Software Design Methodologies Goal and Scope

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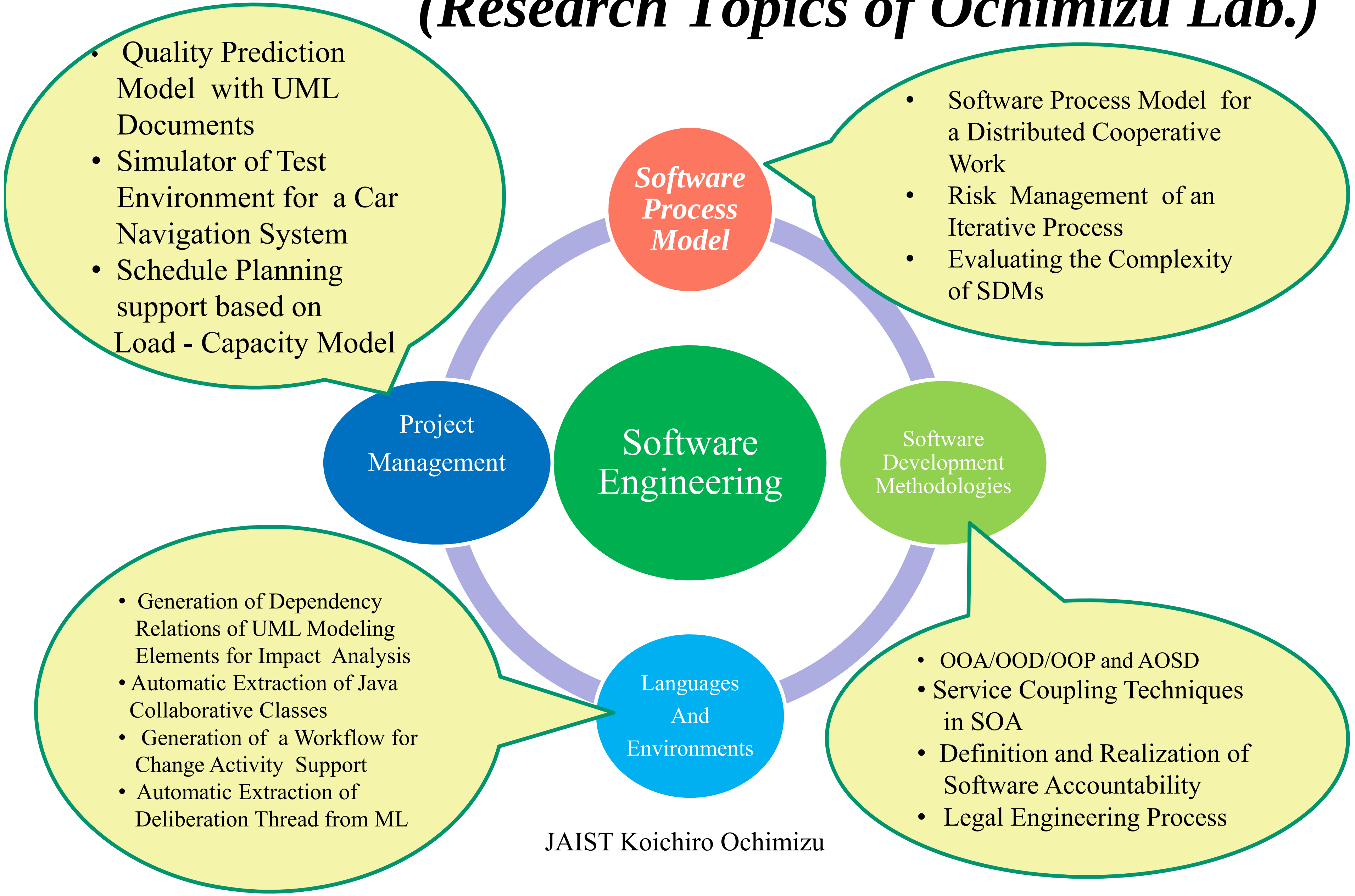
Supporting Software Development and Evolution (Research Topics of Ochimizu Lab.)


