Case studies:

a methodological approach

Towards validation: Case studies

- Goals:
  - validate research results with realistic scenarios
  - develop research challenges derived from case studies

- A methodology for case study documentation has been developed

Case studies

- S-Cube proposal
  - An approach to describe case studies derived from NEXOF-RA and enriched with other elements from the RE literature
  - The identification of a set of case studies on which the approach is applied

Current case studies

- Directly from S-CUBE:
  - Wine production (Donnafugata)
  - Automotive supply chain (360Fresh and IBM)
- Derived from NEXOF-RA:
  - E-Health diagnostic workflow (Siemens/Thales)
  - Traffic management (Siemens)
  - E-Government (TIS and Engineering)

- For a complete description of the case studies and the scenarios analyzed in S-Cube, please refer to deliverables CD-IA-2.2.2 and CD-IA-2.2.4, respectively
  - Available under

    http://www.s-cube-network.eu/results/deliverables/wp-ia-2.2

Case study description approach

- **Business goals:** express the main purposes of some system in terms of the business domain in which the system will live or currently lives
- **Domain assumptions and constraints:** report properties of the domain or restrictions on the design of the system architecture
- **Domain description:** phenomena occurring in the world together with the laws that regulate such a world
- **Abstract scenario description:** a way to describe world phenomena

Business goals and domain assumptions/constraints

- Business goals and domain assumption/constraints rely on the same elements:
  - Description
  - Rationale
  - Involved stakeholders
  - Conflicts
  - Supporting material
  - Priority

Domain description

- Purpose
  - Study and describe phenomena in the world as well as shared phenomena
- Content
  - Glossary
  - Relationships among the main terms
    - Through class diagrams, semantic networks, E/R diagrams, …
  - Boundaries between the world and the machine
    - Context diagrams

