

Enclosure 1 – Project Description for:

Incremental and component-based software development (INCO)

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1 Summary of Incremental and Component-Based Software Development (INCO)

The high costs and high failure rate of present software projects call for better technologies and work processes for software development and maintenance. Recently, incremental and component-based software development have been proposed as remedies – separate or combined – to reduce development time and cost, and to increase software quality (especially usability and reliability). However, there are few such technologies (methods, models, and tools) in industrial use, reflecting the immaturity of these technologies. For instance, incremental development needs better support on overall planning and on estimating risks and costs. Likewise, COTS (Component-Off-The-Shelf) based development suffers from poor integration with requirements engineering, architectural modelling and analysis, and cost/risk estimation.

Overall goals:

- G1) Advancing the state-of-the-art of software engineering, focusing on technologies for incremental and component-based software development.
- G2) Advancing the state-of-the-practice in software-intensive industry and for own students, focusing on technologies for incremental and component-based software development.
- G3) Building up a national competence base around these themes.
- G4) Disseminating and exchanging the knowledge gained.

Approach:

- 1) Propose, refine and validate enhanced technologies for incremental and component-based software development, focusing on UML and RUP with time-boxing, and COTS-based development (R1 below).
- 2) Derive a menu of PhD study topics in co-operation with industry serving as “software laboratory” (R2).
- 3) Conduct two phases of technology development and empirical studies, at univ. and in industry (R3).
- 4) Assemble and disseminate the results (R4).

Close contact with Norwegian, industrial projects (especially PROFIT) is envisaged, although we can run INCO solely based on existing industrial contacts and student projects.

Results – mainly as PhD theses, papers, reports, and Web material – and covering the following:

- R1) A set of improved technologies for incremental and component-based software development.
- R2) Guidelines for training software developers and for achieving organisational learning in incremental and component-based software development.
- R3) A body of experiences from empirical studies of such technologies.
- R4) General presentation material, new/revised courses, and a new national seminar on INCO themes

Partners: The software engineering groups at IDI, NTNU and Ifi, Univ. Oslo both have 3-4 teachers, 4-5 PhD students and 20 MSc students involved in related education and research. The two groups have been co-operating for over 7 years, the last 4 years on the national SPIQ and PROFIT projects (on software process improvement), with regular project and research meetings. Both groups have extensive connections to Norwegian industry, partly through the same projects. Together, the two groups have participated in more than a dozen EU projects in software engineering. The groups also participated in the NAWUS project (on software engineering education in “Norgesnett”) in 1998-1999.

Budget and management: INCO is planned for 4 years, with 3 PhD students and 1 postdoc/guest researcher per year financed by NFR – totally 7000 KNOK (1491 in year 2001). 3 PhD students will be financed internally by the two universities. In addition comes involvement of teachers, guest researchers and the surrounding university environment. Total capitalised effort is estimated to 7284 KNOK from the university side. Two main evaluations are envisaged, respectively after 2 and 4 years. Project management lies at UiO, and four quarterly common project meetings are planned, plus monthly status meetings among the co-ordinators.

Keywords: Software engineering, incremental development, component-based development, software quality, heterogeneous components (COTS), empirical studies.