A Web-based Platform for Mass Customization

e-CUSTOM
Factories of the Future

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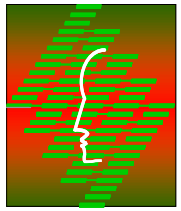


SEVENTH FRAMEWORK
PROGRAMME

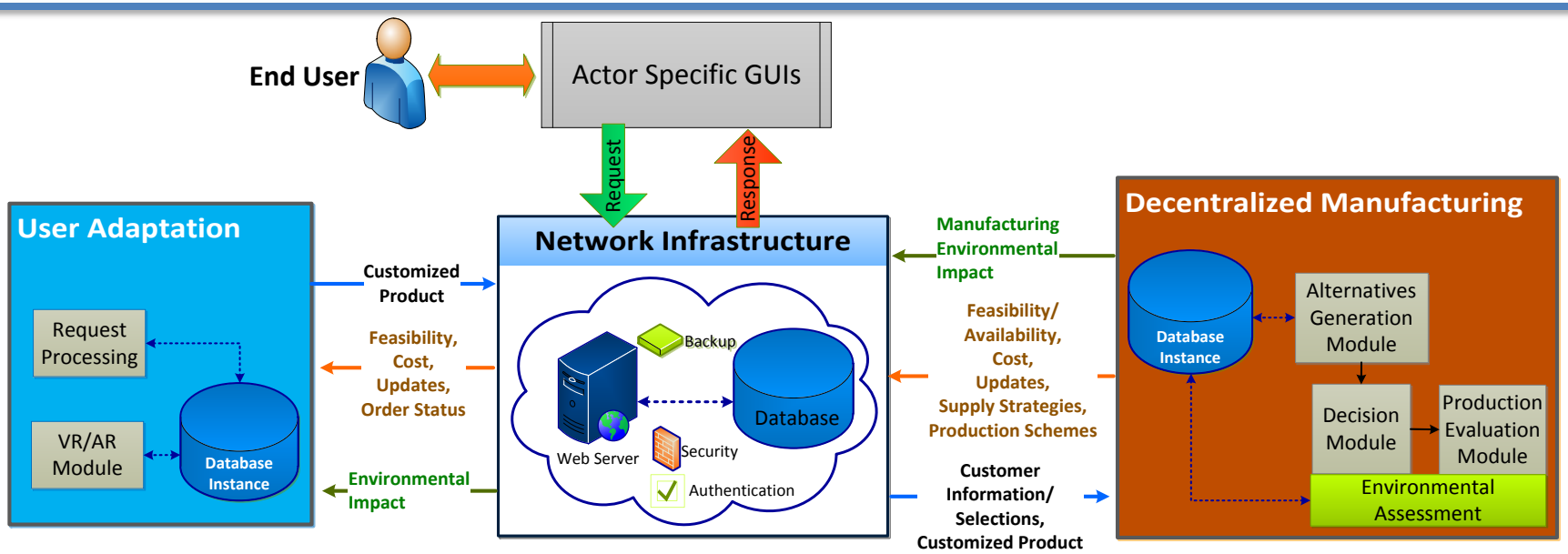
Contents

Design of the Web-based Platform - Architecture

Web framework responsible for:

Production Phases

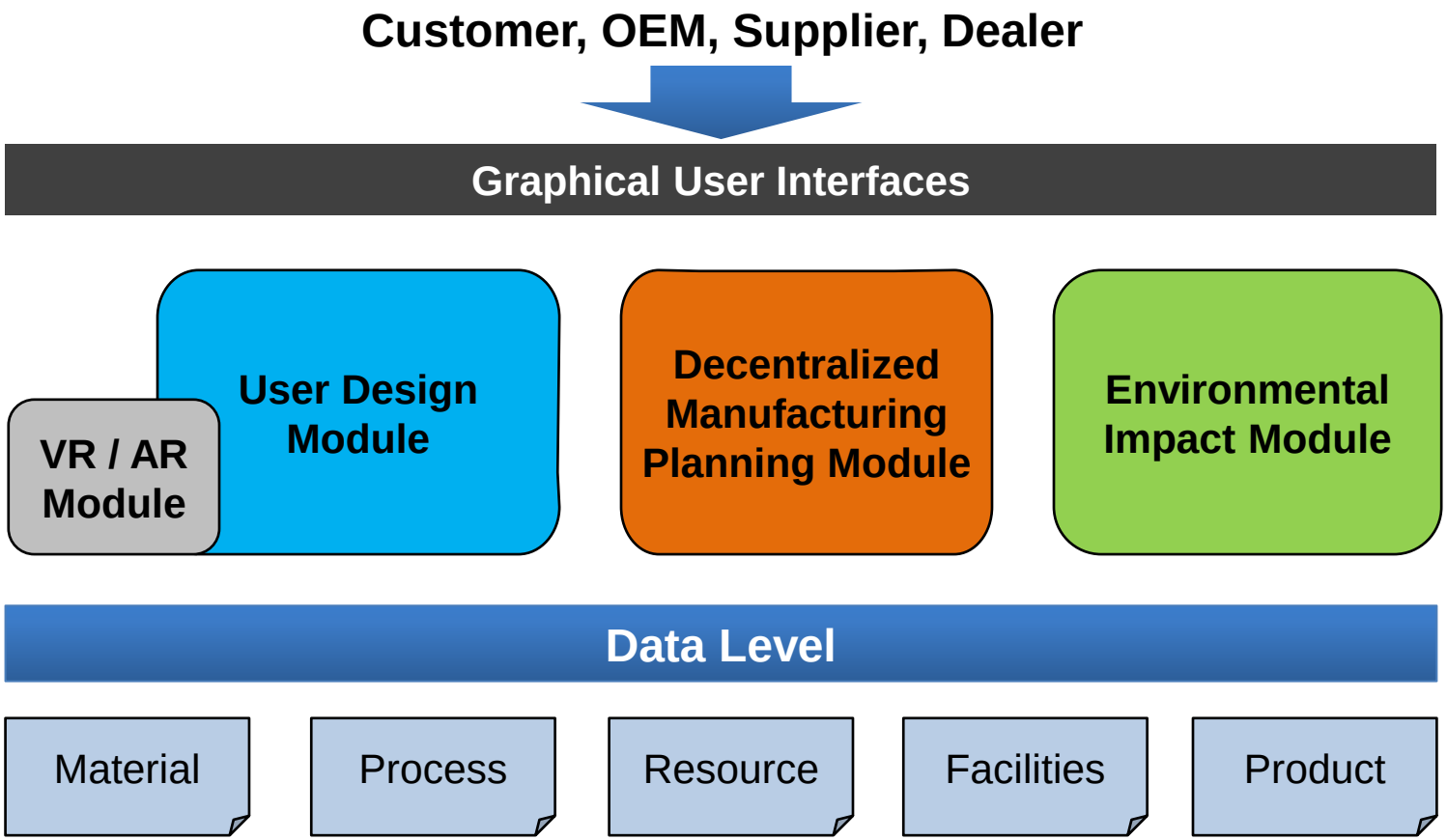
- ✓ Design
- ✓ Planning
- ✓ Supervision
- ✓ Distribution



