

SLA@SOI – An Overview

Empowering the Service Economy with
SLA-aware Infrastructures

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SAP

- Motivation & Goals
- Expected Results
- Project Data
- (Industrial) Use Cases
- Collaboration Spaces
- Problem Perspectives & First Steps

- **Vision**
 - A business-ready service-oriented infrastructure empowering the service economy in a flexible and dependable way.
- **Business-readiness requires**
 - predictability & dependability → prerequisite for acceptance & uptake of (new) services
 - holistic SLA management → transparent IT management
 - automated negotiation → dynamic, scalable service consumption
- **Impact on the knowledge economy**
 - decreased time to market for new services
 - increased productivity and competitiveness
 - lower entry barriers, especially for SMEs

Service Consumer

- dynamic demand for complex business solutions at low costs

Flexible usage
Business Services

Software Provider

- SOAs provide unprecedented flexibility

Engineering of
predictable
services

Service Provider

- service economy requires dependable services

Automated SLA
negotiation and
management

Infrastructure Provider

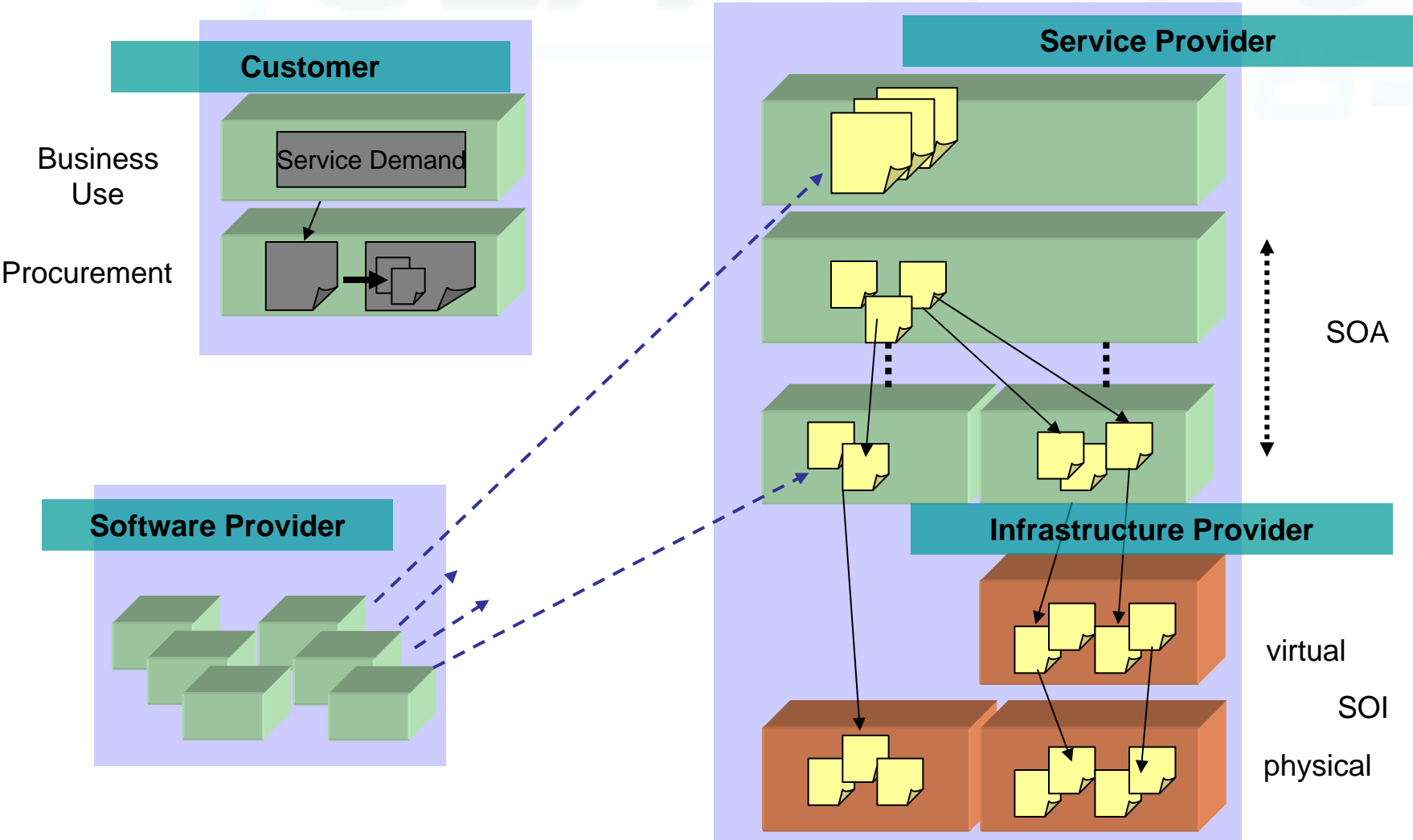
- virtualization technologies allow for adaptive SOIs

