Modeling and Simulation Tool Suite for Patient Portals

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Goal

Develop a Modeling and Simulation Platform for patient Health Information Systems (HIS)

Platform is suitable for

- modeling and model-based integration of Patient Portals (PP) providing access to Electronic Medical Records (EMR) and Health Information Systems (HIS)
- performing security and privacy analysis using model verification and simulation-based testing
- providing mapping to standard SOA execution platforms

Application System

MyHealth @ Vanderbilt (MHAV)

- **Patient Portal**
- **> 25 000 users**
- **Provides a set of (web-based) services**

  Heterogenic
  - Secure messaging with doctors
  - Access to lab results
  - Scheduling of appointments
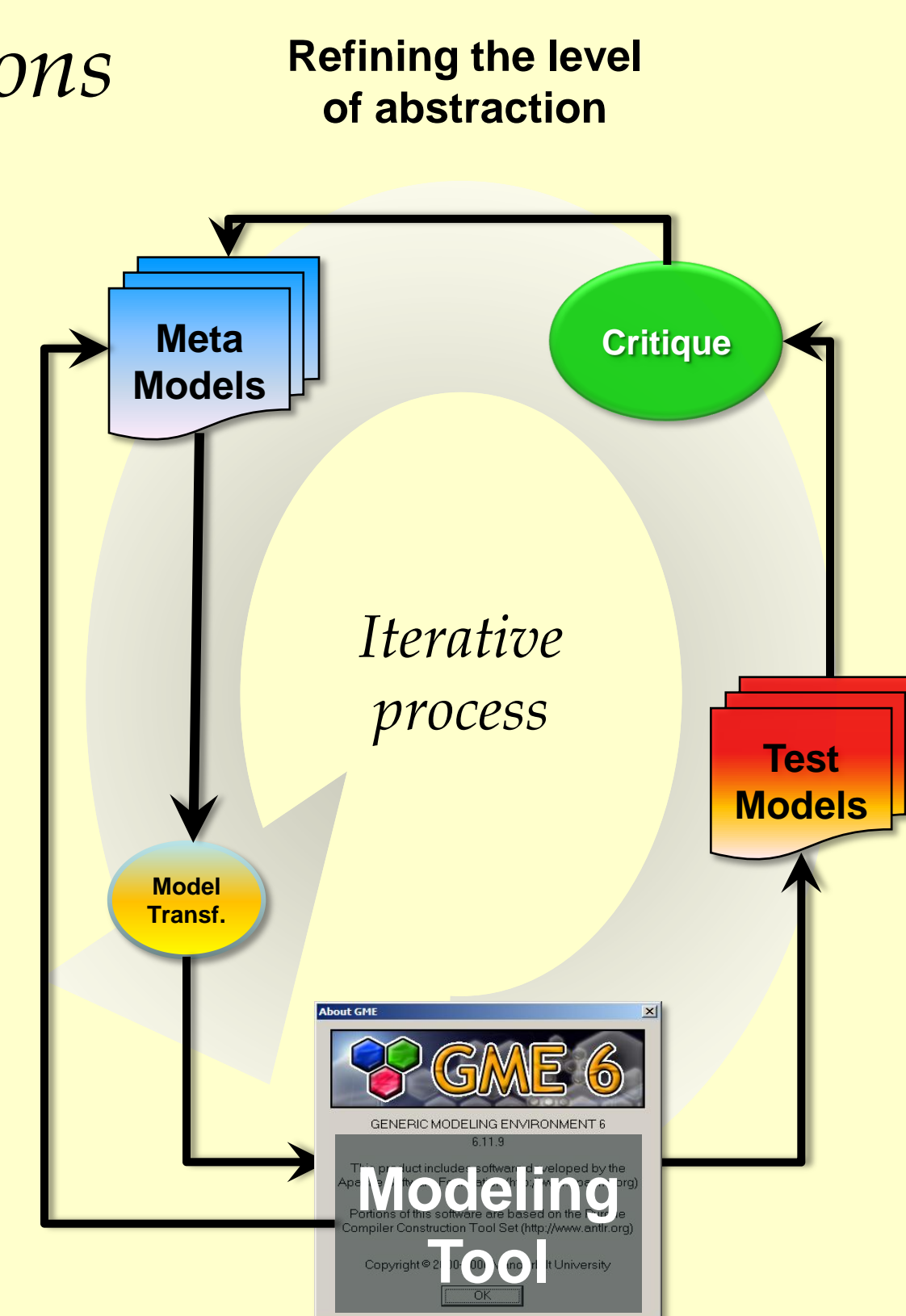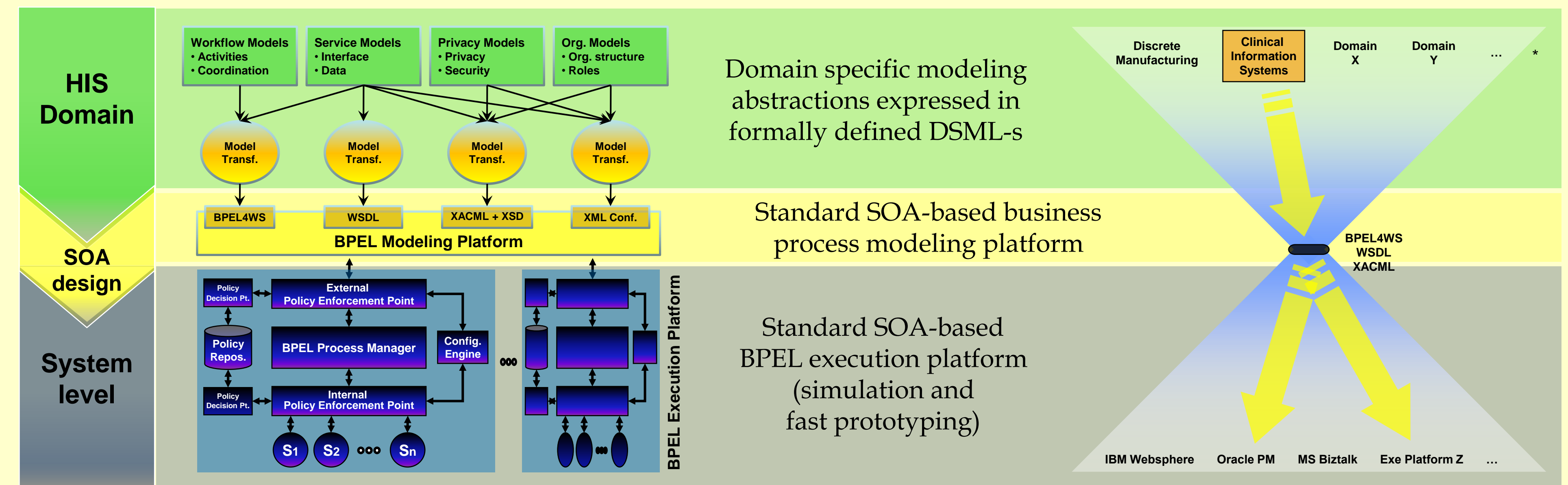 - Access to billing info
  - Personalized literature

