Model Based Development on a Command & Control System

A Case Study by STM and IBM

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Overview

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- Case Study
- Objectives & Road Map
- Architecture of the Solution
- IBM Rhapsody - Nokia Qt Integration
- Benefits of using IBM Rational Rhapsody

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STM Overview

STM was established in 1991 by the decree of the Defence Industry Executive Committee, highest decision making authority in Turkey, for the following purposes:

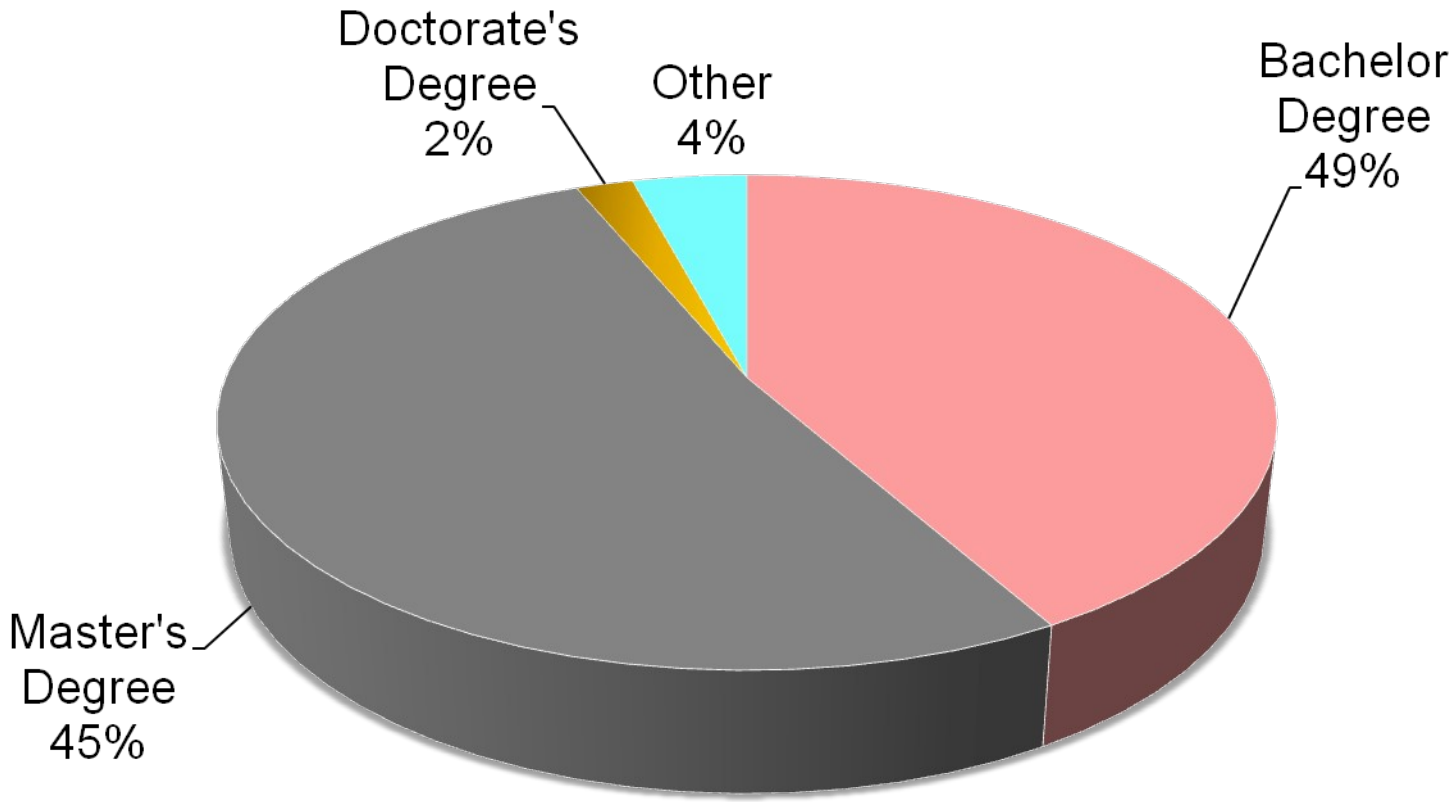
- To provide technical support, systems engineering, project management, technology transfer and logistics support services to TAF (Turkish Armed Forces) and SSM (Undersecretariat for Defence Industries)

- To develop necessary software technologies for defence systems, and to establish and operate national software centers for software development and maintenance/support.

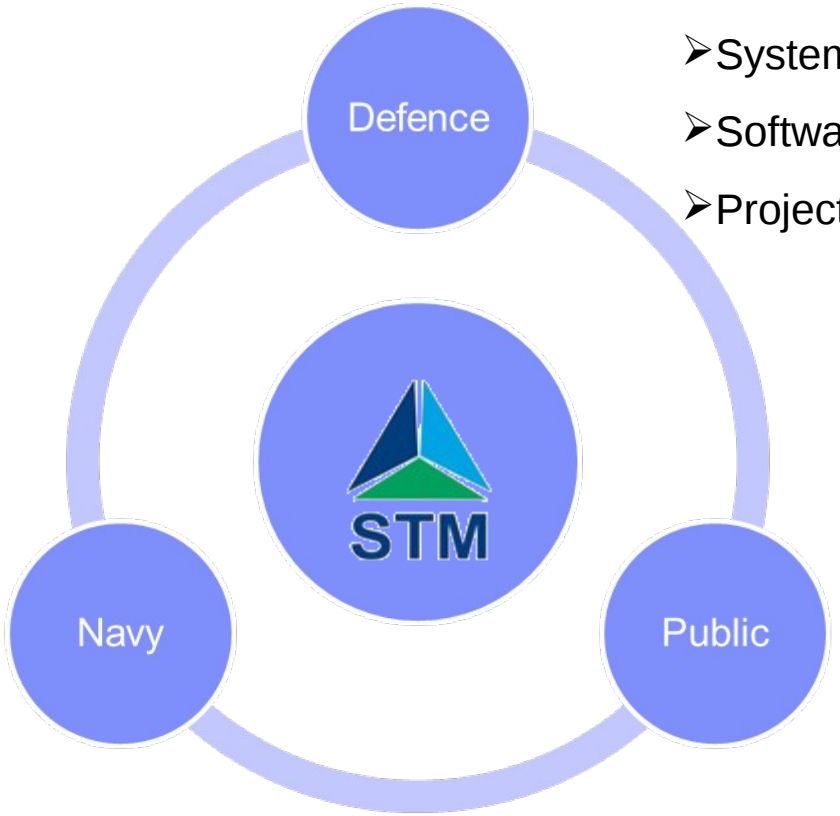
Company Profile

Total number of employees: 385

93% (361) of STM employees are of BSc and MSc Degree.