SLA enforcement
via adaptive
infrastructures

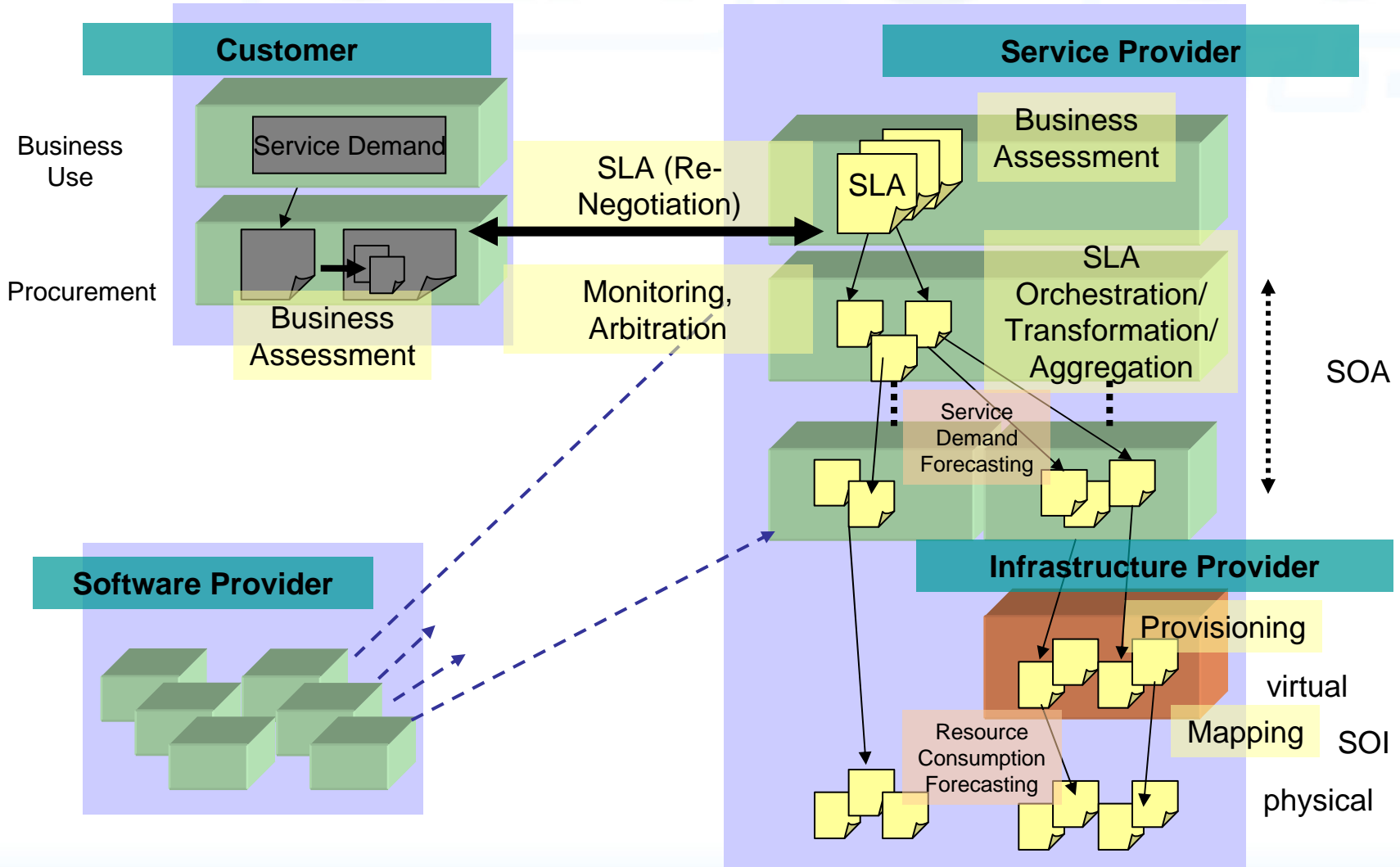
Vision of SLA@SOI

A business-ready
service-oriented
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empowering the
service economy
in a flexible and
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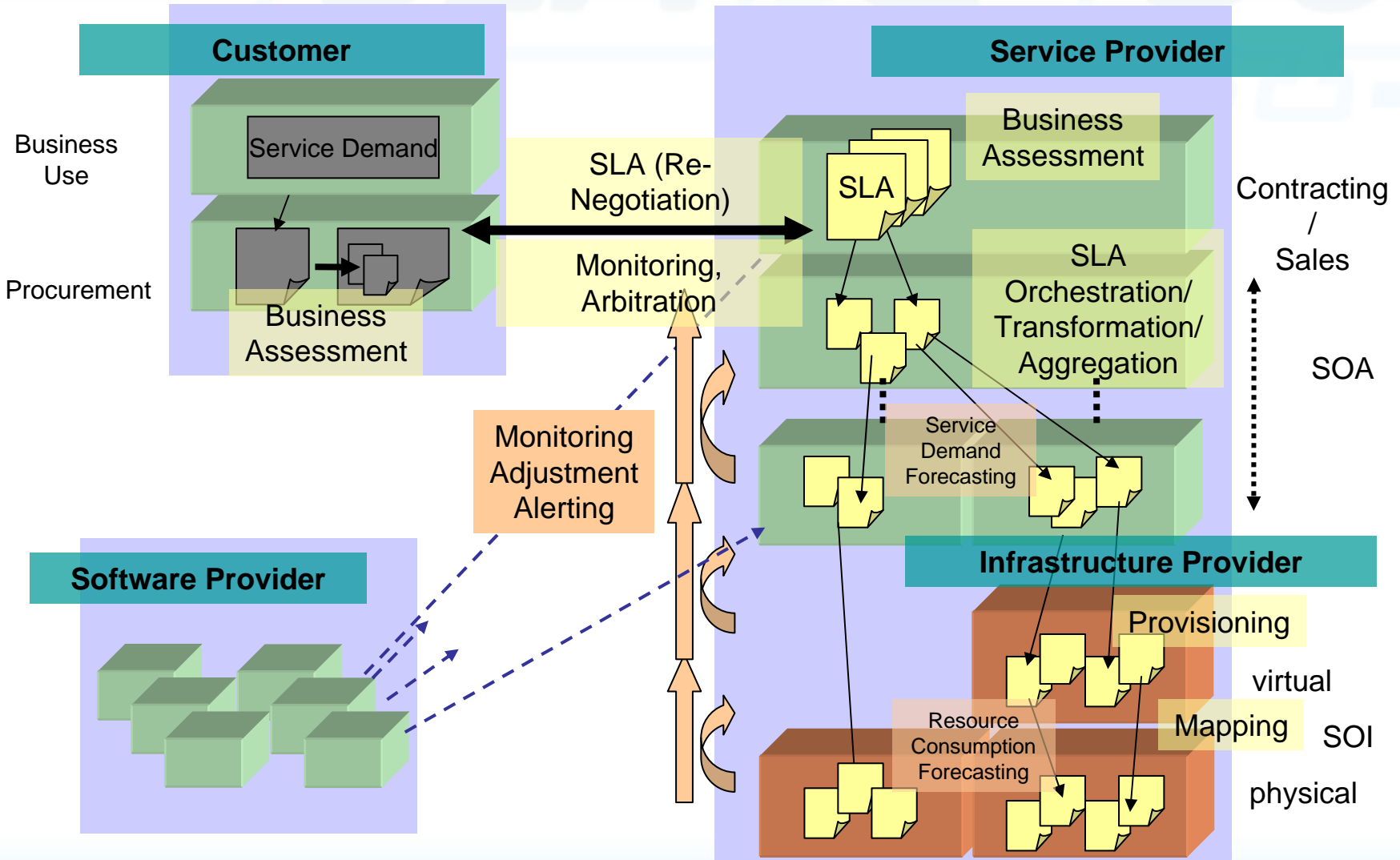
Envisioned Interaction



Envisioned Interaction



Envisioned Interaction



Main innovations

- **SLA management framework**
 - harmonizing perspectives of relevant stakeholders (software/service/infrastructure provider and customer)
 - standards for SLA specification and negotiation & systematic multi-layer SLA management (planning, optimization, and provisioning), monitoring and accounting
 - guaranteed QoS in a dynamic and end-to-end fashion via consistent SLA handling across IT stack