(D. Mourtzis, M. Doukas, G. Michalos, F. Psarommatis, "A Web-Based Platform for Distributed Mass Product Customization: Conceptual Design", (DET 2011), ISBN 978-960-88104-2-6, 7th International Conference on Digital Enterprise Technology, Athens, Greece, pp. 604-613 (2011))

Design of the Web-based Platform - Overview

"modular architecture"



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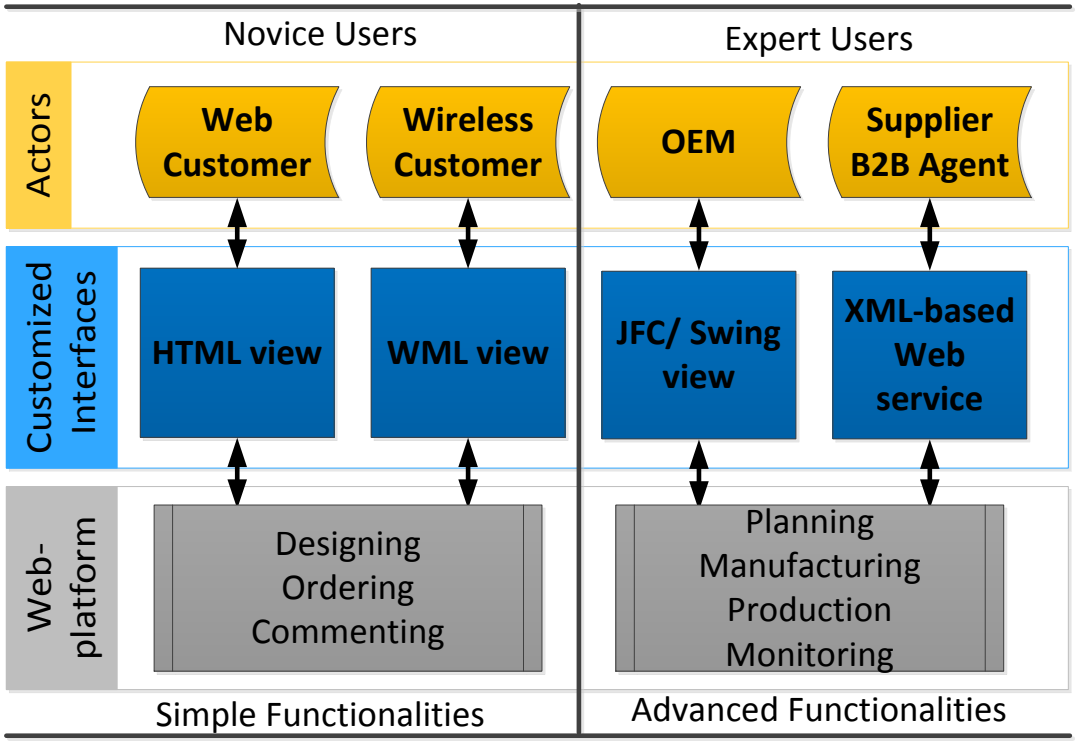
Design of the Web-based Platform - User Involvement in Product customization

- ✓ Different **interfaces** to different actors - level of expertise
- ✓ Provision of sets of **functionalities** according to the end user's needs
- ✓ **Modularity**



Enablers

- Java Programming Framework
- Model-View-Controller (MVC) Architectural Pattern
- Struts, Hibernate, Tiles etc.