Business Areas



- Consultancy Services
- Systems Engineering
- Software Engineering
- Project Management

- Project Management
- Design, Integration, Tests and Trials
- Modernization
- Systems Engineering
- Shipyard Layout Organization & Management

- Consultancy Services
- Quality
- Acquisition Projects
- Logistics

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Case Study

Battalion Command Post Computer

Vehicle Command Control Computer

Preparation Computer

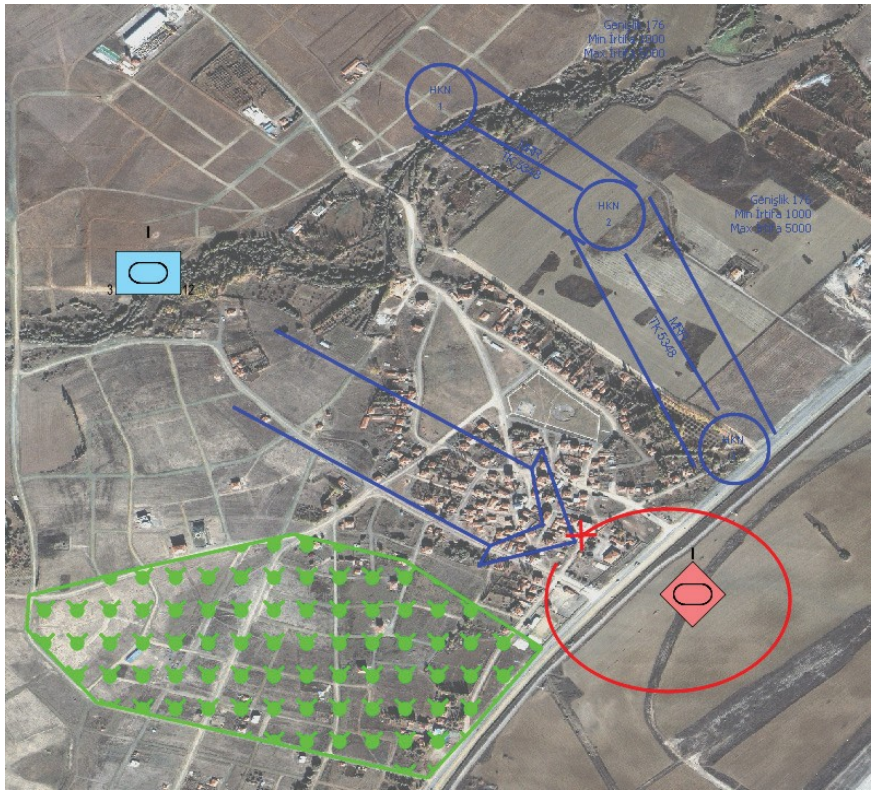
Situational Awareness

Portable Command Control Computers

Tank Command Control Communication and Information System

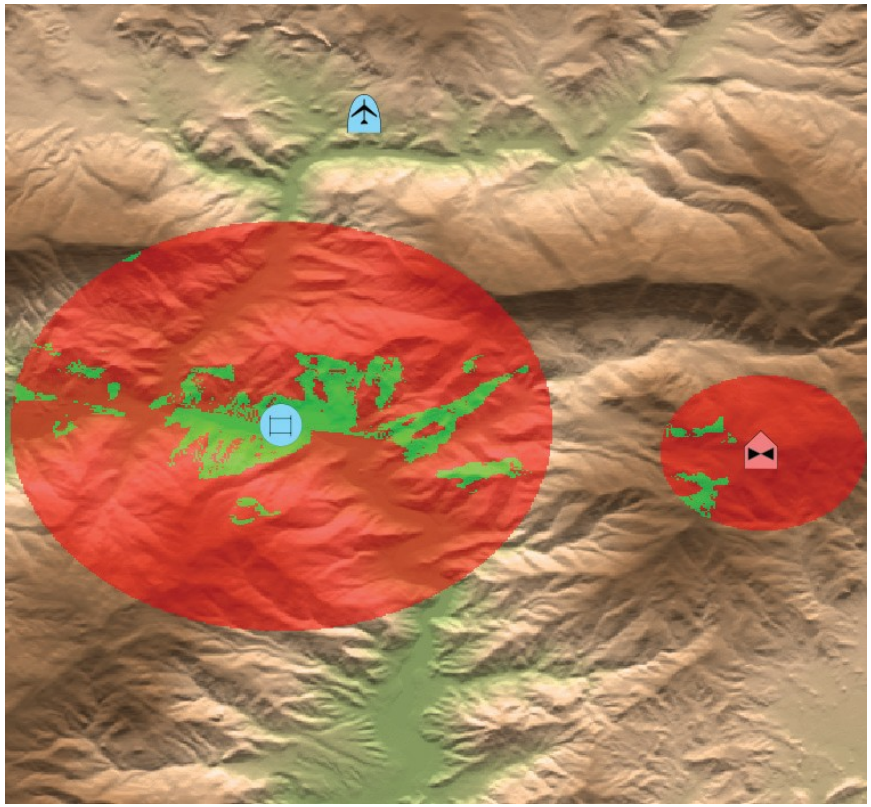
Situational Awareness & Exchange of Reports

- Friendly Force Tracking
- Hostile / Unknown / Neutral Units
- Obstacles (Minefield, Anti-tank ditch, etc.)
- CBRN (Chemical, Biological, Radiological, Nuclear)
- Supply Points
- Bridges
- Alerts (Air Assault, Artillery Fire, etc.)



Mission Planning & GIS (Geographical Information System)

- Raster, Shaded, Vector map display
- Multiple layer support (raster, shaded, units, route, etc.)
- Multiple geocoordinate system support (MGRS-Military Grid Reference System, UTM-Universal Transverse Mercator, Geographical)
- Overlays, Route Planning
- Mission Record & Replay



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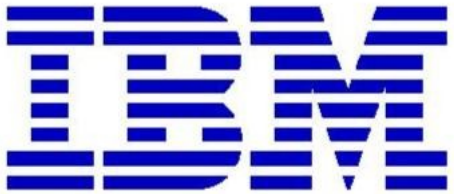
Objectives

- Platform independency
- Agility and responsiveness to change
- Reusable components
- Simplify and speed up development
- Lower the required skill level needed to work
- Complete solution throughout development lifecycle

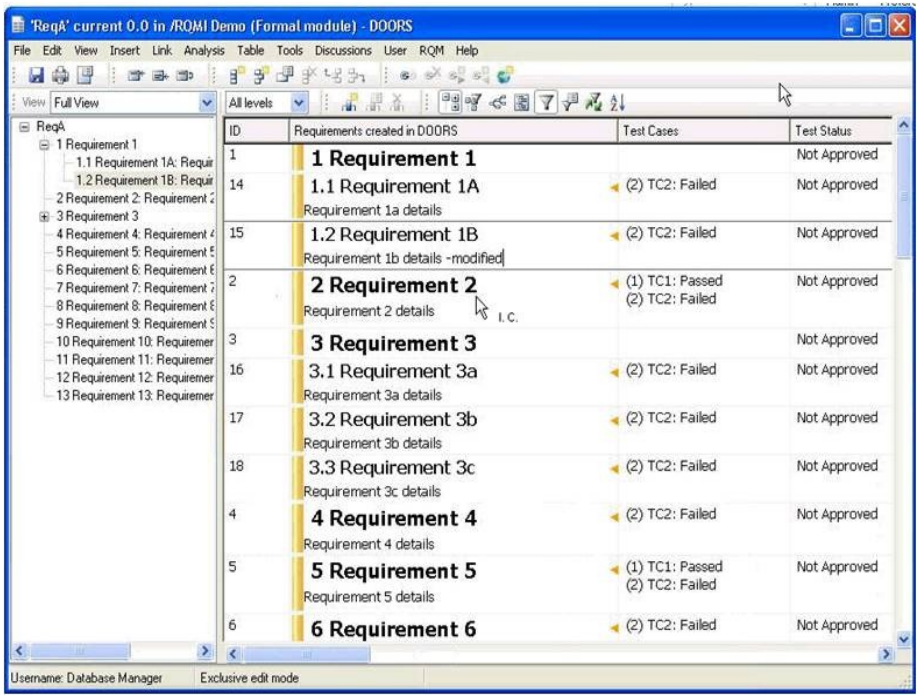
Complete Solution

- IBM Doors for Requirement Analysis
- IBM Gateway for requirements traceability solution that links to development
- IBM Reporter Plus for documentation
- *IBM Rhapsody for Design and Development*



