

# Research Topics

# Process Preservation

## SS 2013

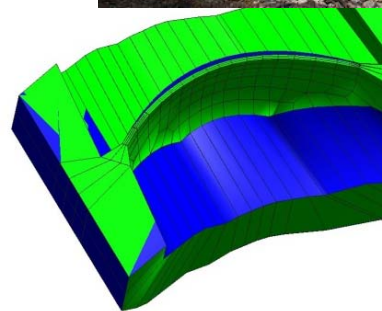
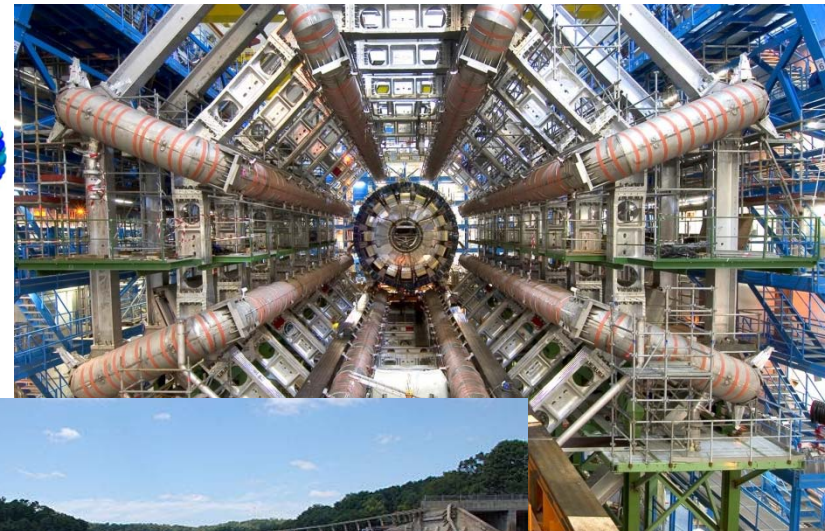
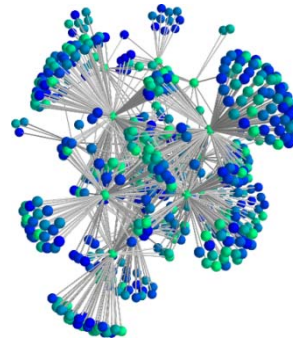
**Stephan Strodl**

