

Pro-Active Service Entity Framework

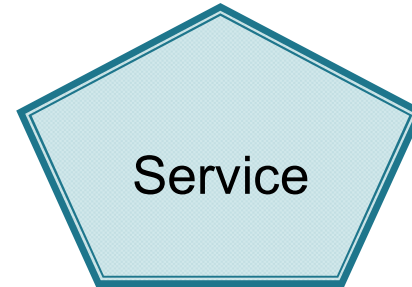
Towards better mapping between Business
and Software



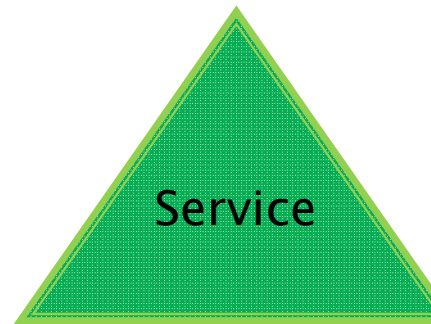
Motivation – I



Service



Service



Motivation – II

- ▶ Client satisfaction
- ▶ Business Process
- ▶ Resource Management
- ▶ Marketing
- ▶ ...

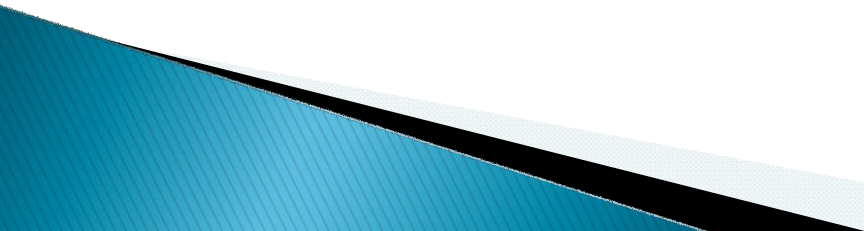
Business Perspective

- ▶ Remote Procedure Calling
- ▶ Input-Parameters
- ▶ Output Results
- ▶ Interoperability
- ▶ WS Composition
- ▶ ...

Software Perspective

Motivation – III

Web Service Approach Limitations

- ▶ Functional Restriction
 - ▶ WS are Static entities
 - ▶ Provider Selection Difficulties
 - Client Perspective
 - Provider Perspective
 - ▶ Catalogues out of date
 - ▶ No Aggregation
- 

Suggested Approach-I

▶ Service concept

Definition 1 – Service: is a software construct materializing the value an entity can provide to clients in exchange for some reimbursement, that can be represented by a tuple $S=(SR, C, D, RO)$, where:

- SR – a reference to the actual (technical) service, enabling the functional call or the i-content provision launch;
- C – the category of the service;
- D – the detailed description of the service. Depending on the specific Service and Category, this description may include format or semantic specifications, for the case of an i-content service; or input parameters and results' information, for the case of a functional service.
- RO – the reference ontology.

Suggested Approach-II

▶ Service Entity concept

Definition 2 – Service Entity: is a tuple $SE = (CR, AT, SS)$, representing a CBE member (perspective of a service provider), where:

- CR - **reference** to the CBE member represented by the service entity;
- AT = $\{attr_i \mid i \in N\}$ - the **Set of Attributes** of the corresponding CBE member;
- SS = $\{s_i \mid i \in N\}$ - the **Set of Services** the represented CBE member can provide.

Suggested Approach-III

▶ Behavior concept

Definition 3 – Behavior Definition: a tuple $BD = (D, PREC, POSC, TM, BWD)$, where:

- D – a description including the aim of the BD;
- PREC – Pre-Conditions – verified before the behavior is triggered;
- POSC – Pos-Conditions – verified to assess the behavior success;
- TM – Triggering Mechanism – timings, frequency and data-flow conditions specifying the execution launch;
- BWD – Behavior Workflow Definition – specification of the base functions that are used within the behavior, their input parameters and their execution flow graph.