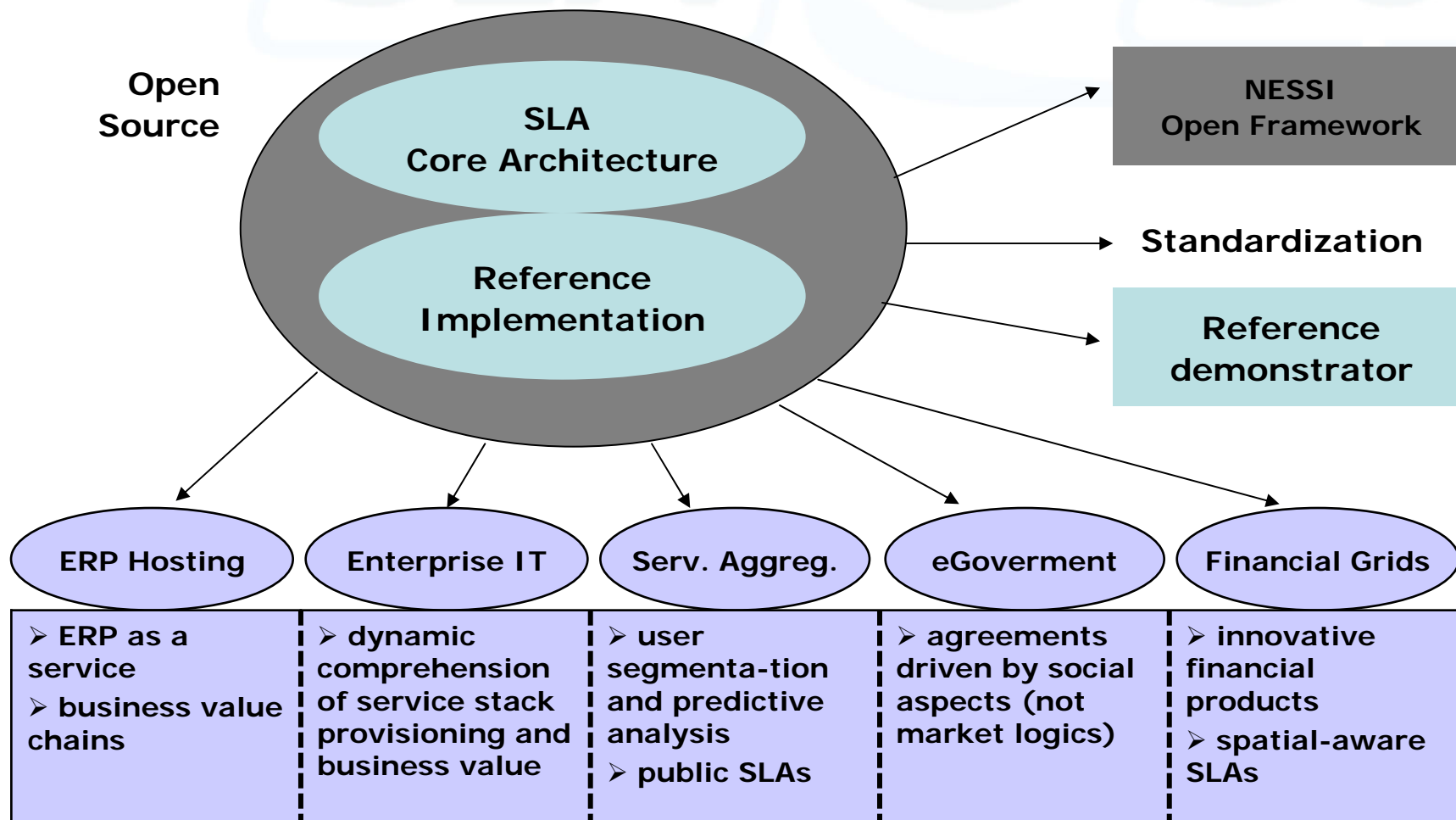
- **adaptive SLA-aware infrastructures**
 - standardized interfaces for adaptive infrastructures with harmonized access to different virtualization technologies.
 - advanced technologies for SLA enforcement on infrastructure level
 - efficient resource usage w/ reliable SLA enforcement at infrastructure level

- **engineering methods for predictable service-oriented systems**
 - modelling techniques and prediction tools for SOA and SOI components

- **business management suite for e-contracting**
 - covers complete business lifecycle of a service provisioning/delivery

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Major Project Results



➔ Industrial Evaluation Report: "How to run an SLA-driven business"

- **Scientific results (from action line A)**
 - at least 95% of research results are public
 - SLA management framework (report + prototype)
 - including all results from action line A (architecture, SLA foundation, business/ service/infrastructure mgmt., predictable systems engineering)
 - contains architecture, methodologies, meta-models, tools, services, protocols, interfaces, integrated technical framework
 - allows scientific community to precisely see scientific approach, developed solutions and technical evaluation results
 - allows industrial community (software/ service/ infrastructure providers and service customers) to leverage prototype components
 - basis for standardization activities
 - designed for integration with NESSI open framework

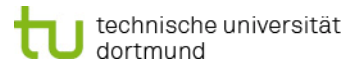
- **Impact-related results (from action line B)**
 - **Reference demonstrator (report, prototype)**
 - demo scenario available as open source
 - allows scientific community to compare results and to do subsequent research (replay and modification of SLA-experiments)
 - allows industrial stakeholders to get hands-on experience
 - **Industrial use cases**
 - will be made largely public
 - allows industrial stakeholders to get detailed insight
 - **Scientific/Technical Evaluation Report**
 - precise description and assessment of scientific/technical results
 - community (IT managers & researchers) is able to understand the technical conditions under which the SLA framework can be used and receive guidance for implementing SLA projects
 - **Industrial Evaluation Report**
 - precise description and assessment on the applicability of project results to different industrial setups (based on use cases and external requirements)
 - includes description & evaluation results from industrial use cases
 - CIOs can assess applicability of results for their organization

- **Major contributions to NEXOF, i.e.**
 - the **NESSI reference model** and the **NESSI architecture**
 - a complete SLA management infrastructure for service-oriented utility infrastructure. This includes in particular:
 - an **e-contracting platform** between service consumers and providers
 - a **framework for mapping, planning and coordination** within multiple levels in an organizational/IT structure
 - **access and provisioning layer** for SLA-aware infrastructure

Service Consumers	The project will provide standardized models, protocols and methods for SLA contracting procedures between service providers and consumers
BPM view	Methods and tooling for analysis of business processes and service user behavior (independently from the functional service aspects)
Composition	Standardized models, methodologies and frameworks for holistic SLA management
Services	Standardized models, methodologies and frameworks for holistic SLA management
Infrastructure	Standardized interfaces for a service-oriented infrastructure including implementations of selected components

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The Consortium



POLITECNICO DI MILANO



DIPARTIMENTO DI ELETTRONICA E INFORMAZIONE



- **Duration**

- June 2008 – May 2011

- **13 Partners**

- 6 industrial, 1 SME, 4 academic, 2 research centres
 - 7 countries: Austria, Germany, Ireland, Italy, Slovenia, Spain, United Kingdom