Software Engineering
Software Process Model
Project Management
Software Development Methodologies
Languages And Environments

- Quality Prediction Model with UML Documents
- Simulator of Test Environment for a Car Navigation System
- Schedule Planning support based on Load - Capacity Model

- Software Process Model for a Distributed Cooperative Work
- Risk Management of an Iterative Process
- Evaluating the Complexity of SDMs

- Generation of Dependency Relations of UML Modeling Elements for Impact Analysis
- Automatic Extraction of Java Collaborative Classes
- Generation of a Workflow for Change Activity Support
- Automatic Extraction of Deliberation Thread from ML

- OOA/OOD/OOP and AOSD
- Service Coupling Techniques in SOA
- Definition and Realization of Software Accountability
- Legal Engineering Process

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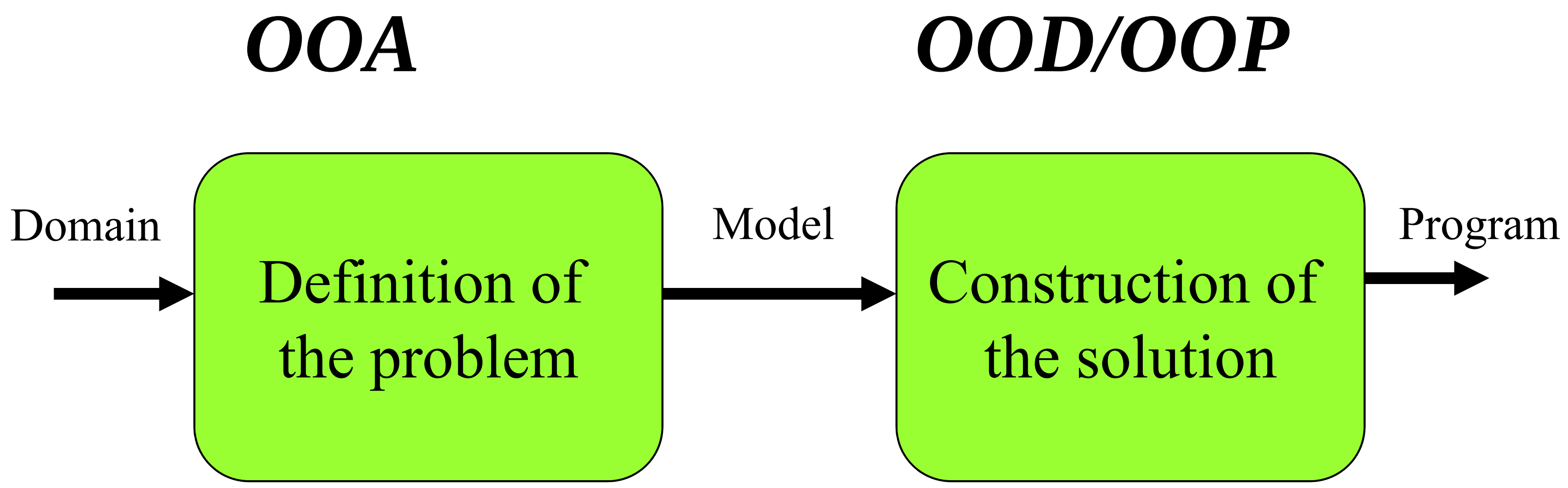
Object Oriented Analysis/Design/Programming

