Welcome to CREST

COW/SEBASE workshop

Mark Harman

**Centre for Research in
Evolution, Search & Testing**

KING'S
College
LONDON

CREST is home to

4 faculty

1 administrative officer

8 post docs

12 PhD students

1 to 4 long term visitors

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Testing

All kinds of testing:–

- Mutation testing
- Model based testing
- Automated test data generation
- Web application testing
- Service oriented testing
- Fuzz testing
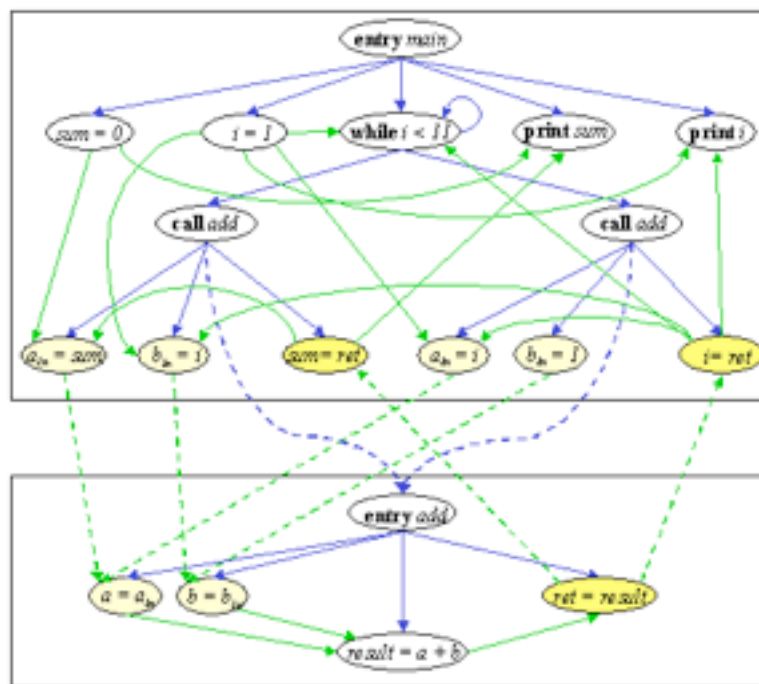- Security testing
- Regression testing

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Dependence Analysis

dependence clusters

impact analysis

program and model based slicing

assessing third party code

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Quantitative Information Flow

calculate amount of information flowing

find security leaks

use information theory to compute fitness

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Service Oriented Computing

Testing services with services

Optimizing performance

Finding dependence

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Clone detection

using static analysis
applied to code provenance
applied to graphical languages

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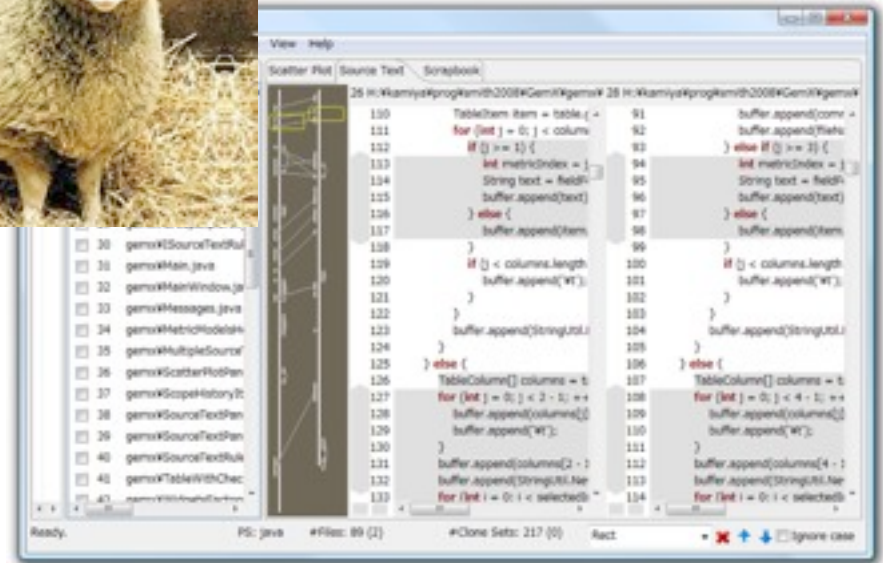
Digital Humanities