Suggested Approach-IV

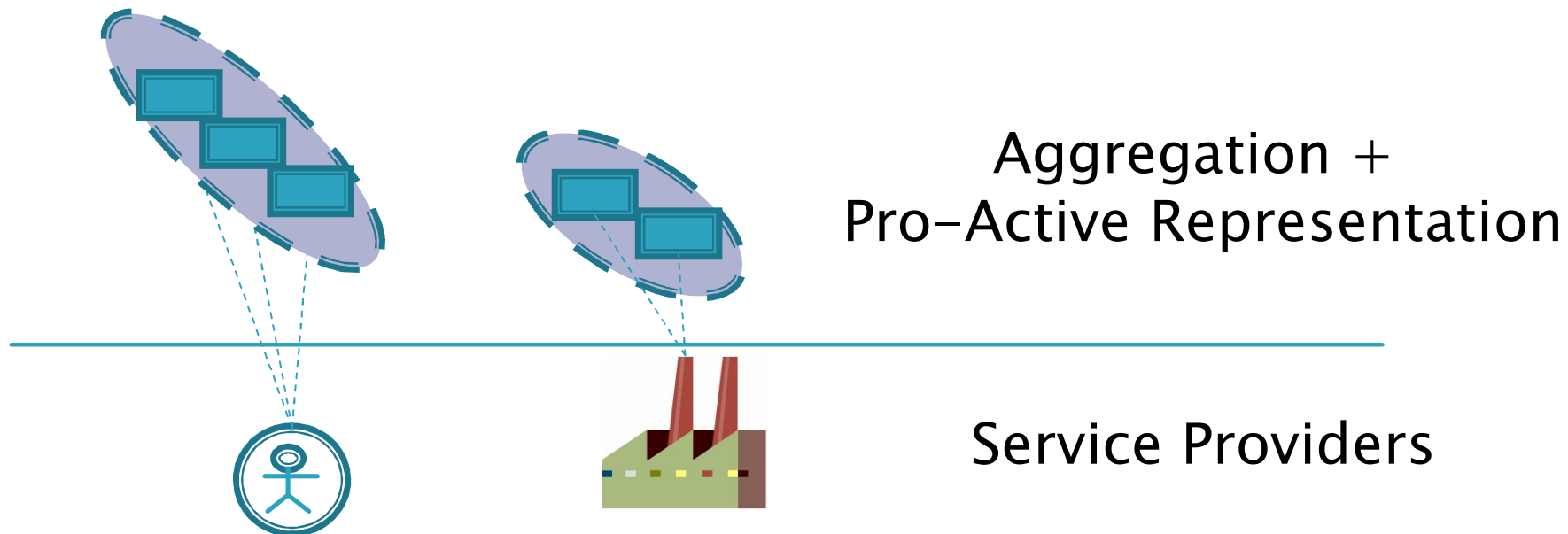
▶ Pro-Active Service Entity concept

Definition 4 – Pro-Active Service Entity: a tuple $PSE = (SE, AT, BD)$, where:

- SE – Reference to the represented and promoted Service Entity,
- $AT = \{at_i \mid i \in N\}$ – a set of the "base functions" aiming representation purposes that can be performed by the PSE in the defined behaviors.
- $BD = \{bd_i \mid i \in N\}$ – a set of Behavior Definitions – that identify the triggering mechanisms, the timings, the frequency and the workflow of a given behavior.