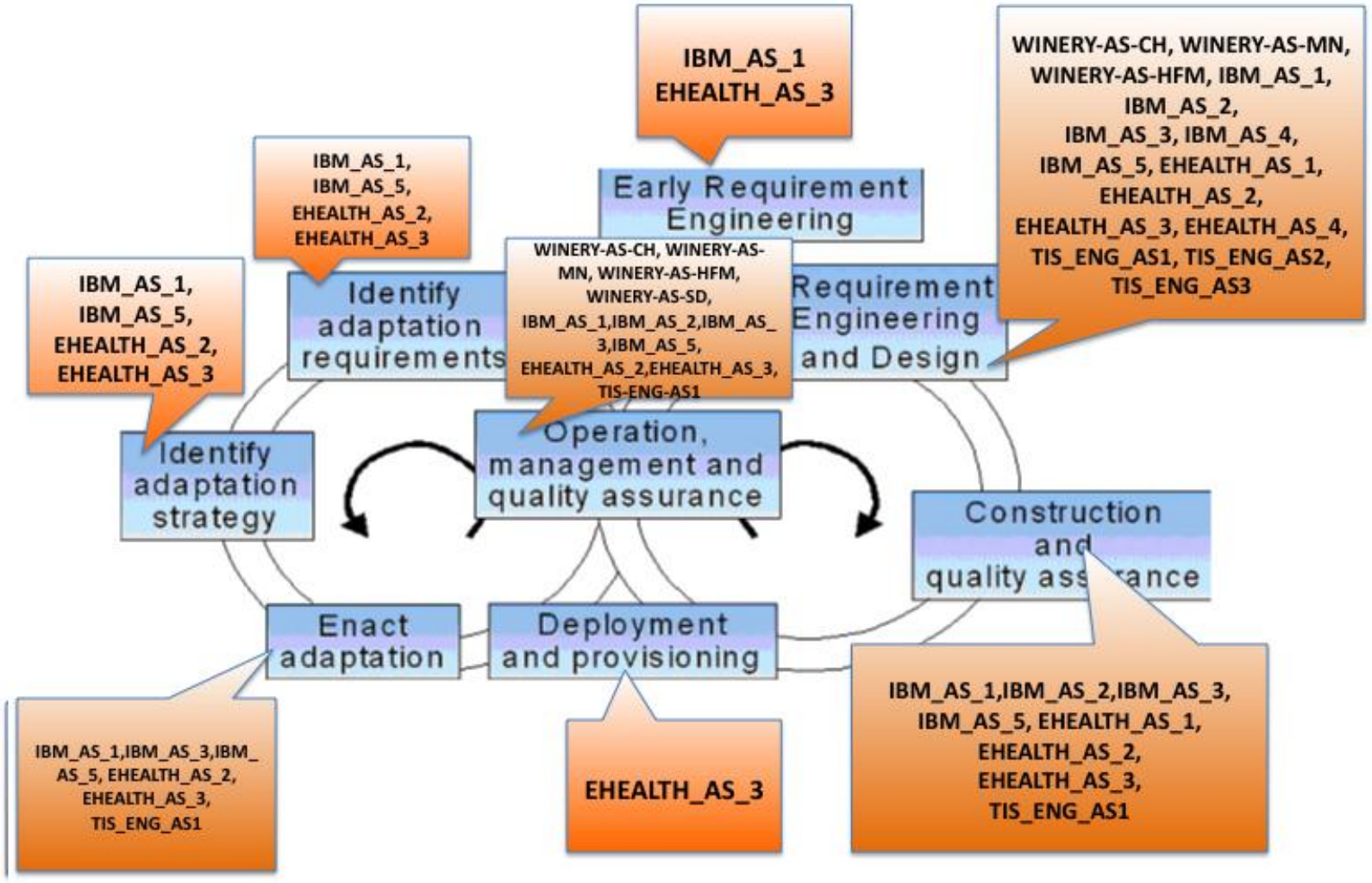
Scenario descriptions

- Purpose: to describe possible situations and interactions between the world and the machine
- Structure of description
  - Involved actors
  - Detailed operational description
  - Problems and challenges
  - Non-functional requirements and constraints
  - Accompanying material
    - sequence and activity diagrams
    - (sub)use case diagrams
- From scenarios, **abstract scenarios** are derived

Life cycle of a case study description

- These four elements do not have to be necessarily defined sequentially (as goals → assumptions → domain → scenario)
- They can be defined iteratively
- Some rules:
  - All the terms used in the description have to be put in a glossary
  - All identified actors have to appear in the context diagram (and vice versa)
  - From each scenario there exist at least one related business goal and vice versa
  - Scenarios are not overlapping
  - Goals are not overlapping

Coverage of life cycle
(see also comments on the IRF later on these slides)



Classifying & Comparing case studies

Case study meta-data

- Used to index case studies in the repository for facilitating search mechanisms
- Meta-data:
  - Source
  - Real vs. Realistic
  - Abstract
  - Available solutions
  - Licensing
  - …

Comparison dimensions

- S-Cube
  - Description of business situations and presence of agile service networks
  - Need for negotiating, establishing, monitoring, enforcing QoS
  - Need for service consumers with various different characteristics
  - Need for distributed infrastructures
  - Need for highly distributed service compositions
  - Highly changing requirements at various levels (from business to infrastructure)
- Others
  - Security
  - Reliability
  - …