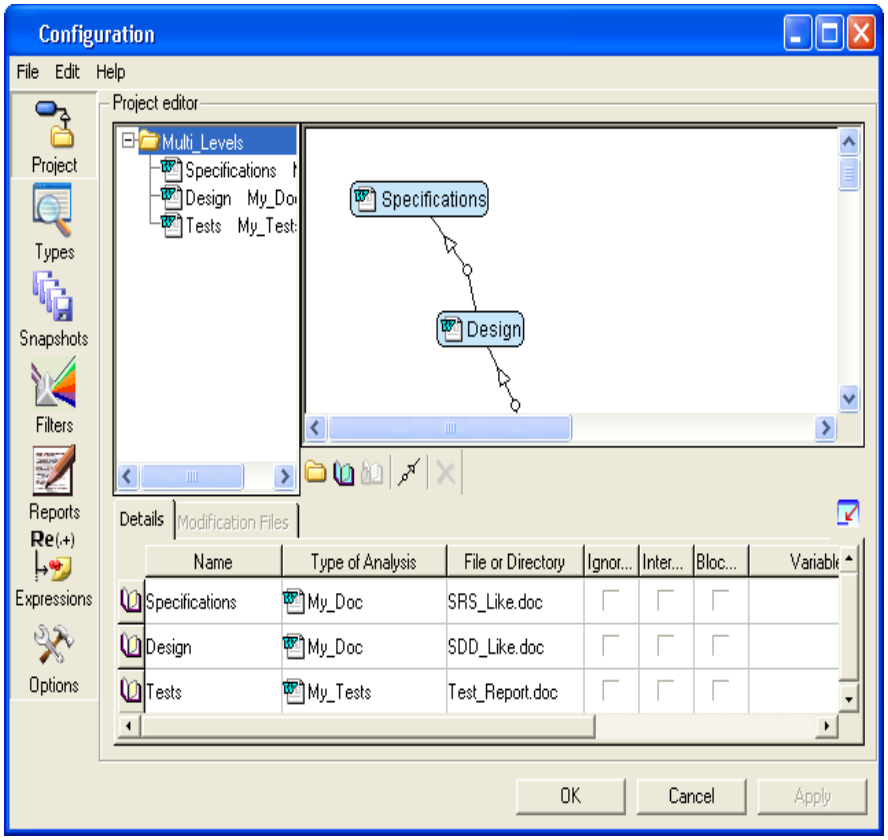
IBM Doors for Requirement Analysis

- System Requirement Management
- Software Requirement Management
- Traceability between Software and System Requirements
- Traceability between System Requirements and Test Scenarios



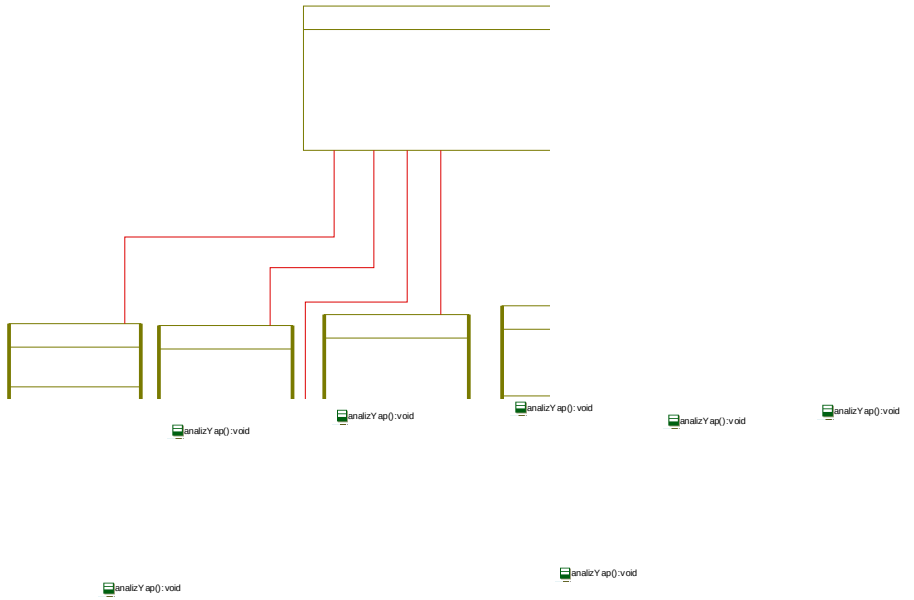
Rational Rhapsody Gateway and ReporterPLUS

- Traceability between the software requirements and design
- Coverage Analysis
- Customizable Architectural and Detailed Design Documentation



IBM Rhapsody for Design and Development

- Software Architectural Design
- Software Detailed Design
- Software Development



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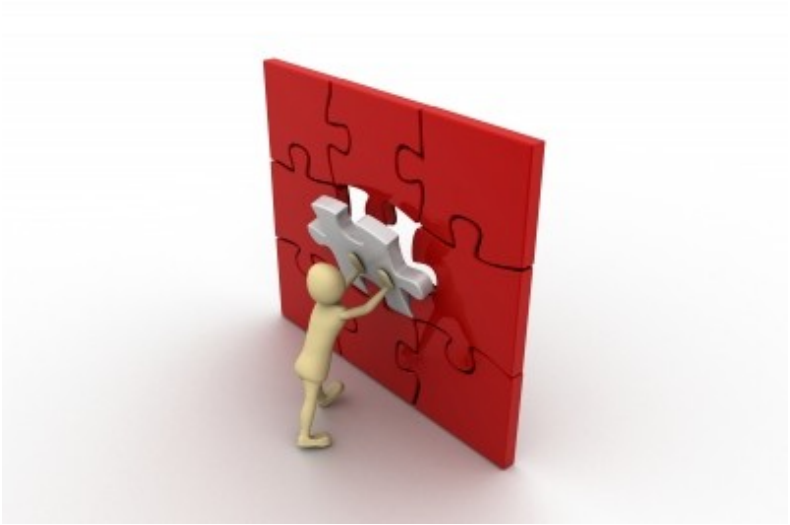
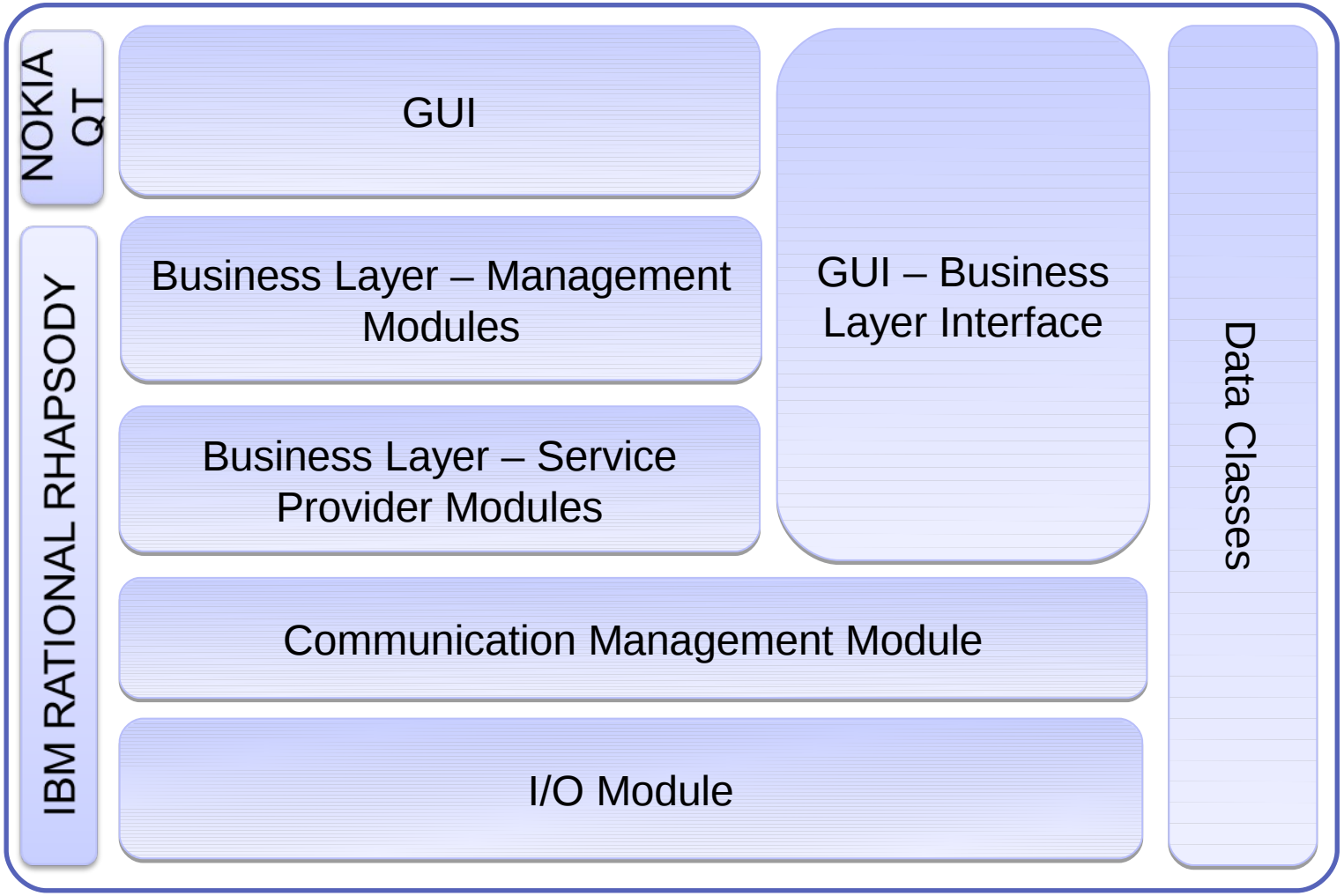