Suggested Approach-IV

- ▶ Pro-Active Service Entity concept



Suggested Approach-V

▶ Pro-Active Service Park concept

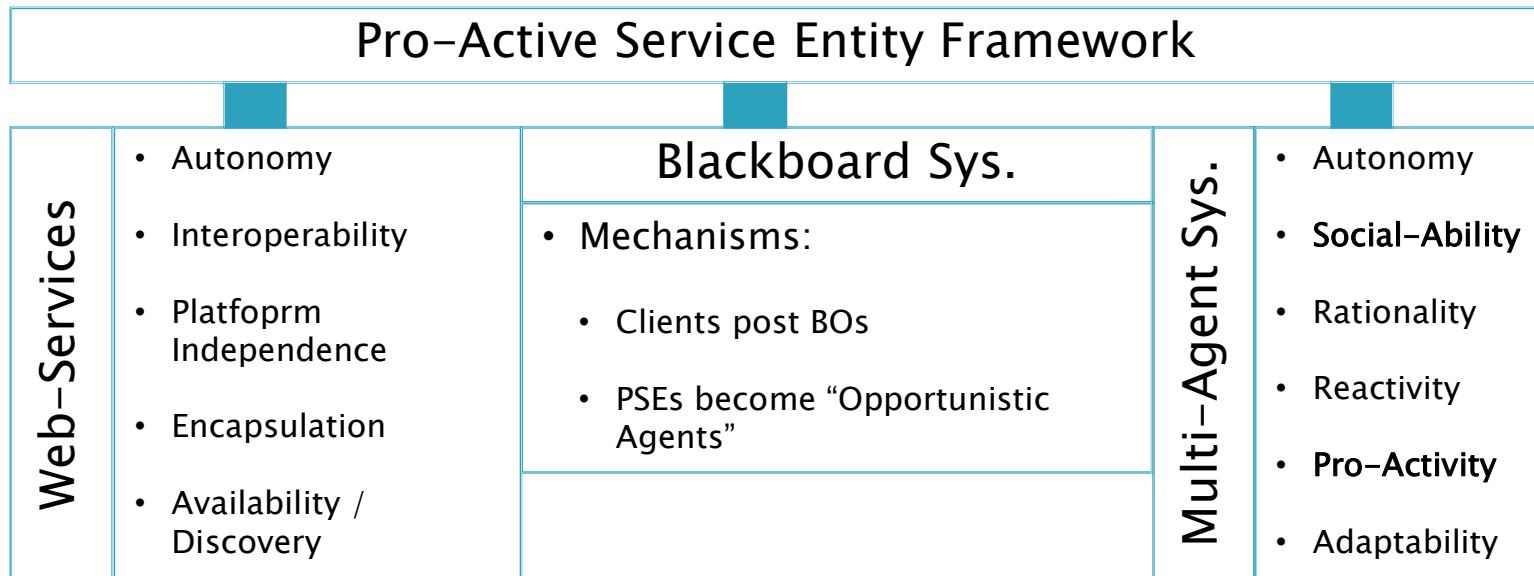
Definition 5 - Pro-Active Service Park - a tuple PSE-Park = (PS, BO, PM, CR, BF), where:

- PS = {pse_i | i ∈ N} - set of registered PSEs;
- BO = {bo_i | i ∈ N} - set of specified needs / BOs;
- PM = {pm_{i,j} | (∀ pm_{i,j} ∃ pse_i ∈ PS ∧ ∃ bo_j ∈ BO)} - set of **Performance Measurement Information** for each PSE used in every BO (historic data).
- CR = {cse_i | (∀ cse_i ∃ pse_i ∈ PS)} - set with **certification information** on PSEs.
- BF = {f₁, f₂, f₃, f₄} - 4 **built-in functionality**

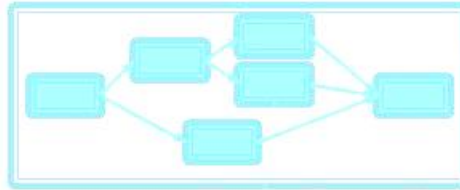
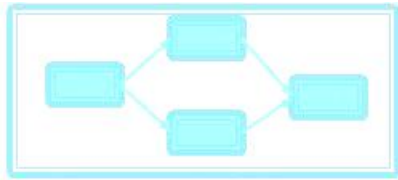


f₁ (PSE Registration)
f₂ (BO Posting)
f₃ (Performance Measurement)
f₄ (Certification)