SBA Research

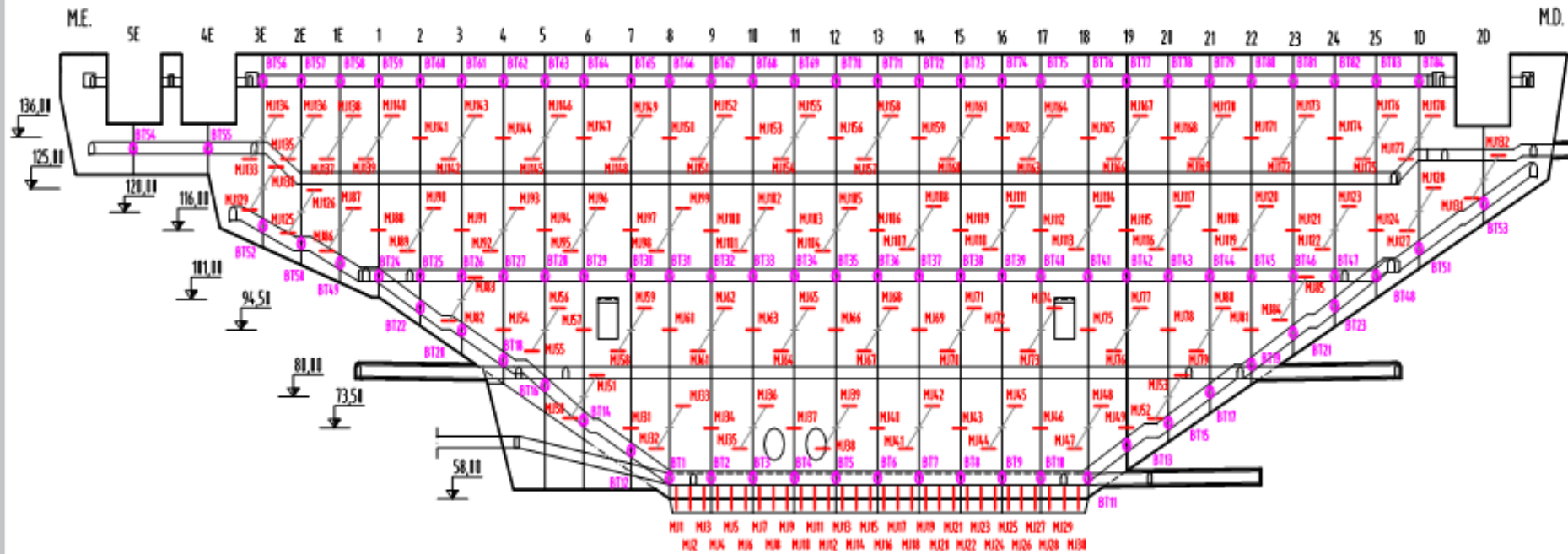
<http://www.sba-research.org/~sstrodl>

# Motivation

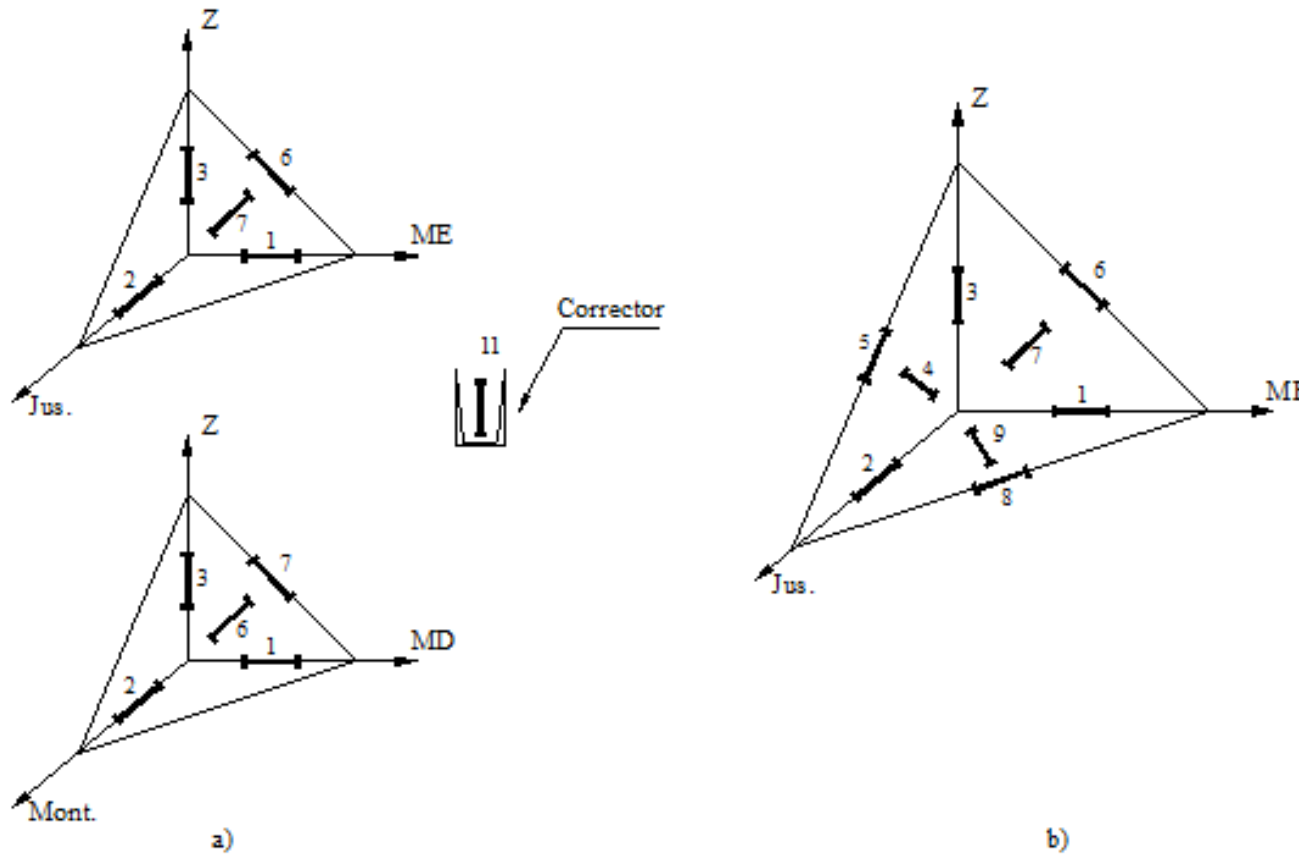
- Science
- E-Health
- Infrastructure
- Finance
- Insurance
- Aviation industry
- ...



# Structural Safety



# Electrical Resistance



Algorithm:

$$T = (R_n - R_0) \Delta t \text{ (}^\circ\text{C)}$$

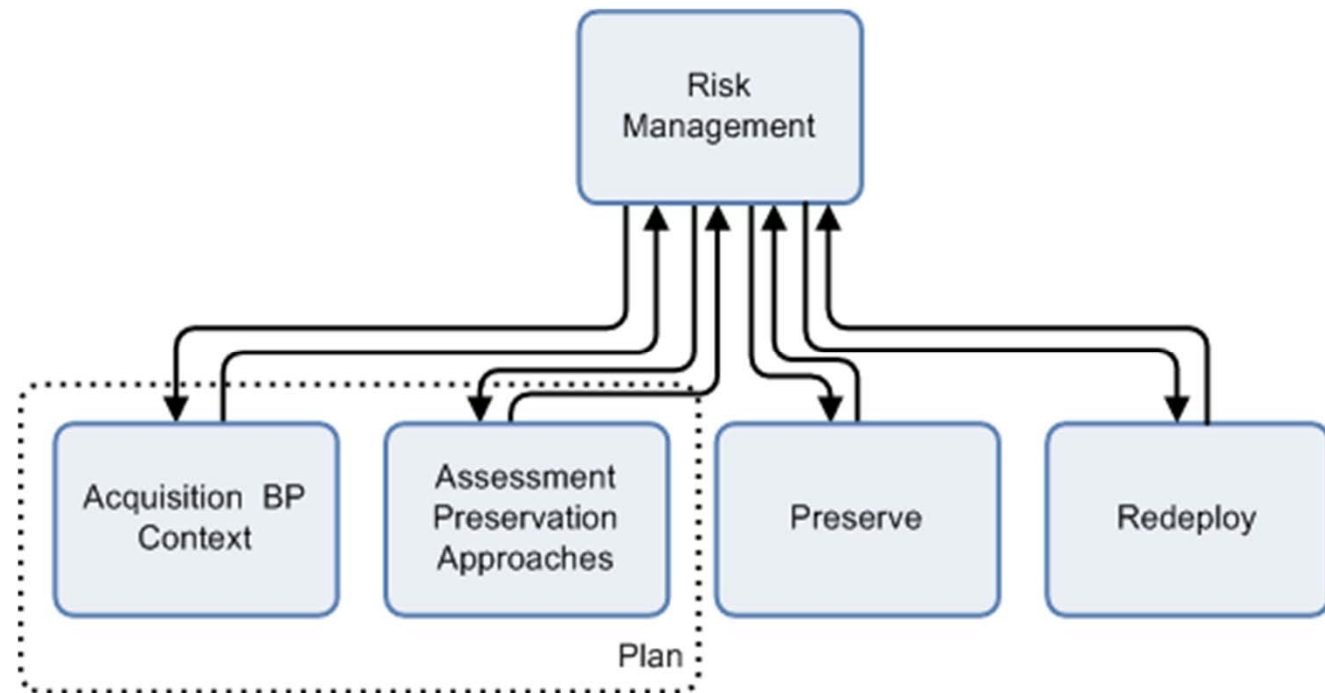
$$\mathcal{E}r = (T - T_i) \varepsilon_2 + (r_n - r_i) \varepsilon_1 \text{ (x10}^{-6}\text{)}$$

# Challenges

- Specification, description
  - outdated
  - incomplete
  - distributed
- Process
  - evolving over time
  - complexity
  - manual steps
- Context
  - legal, organisational, technical
- Supporting information systems
  - complex
  - distributed
  - external services
- Legal
  - laws
  - contracts
- ....

