

UbiVal

Fundamental Approaches to Validation of Ubiquitous Computing Applications and Infrastructures

Prof David S. Rosenblum

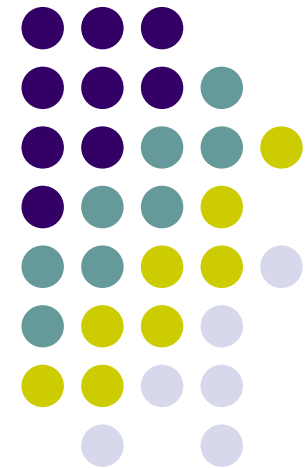
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Project Rationale

- *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

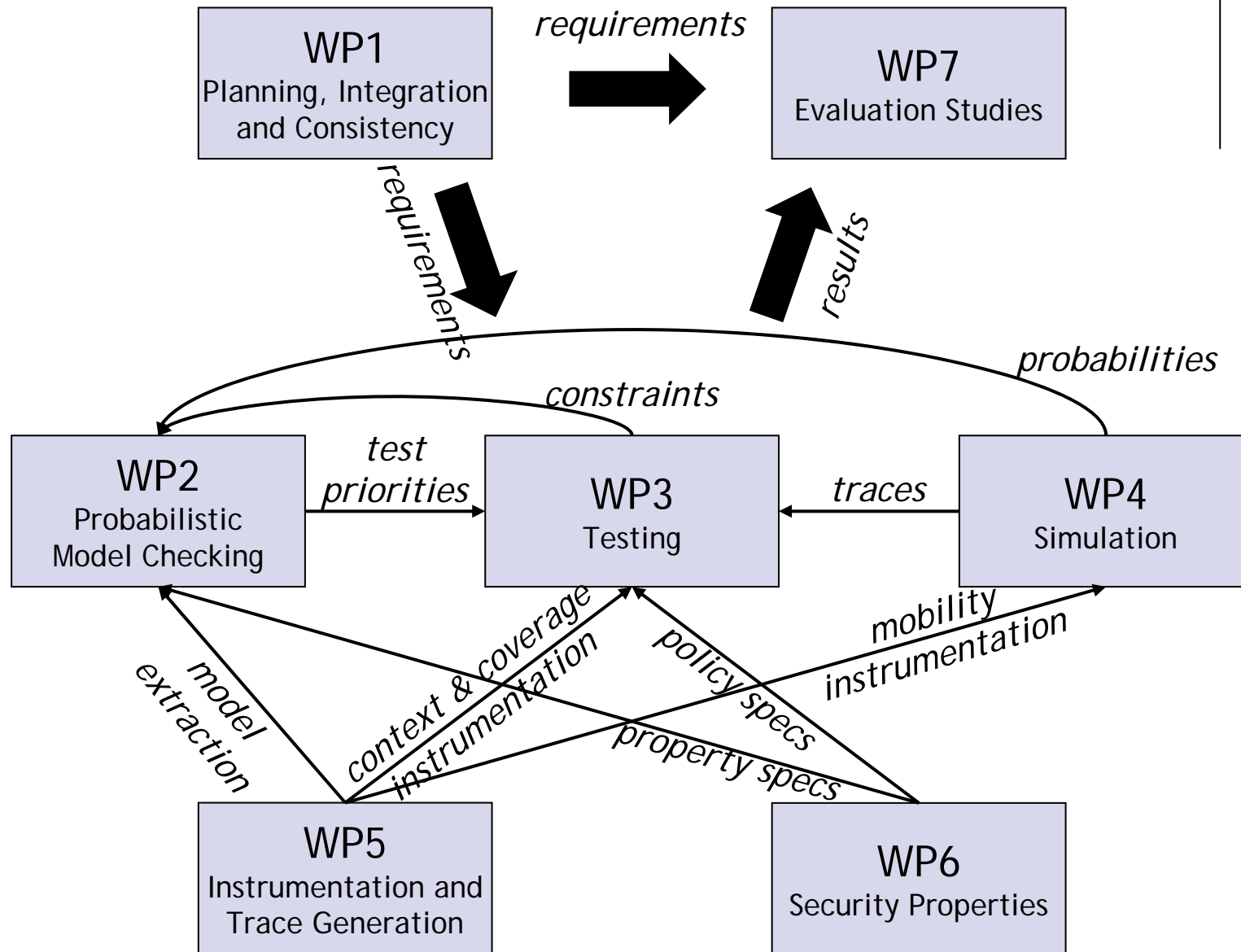
3. Evaluate the validation techniques on significant case studies
 - *Cityware* (from WINES 1)
 - Case studies from industrial partners
 - BT
 - HP
 - QinetiQ
 - Other WINES projects