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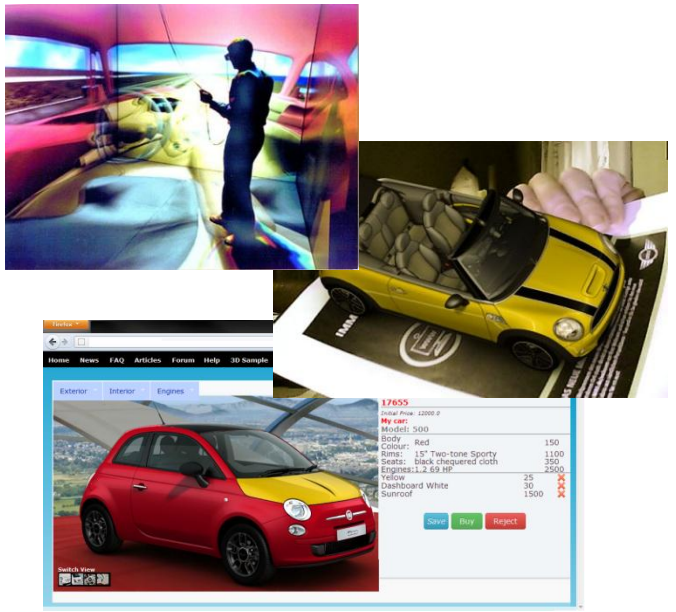
Virtual and Augmented Reality for User Adaptation

- The **involvement** of the customer in the design of a new product is aided by:

Enablers

- ✓ Virtual Reality (VR)
- ✓ Augmented Reality (AR)

- ❑ **Immersive** Visualization at specific sites
- ❑ **AR product visualization** using a PC and a webcam
- ❑ **3D product manipulation** inside a browser, through **straightforward** commands (pan, zoom, rotate)



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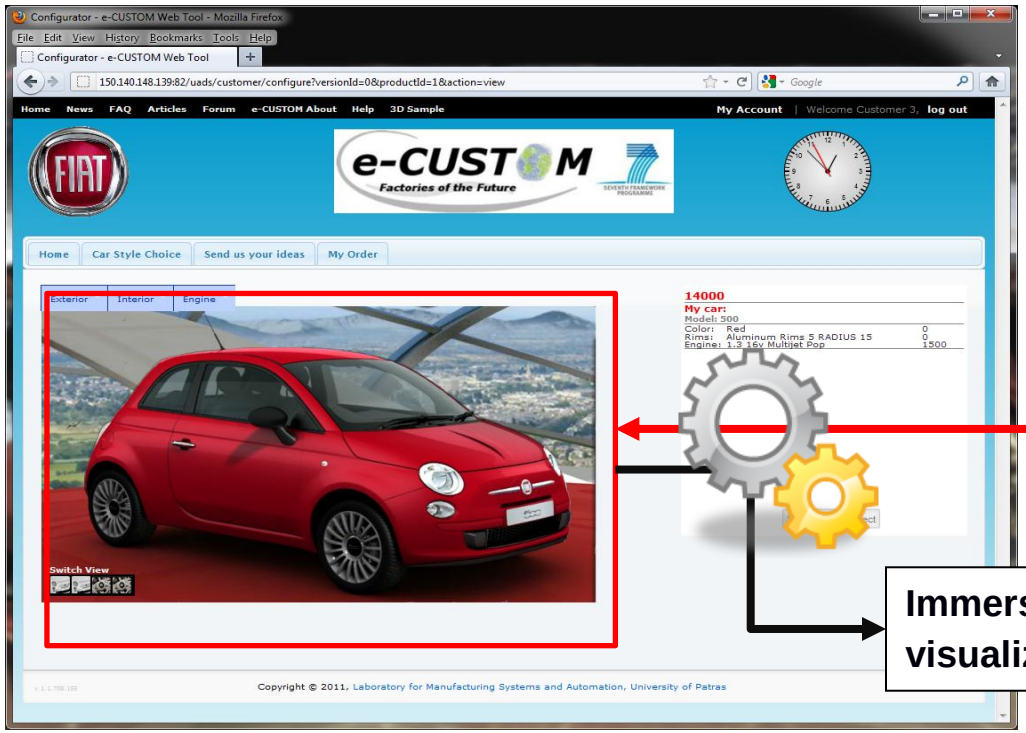
Virtual Reality Features

"supporting the customer involvement in the initial design of products"



3D editing tool embedded inside the browser

Immersive VR visualization

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Augmented Reality Features

"enhancing the customer perception towards the product"

- **The customers have the ability to print the AR marker and visualize the product at their computer screen, using just a webcam.**

- **AR visualization through smartphones / tablets, using free and open source applications.**