- **Budget**

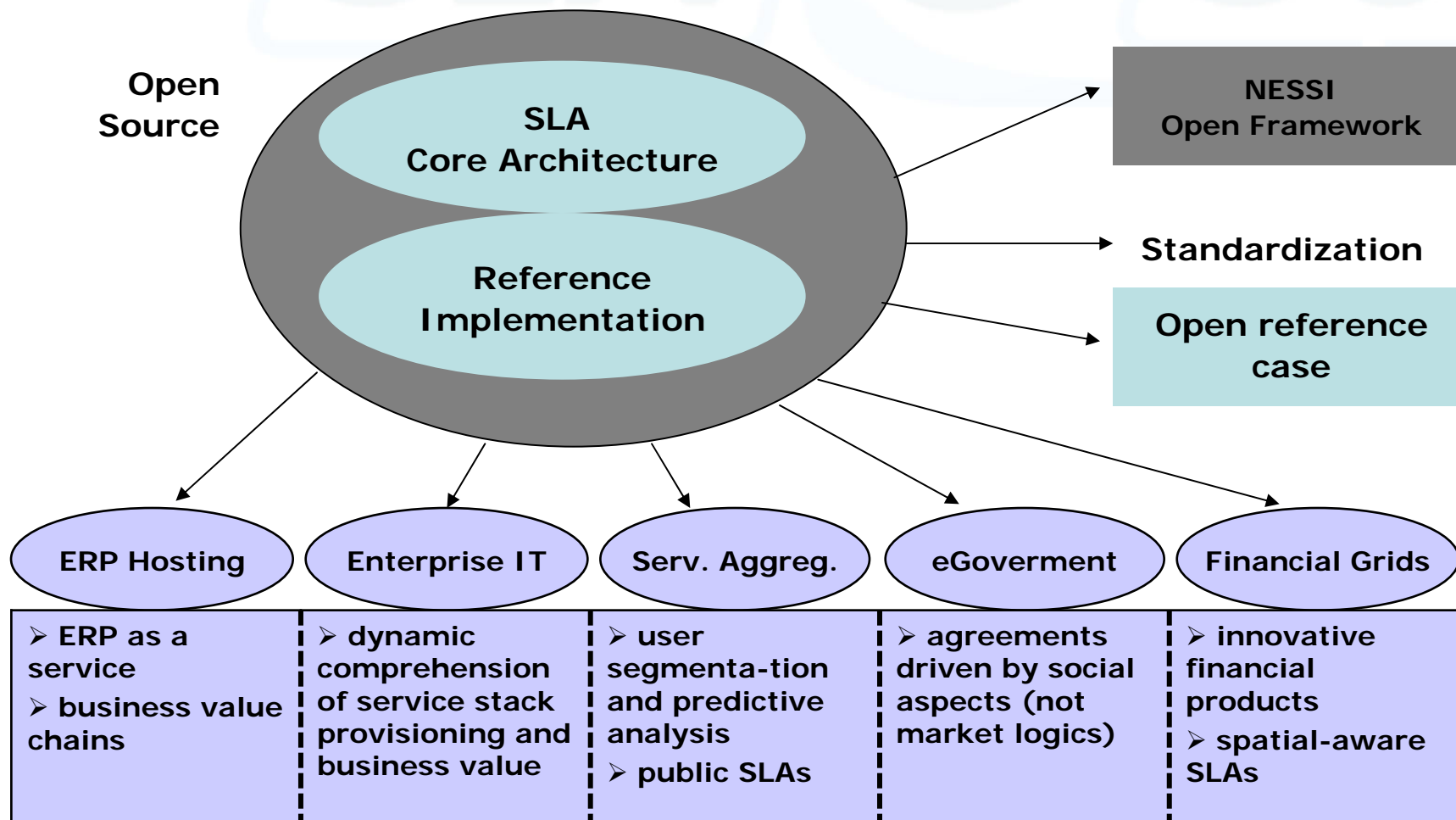
- 15.2 M€

- **Info**

- <http://www.sla-at-soi.eu/>

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A use-case driven project



→ Industrial Evaluation Report: "How to run an SLA-driven business"

