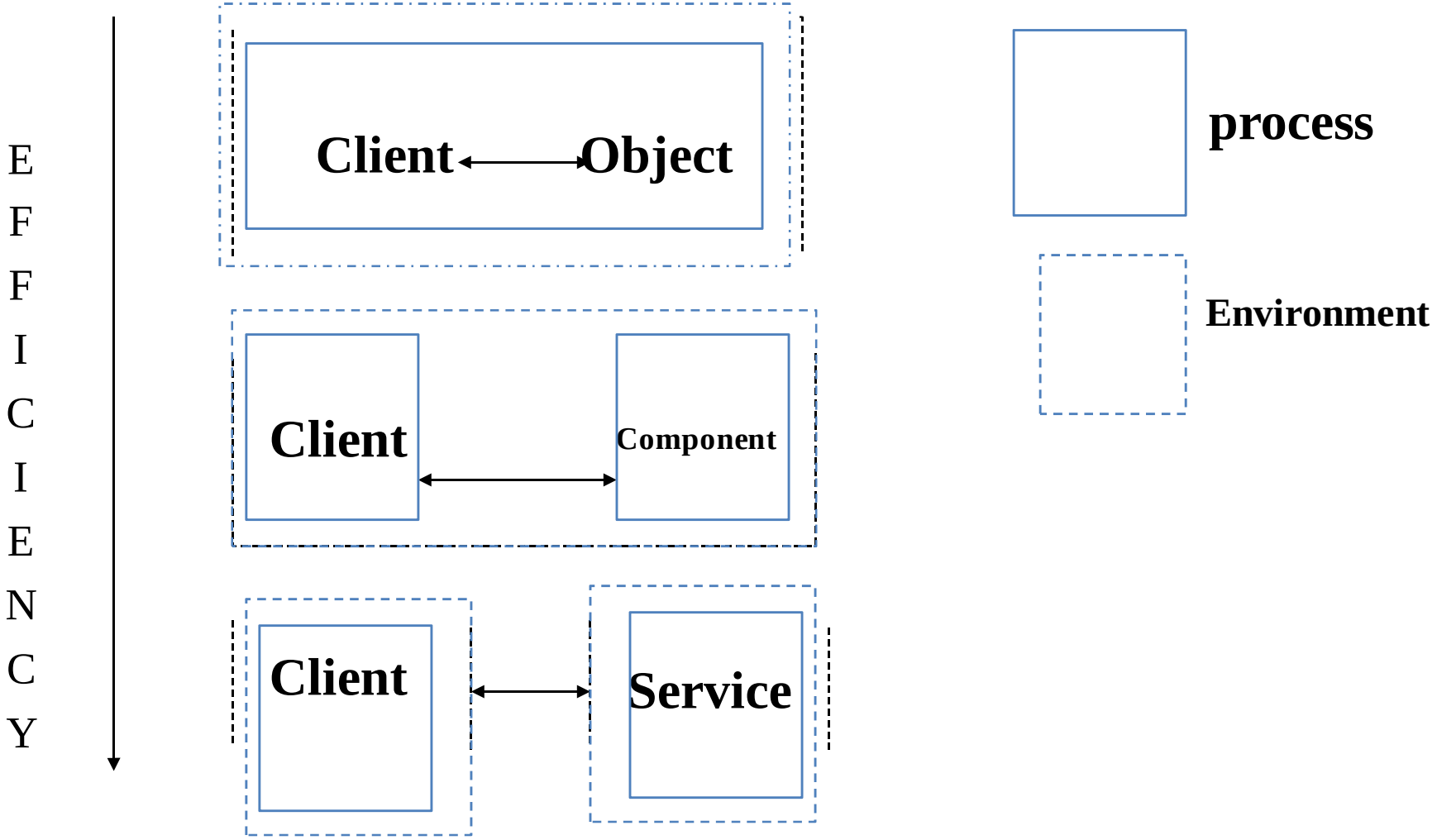
- **Data & functions Objects Components Services**

- **Objects**
  - Clients and objects live in same process and work in same environment (eg. Java / C#)

- **Components**
  - Clients and components live in different processes and work in same environment (eg. EJB)

- **Services**
  - came into use when publishing, discoverability, on-demand operation among interacting enterprises became necessity
  - Clients and services live in different processes and work in different environments (SOAP, WSDL, UDDI)

Objects, Components and Services



Objects, Components and Services

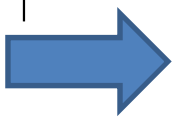
Builder Relationship

- **Objects**
  - Built by same person that built its clients
- **Components**
  - Built by the same group that built its client
- **Services**
  - Built by a different company that built its client

Evolution of SOA

- SOA - A step from:

Fine grained
Tightly coupled
object models



Coarse grained
Loosely coupled
Component interfaces

What is SOA ?

- **Framework within which enterprises build, deploy and manage services**
- **Open, agile, extensible, composable architecture**
- **Approach to loosely coupled, protocol independent, standards-based distributed computing where software resources available on a network are considered as services**
- **Creates service level abstractions that map to the way a business actually works**
- **SOA enables discovery, composition and invocation of services**
- **Applications are built using functionality from available services**