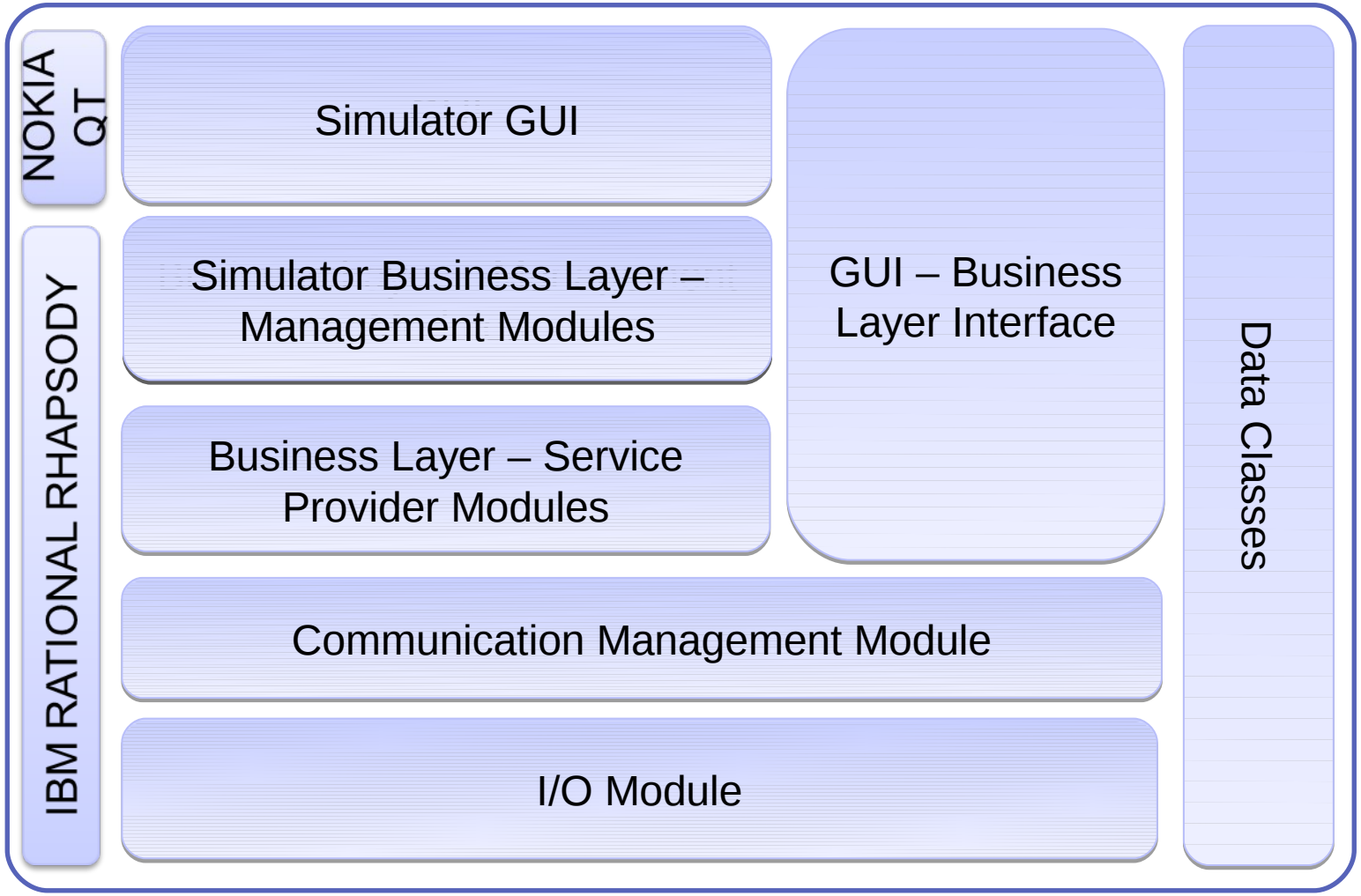
Architecture of the Solution

- Model Driven Development
- Layered Architecture
- Service Oriented Design

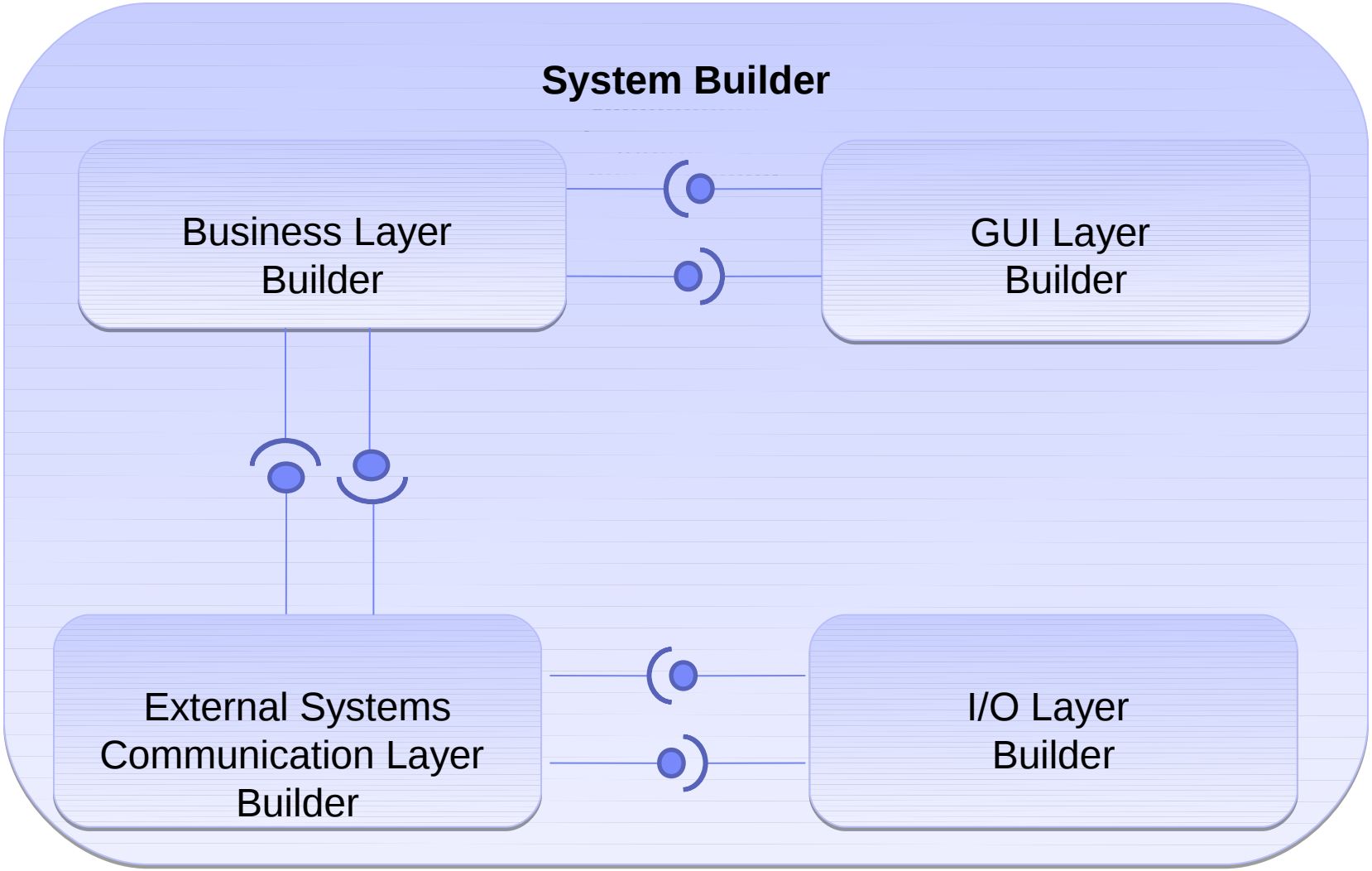
Layered Architecture



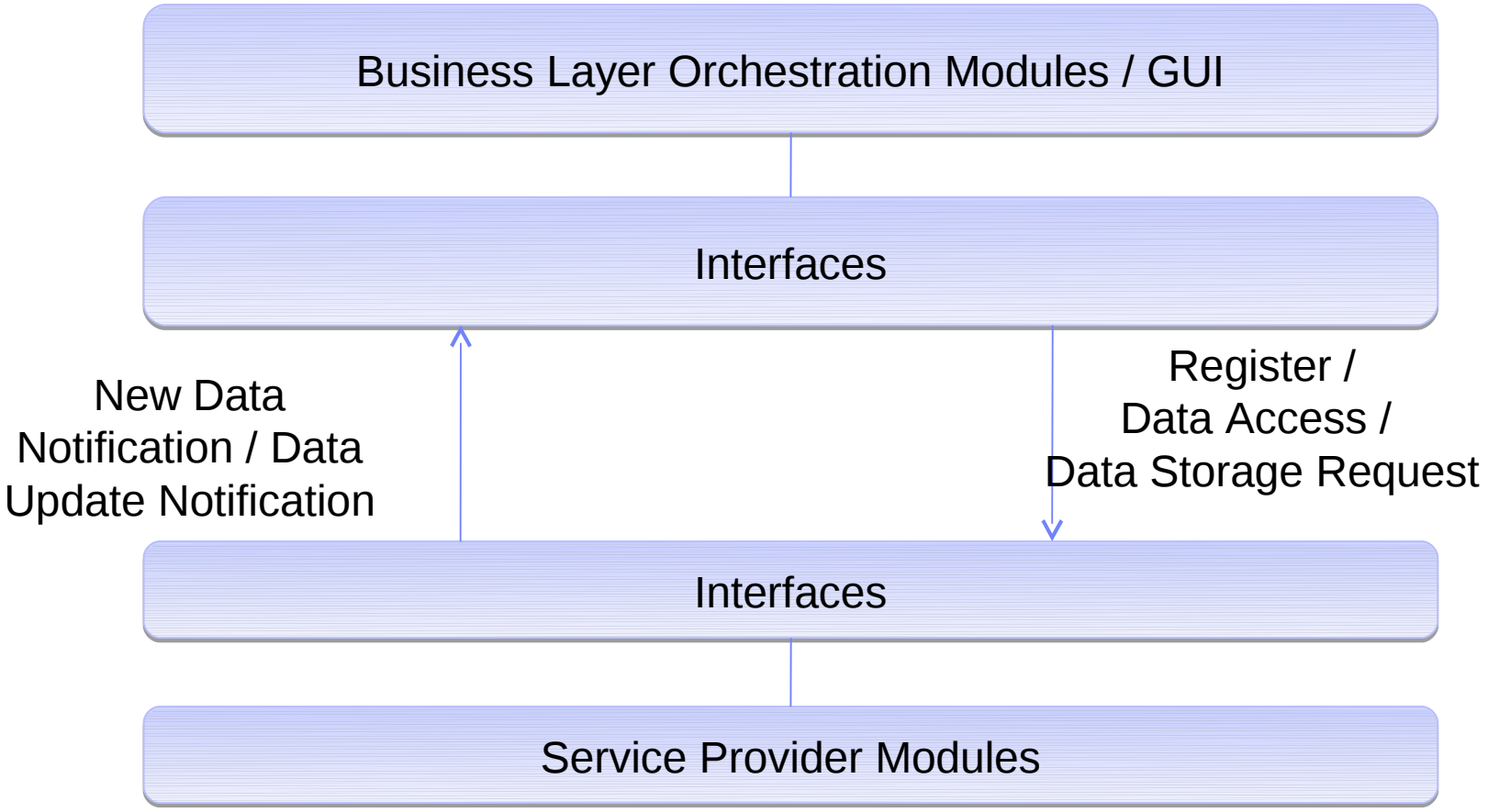