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



Consortium

*Rosenblum
Elbaum & UCL PhD 1*

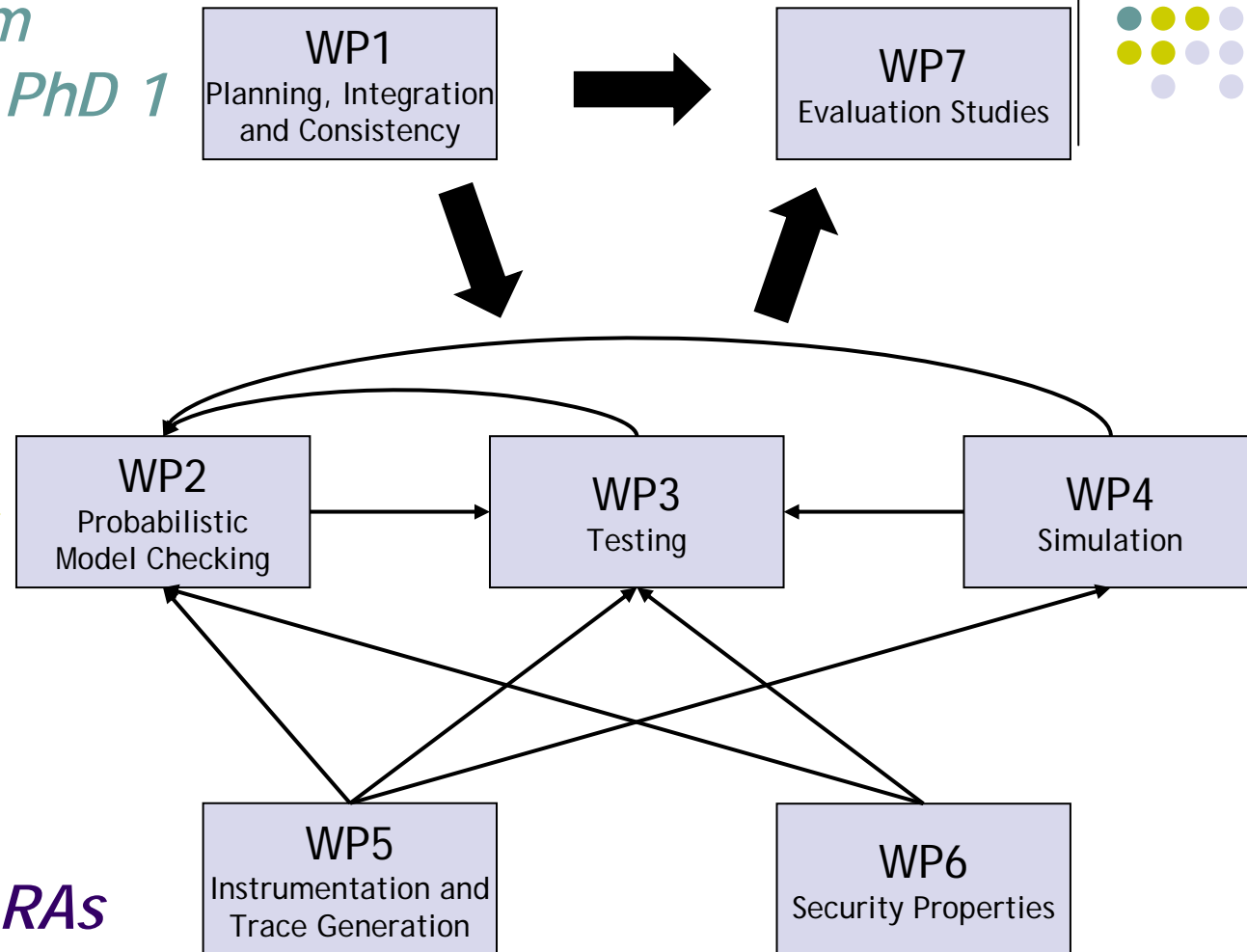
*Mascolo
UCL PhD 2*

*Kwiatkowska
Ghica
Bham RA & PhD 1*

*Ryan
Bham PhD 2*

*Dulay
Imperial & UCL RAs*

