# Cost Action IC0701: The National University of Ireland, Maynooth (NUIM)

Rosemary Monahan
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Eindhoven, Netherlands.

# Principles of Programming Group:

- Permanent staff members: Rosemary Monahan, James Power
- Past 5 yrs: Graduated 3 PhDs, 1 two-year Research MSc, 14 Taught MSc with minor dissertations.
- Current: 6 MSc students, 1 PhD student

Research Interests

- static and dynamic analysis of object-oriented programs and programming languages
- parsing, bytecode analysis, software metrics, meta-modelling and program verification to model software systems in order to increase comprehensibility and reliability
- reverse engineering, program verification and validated forward engineering

# Research Areas:

- Verification languages and tools
- Safety critical software
- Data refinement
- Software metrics on UML models
- Meta-models for the measurement of object-oriented systems
- Testing and profiling ATL model transformations
- Grammarware and program analysis

# Verification Tools/Languages

- Spec# Programming System
- Perfect Developer
- JML
- ESC/Java
- Octopus
- Rodin
- Alloy

# Research most relevant to this COST Action…

- Software Verification Languages and Tools
  - Spec#: Reasoning about Comprehensions with First-Order SMT Solvers, Supporting Textbook Examples (RiSE Group, Microsoft Research USA)
  - Dafny: Verification Benchmarks (RiSE Group, Microsoft Research USA)
  - Perfect Developer: Tool Evaluation MSc Projects, (David Crocker, Escher Technologies, UK)
  - JML: We're getting involved … Dagstuhl, Spec-a-thon (Joe Kiniry, University College Dublin)
- Data Refinement
  - Representing Data Refinement in a modular way in Object Oriented Languages (Joe Morris, Dublin City University)

# Research most relevant to this COST Action:

- Safety Critical Software Verification
  - Verifying control software for Programmable Logic Controllers (Dominique Mery, INRIA, France; Thierry Lecomte, ClearSy, France; Adam Winstanley, NUIM (Ulysees ))
- Metrics in Object-Oriented Software
  - Using Model Driven Engineering to Reliably Automate the Measurement of Object-Oriented Software; Run-Time Coupling and Cohesion Software Metrics (Jacqueline McQuillian; Aine Mitchell; Hao Wu; NUIM)
- Grammarware and Program Analysis
  - The effectiveness of rule-coverage as a reduction criterion for test suites grammar-based software (Mark Hennessey, NUIM; Brian Malloy, Clemson University, USA)

# The Working Groups of the Action in which we most fit:

- WG1: Adaptable and Reusable Programs
- WG2: Modularisation and Components
- Others?

# Research problems that we would like to tackle in conjunction with IC0701

- Developing a theoretical framework to allow software developers reliably re-use artefacts between different software representations e.g. metrics, invariants
- Supporting data refinement in program verification tools.
- Improving verification tools to make them accessible to the mainstream programmer
- Increasing the use of verification tools: improving teaching materials, expanding the repository of verified software, doing industrial case studies.

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