SOA – Basic Model

Provider

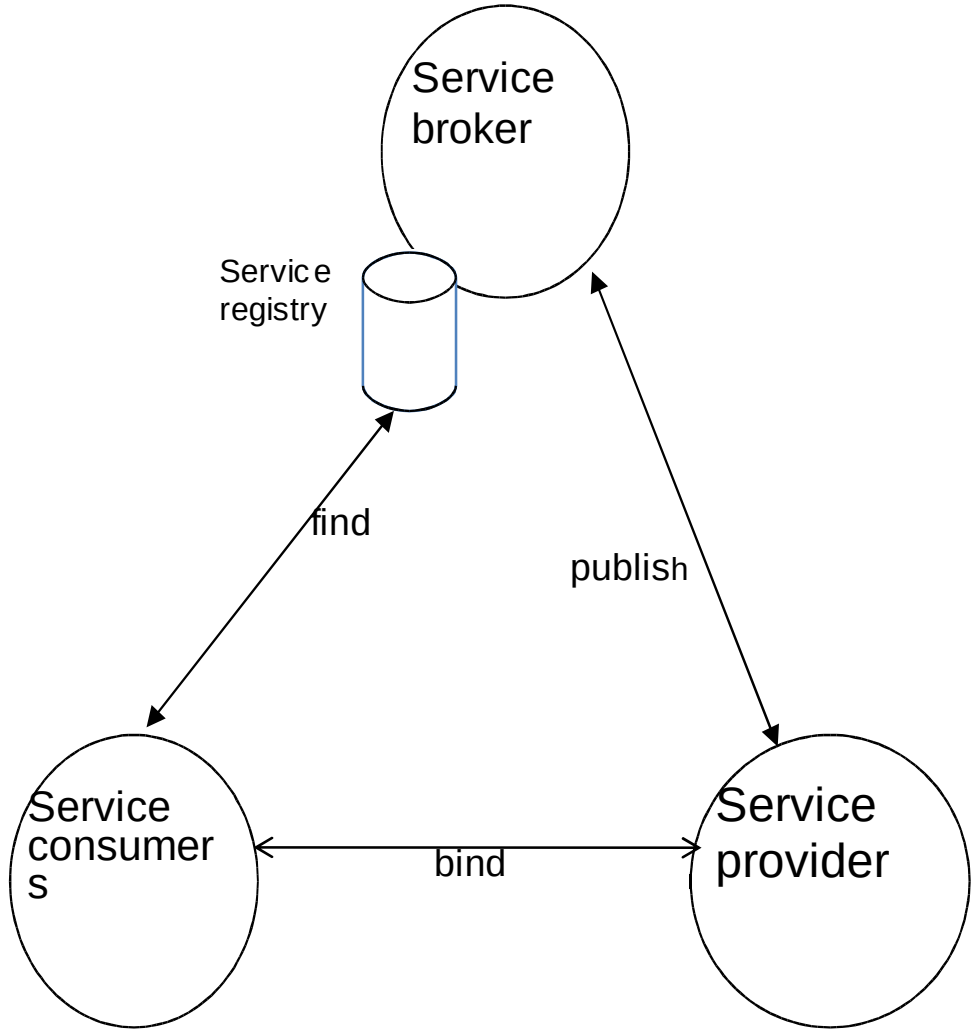
- deploys & publishes services

Consumer

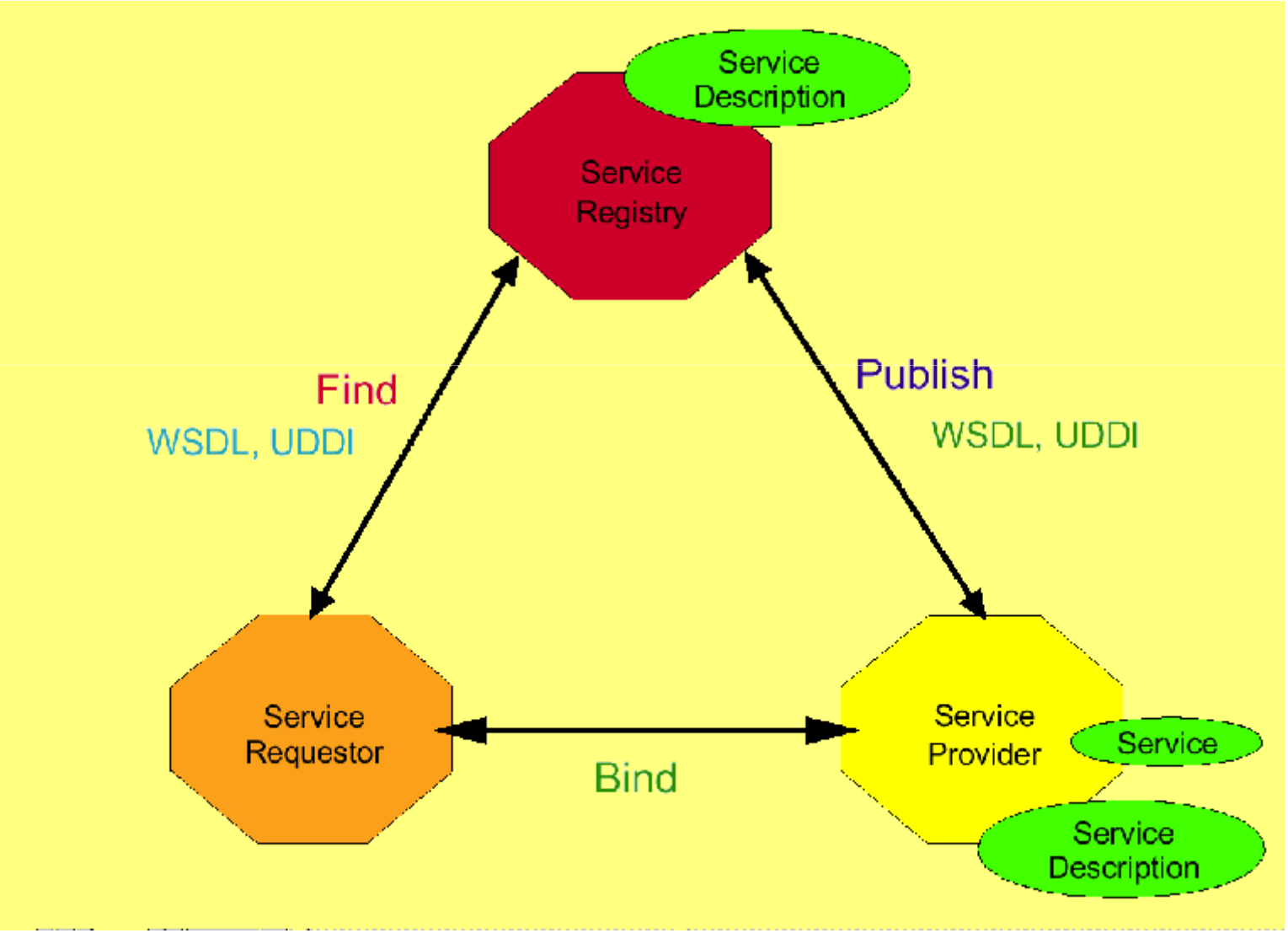
- Locates service provider through service registry
- Binds to & invokes service