(Working paper: Mourtzis D. and Doukas M., "A web-based virtual and augmented reality platform for supporting the design of personalized products", 45th CIRP CMS 2012)

e-CUSTOM - A Typical Scenario

1.1. OEM

- Defines **customizable options**
- Creates **new concept designs**

1.2. Customer

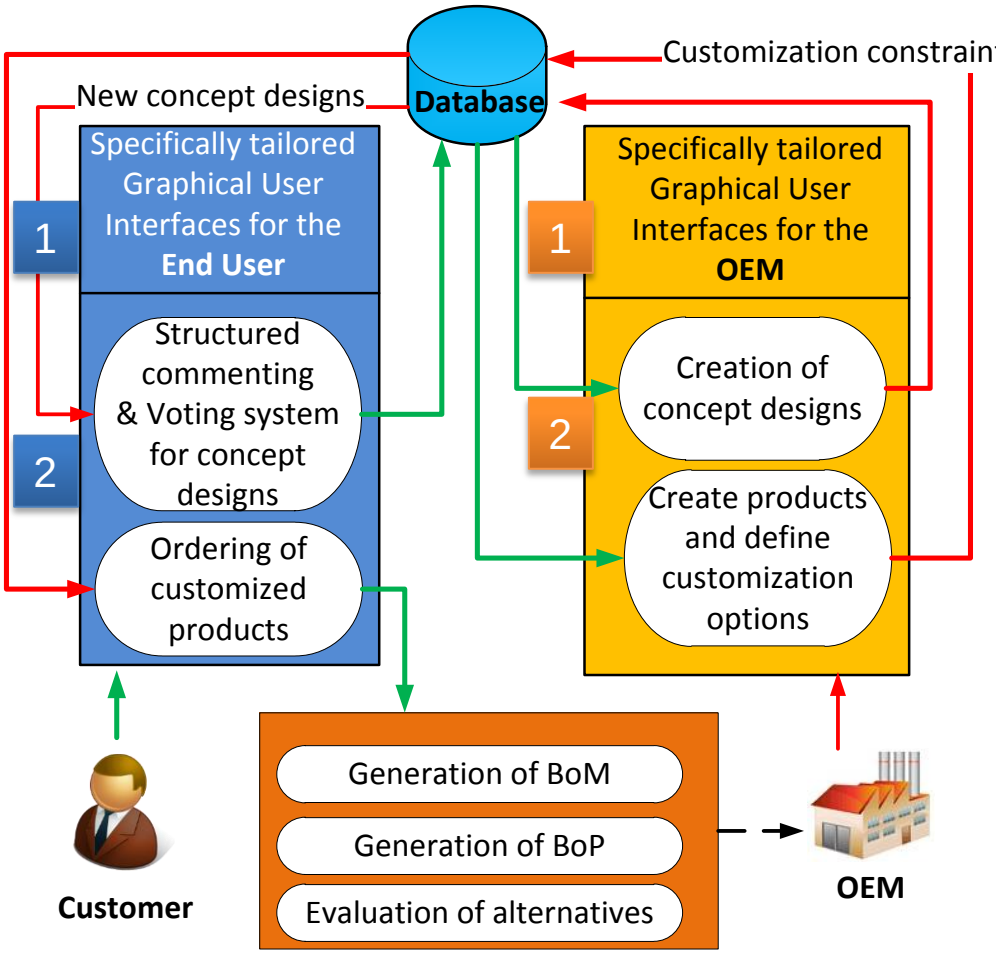
- Orders **customized product**
- Leaves **feedback about concept designs**

2. OEM

- Receives **feedback, order**
- Produces **customized product**
- Updates **concept designs**

3. Customer

- Receives **finished product**



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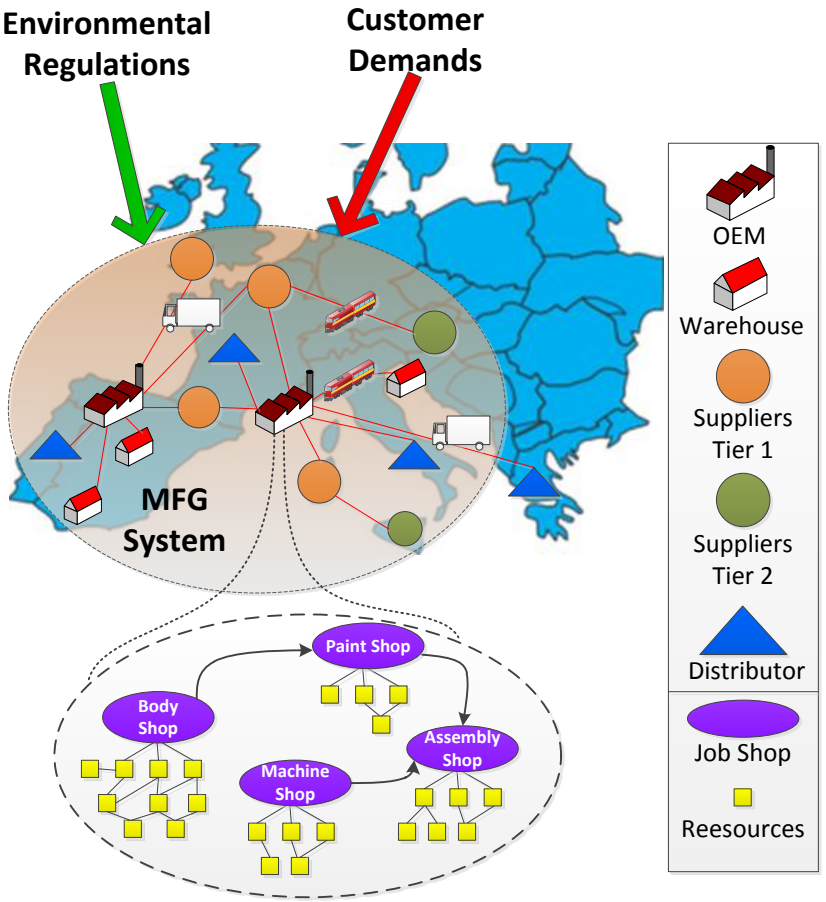
e-CUSTOM Web-based Platform - Supporting the Planning of Decentralized production networks