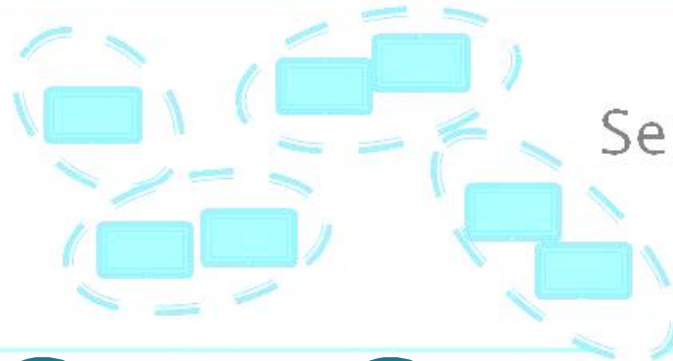
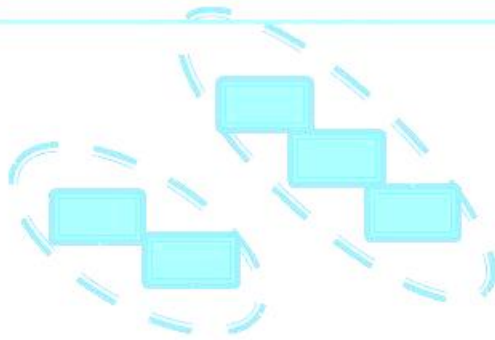
Inspiring contributions



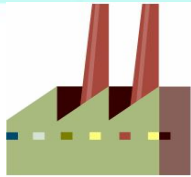
Logical Architecture



Integrated Service Space

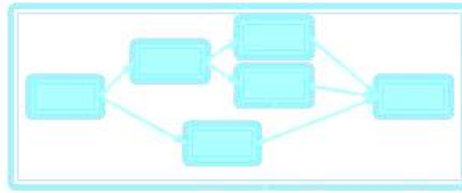
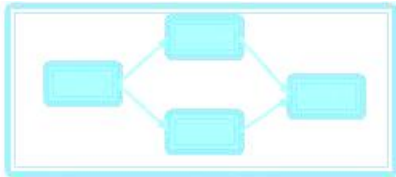