Broker

- Registers, categorizes published services
- Responds to requests to use its services



Service Oriented Architecture model



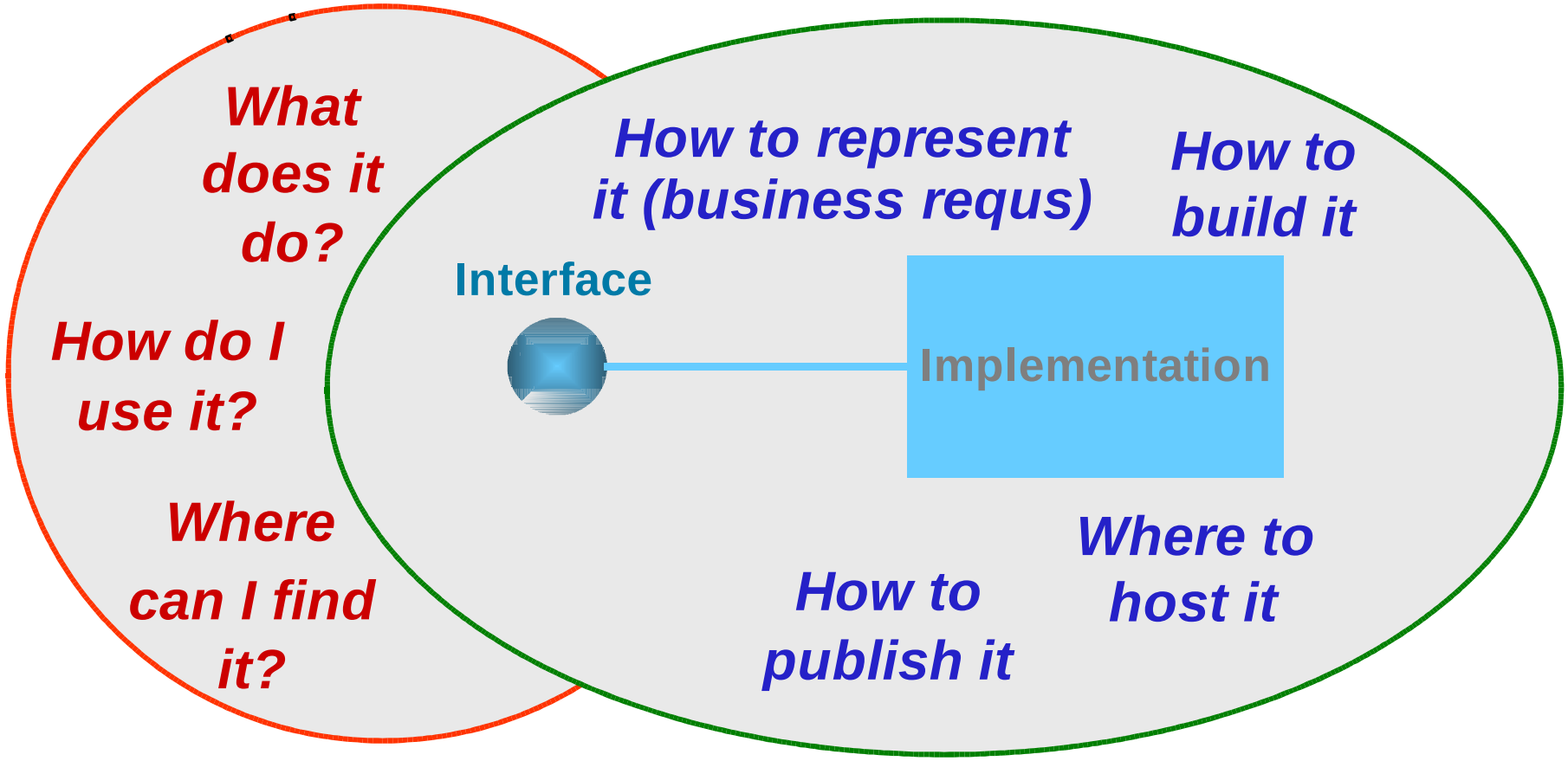
Features of SOA

- Self- describing Interface (WSDL)
- Message communication via formally defined XML
- Services are maintained in a registry
- Each service has a Quality Of Service
- Applications adapt to changing technologies
- Easy integration of applications with other systems
- Leverage existing investments in legacy applications

Goal of SOA

- Loosely coupled
- The goal for a SOA is a world wide mesh of collaborating services, which are published and available for invocation on the Service Bus.
- SOA is not just an architecture of services seen from a technology perspective, but the policies, practices, and frameworks by which we ensure the *right* services are provided and consumed.

Service Interfaces



Fundamental Issues that Must Be Addressed

A common framework for Web service interactions based on open standards must occur.