IRF: Details and views

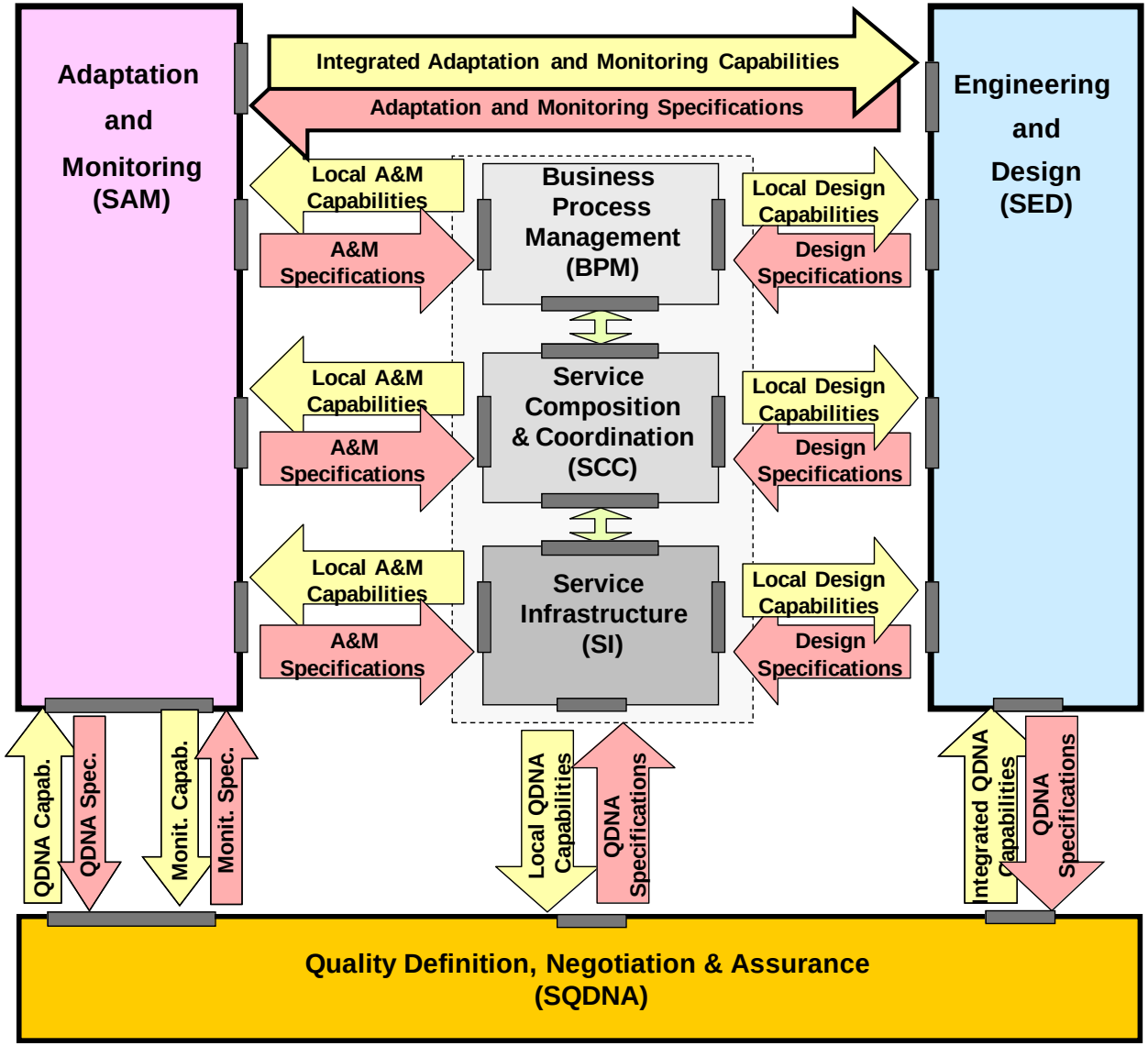
S-Cube Integrated Research Framework

- S-Cube focuses on long-term research
- Main research focus:
  - Software service and systems
  - Adaptivity and evolution
    - of services
    - of agile service networks
- S-Cube developed an Integrated Research Framework
  - 4 views on research issues
- S-Cube evolved a methodology for case study documentation