Service Market Space

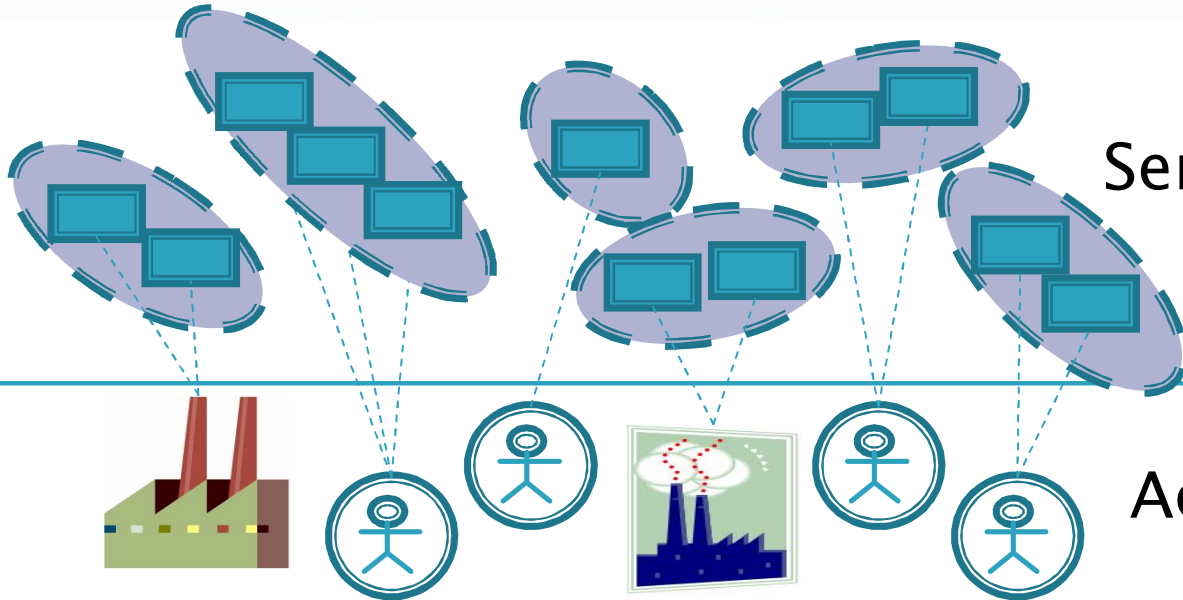


Actors Space

Logical Architecture



Integrated Service Space



Service Market Space

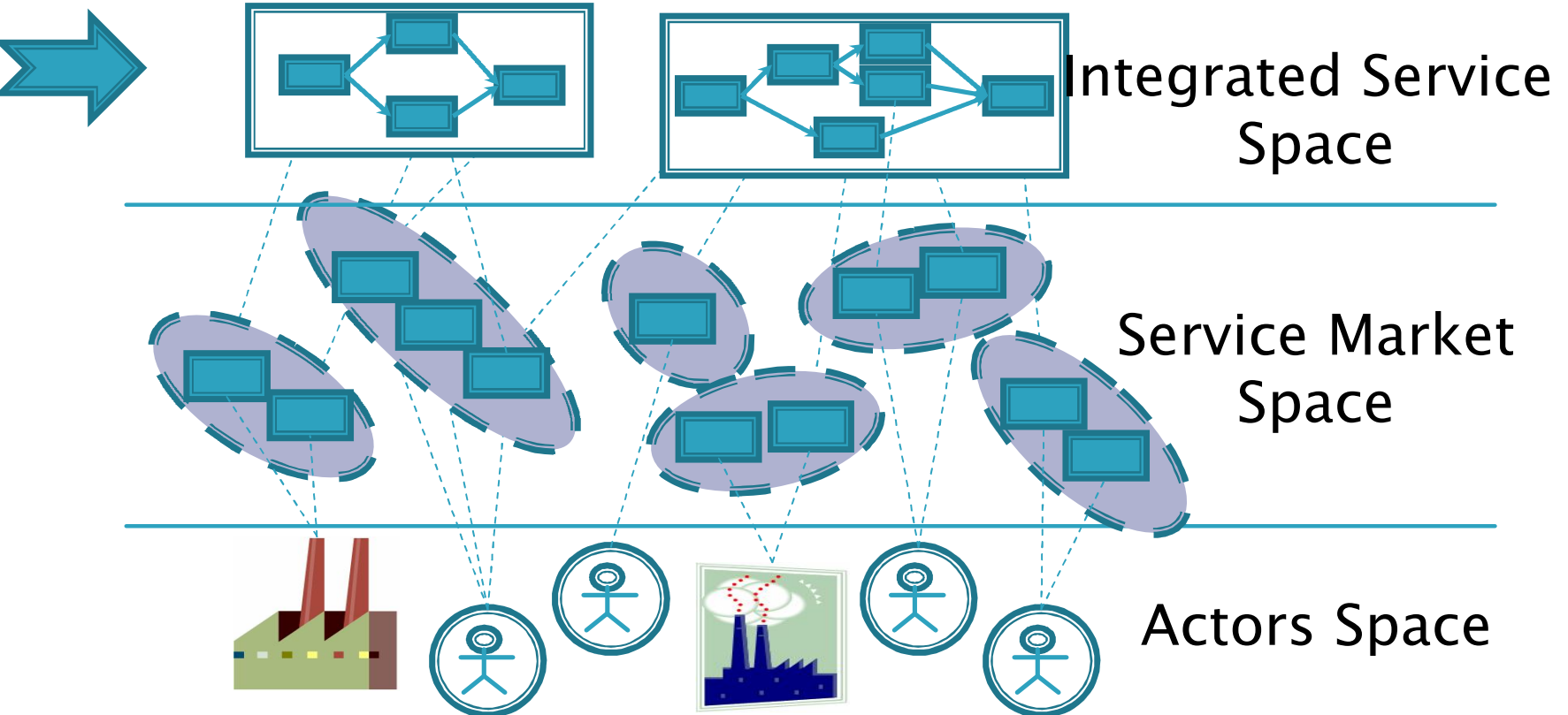
Actors Space

Logical Architecture



Client Need Specification

Logical Architecture



Actors & Roles



CBE Member – Service Providers



Clients – making high-level specifications of the needs / BOs



Brokers – responsible to prepare proposals for clients' needs and to select the Services that best fit these needs,