Reuse



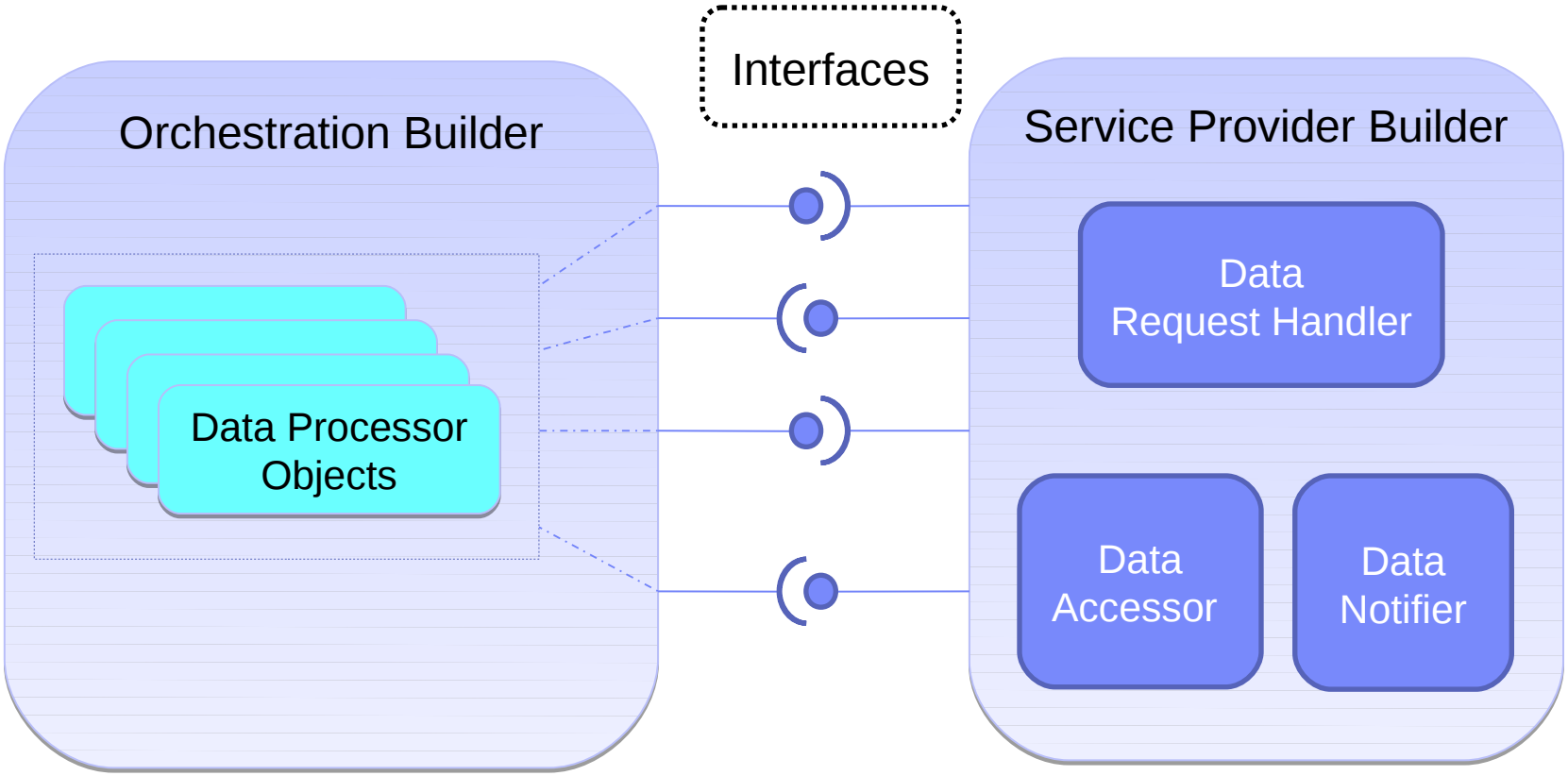
System Decomposition



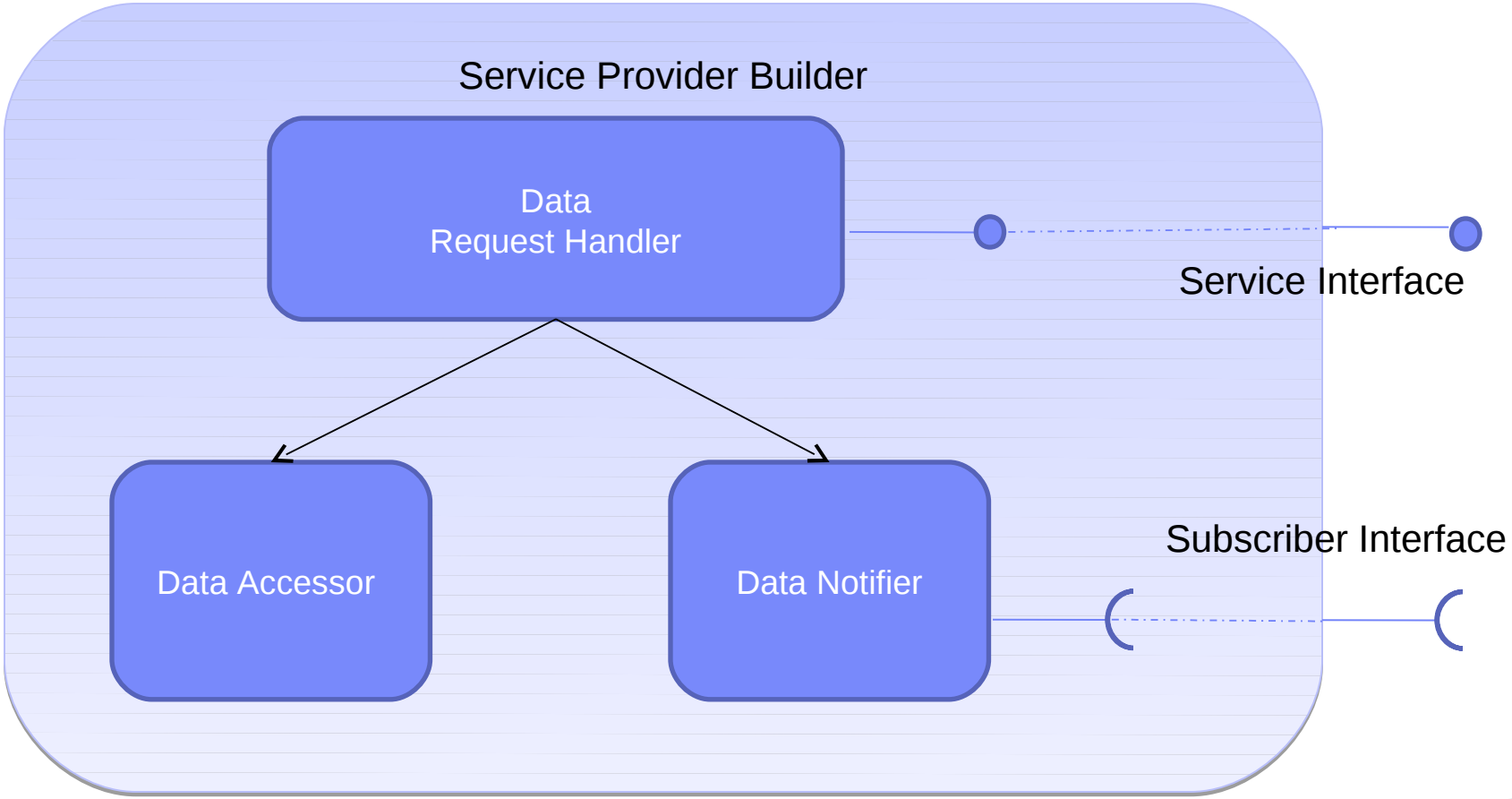
Publisher/Subscriber Logic



Service Oriented Design



Service Provider Component