- Creation of **Bill of Materials** and **Bill of Processes for customized products**
- Efficient **production / supply schemes generation**
- **Dispersed** production and assembly
- **Coordination** of the supply and production network



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e-CUSTOM Web-based Platform – Environmental Assessment

Customized Order

Environmental Simulation

Legislation, Emissions, Energy

Environmental Impact of Customized Product

Environmental Impact

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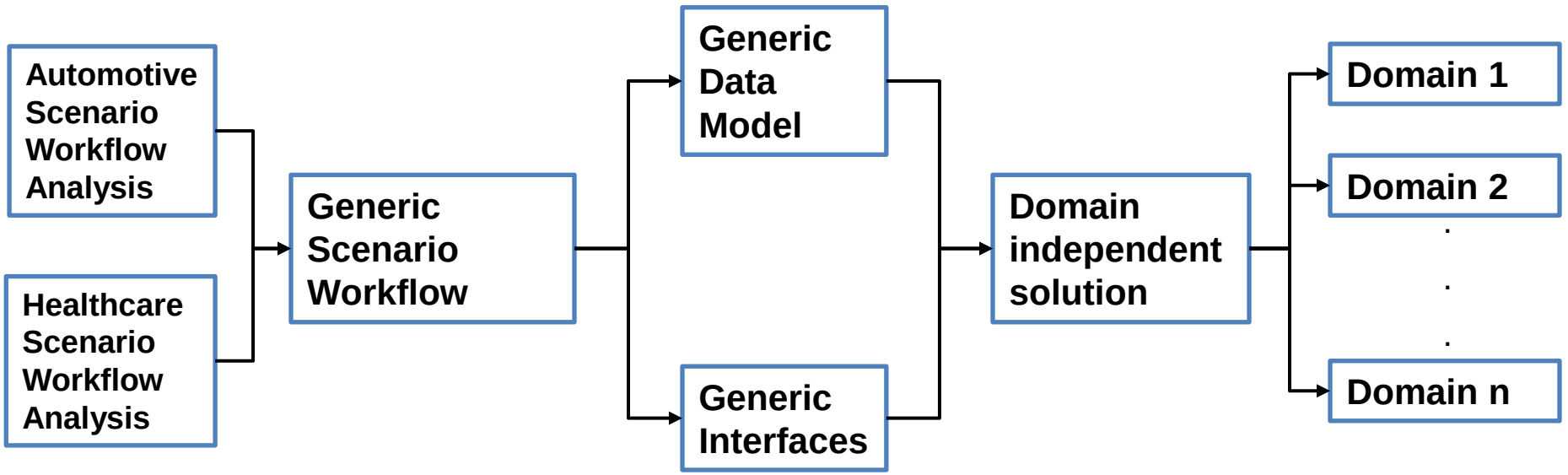
Software Design of the Web-based Platform

"towards a domain independent solution"

Identification of Workflow Commonalities



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Software Design of the Web-based Platform

"workflow visualisation"

User-friendly Graphical User Interfaces (GUIs)

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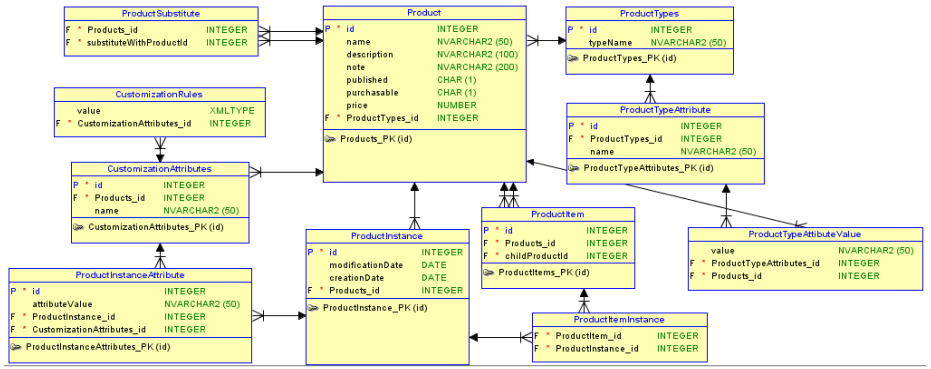
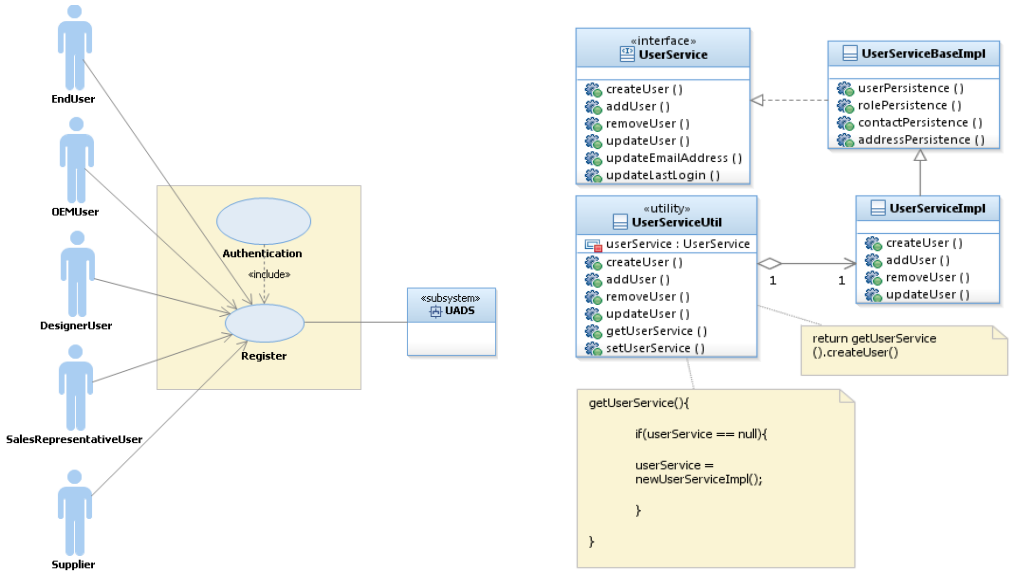
Software Design of the Web-based Platform