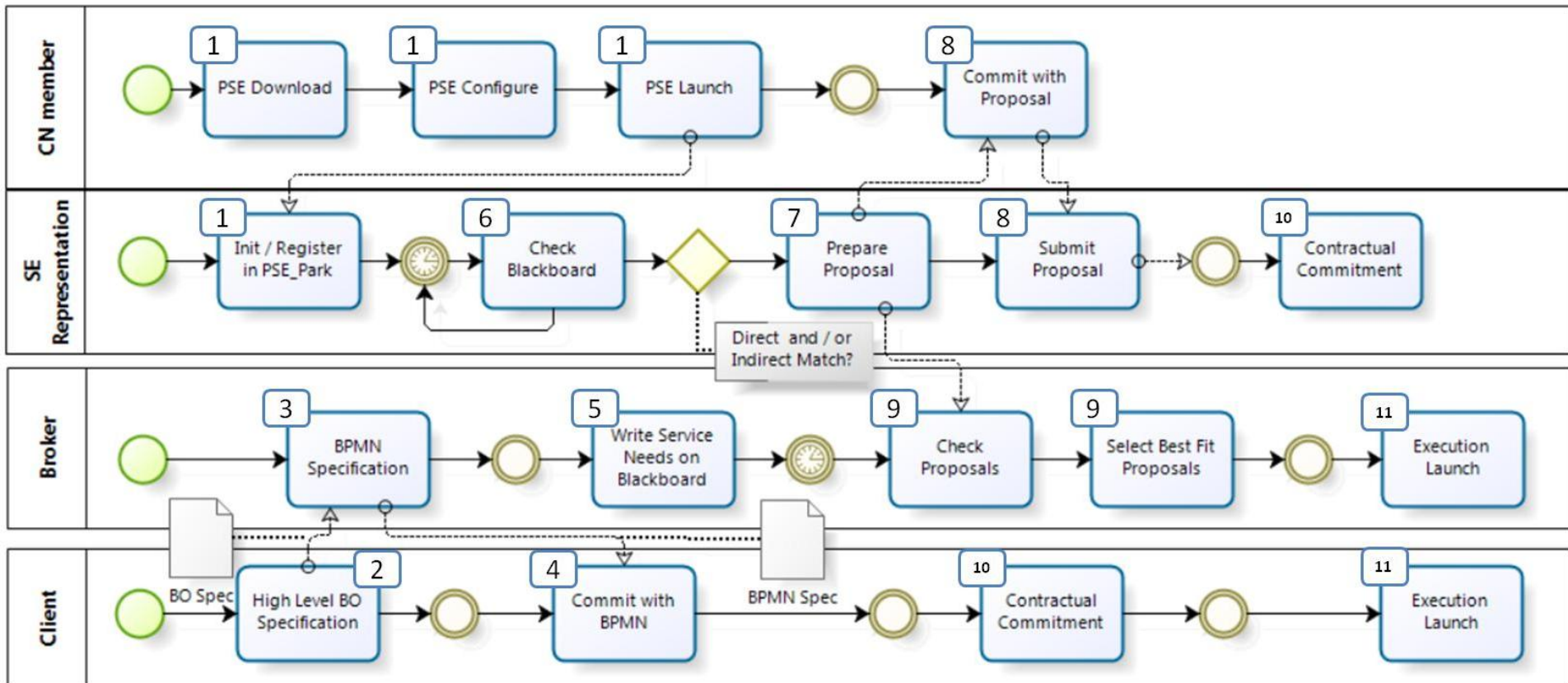


Pro-Active Service Park Administrator



Pro-Active Service Entity– Represents a Service Entity

Service Composition Process



Implementation Approach – I



JAVA + JADE

▶ Main Classes:



•PSE_ParkGUI

•ClientAgent / ClientGUI

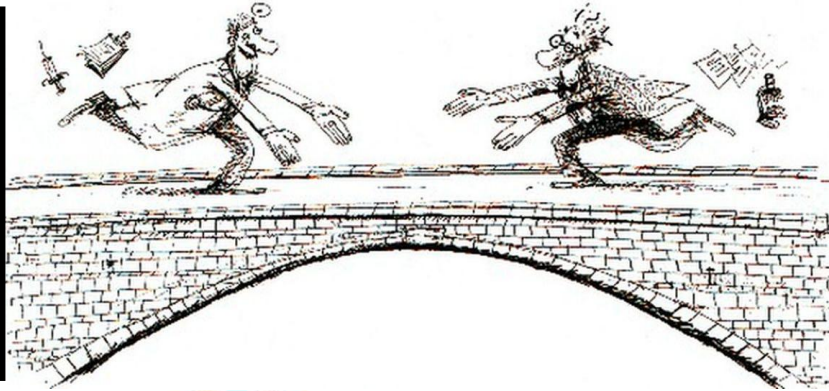
•PSE

- 2 •BusinessOpportunity
- 3 •CallForProposals

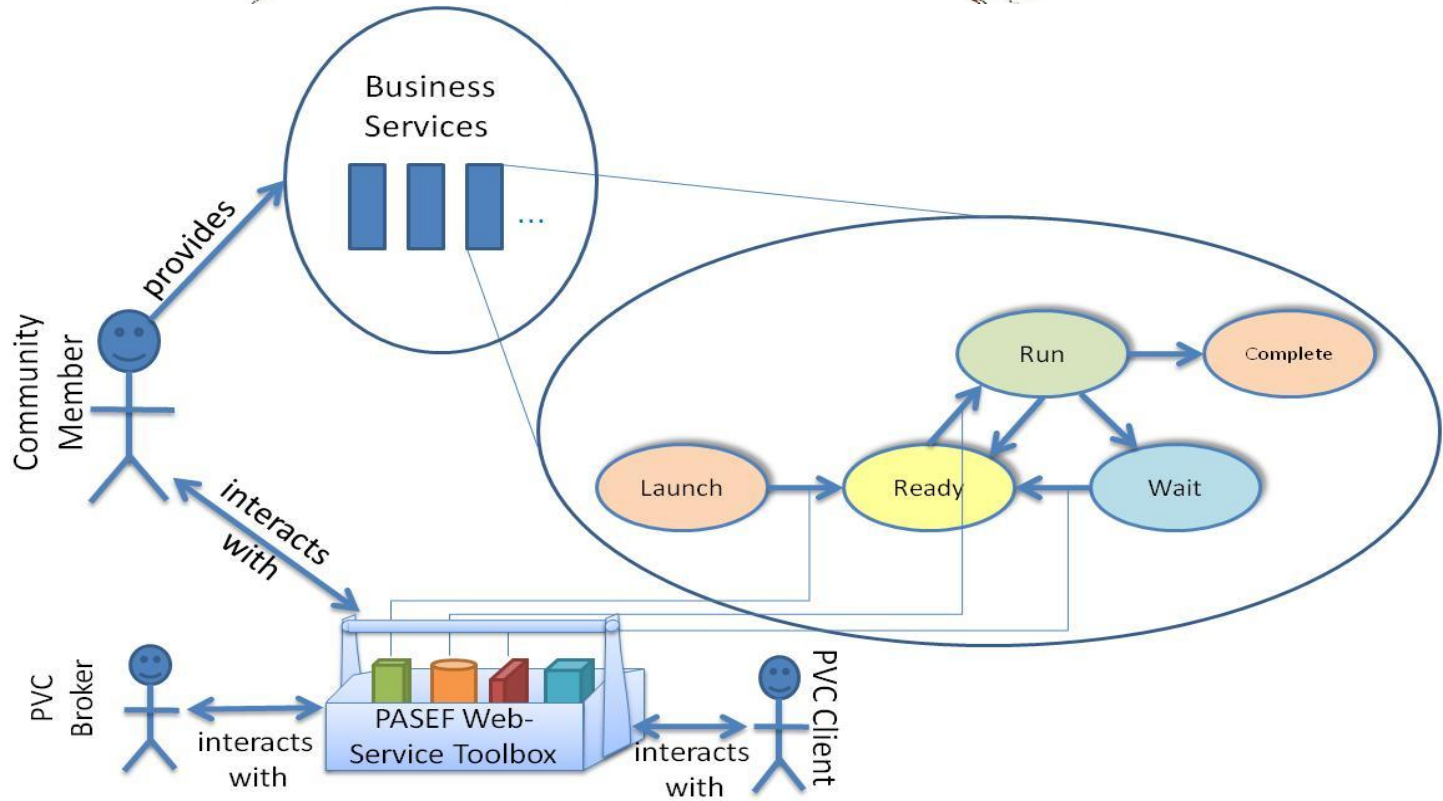
1 ClientNeed

4 •Proposal

Business Services



PASEF
Tech.
Services
(WS)



Implementation Approach – II

The screenshot displays a software interface with several components:

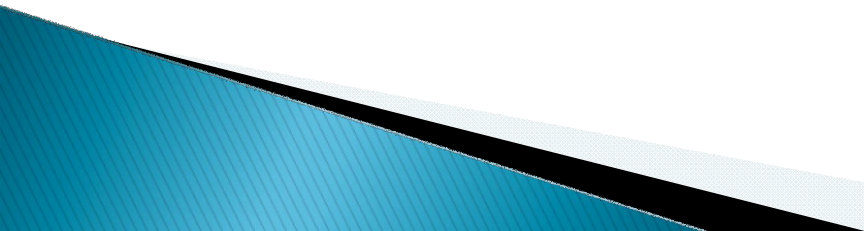
- Registered Pro-Active Service Entities:** A list containing `pse_1@pc-tomfc:1099/JADE`, `pse_4@pc-tomfc:1099/JADE`, `pse_0@pc-tomfc:1099/JADE`, and `pse_5@pc-tomfc:1099/JADE`.
- Received Messages / Debug ...:** A log of messages such as "27 - # PARK - CFP - 'a client asking for registered needs - Call For Proposals' - details: 3" and "26 - # PARK - QUERY_IF from pse_9@pc-tomfc:1099/JADE - 'asking for available needs / CFPs' - details: (2, 5, 4, 6)".
- Proposals: Open. 0 Closea 0:** A status indicator showing zero open or closed proposals.
- Registered Clients:** A list containing `client_0@pc-tomfc:1099/JADE`.
- GUI of client_0 (pop-up):** A window showing a log of proposal events: "Proposal on 3 from 'pse_11@pc-tomfc:1099/JADE' selected as THE BEST!!!", "Proposal #2 on service 3 recieved from pse_4@pc-tomfc:1099/JADE", "Proposal #1 on service 1 recieved from pse_1@pc-tomfc:1099/JADE", and "Need service Kind 1, waiting for 4 proposals". It includes a "Service Kind CFP:" field with the value "1" and "Send" and "Finish" buttons.
- Control Panel (pop-up):** A window with configuration fields for "PSE Park location: pc-tomfc" and "PSE Park JADE Framework: PSE_Framework". It features buttons for "1 - Launch PSE - Provider", "2 - Launch N PSEs - Providers" (with a value of 12), and "3 - Launch Client" (with an "Auto Post BOs" checkbox). It also displays "found PSE_Parks:" with the entry `pse_park@pc-tomfc:1099/JADE`.

Concluding Remarks-I

- ▶ Reduction of distance between Business & Software perspectives
 - PSE represents and promotes services provided by a PVC member
 - PSE is not a static entity
 - Instead of waiting for client's initiative, the PSE tries to find BOs
 - PSE acts as an "Ambassador"
- ▶ Proposals received are up-to-date / their providers are "alive"

Concluding Remarks–II

- ▶ Ongoing work
 - Quality of Service
 - Development of co-creation space for:
 - PVC Clients
 - PVC Intermediaries
 - PVC members – the service providers

 - ▶ Prototype improvement
- 

Pro-Active Service Entity Framework

Towards better mapping between Business and Software

Thank you ...

Questions?