Mapping outwards from software to systems

Software Engineering Analysis translates to

- – musicology
- – archaeology

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SEBASE

Search Based Software Engineering – SBSE

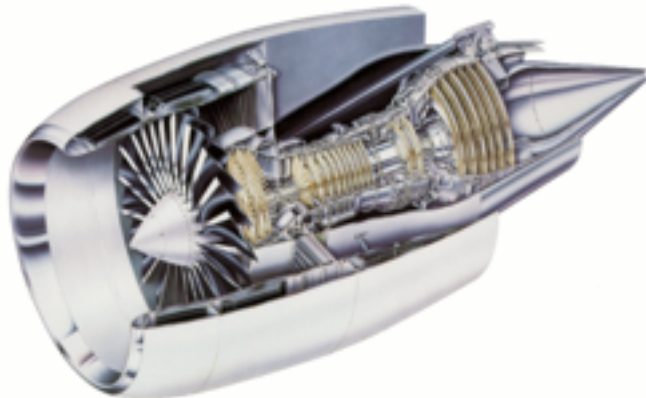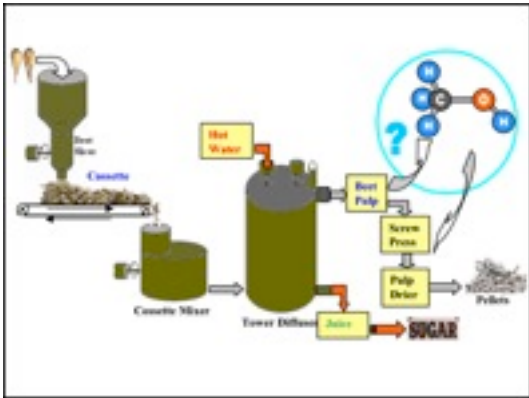York, Birmingham, King's

Motorola, IBM

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What is SBSE?

In SBSE we apply search techniques to search large search spaces, guided by a fitness function that captures properties of the acceptable software artefacts we seek.

Genetic Algorithms, Hill climbing, Simulated Annealing, Random, Tabu Search, Estimation of Distribution Algorithms, Particle Swarm Optimization
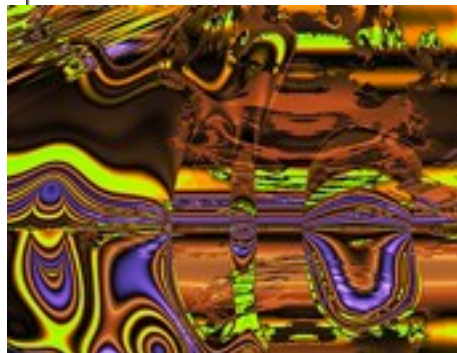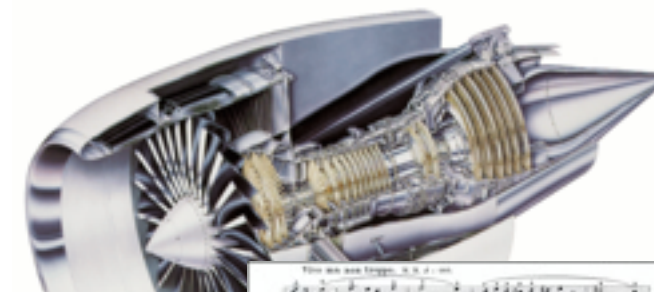
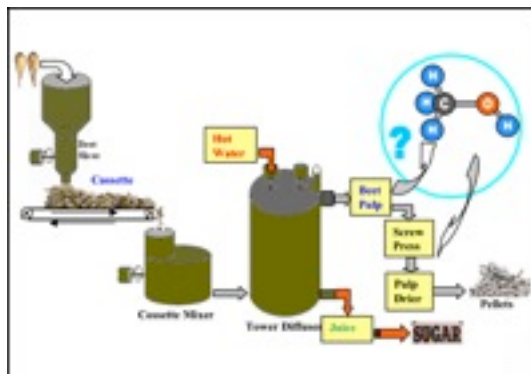http://crest.dcs.kcl.ac.uk/

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Why is SBSE?

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Why is SBSE?

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Why **not** SBSE?

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Why **not** SBSE?

EPSRC network

1999 – 2002

Laid foundation for SBSE

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SBSE Applications

Transformation	Cooper, Ryan, Schielke, Subramanian, Fatiregun, Williams
Requirements	Bagnall, Mansouri, Zhang
Effort prediction	Aguilar-Ruiz, Burgess, Dolado, Lefley, Shepperd
Management	Alba, Antoniol, Chicano, Di Pentam Greer, Ruhe
Heap allocation	Cohen, Kooi, Srisa-an
Regression test	Li, Yoo, Elbaum, Rothermel, Walcott, Soffa, Kampfhamer
SOA	Canfora, Di Penta, Esposito, Villani
Refactoring	Antoniol, Briand, Cinneide, O'Keeffe, Merlo, Seng, Tratt
Test Generation	Alba, Binkley, Bottaci, Briand, Chicano, Clark, Cohen, Gutjahr, Harrold, Holcombe, Jones, Korel, Pargass, Reformat, Roper, McMinn, Michael, Sthamer, Tracy, Tonella,Xanthakis, Xiao, Wegener, Wilkins
Maintenance	Antoniol, Lutz, Di Penta, Madhavi, Mancoridis, Mitchell, Swift
Model checking	Alba, Chicano, Godefroid
Probe dist'ion	Cohen, Elbaum
UIOs	Derderian, Guo, Hierons
Comprehension	Gold, Li, Mahdavi
Protocols	Alba, Clark, Jacob, Troya
Component sel	Baker, Skaliotis, Steinhofel, Yoo
Agent Oriented	Haas, Peysakhov, Sinclair, Shami, Mancoridis