- **Entity Relationship Diagrams (ERD)**



- **Unified Modelling Language Diagrams (UML)**
  - Use Case Diagrams
  - Sequence Diagrams
  - Class Diagrams



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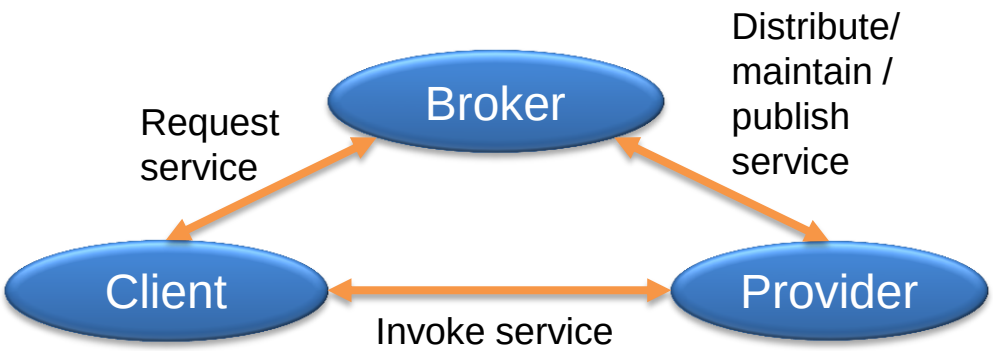
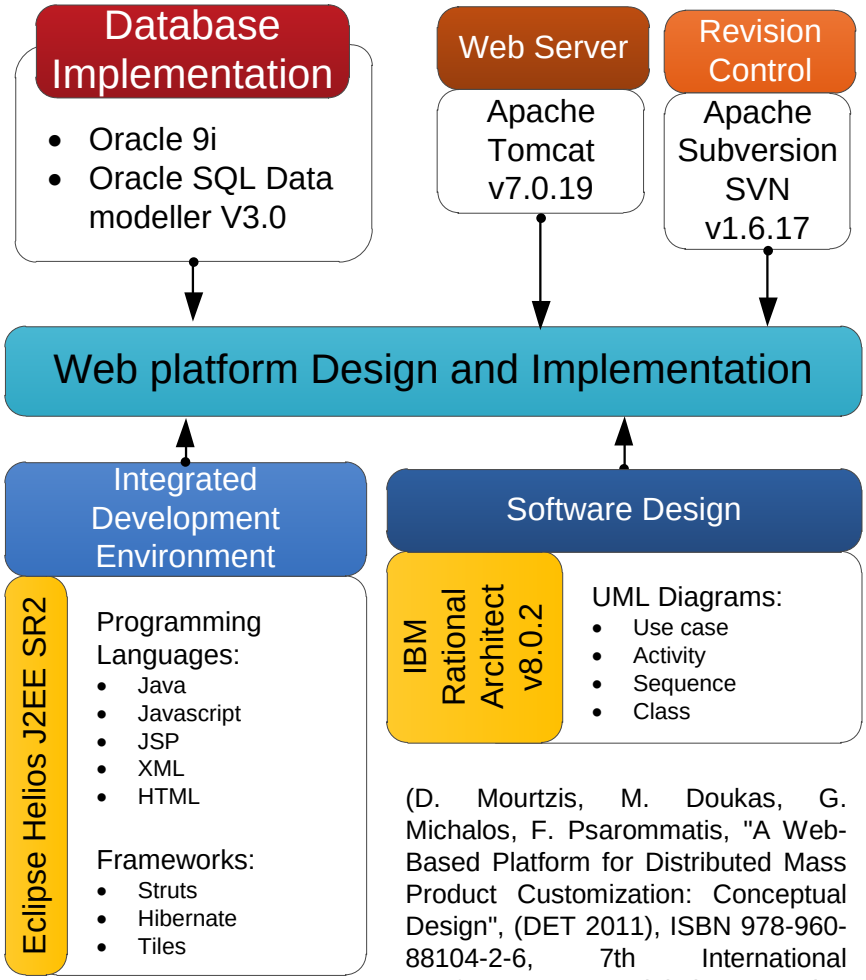
Software Development Tools

- **Service-oriented Architecture (SoA)**
  - ✓ Modular and autonomous solutions
  - ✓ Interoperable services
  - ✓ Platform independent applications
  - ✓ Reusable





