

Software Product Integration

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❑ **Component Based Software Engineering & Product Integration**

- Requirements on individual components and the system aspects related to combination of components.
- The **process for integrating** components requires additional capabilities and characteristics to secure that the assembly of parts results in the expected product or system.

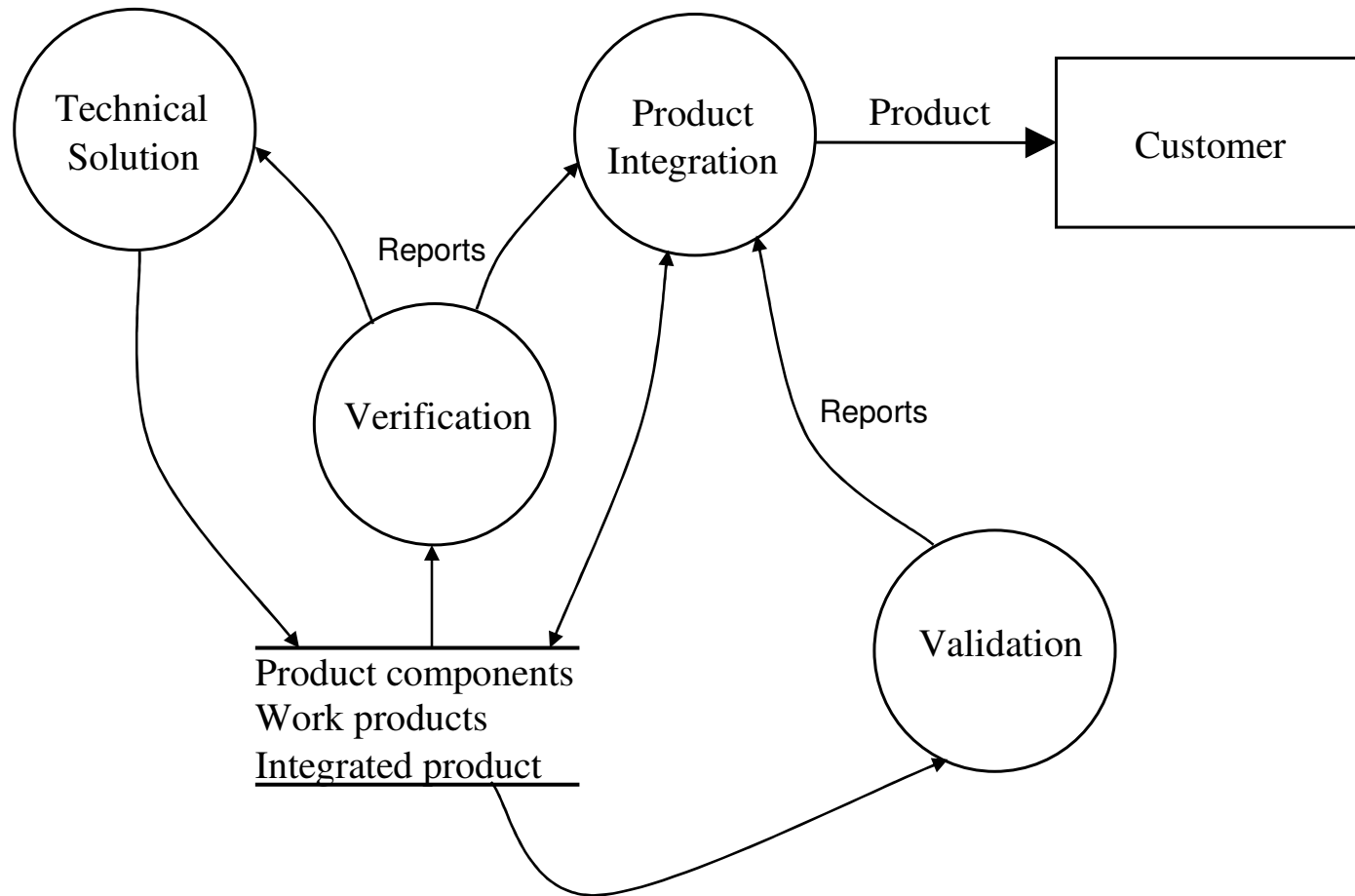
❑ **The goal of this project is to**

- investigate and improve current practices in the integration of systems built on Component Based Software.