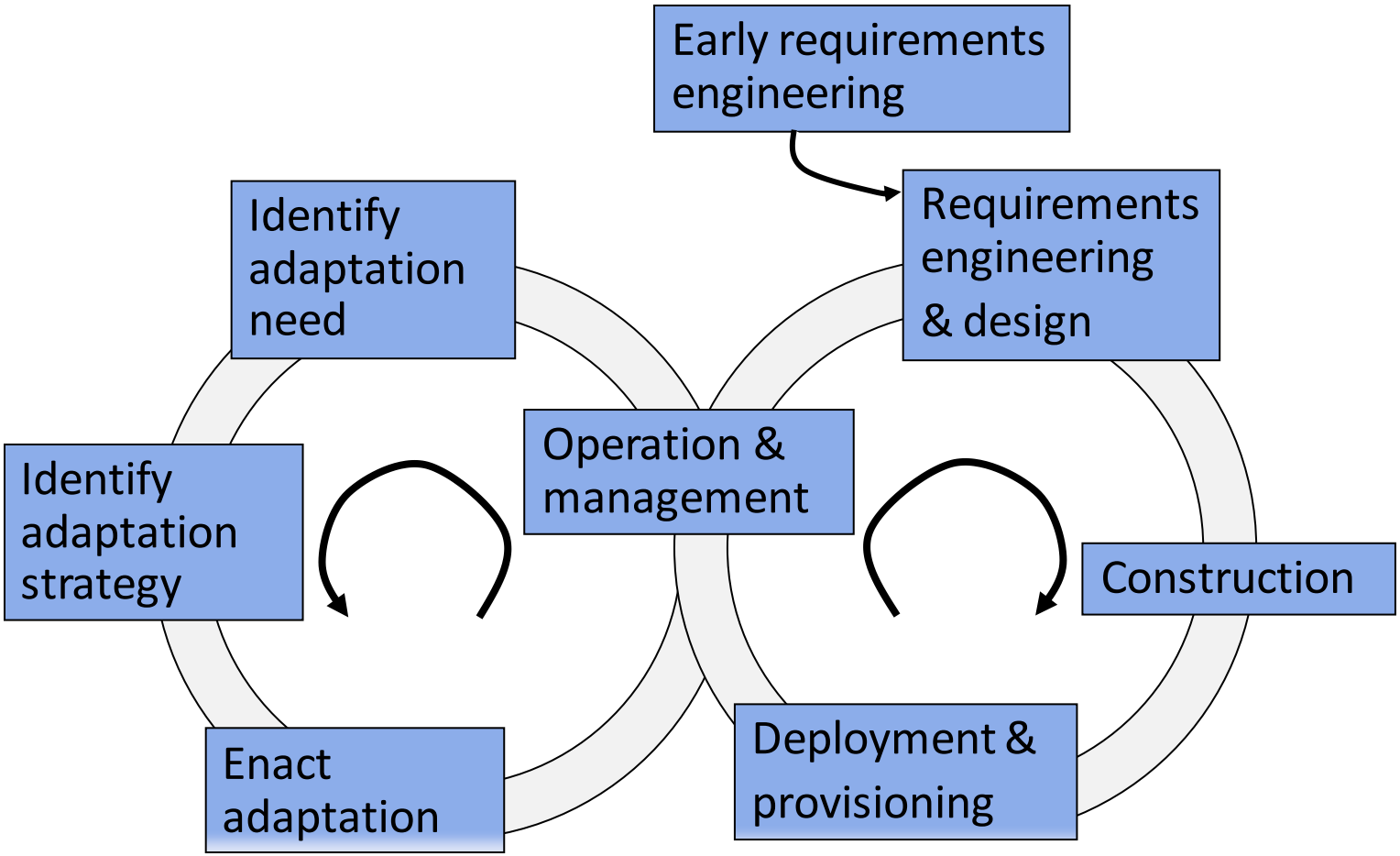
Integrated Research Framework Views

- **Four distinct views:**
  - Conceptual Research Framework
  - Reference Life Cycle
  - Logical Run Time Architecture
  - Logical Design Environment