Approach

Developing Domain-Specific Abstractions

1) Developing Domain-Specific Modeling Languages (DSML) for Patient Portals
   - by casting EMR/HIS onto Service-Oriented Architectures (SOA) defined by the OASIS and the WC3 family of standards (BPEL4WS, XACML, WSDL)

2) Building the models
   - capturing the key elements of operation

3) Model translation
   - interpretation of models

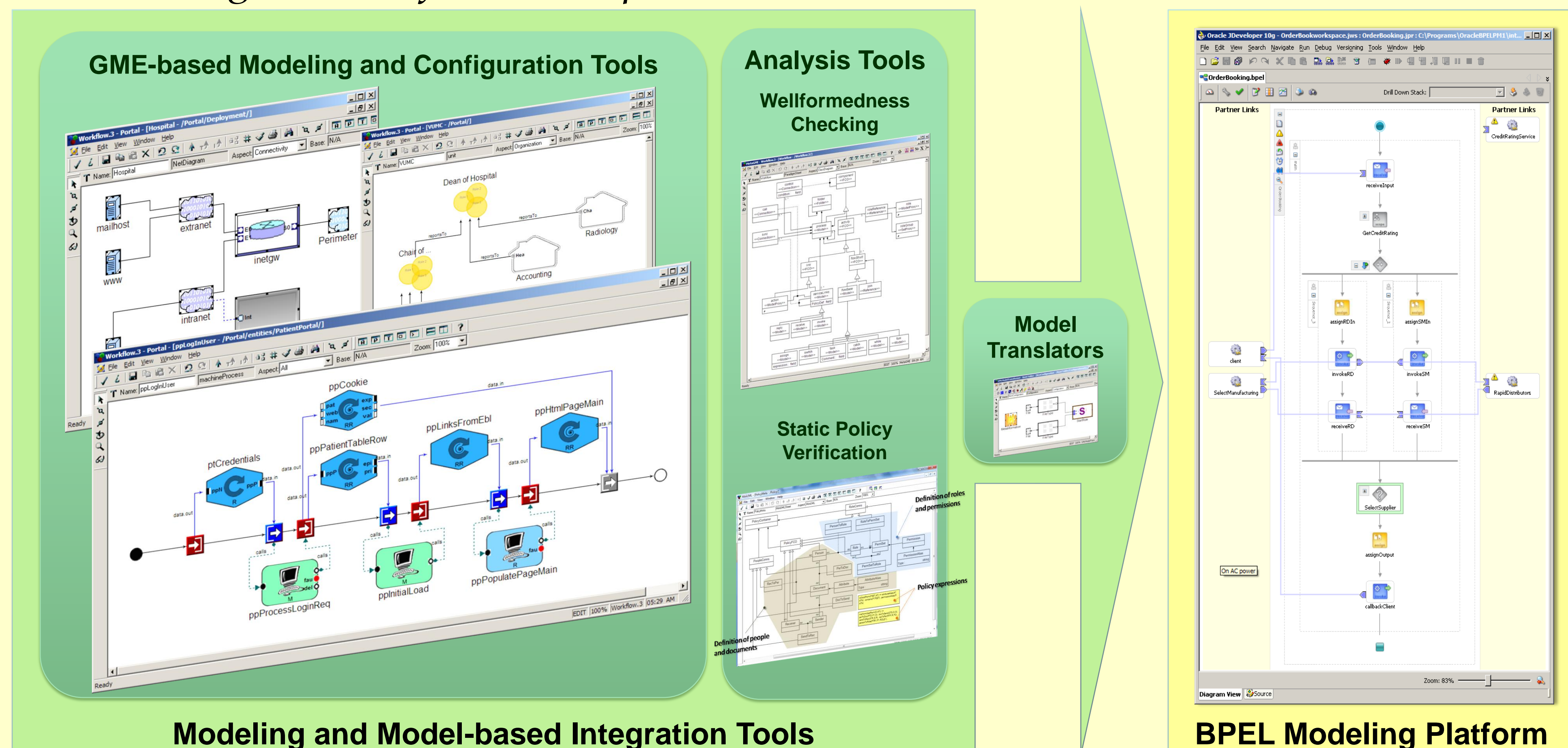4) Execution and simulation of models, workflows with an execution engine

Refining the level of abstraction

Meta Models → Critique → Iterative process → Model Transf. → Test Models

GME 6 — GENERIC MODELING ENVIRONMENT 6
Modeling Tool

Integration and Simulation

Domain specific modeling abstractions expressed in formally defined DSML-s

Standard SOA-based business process modeling platform

Standard SOA-based BPEL execution platform (simulation and fast prototyping)

* SGV triangle of Platform-Based Design (PBD)

Modeling and Verification steps with our tools suite

GME-based Modeling and Configuration Tools

Analysis Tools
- Wellformedness Checking
- Static Policy Verification

Model Translators

Modeling and Model-based Integration Tools

BPEL Modeling Platform

Benefits

Following Model-Based Design principals

- Separation of the low level implementation details from the high level abstractions
- Matching SOA modeling abstractions with the HIS domain
- Simulation of operation

Future Work

Work in progress

- **Building tools for**
  - Policy Validation
  - Dynamic Policy Verification
    - Temporal nature of expressions
  - Model Translator