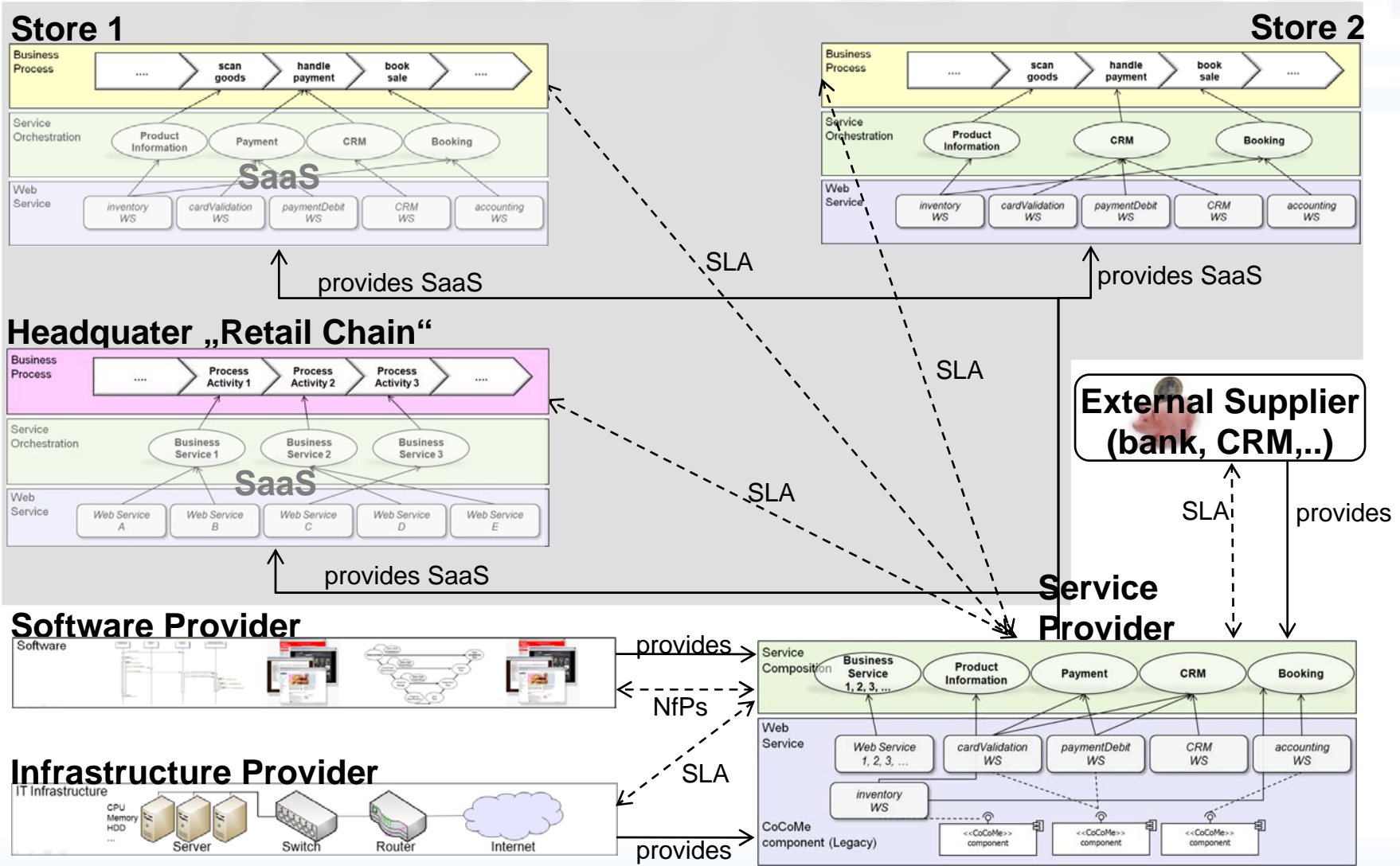
- **Idea**

- a reference demo application (as open source)
- a reference SLA management demo scenario (as open source)
- allows scientific community to compare results and to do subsequent research (replay and modification of SLA-experiments)
- allows industrial stakeholders to get hands-on experience

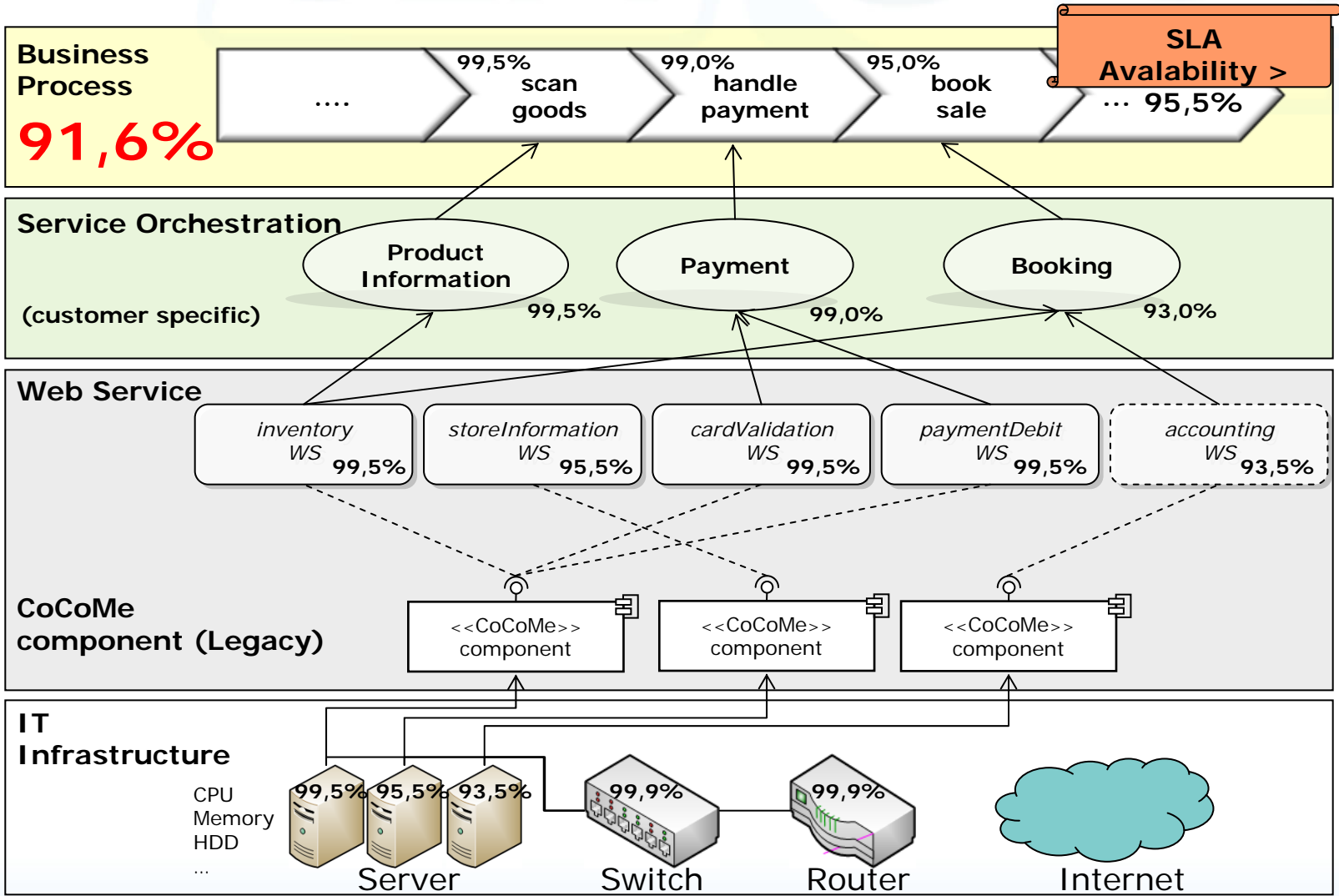
- **Features of the ORC**

- an existing Java-based application
- precise specification & modelling available
- addresses management of retail chains (w/ core enterprise and several stores)
- different service selection and deployment options

Open Reference Case - Scenario



Open Reference Case - Scenario



- **Partner & roles**
 - SAP: software & service provider
 - Intel: infrastructure provider
- **Business context**
 - business applications (ERP, SCM, CRM, ...)
 - hosted in a Software-as-a-Service model
- **Technical service/SLA features**
 - Service types: A2A/B2B Web Services, UI services, business processes
 - SLAs on performance, availability & security
- **Challenges**
 - complexity in terms of number of services, components, configurations & usage variants
 - process flow partly implemented in a constraint model (no explicit flow information)
 - underspecified environment: various parameters unknown at design time

- **Partner & roles**

- Intel: lead, use cases and infrastructure provider
- XLAB: specification, design & implementation contributions
- SAP: ERP process knowledge, monitoring capabilities
- UDO: design & implementation contributions

- **Business context**

- SLA-aware dynamic provisioning of Enterprise IT Suite
- Supporting continuously evolving role and priorities of Enterprise IT
- CMF, ECF, Scalability + TCO

- **Technical service/SLA features**

- Demonstrate tuned adaptation to provision competing demands appropriately
- SLAs potentially describing relative priority, response times & temporal variation
- Realistic infrastructure, services & workload simulation