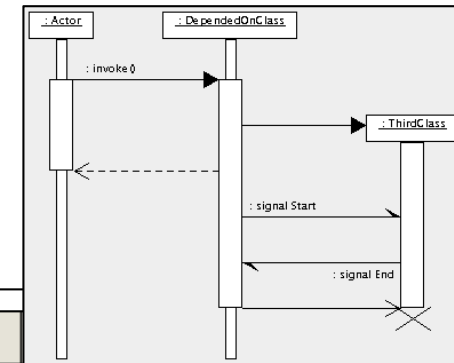
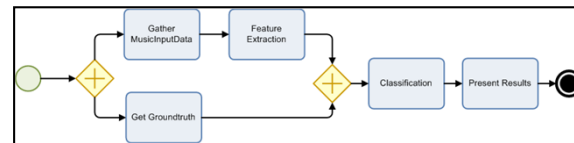
# Approach

- Capture and specify
- Risk analysis
- Plan
- Preserve
- Redeploy

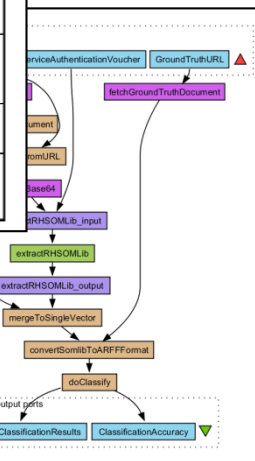


# (Process) description

- Verbal description
- BPMN
- UML
- BEPL
- Zachmann
- TOGAF
- WSDL
- Workflow Engines
- .....



	DATA What	FUNCTION How	NETWORK Where	PEOPLE Who	List of events	List of business goals and strategies
<b>SCOPE</b> (contextual)	List of things important in the business	List of business processes	List of business locations	List of important organizations		
<b>BUSINESS</b> (conceptual)	Conceptual data/object model	Business process model	Business logistics system	Work flow model	Master schedule	Business plan
<b>SYSTEM</b> (logical)	Logical data model	System architecture model	Distributed systems architecture	Human interface architecture	Processing structure	Business rule model
<b>TECHNOLOGY</b> (physical)	Physical data/class model	Technology design model	Technology architecture	Presentation architecture	Control structure	Rule design
<b>COMPONENTS</b> (detailed)	Data definition	Program	Network architecture	Security architecture	Timing definition	Rule specification
<b>INSTANCES</b> (functioning enterprise)	Usable data	Working function	Usable network	Functioning organization	Implemented schedule	Working strategy



```

<bpel:partnerLinks>
<bpel:partnerLink name="client"
  partnerLinkType="tns:HelloWorld"
  myRole="HelloWorldProvider" />
</bpel:partnerLinks>

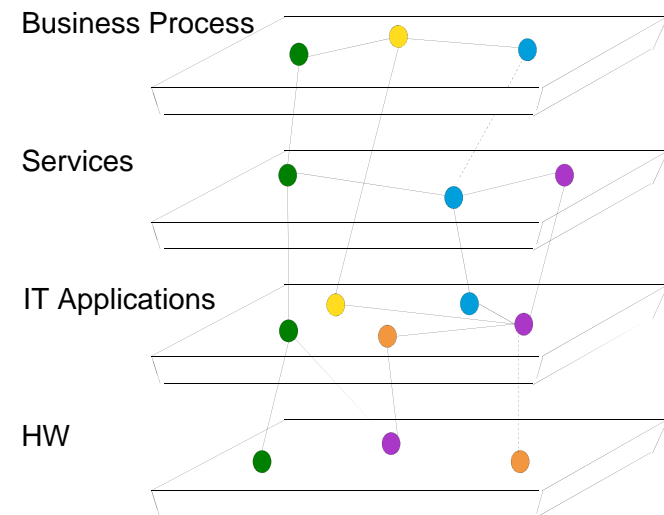
<bpel:variables>
<bpel:variable name="input"
  messageType="tns:sayHelloMessage" />
<bpel:variable name="output"
  messageType="tns:sayHelloResponseMessage" />
</bpel:variables>

<bpel:sequence name="main">
<bpel:receive name="Start"
  partnerLink="client" portType="tns:HelloWorld"
  operation="sayHello" variable="input"
  createInstance="yes" />
  
```



# Process Context

- What is the **relevant** context?
- How do we **gather** it?
- How do we **model** it?
  
- Relationships
  - Constraint
  - Descriptive





# Process Context

## Strategy

Strategic Indicators, External Services, Contracts, Regulations, Licenses, Legal Requirements, Patents

## Business

### Organization

Information

Processes

Organizational Structure, People, Business Processes, Operational Indicators

## Applications

Services

Components

Applications, Services, Virtualization Applications

## Technological Infrastructure

Processing

Storage

Communication

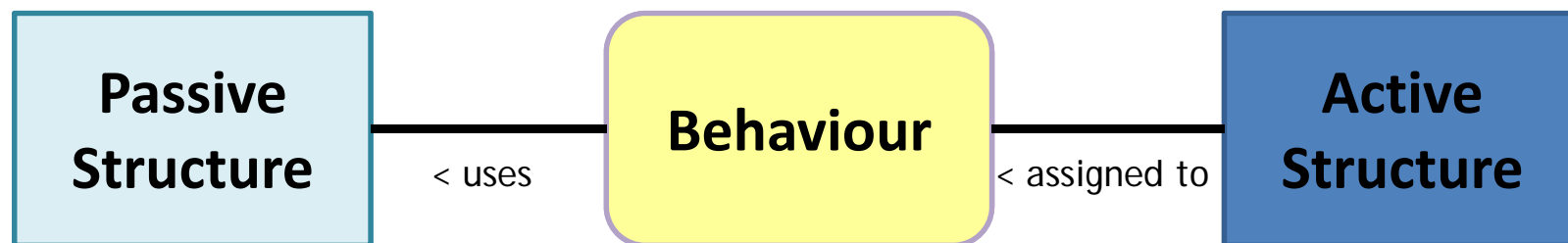
Deployed software applications and services, Hardware nodes, Communication nodes

# ArchiMate

- Modelling language for enterprise architecture
- Different frameworks
  - Zachmann
  - TOGAF
  - FEAF
  - MODAF
- Different tools
  - Archi
  - IBM Rational System Architect

# The ArchiMate Core Concepts

- **Active structure** is an entity capable of performing behaviour (e.g. person, machine).
- **Behaviour** is an unit of activity performed by one or more active structure elements (e.g. process, application function).
- **Passive structure** is an object on which **behaviour** is performed (e.g. product, document).



