UbiVal
Fundamental Approaches to Validation of Ubiquitous Computing Applications and Infrastructures

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Project Rationale

- *Very many* demonstration projects in ubiquitous computing
  - Example applications and support technologies
- *But very little* work on engineering foundations for ubiquitous computing
  - Many unique engineering challenges
    - Mobility
    - Context-awareness
    - Adaptive
  - Leading to significant challenges for *validation*
Research Objectives

1. Develop a comprehensive suite of validation techniques for mobile, adaptive, context-aware ubiquitous systems
   - *Model checking*
   - *Testing*
   - *Simulation*
   - ... and useful combinations of these
Research Objectives

2. Develop the necessary scientific and engineering foundations to support the validation techniques
   - Probabilistic representations
   - Realistic mobility models
   - Transparent instrumentation techniques
Research Objectives

3. Evaluate the validation techniques on significant case studies
   - *Cityware* (from WINES 1)
   - Case studies from industrial partners
     - BT
     - HP
     - QinetiQ
   - Other WINES projects
Scope of the Work

- Validation of *functional correctness*
- Validation of *non-functional properties*
  - Security and privacy
  - Performance and responsiveness
  - Reliability
- Systems built in Java and J2ME
Work Plan

WP1 Planning, Integration and Consistency

WP2 Probabilistic Model Checking

WP3 Testing

WP4 Simulation

WP5 Instrumentation and Trace Generation

WP6 Security Properties

WP7 Evaluation Studies

requirements

constraints

test priorities

traces

model extraction
context & coverage
policy specs

mobility

instrumentation

property specs

probabilities

results

context & coverage

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Consortium

Rosenblum
Elbaum & UCL PhD 1

Mascolo
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Bham RA & PhD 1

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WP1
Planning, Integration and Consistency

WP2
Probabilistic Model Checking

WP3
Testing

WP4
Simulation

WP5
Instrumentation and Trace Generation

WP6
Security Properties

WP7
Evaluation Studies
Deliverables

● 1st Year
  ● Specification language, verification algorithms, CAPPs model, mobility models, instrumentation methods

● 2nd Year
  ● Initial versions of prototype tools
  ● Extension and refinement of languages, models, methods

● 3rd Year
  ● Case study results
  ● Extension and refinement of languages, models, methods
  ● Improved tools
Relevance to WINES 2

- Technically relevant
- Large scope, size and ambition
- Newly formed consortium
- Multi-disciplinary
- Highly adventurous
- Evaluation in significant application domains
- Significant bridge to other WINES projects
Overall Outcome

An interoperable suite of tools

embodying sound validation methods for ubiquitous systems

applied to significant case studies

and disseminated to academia and industry
Thank You

(And we’re still accepting applications!)

http://www.ubival.org/