- **Challenges**

- Efficiently reconciling and dynamically provisioning a technology capability or investment relative to a specified process with business level metrics

- **Partner & roles**

- eTel (lead)
- TID, FBK, Intel (contributors)

- **Logistical Fulfillment**

- For a product's technical fulfillment various SLAs have to be fulfilled in aggregate across the heterogeneous technical landscape

- **Tripleplay (or Quadplay) services (implemented)**

- (quadplay exists but not sold as such)
 - » Television
 - » Phone
 - » IP
 - » Add on services
- SLA for services
 - multiple instances
 - » DSL (8Mbits for 1 setup box)

- **Carrier routing**

- VOIP/trunking arbitrage of minutes between carriers
 - spot markets created for

- **Partner & roles**

- ENG: WP Lead., Design & Implementation Lead.
- FBK: Requirement Specification Lead, Design & Implementation Contr.
- GPI: Evaluation Lead., Platform Provider, Design & Implementation Contr.
- CITY, INTEL: requirement specification

- **Business context**

- Social and Health assistance to elderly people: home meal delivering
- Government (Governance, Social Care Body), Citizens, Health Care Structures
- Integrated management of Citizen needs, Structures activities, Governance of costs, quality and performances.

- **Technical service/SLA features**

- G2G: SLAs on key performance indexes, norms, regulations, accounting
- G2C: SLAs on quality, privacy issues
- G2B: quality, security, accounting
- SOA platform provided by GPI in compliance to SPCoop (Italian standard for G2G).

- **Challenges**

- Human Based Services (e.g. meal delivery) and integration with automatic services and monitoring.
- No one big centralized workflow, but related/synchronized processes.
- Relationships between G2G, G2C and G2B SLAs (related to different processes) and automatic derivation.
- Probably each SLA will contain both business and technical constraints.
- The Service Provider selection is possibly operated by a Request for BID (the consumer provides a SLA Template that the provider must instantiate and agree to).

Industrial Use Case: Financial Grid

- **Partner & roles**

- BeSC: Grid and Computational Finance provider
- XLAB: Implementation
- Intel: infrastructure provider

- **Business context**

- Financial applications (Risk Management, Implied Volatility, Back testing)
- Competitive and volatile sector with demand for Risk analysis on ever larger data sets increasing by order of magnitude
- Solutions to be deployed as a highly available and scalable online services

- **Technical service/SLA features**

- Service types: B2B Web Services, UI services, Infrastructure Services
- Online services – dynamic composition and deployment of spatially aware services
- SLAs on availability, location, compliance, system architecture, networking capability
- Vendor and architecture neutral services

- **Challenges**

- complexity in terms of dynamic service composition, auto deployment and un-deployment
- Service Discovery and selection based on
 - location, networking bandwidth and non functional metadata e.g. legal and jurisdiction issues
- Service Assurance in such a complex and dynamic environment
- Highly regulated and compliance aware sector (MiFID - EU FSA, CRD, SarbOx, Basel2)

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- **NEXOF-RA**
 - early input delivered to RFP roadmap
- **SSAI Concertation WG on “SLAs and QoS”**
 - co-lead by SLA@SOI (Tariq Ellahi)
- **SSAI Concertation WG on “Standardization”**
 - co-lead by SLA@SOI (Philip Wieder)
- **SSAI Concertation WG on “Virtualization”**
 - active participation (Joe Butler)
- **Future Internet**
 - participation in “Management & Governance”

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Topic Areas

Predictable systems engineering

- engineering
- modelling
- analysis

Business Management (provider – consumer)

- specification & negotiation
- business & legal assessment
- arbitration & penalty management

Service-enabled Business Logic

- for complex layered architectures
- for different application types

Applications / Processes

Business logic

Middleware

Service/SW management (provider)

- landscape modelling
- discovery
- monitoring
- steering
- provisioning

Infrastructure Management

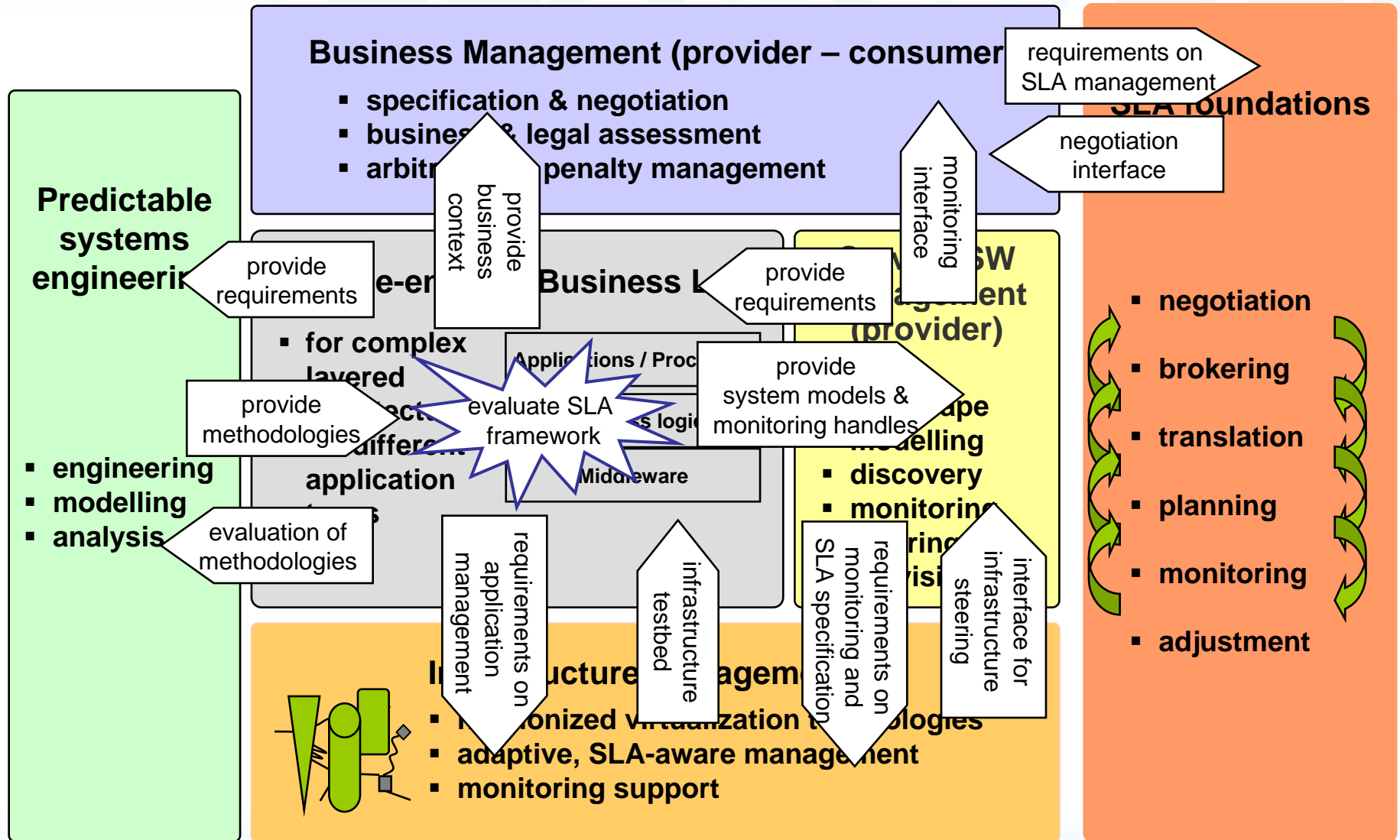


- harmonized virtualization technologies
- adaptive, SLA-aware management
- monitoring support