# The ArchiMate Framework

- The ArchiMate framework is a **layered** and **service-oriented framework** that addresses three enterprise modelling concerns:
  - **Business**
  - **Application**
  - **Technology**

[architecture] **framework**: conventions, principles and practices for the description of architectures established within a specific domain of application and/or community of stakeholders (ISO 42010:2011).

# The ArchiMate Framework

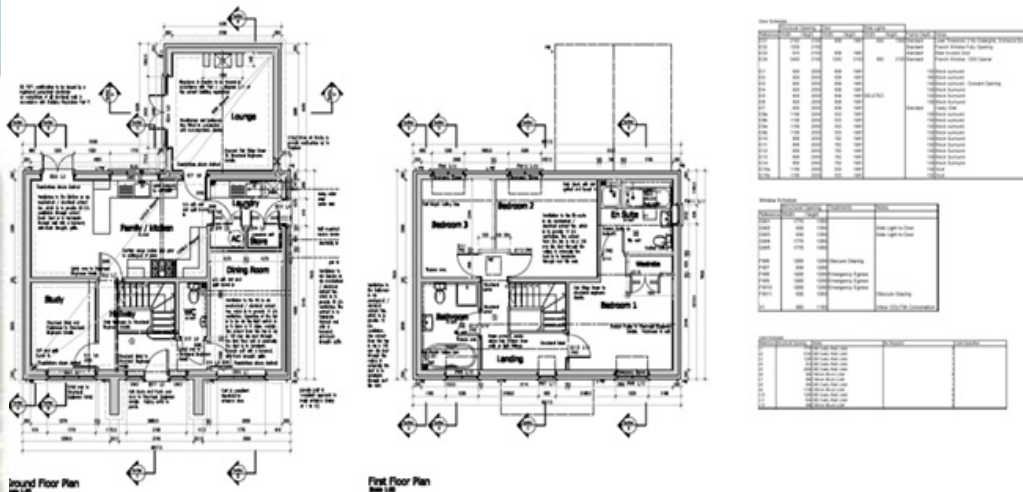
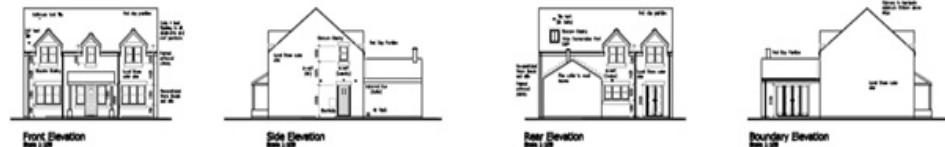
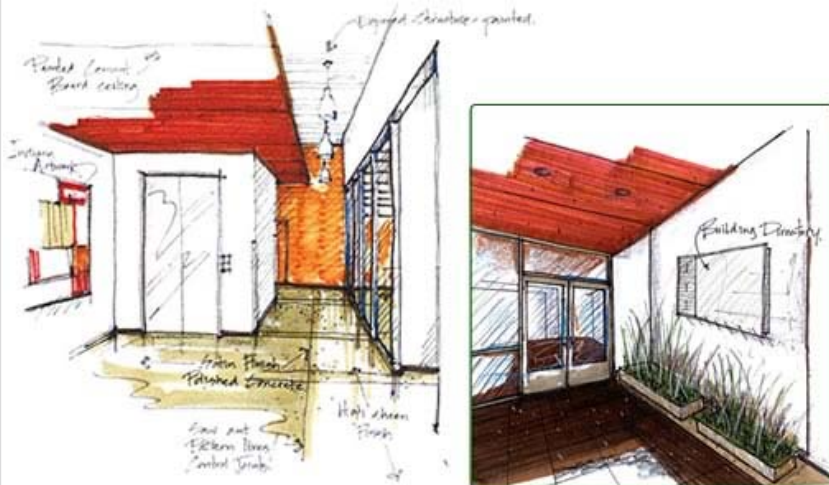
**Passive  
Structure**

**Behaviour**

**Active  
Structure**

	Passive Structure	Behaviour	Active Structure
Business	business objects	business services and processes	actors and roles
Application	data objects	application services and functions	applications and components
Technology	artifacts	infrastructure services and system software	devices and networks

# Views and Viewpoints



## Production Drawing

Proposed New Dwelling,  
Plot 2, Land Adjacent Blue Bell Inn, Pickworth.

**JbDesign**  
ARCHITECTURAL SERVICES

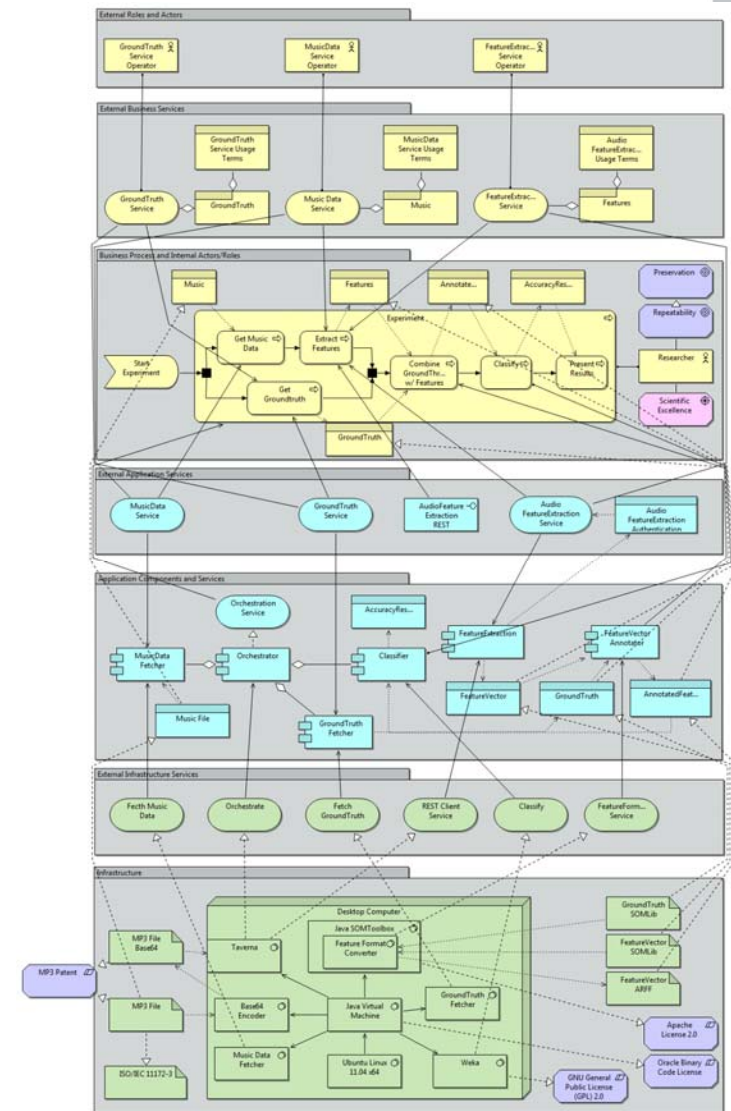
Project: Proposed new dwelling - Land Adjacent Blue Bell Inn, Pickworth  
 Drawing Title: Production Drawing - Plot 2 of 2  
 Client: JbDesign/Architects  
 Date: 15/05/2018  
 Scale: As detailed