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SBSE Applications in which SEBASE is active

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York SEBASE team and colleagues

Task allocation

Reducing time to move between configuration
During development and maintenance
- to make systems robust to change
- to minimise cost when change can't be avoided

Wireless Sensor Networks

- energy, performance, reliability, robustness

Automatic WCET test-case generation

Statistical Testing

Non Functional Properties

Optimize for functionality and power consumption

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Birmingham SEBASE team

Multi objective optimization
- Power consumption
- Response time
- Cohesion and coupling for modularization

Algorithms
- Estimation of Distribution Algorithms
- Differential Evolution

Theoretical Analysis of SBST

Automatic bug fixing

Co-evolution of program and test cases

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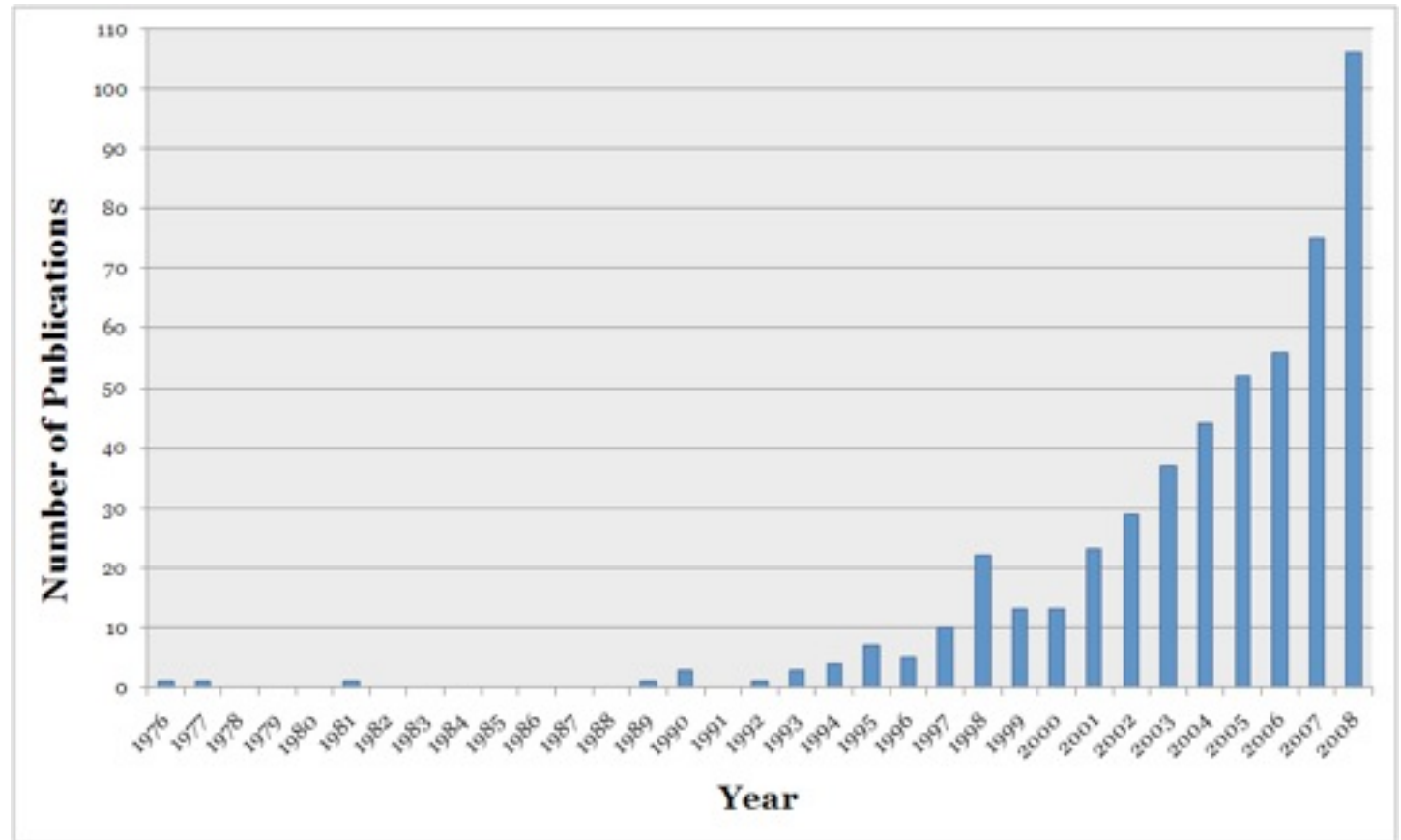# King's SEBASE team