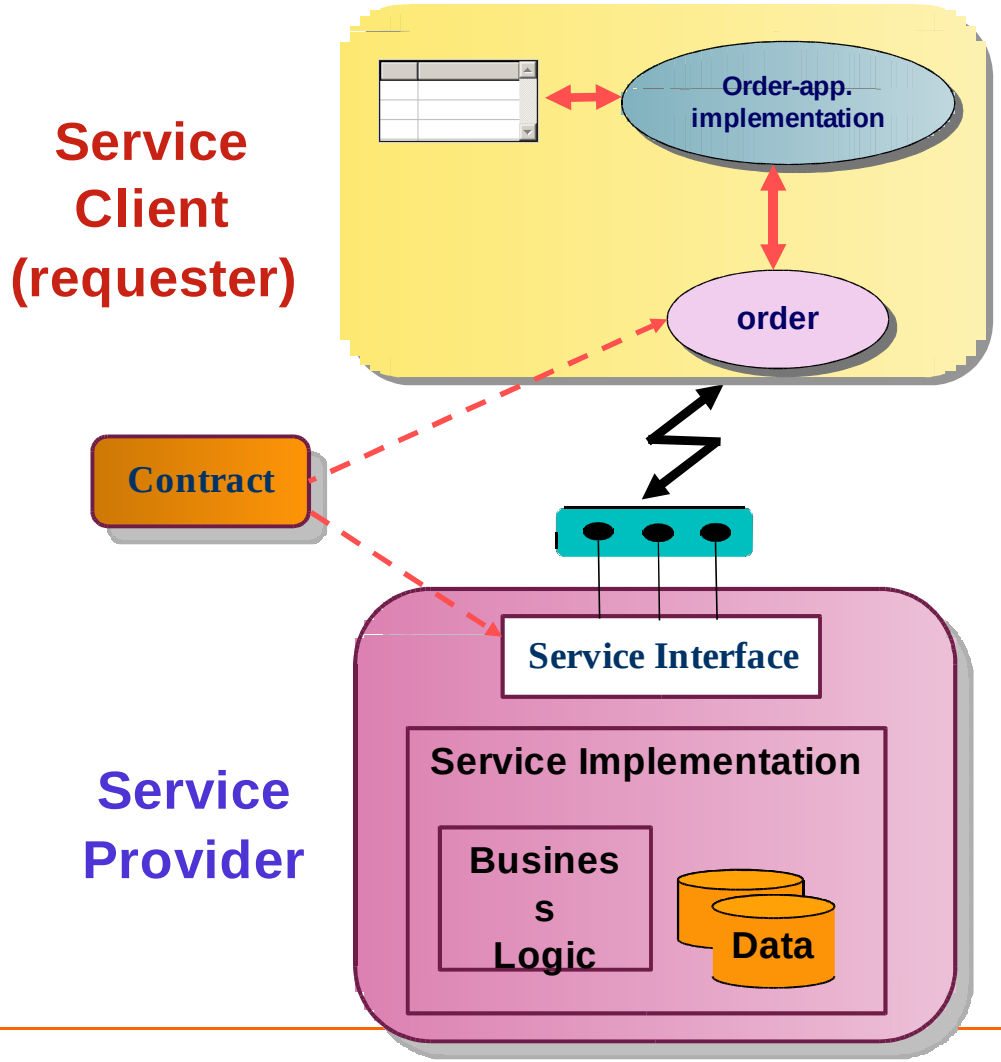
- Communication (SOAP)
- Description (WSDL)
- Registration (UDDI)
- Composition (BPEL)

An agreed set of vocabularies and interactions (common processes)for specific industries or common functions must be adopted.

What are Web Services?

- **Web services perform encapsulated business functions**
- **Functions can be from simple request-reply to full business process interactions**
  - Credit checking & approval & limit determination/payment processing
- **Can be mixed and matched to create complete enterprise processes, e.g., supply chain management, procurement, logistics, etc.**
- **Enable dynamic integration of applications across diverse technologies and between organizations:**
  - allows integration at a (business) process level both within an enterprise (EAI) & between enterprise partners (e-Business integration)
- **Provide a platform-independent method for message-based interaction of applications in SOA**
- **SOA is realized through web services**

Service Clients and Providers



Major service types

Basic Services:

- Data-centric and logic-centric services
- Encapsulate data behavior and data model and ensures data consistency (only on one backend).
- Basic services are stateless services with high degree of reusability.
- Represent fundamental SOA maturity level and usually are build on top existing legacy API (underlying services.