Drawn: JbDesign  
 Dwg No: 2018.05.01

Special conditions and/or notes in relation to this drawing and any dependencies on it to which it relates should be noted on the drawing. All drawings are the property of JbDesign and shall not be used for any other purpose without the written consent of JbDesign. All drawings are subject to change without notice.

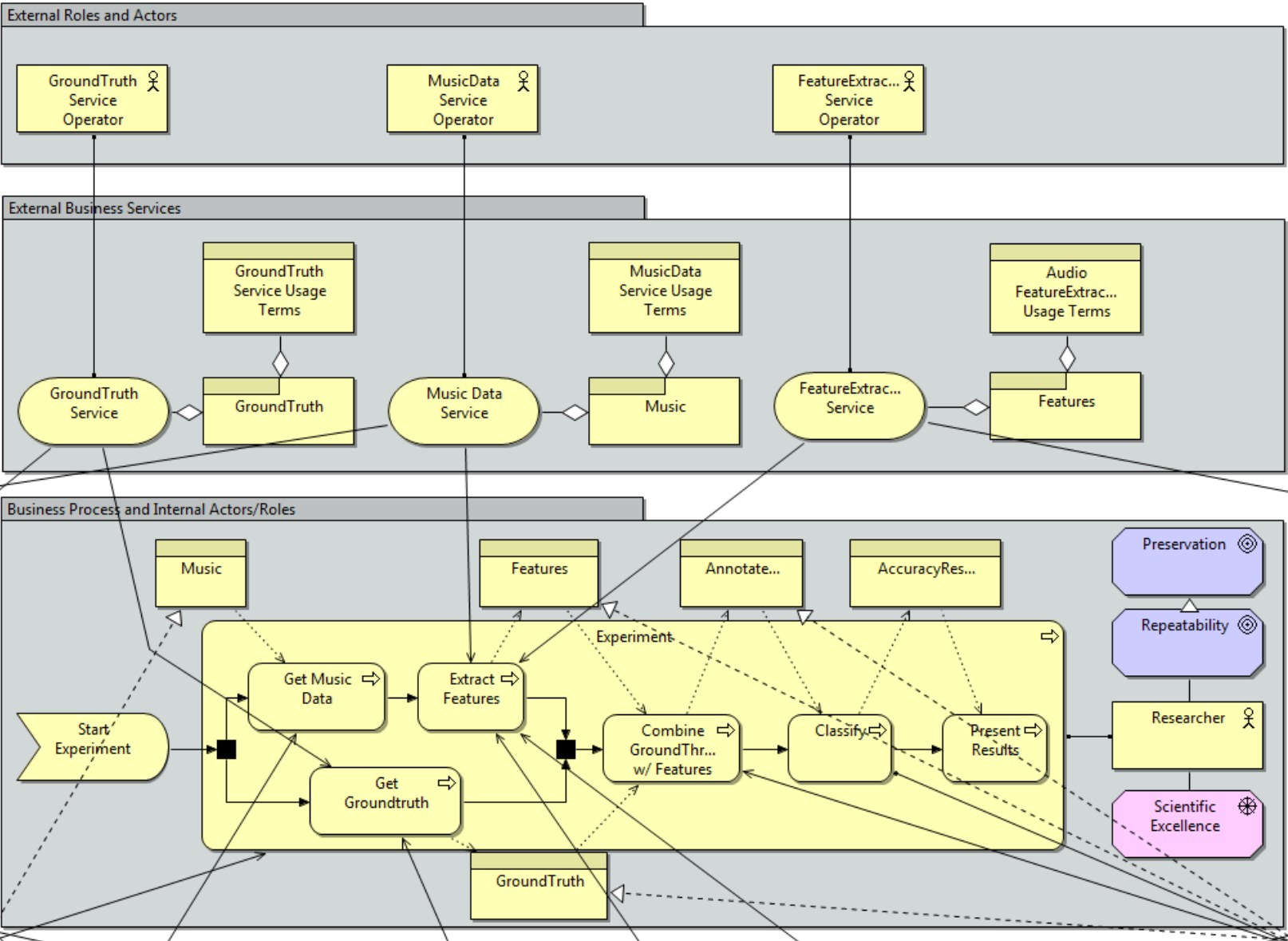
# ArchiMate

- External business service
- Workflow
- Business objects
- Motivation
- Software Services
- Files and formats
- Licences and patents