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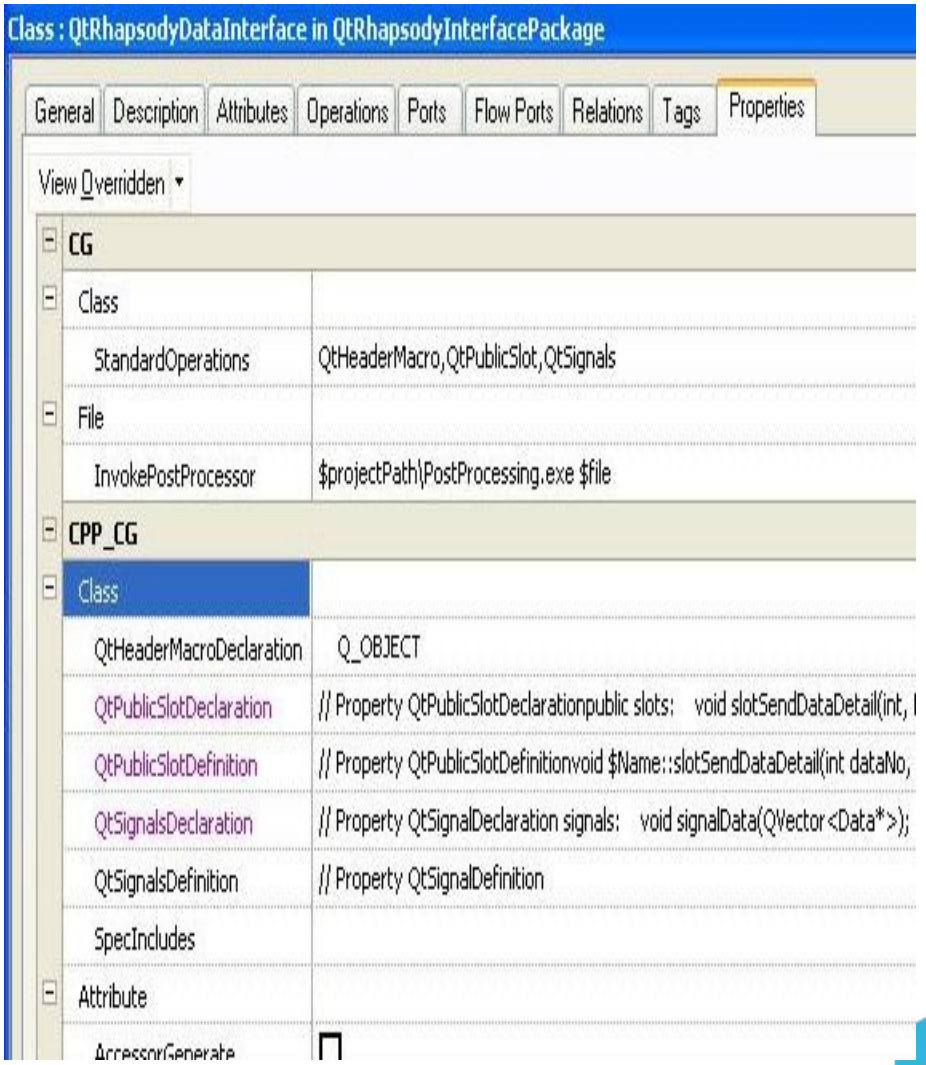
IBM Rhapsody Profiling

QtAddOn Profile

- Qt Header Macro Declaration
- Qt Public Slot Declaration
- Qt Public Slot Definiton
- Qt Signals Declaration