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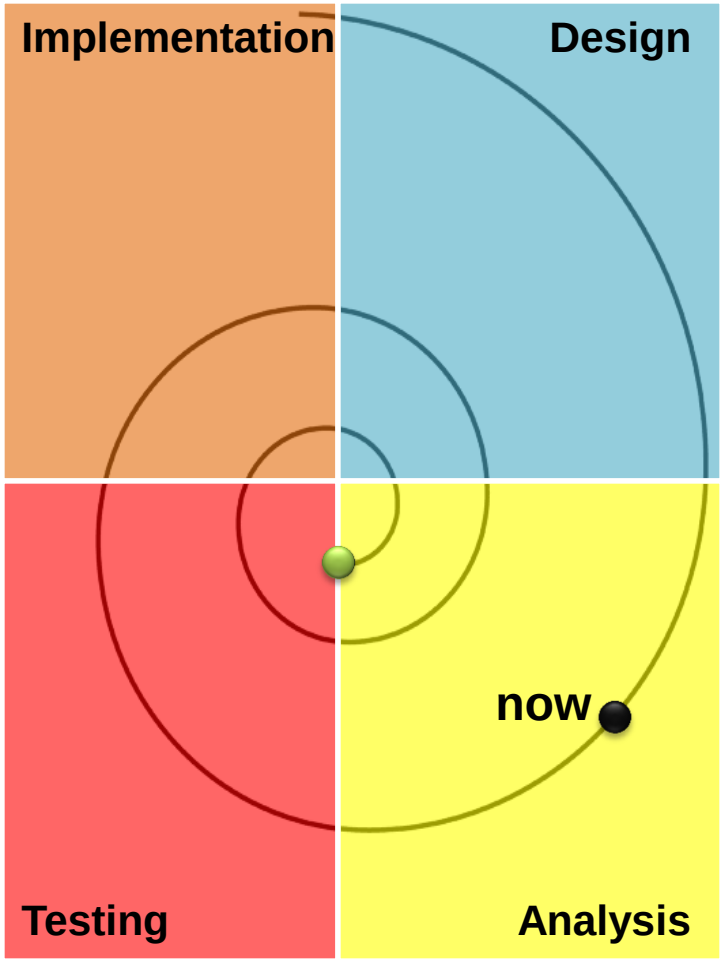
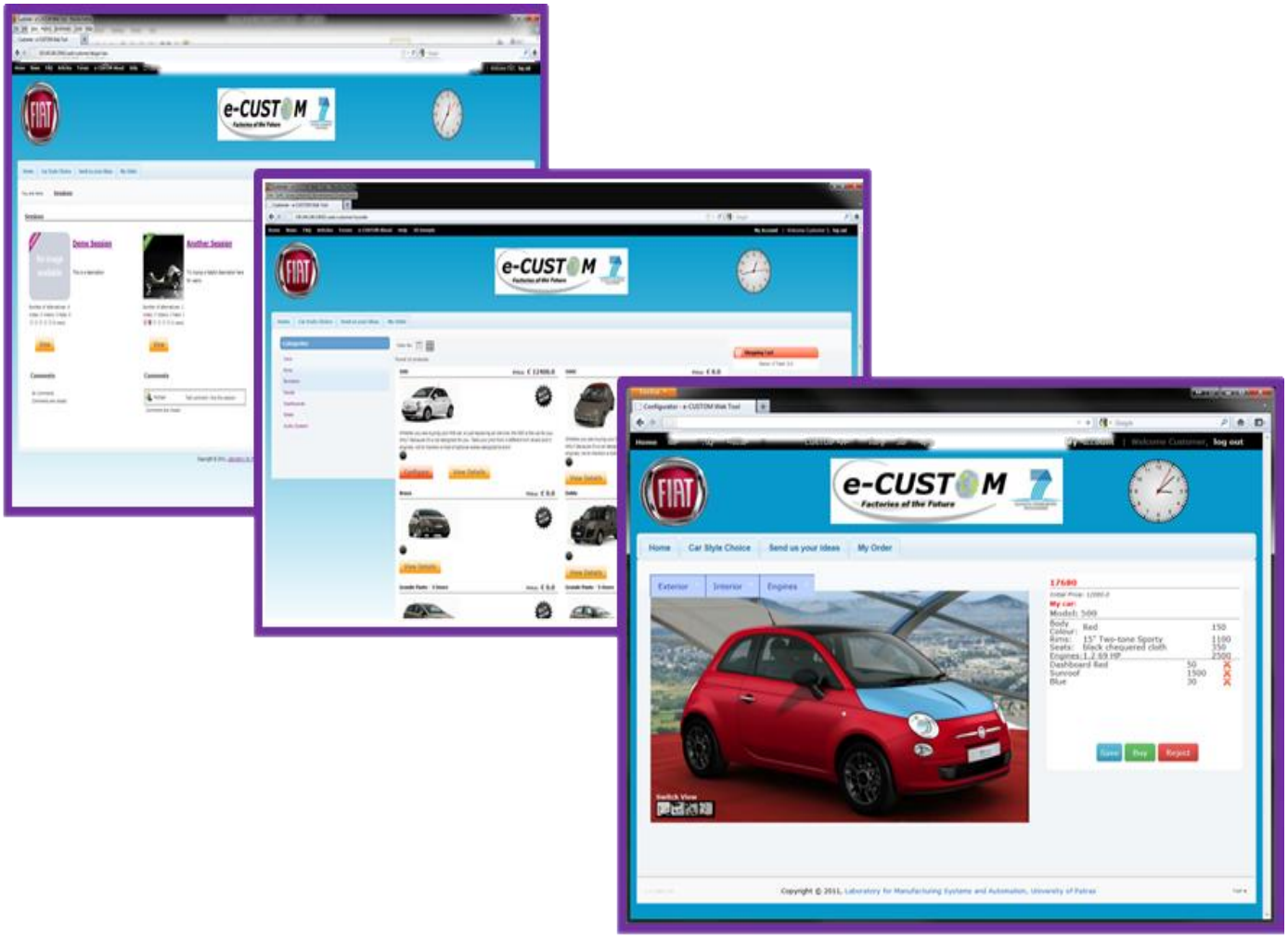
Software Development Status