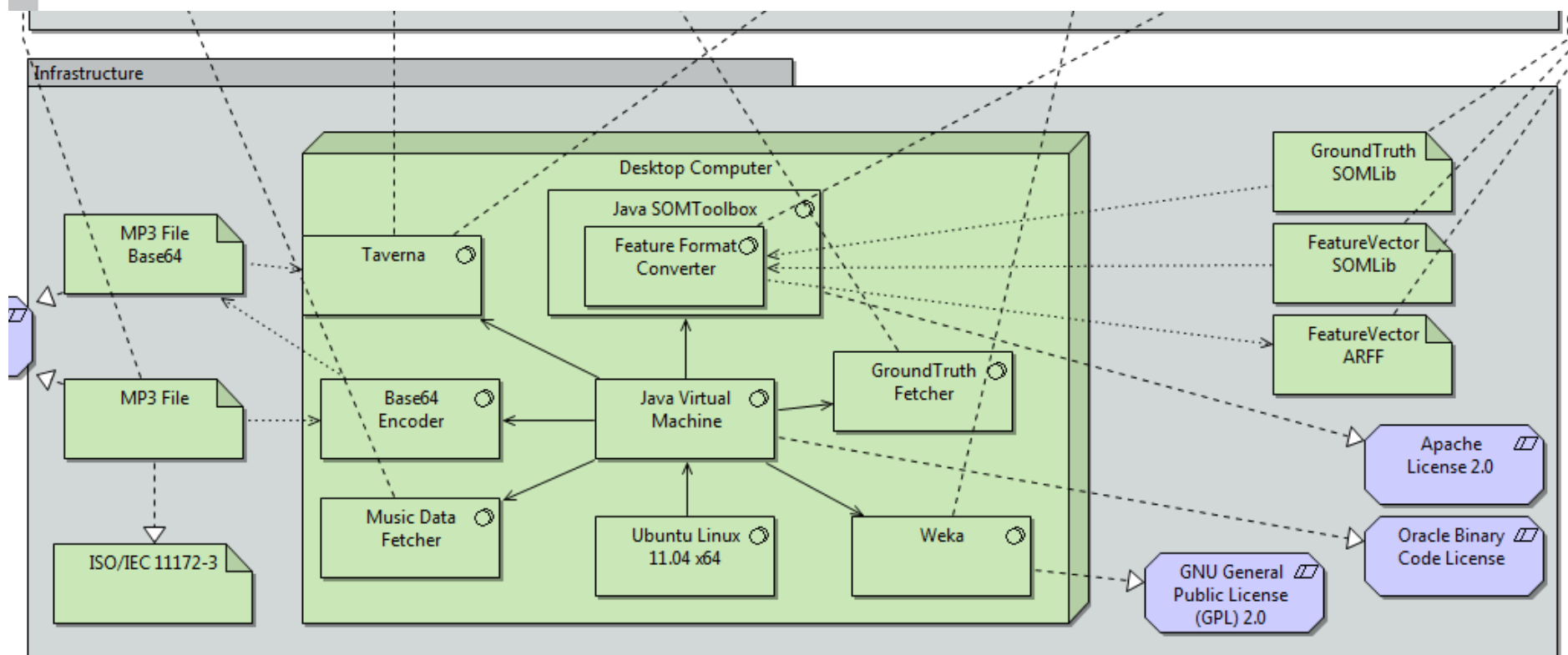




# ArchiMate

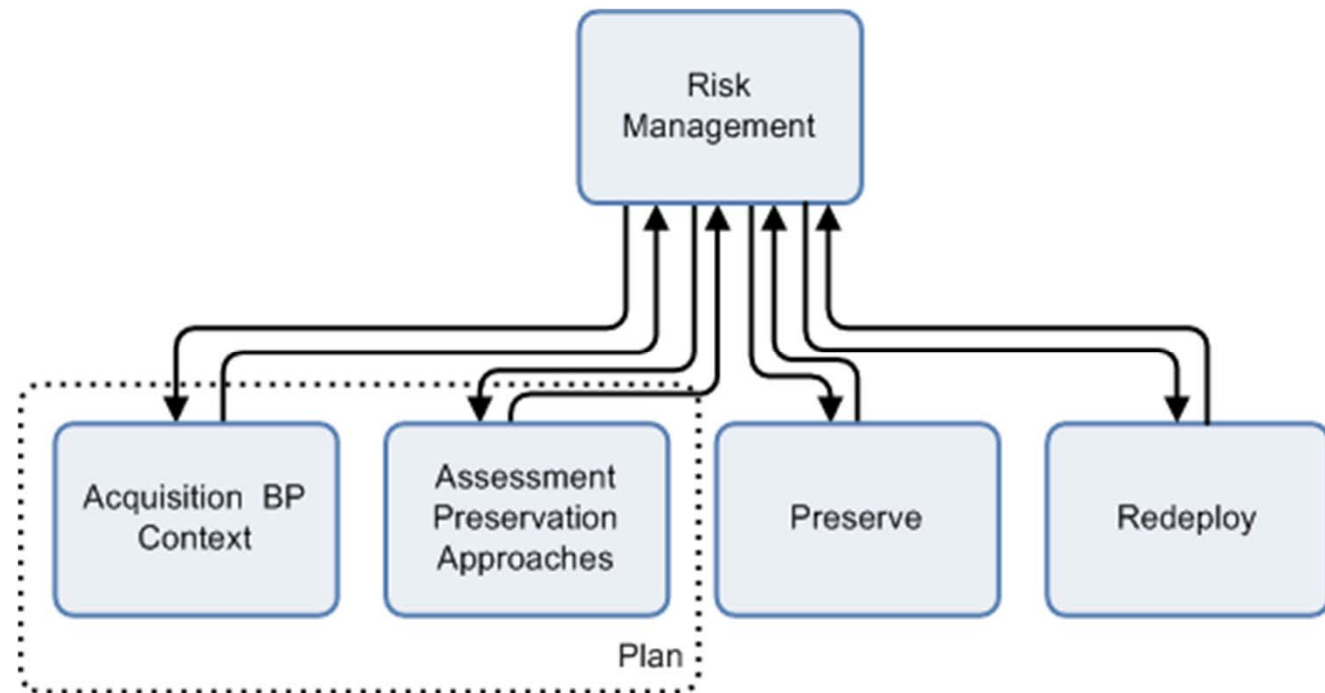


# ArchiMate

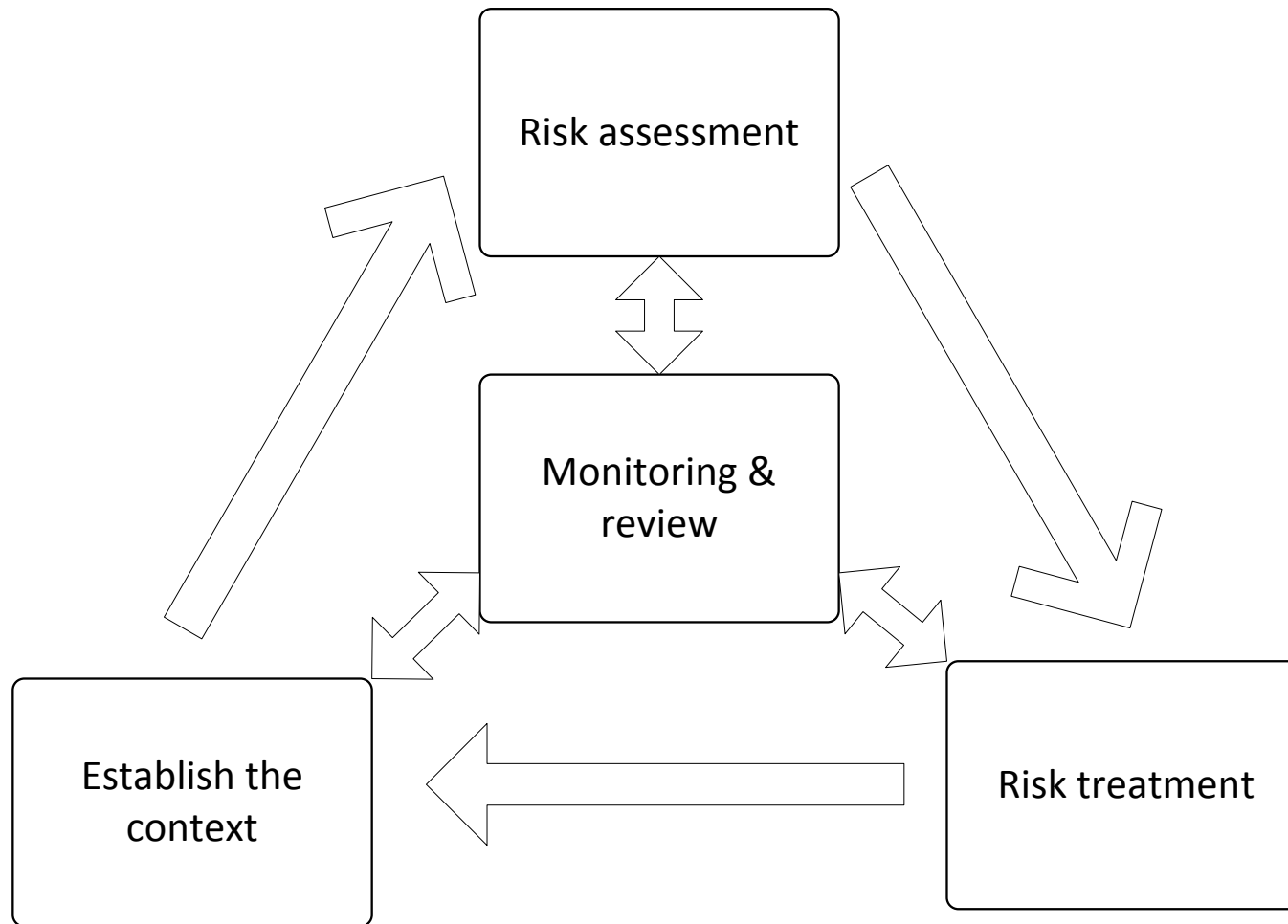


# Approach

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- Risk analysis
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- Redeploy



# Risk Management



# Preservation Requirements

- Driver
  - Reuse Scenarios
    - traceability
    - repeatability
    - reusability
    - repurposeability
  - Organisational policies
  - Technological environment
  - Legal obligations
  - Budget
  - ....

# Preservation Plan

- Identification, evaluation and comparison of preservation plans
- Preservation plan