*Lupu
Imperial RA*



Consortium

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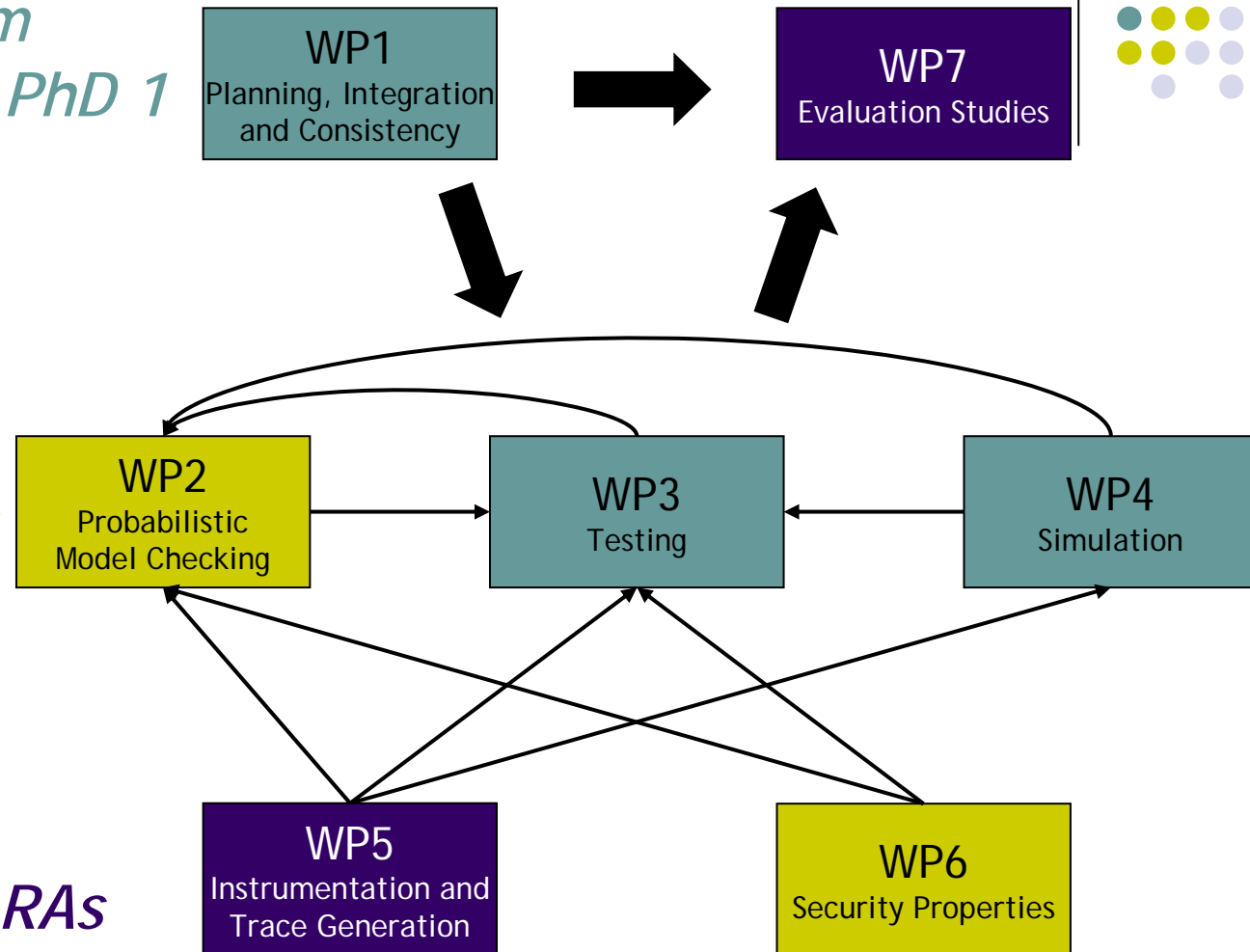
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Deliverables

- 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/>