SLA foundations

- negotiation
- brokering
- translation
- planning
- monitoring
- adjustment

Topic Areas & Interactions



- **Conceptual system lifecycle**

Engineering

- Engineering of system's building blocks (software & hardware)
- Modelling of system structure and (non-functional) behaviour
- Clean room experiments / measurements

Negotiation & Planning

- Translation of business SLA to technical level
 - concrete workload characterisation & non-functional requirements
- Translation & prediction & planning across whole business/IT stack
 - based on templates & historical traces & models

Provisioning

- Actual resource allocation

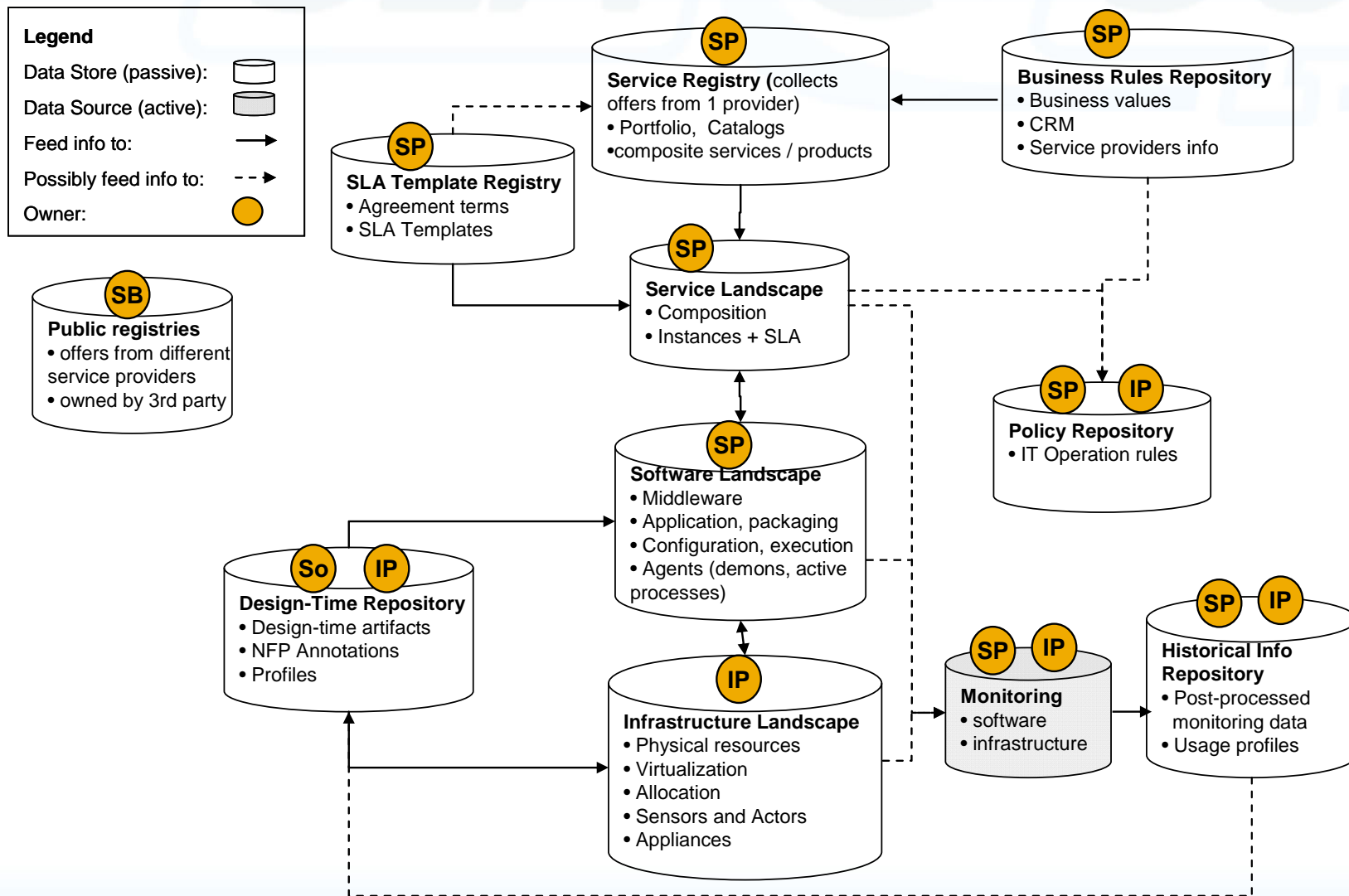
Operation

- Actual workloads
- SLA Monitoring & enforcement/adjustment
- Collection of historical data for improved model calibration / prediction