  - Acquisition procedure
  - Preservation procedure
  - Redeployment procedure
  - Verification and Validation procedure
- Business process → orchestration of services
- Combination of preservation strategies
- Preservation of dependencies and relationships

# Preservation and supporting strategies

- Metadata & Documentation
- Migration
  - File formats
  - Storage media
  - Alternative services
    - Open source service
    - In housing of services
- Emulation

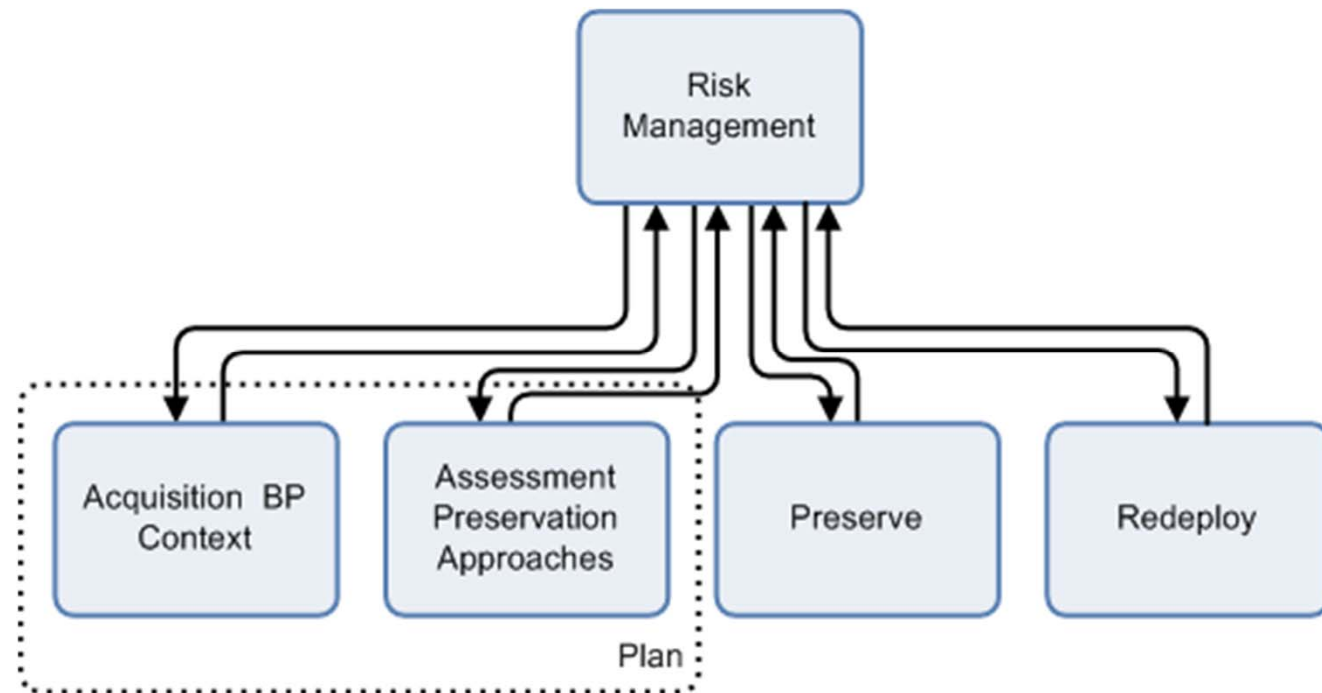


# Preservation and supporting strategies

- Virtualisation
  - Clone
  - Build
- Re-build of SW systems
- Mock-up of software system
- Software Escrow