IBM Rhapsody – Nokia Qt Integration

GUI Level Integration

- OMEvent/Reception – Signal/Slot Integration

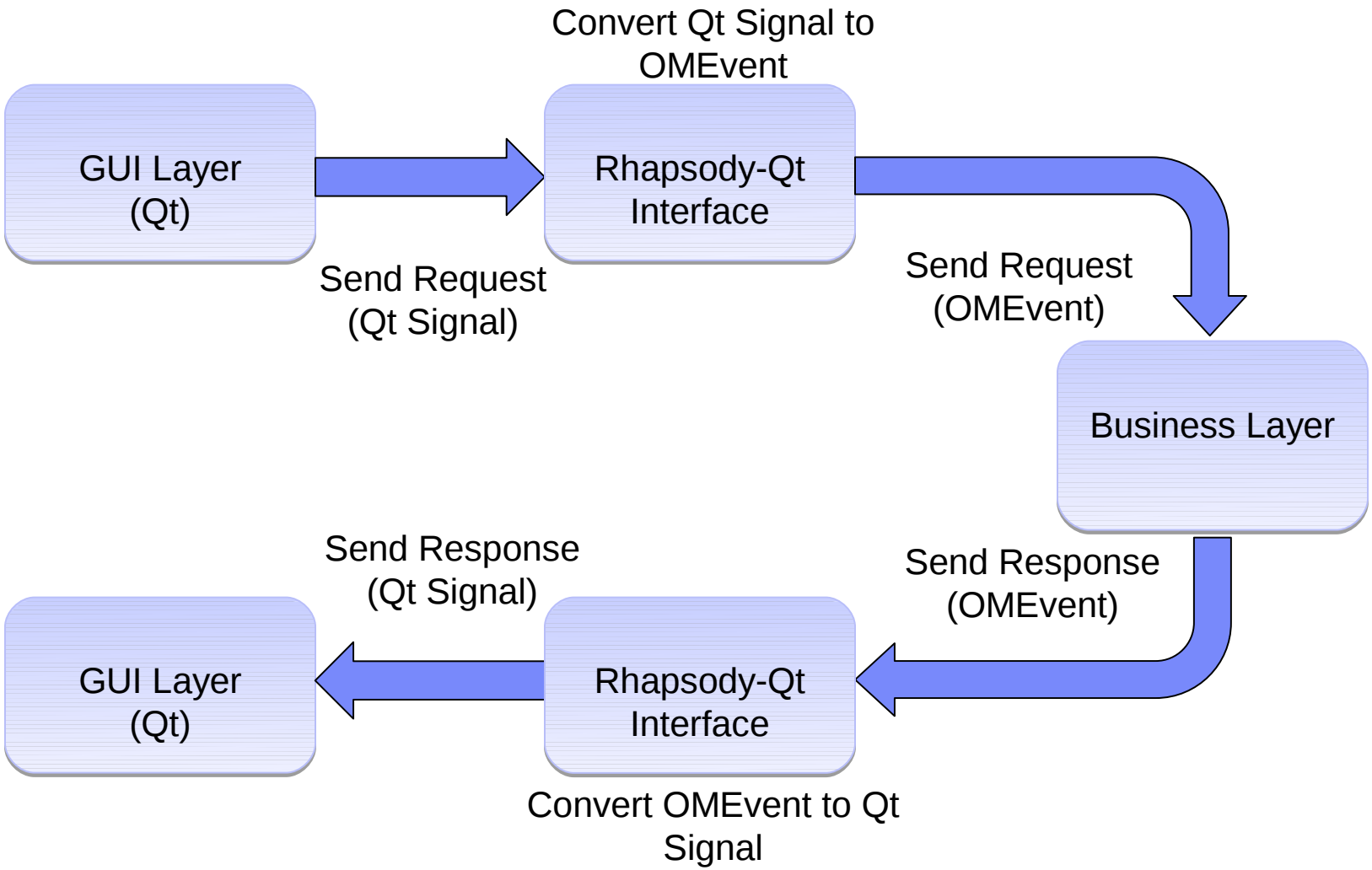
IO Level Integration

- OMThread – QThread Integration

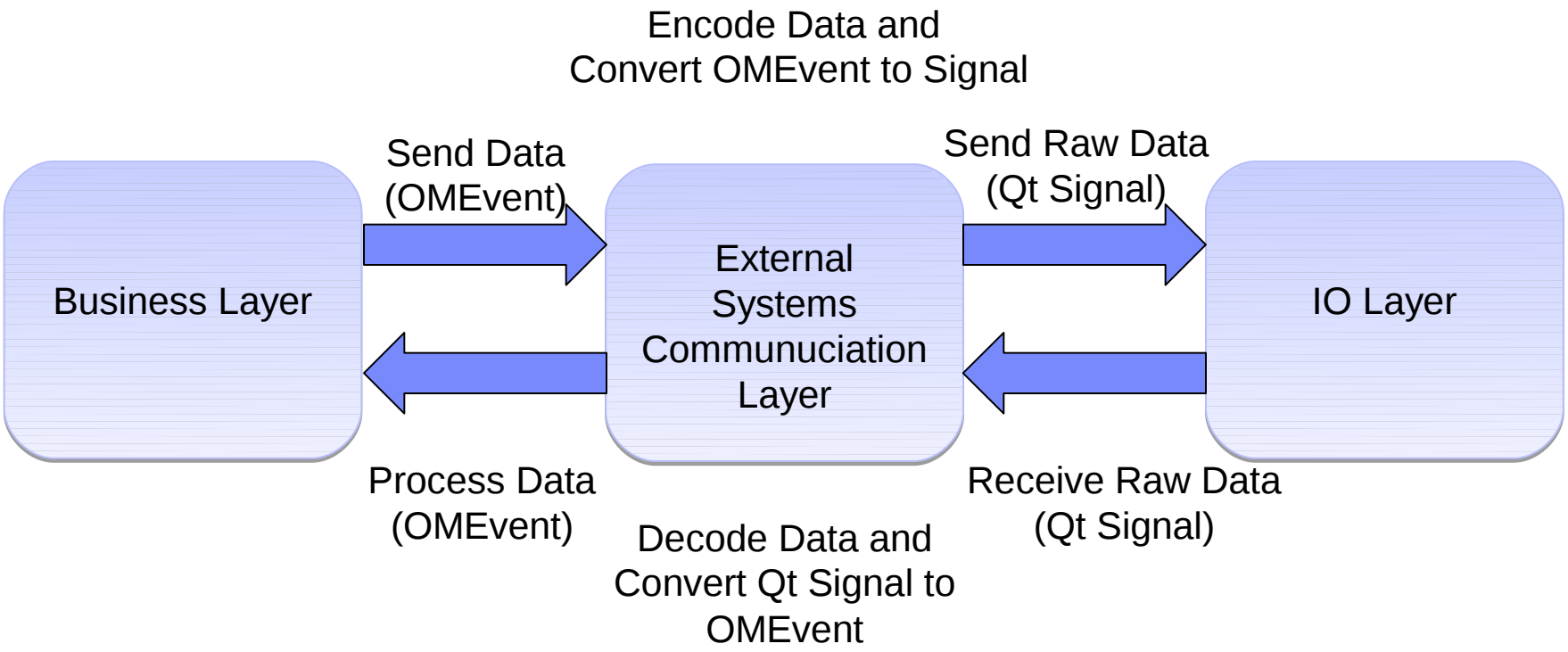
Build/Link Integration

- .moc file integration

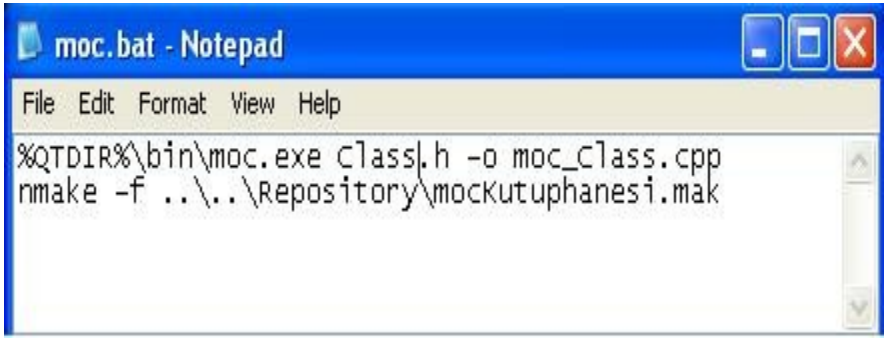
GUI Level Integration



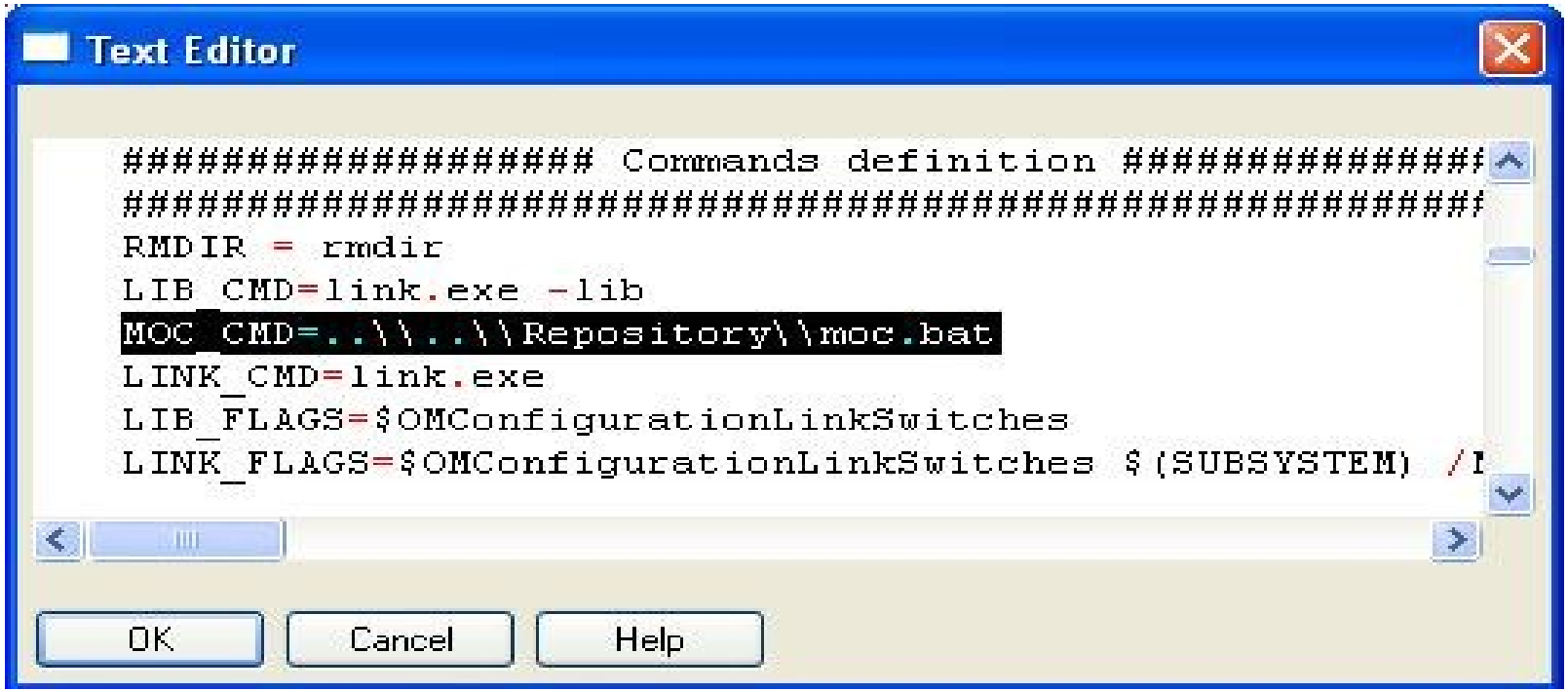
I/O Level Integration



Build/Link Integration



- .moc file for each Qt Class is generated with a batch file
- A library is built with moc files
- Library is linked to project



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Benefits of Using IBM Rational Rhapsody

- Platform Independency / RTOS Support
  - ✓ Windows
  - ✓ Linux
  - ✓ VxWorks

- Model level debugging
  - ✓ Statechart
  - ✓ Sequence Diagrams

Benefits of Using IBM Rational Rhapsody Cont'd

- Low effort for design documentation
  - ✓ Design document generation in 1 day
- Requirements traceability to design and code
- Design once, use everywhere
  - ✓ Reusable components
- Easy multi-thread management
  - ✓ Over 100 threads running simultaneously

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