❑ **The main research goal is to**

- propose and evaluate integration processes for systems, with focus on real time systems

Product Integration





Problems Experienced in Product Integration

❑ Differences in goals

- Between engineers in different parts of the project
- Discrepancies in project and long term goals

❑ Inadequate preparation of parts

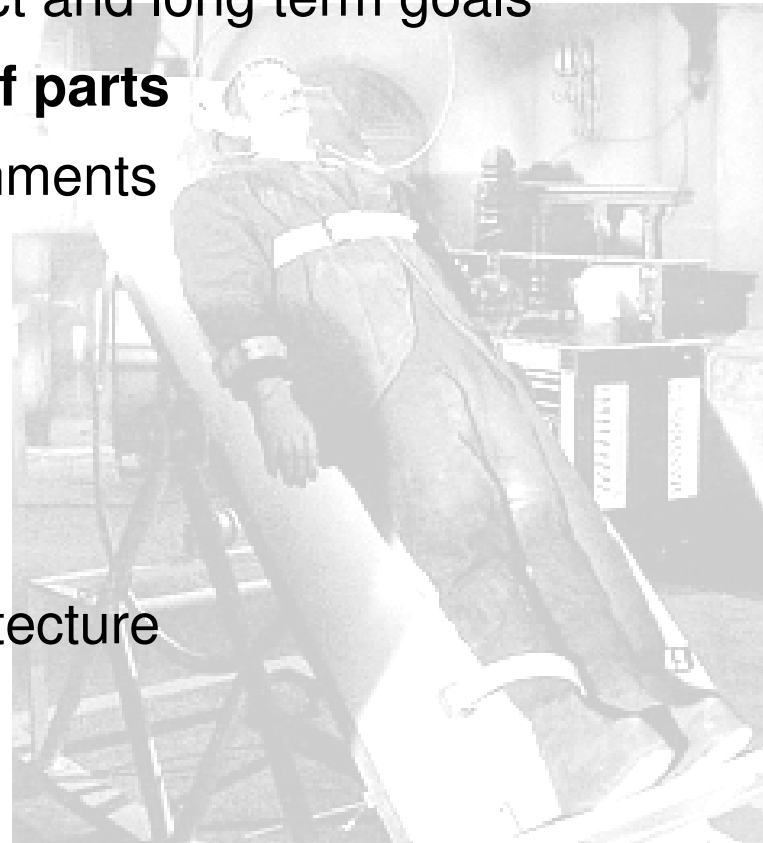
- Insufficient test environments

❑ Inadequate information

- Unwritten rules
- Default assumptions

❑ Additions of features

- May degrade the architecture



No Agreed Body-of-Knowledge?

Descriptions exist in

- ISO/IEC 12207
- IEEE Std 1220-1998
- EIA-632
- CMMI
- EIA-731.1
- ISO/IEC 15288
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But are they sufficient?

Identified Challenge

- Product integration is not performed well in industry today
- Descriptions exist, but are they relevant and sufficient (or maybe too much)?
- Technology exists that may assist in improving product integration



Research approach

- ❑ **Comparison of two approaches**
 - CMMI from Software Engineering Institute
 - Component-Based Software Engineering
- ❑ **Case study**
 - Highlights main challenges
- ❑ **Analysis of challenges**
- ❑ **Discuss possible improvements through use of Component-Based Software Engineering**

	ISO/IEC 12207	IEEE Std 1220-1998	EIA-632	CMMI	EIA-731.1	ISO/IEC 15288
Publication date	Aug 1995	Dec 1998	Jan 1999	Mar 2002	Aug 2002	Nov 2002
Generic description of activity						
Define an integration strategy	-	I	I	I	E	E
Develop an integration plan based on the strategy	E	I	E	E	E	E
Define and establish an environment for integration	-	I	I	E	-	E
Define criteria for delivery of components	I	I	I	E	I	E
Define interfaces	-	I	I	E	E	I
Review interface descriptions for completeness	-	I	I	E	E	E
Ensure coordination of interface changes	-	I	I	E	E	I
Review adherence to defined interfaces	-	I	I	E	E	E
Develop and document a set of tests for each requirement of the assembled components	E	I	E	I	-	I
Verify completeness of components obtained for integration through checking criteria for delivery	E	I	E	E	E	E
Deliver/obtain components as agreed in the schedule	E	I	I	I	E	E
Integrate/assemble components as planned	E	I	E	E	E	E
Evaluate/test the assembled components	E	E	E	E	E	E
Record the integration information in an appropriate repository	-	-	-	-	-	E
Package and deliver the product or product component	I	-	I	E	-	-
Update the user documentation	E	-		-	-	-

Summary of Lic Thesis Contribution

- Validates in part the statement that the basic practices described in the investigated models and standards are increasing the effectiveness and efficiency of product integration**
- Observation that the Software Product Integration area is progressing, and that a Body-of-Knowledge is emerging**
- Indications that the use of a specific technology, component based software, help the organizations to follow the described practices**

- Proposal on how companies can set up a strategy using lightweight evaluation methods as a basis for identifying improvement areas.**
- The proposed model for selecting investigation method also includes a proposed scale for classifying the openness of an organization.**

Current work

- ❑ Deeper study of an organization introducing component based software
- ❑ Broader industrial study on best practices
 - Different types of organizations
 - Use of different technologies
- ❑ Study of influence of architectural decisions on product integration