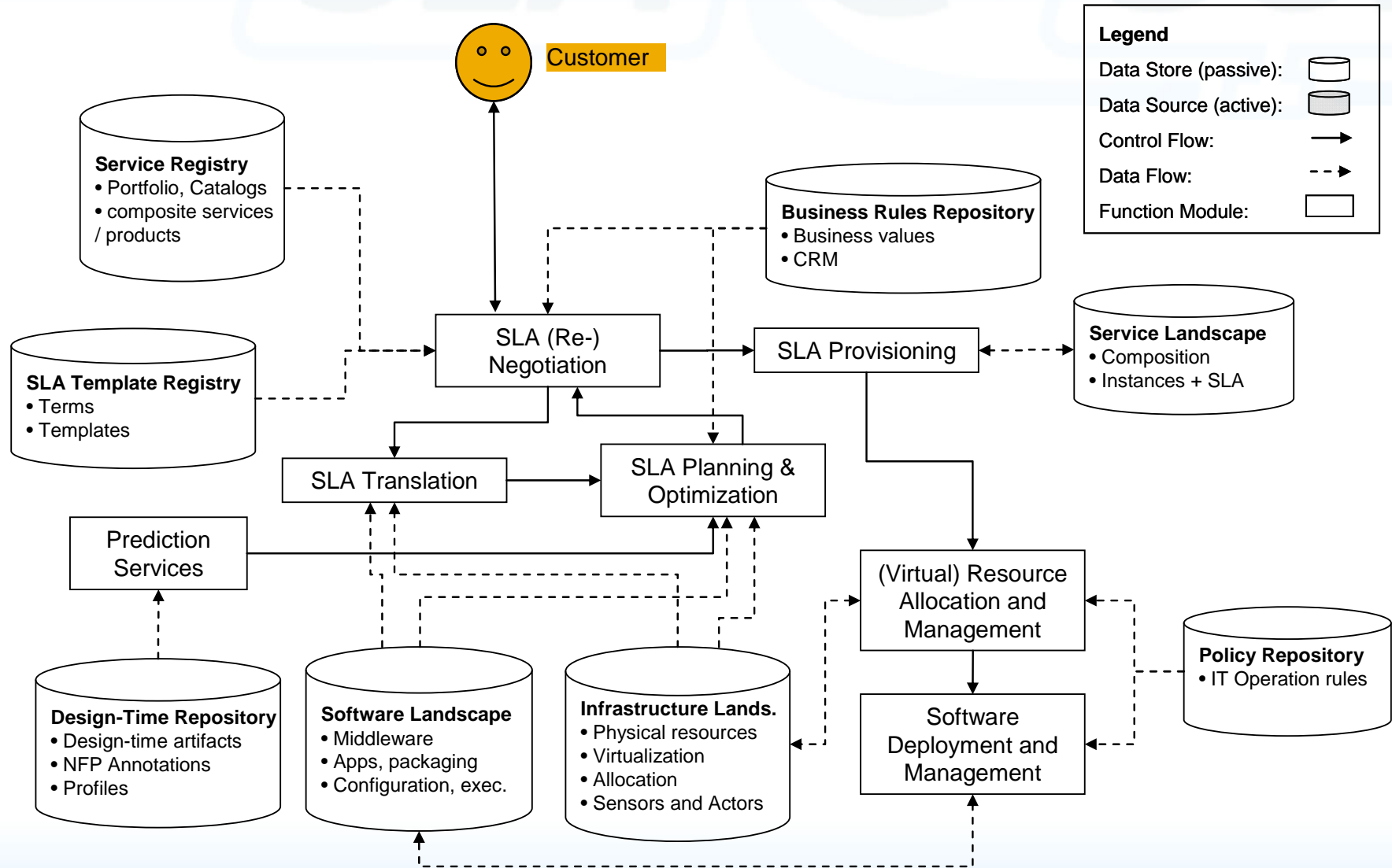
Analysis

- Detailed analysis of trace data
 - to update performance KPIs
 - to identify the necessity for manual efforts

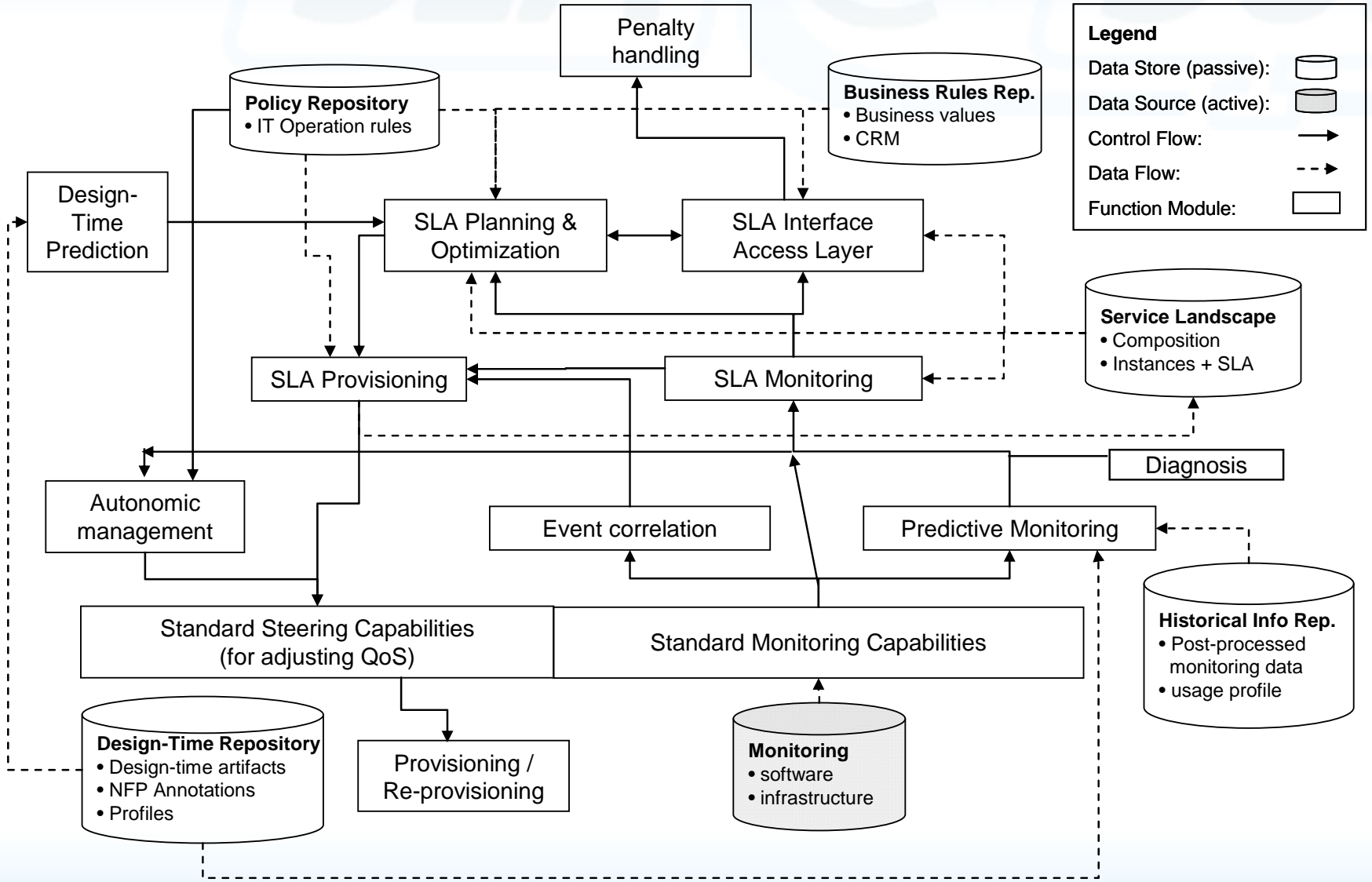
Conceptual Architecture – Data view



Conceptual Architecture – Provisioning view



Conceptual Architecture – Run-time view



Thank you!