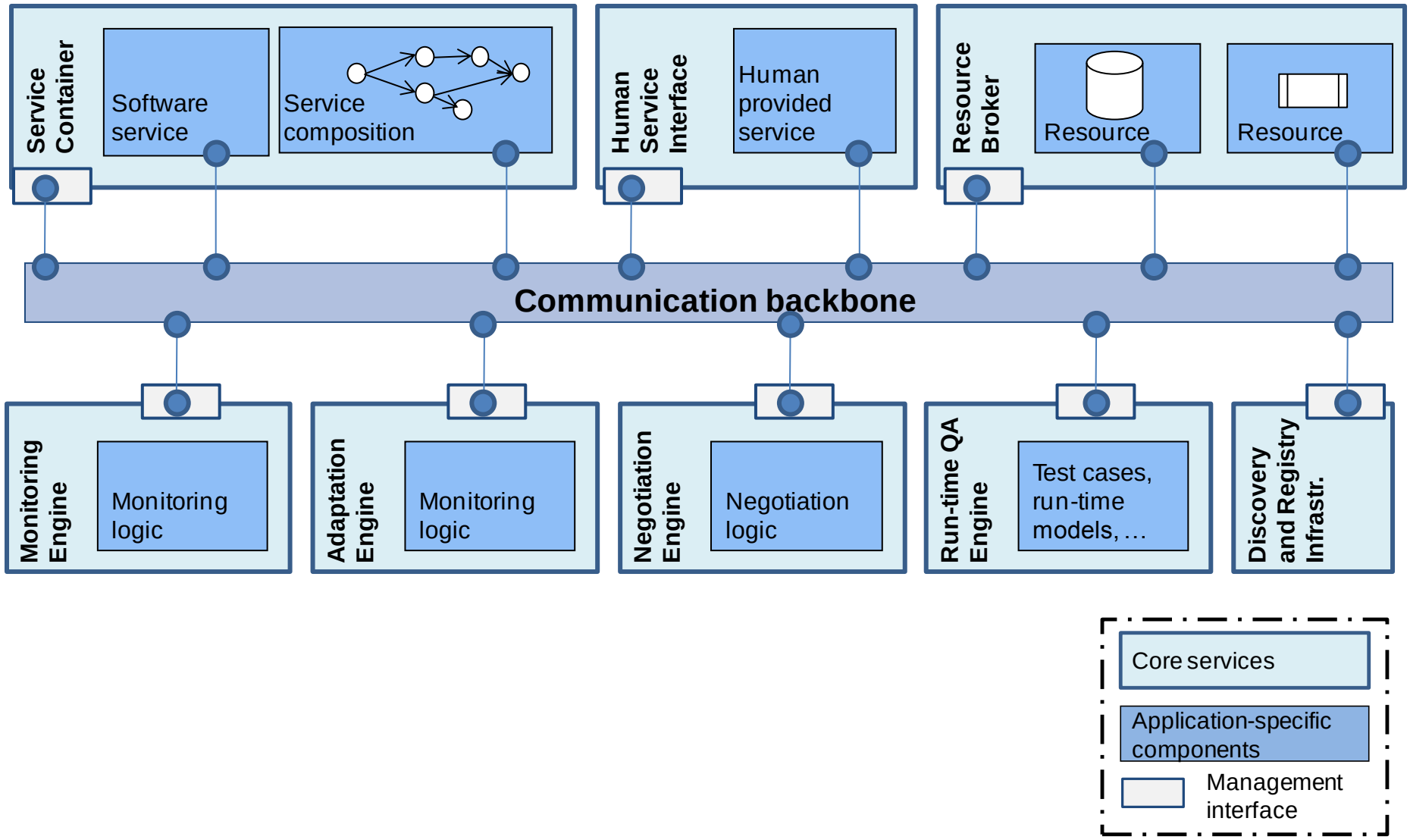
Integrated Research Framework
Conceptual Research Framework