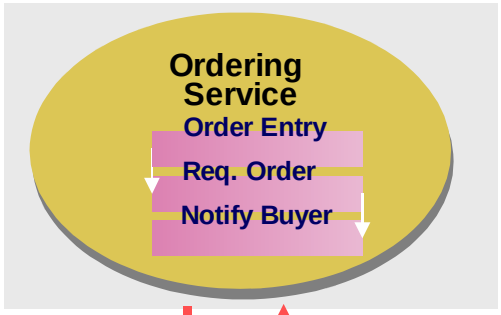
Major service types

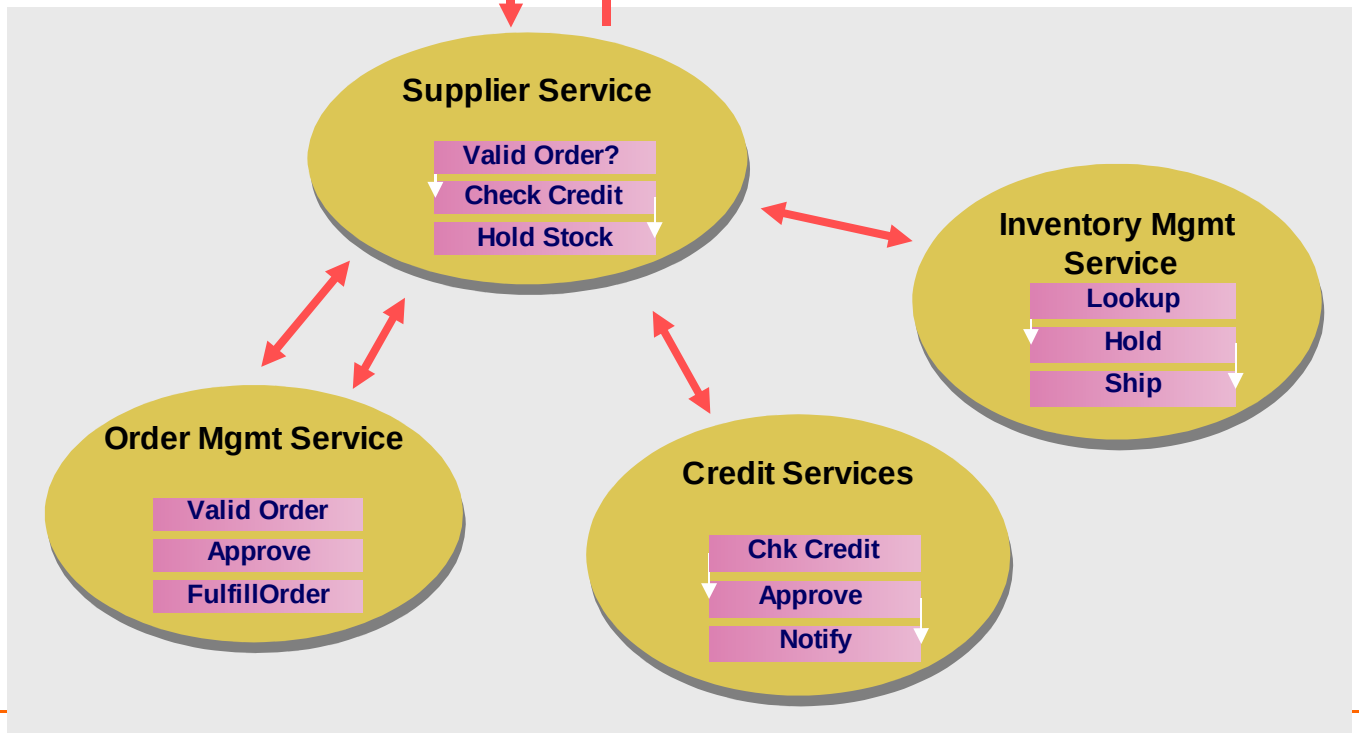
Composed Services :

expose harmonized access to inconsistent basic services technology (gateways, adapters, façades, and functionality-adding services).

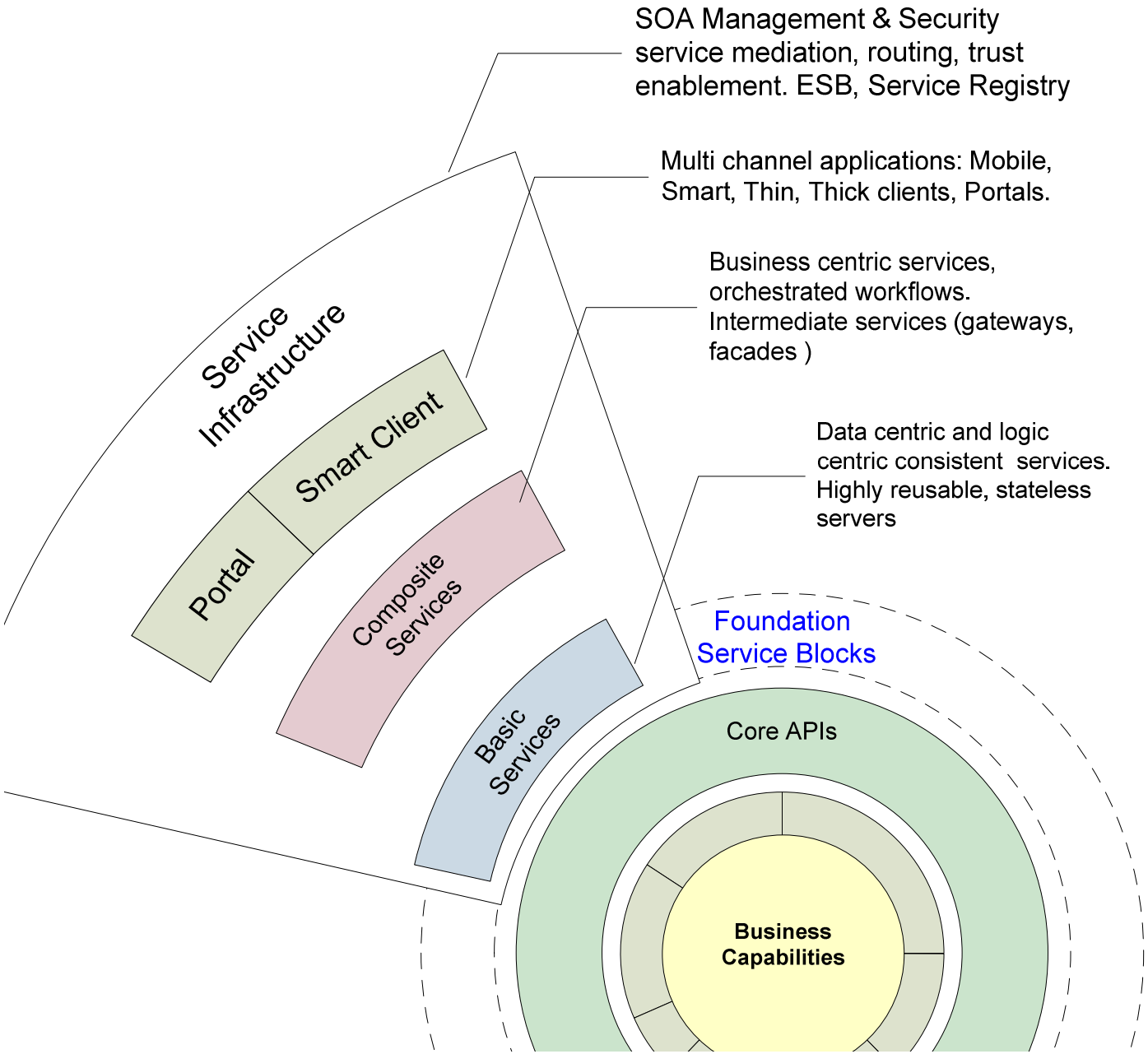
Encapsulate business specific workflows or orchestrated services.