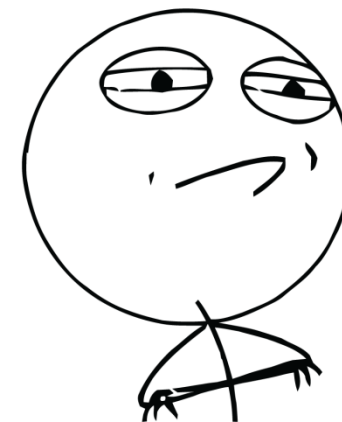
# Approach

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# Challenge External Services

- Objective:
  - Preserve process dependent on WS
  - Ensure continuity of WS dependent process
- Landscape:
  - Business Processes implemented in SOA
  - eScience processes
  - External data supplied by WS
    - Limited access
    - SLA rarely used
  - Business Activity Monitoring not enough
- WS Pros & Cons:
  - WS facilitate adaptation to `changes`
  - WS may be a source of `changes`



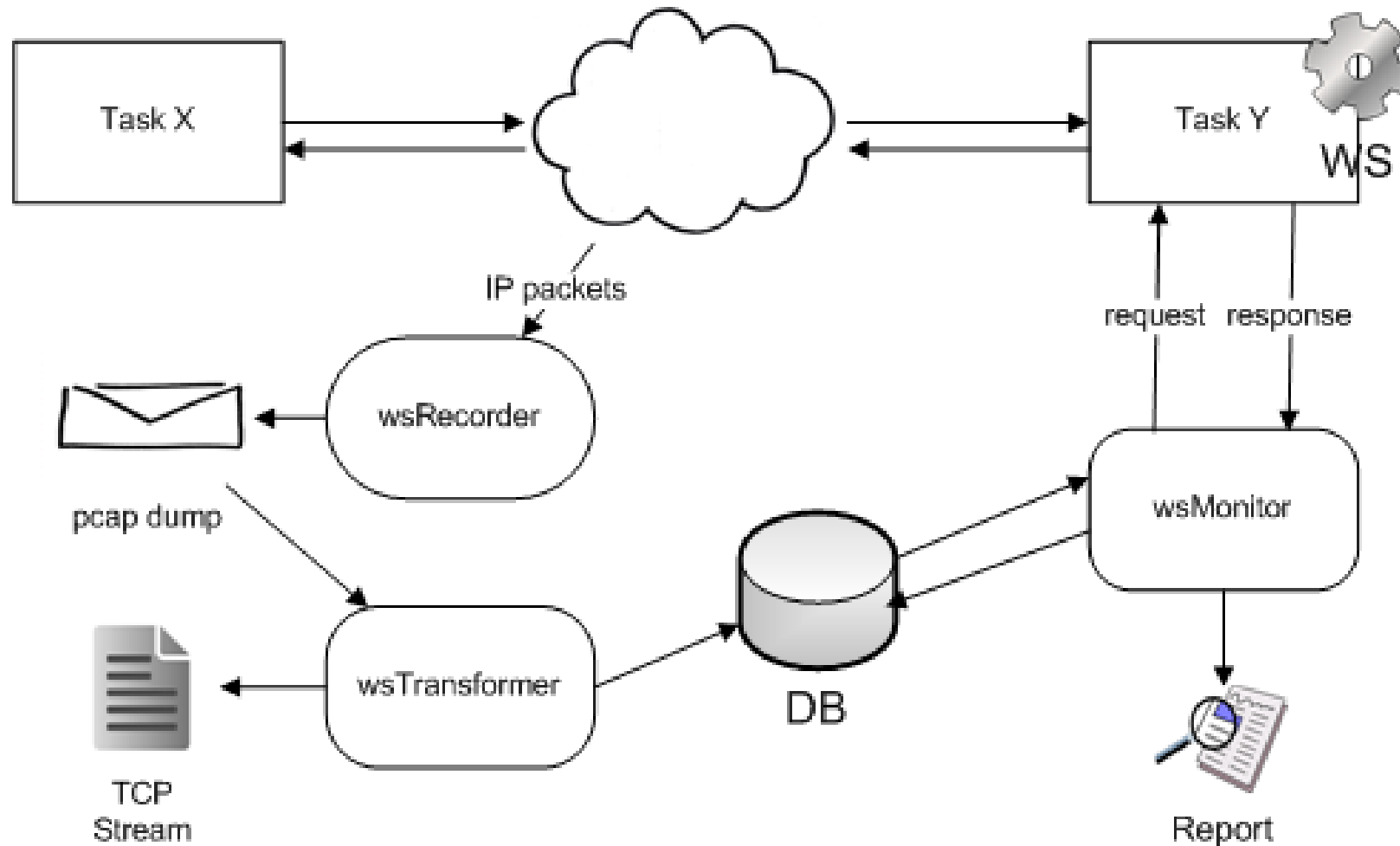
# WS changes

- Availability
  - Lack of access (technical problems or bankruptcy)
- Change in interface
  - Requires changes to the process (e.g. REST ->WSDL)
- Functionality change
  - Outputs and interfaces are the same, results delivered are different (e.g. change of underlying algorithm)
- Behavioral change
  - E.g. different timing characteristics, buffering effect, etc.

# WS Monitoring

- Deterministic vs. Non-deterministic WS
- Statefull vs. Stateless
- Possible approaches:
  - Network traffic interception (next slide)
  - Proxying the traffic to/from the WS
  - Synthetic requests

# Network traffic interception



# Preservation strategies

- WS Mock-up
  - Kind of lookup table
  - Limited to deterministic WS
  - Works for previously intercepted messages
  - Used for temporary switching or as a replacement when process is DP'ed
- Escrow
  - Three-way agreement
  - Grants access to WS when the original vendor stops hosting it



# Resilient WS

- Concept extending current specification of WS
- Standard methods providing information on:
  - Quality of Service (continuity, non-modifiability)
  - Notifications on changes (as described before)
  - Test mode (in order not to affect the live system)
- Example methods:
  - identifyYourself()
  - serviceChangesSince(Date)
  - identifySWEnvironment()
  - identifyHWEnvironment()
  - swEnvironmentChangesSince(Date)