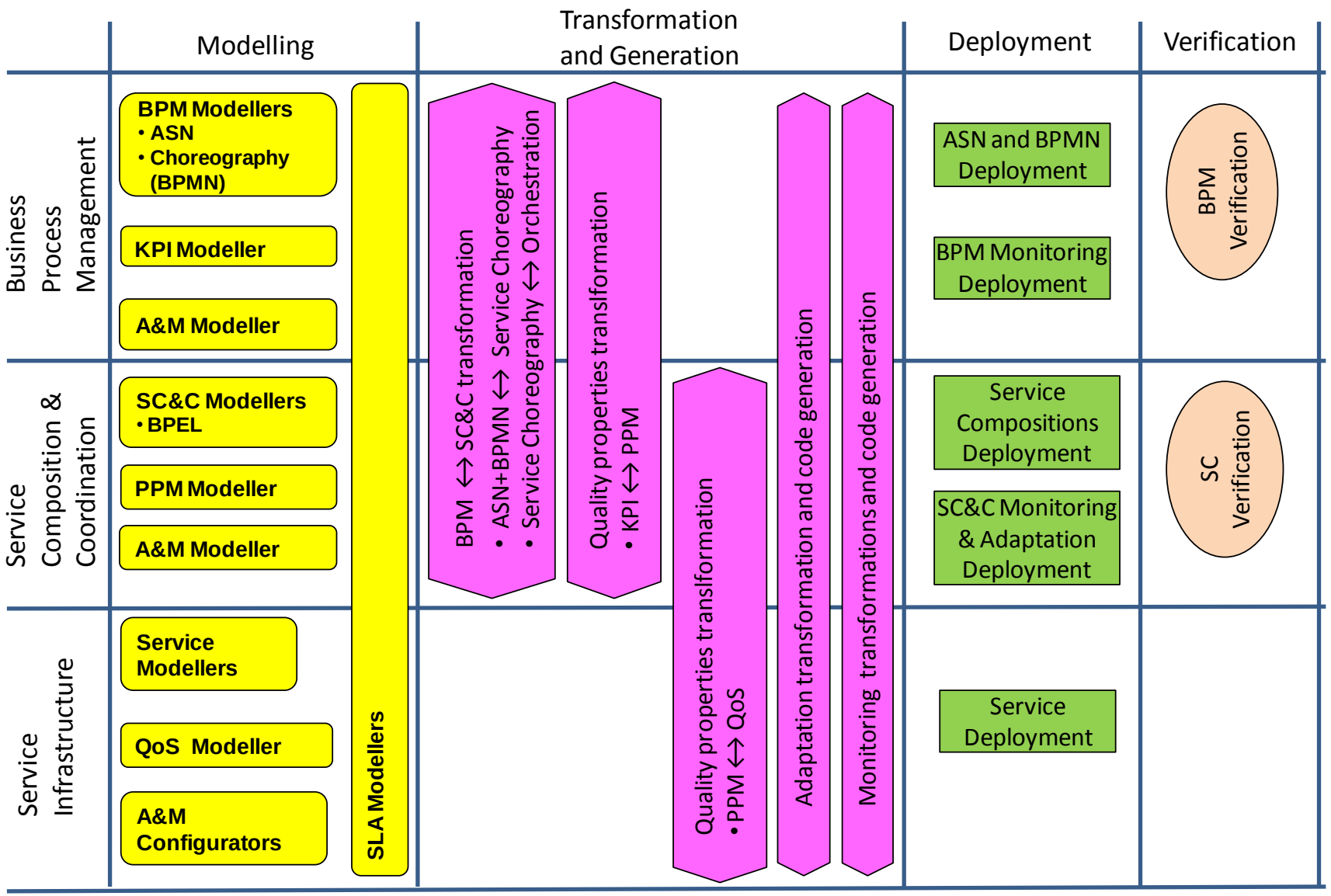
Integrated Research Framework
Reference Life-Cycle



Integrated Research Framework
Logical Run-Time Architecture



Integrated Research Framework
Logical Design Environment



Life-cycle for SBAs