Composite Services

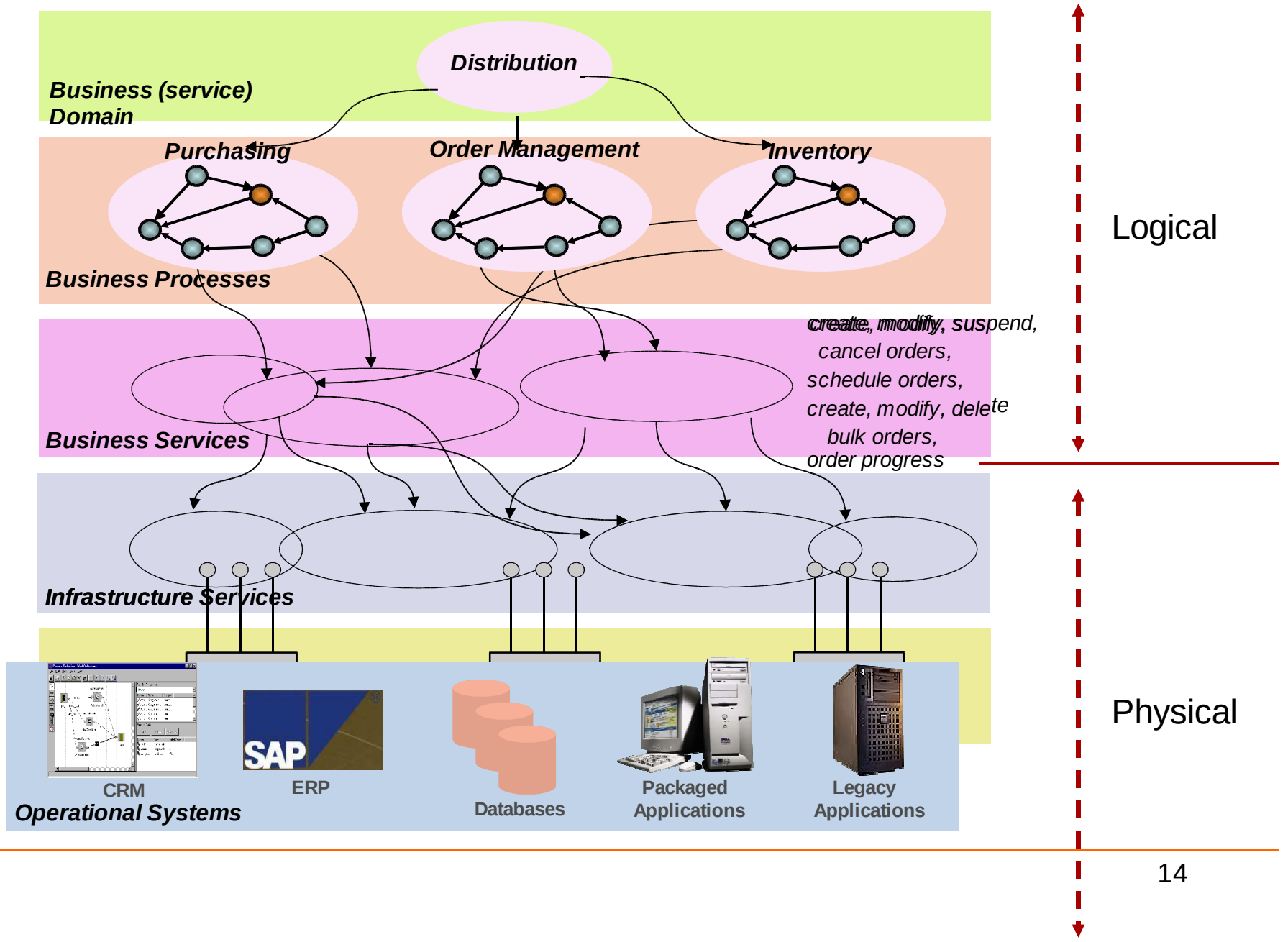




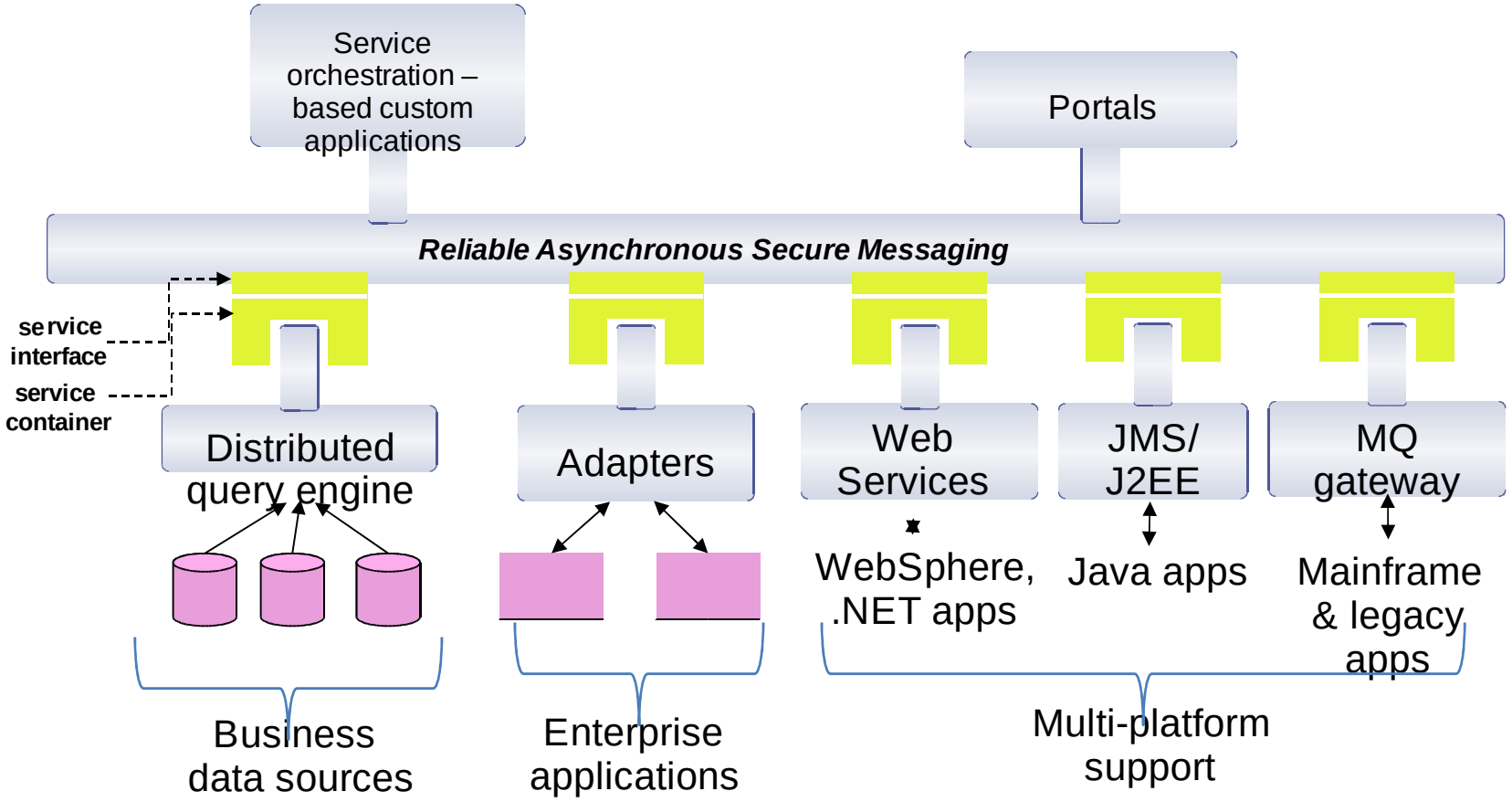
Service Types



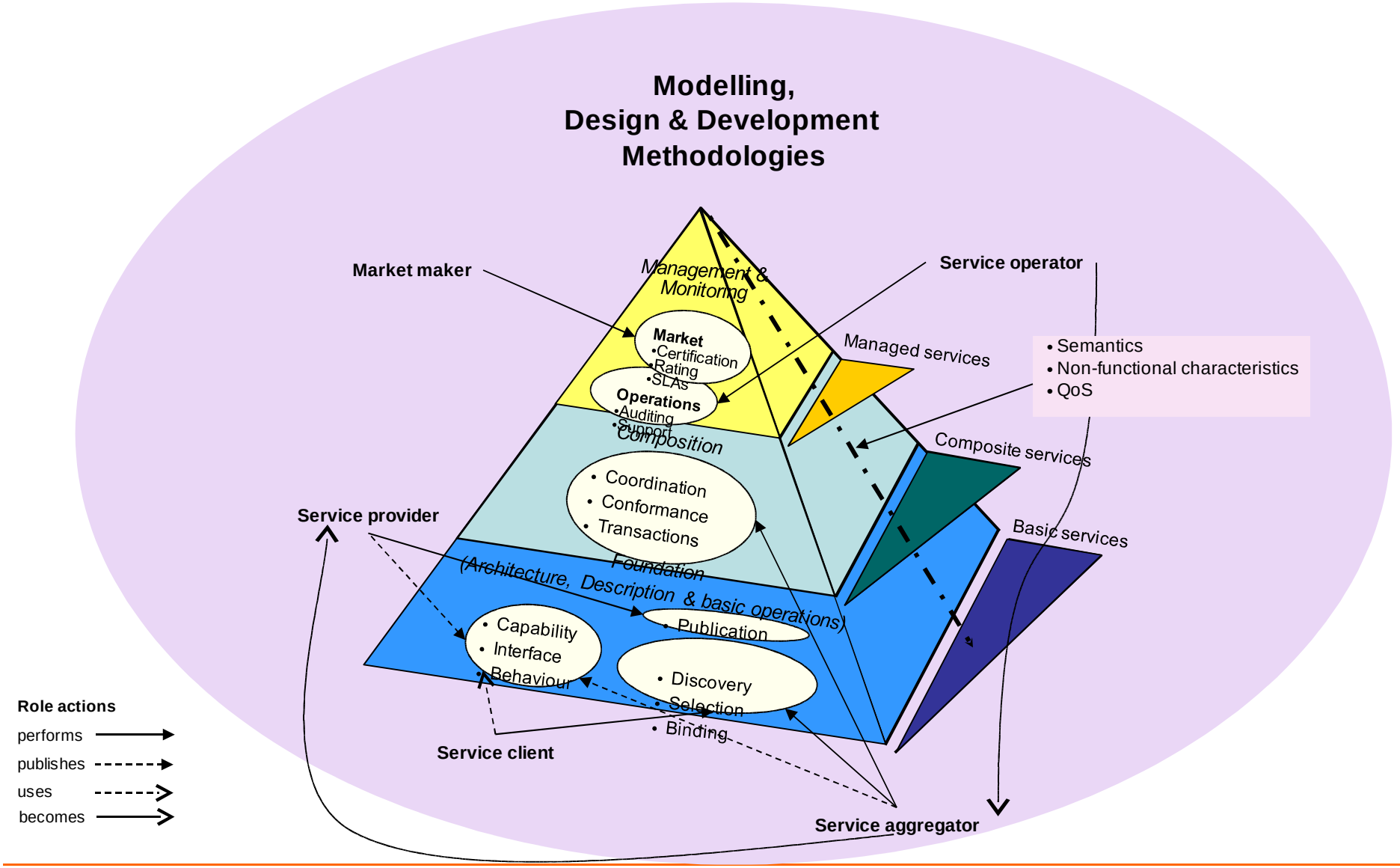
SOA Reference Architecture



Enterprise Service Bus (ESB)



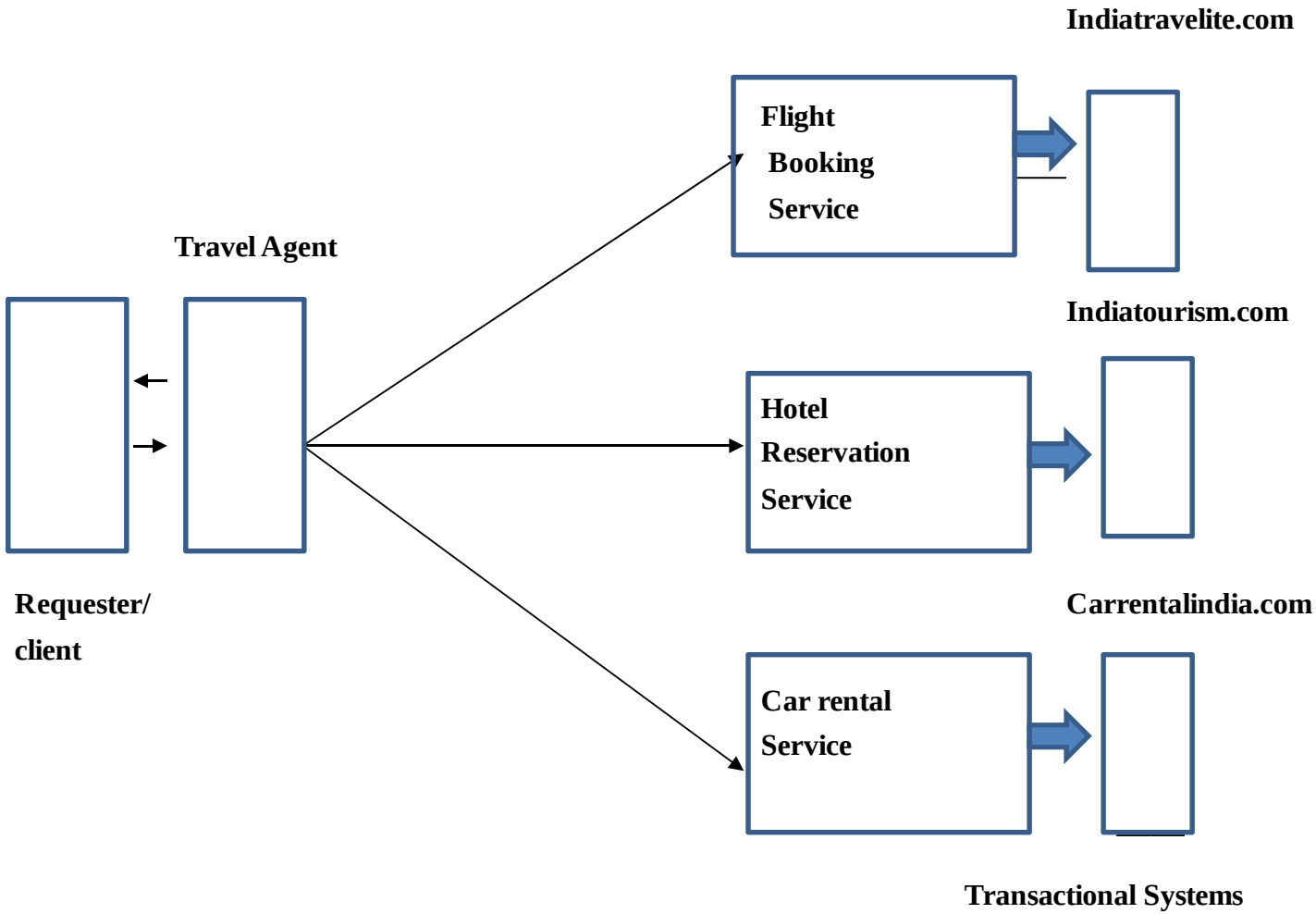
Extended SOA (xSOA)



Web services within SOA

- **Web services within traditional architectures introduce an integration layer that consists of wrapper services that enable synchronous communication via SOAP compliant integration channels – facilitate communication with outside partners and third party utility WS**
- **SOA provides strong support for a variety of messaging models**
- **Web services within SOA are subject to specific design requirements and automate business processes**
- **SOA is standardized across an enterprise – cross interoperability**

Example Scenario – Travel Arrangement



References

[1] T. Erl, Service-Oriented Architecture: Concepts, Technology, and Design, Pearson Education, 2005

[2] D. Krafzig, K. Banke and D. Slama, Enterprise SOA: Service Oriented Architecture Best Practices, Prentice-Hall Inc., Nov 2007

Thank you