❖ **Current status of software development:**

- ✓ **Requirements Extraction**
- ✓ **Requirements Formalization**
- ✓ **Software design** using Unified Modelling Language diagrams (UML)
- ✓ **Software implementation**
  - ➢ First prototype
  - ➢ Testing
- ✓ **Integration**



Software Development Status – Automotive Industrial Case



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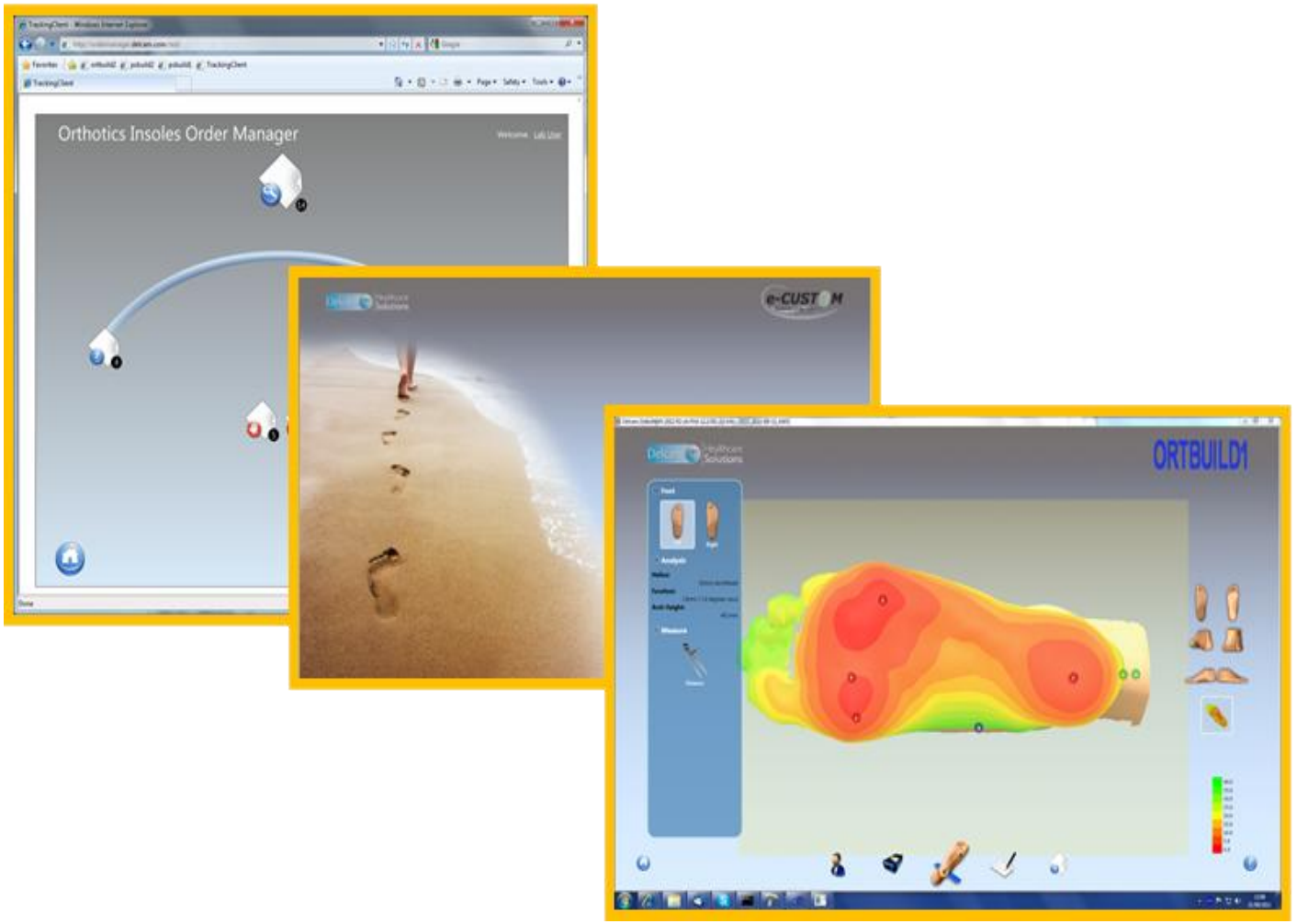
Software Development Status – Healthcare Industrial Case



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For more information please visit the e-CUSTOM project portal at the following link:

http://www.ecustom-project.eu/

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