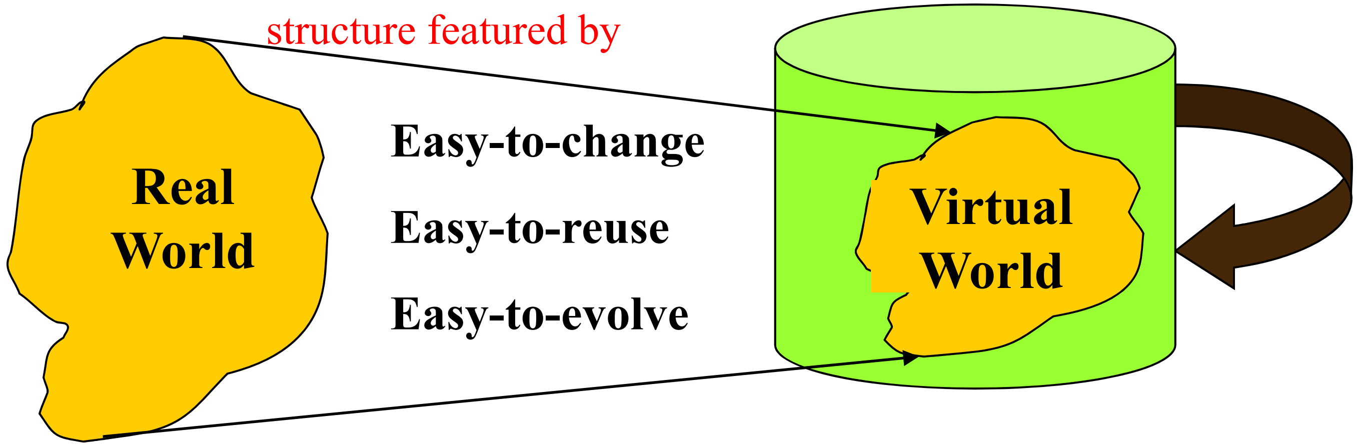
Iterative and Incremental



Three major advantages of OO Technology

- *Project the real world into the computer as you recognize and understand it.*
- *Maintain the virtual world constantly corresponding to mismatches between the real world and the virtual world and evolution of the real world.*

Enable us to realize the software structure featured by



Scope and Goal

- **Goal** enable students to understand of basic principles and concepts of OOT and their application to practical use.
- **Content**
  - Basic Principles and Concepts (object, class, association, message passing, inheritance)
  - Modeling Techniques(Static Modeling, Dynamic Modeling)
  - Modeling Language(UML) and Programming Languages(Java)
  - Object-oriented Software Development Method（Unified Process, COMET）
  - Aspect Oriented Software Design(AOSD)
- **Case Studies**
  - Real-time system Analysis and Design: Elevator Control System
  - Product Line Design: Microwave Oven
  - Aspect Oriented: Hotel Reservation System
- **Contribution of OOT in SE field**

Contents(1)

- **Goal and Scope**
- **Basic Concepts on OOT**
  – Basic Concepts to represent the world
  – Basic Concepts for Reuse
  – Information Hiding Principle and Java Program
  – Superiority of OOT
- **Modeling Techniques**
  – Static Model: Class and Association
  – Dynamic Model: State Machine
  – Dynamic Model: Interaction Diagram
  – Concurrency Description: Active Object and Multi-thread Programming
  – Outline of UML2.0

Content(2)

- **Object-oriented Software Development Methodology**
  - Outline of Unified Process and Use-case Driven Approach
  - Elevator Control System:
    Problem Description and Use-case Model
  - Elevator Control System:
    Finding of Problem Domain Objects
  - Elevator Control System:
    Sub-System Design and Task Design
  - Elevator Control System:
    Performance Evaluation
- **Product Line Technology**
  - Feature modeling
- **Aspect Oriented Software Design**
- **Contribution of OOT in Software Engineering**
  - History of SE Technologies and Contribution of OOT
    in SE field

Important Concepts to be studied

- Class and Instance（O.J. Dahl SIMULA67,1967)
  - Removal of redundant description
- Information Hiding Principle（D.L.Parnas)
  - Easiness of modifying a data structure
- Abstract Data Type
  - Both
- Inheritance
  - Reuse of classes by sub-classing
  - Easiness of extension of functions by sub-typing
- Polymorphism
  - Dynamic binding
- Use of the same concepts through analysis, design and programming
  - Simple correspondence among software artifacts
- Handling cross-cutting concerns by Aspect

Object-Oriented Programming

- 1967: Simula by O.J. Dahl Class and Instance
- 1972: Parnas Module by D.Parnas Information hiding
- 1972: Smalltalk72(Xerox PARC)
- 1977: CLU by B. Liskov abstract data type
- 1981: Smalltalk80 by Xerox class library
- 1986: Objective-C by Cox, C++ by Strusrup
- 1988: Eiffel by B. Meyer
- 1989: CLOS by Moon
- 1995: Java
- 1997: AOP by Gregor Kiczales

Object-Oriented Technologies (Object Oriented Analysis and Design)

- 1986: OOD by G. Booch
- 1988: Shlare/Mellor,
- 1991: Coad/Yordon,
- 1991: OMT by J.Rumbaugh
- 1992: OOSE by Ivar Jacobson
- 1993-1994: Design Patterns by GoF
- 1997: CBSE by Szyperski
- 1997: UML
- 2004: UML2 & MDA
- 2005: AOSD by I.Jacobson

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