Multi objective optimization:
- cost and value
- faults, coverage, time
- metric sets
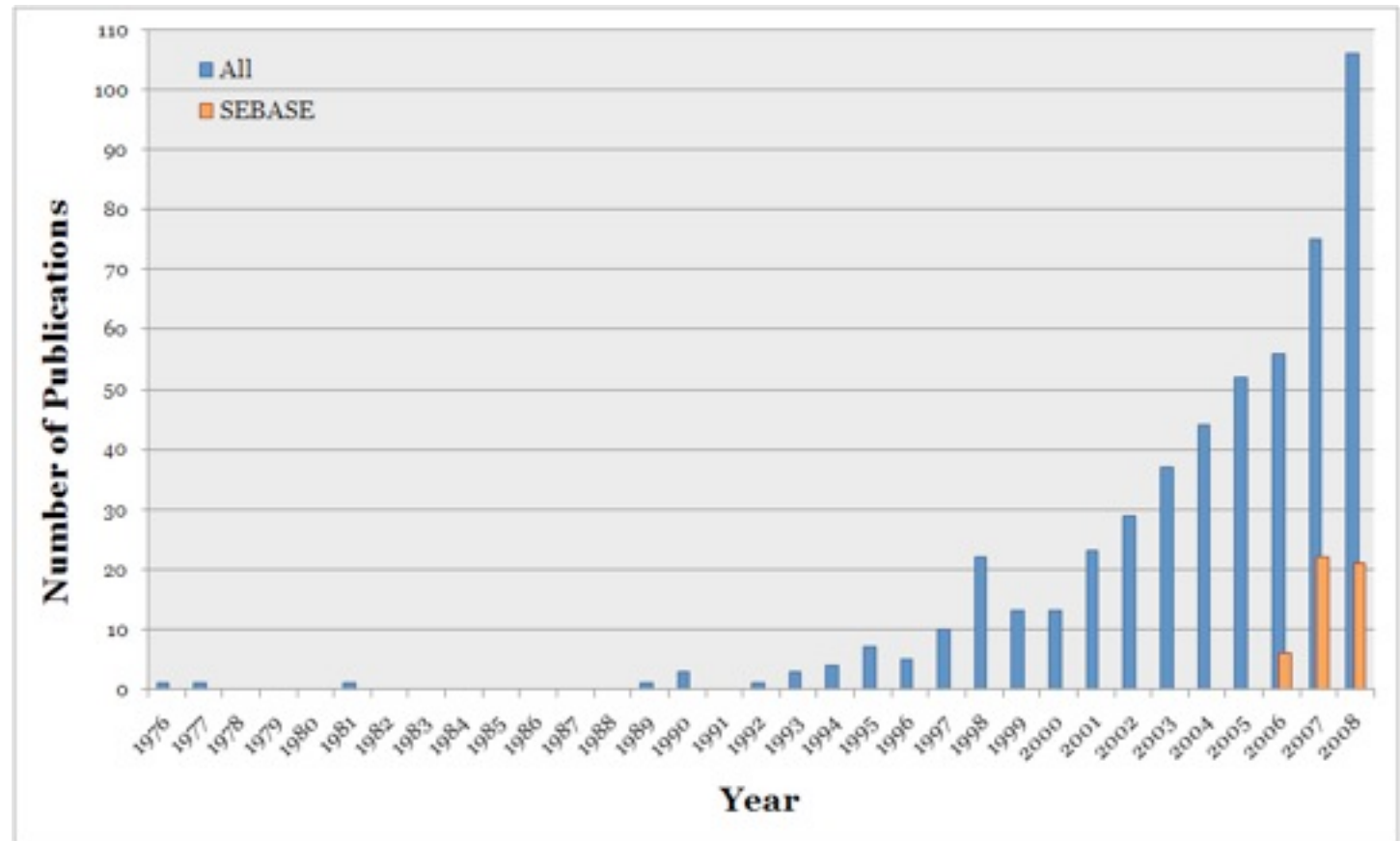- risk and reward

Software Engineering Application areas:
- Requirements
- All kinds of Testing
- Project Management
- Refactoring
- Source Code Analysis

Survey work, Repositories, Community support

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King's SEBASE team

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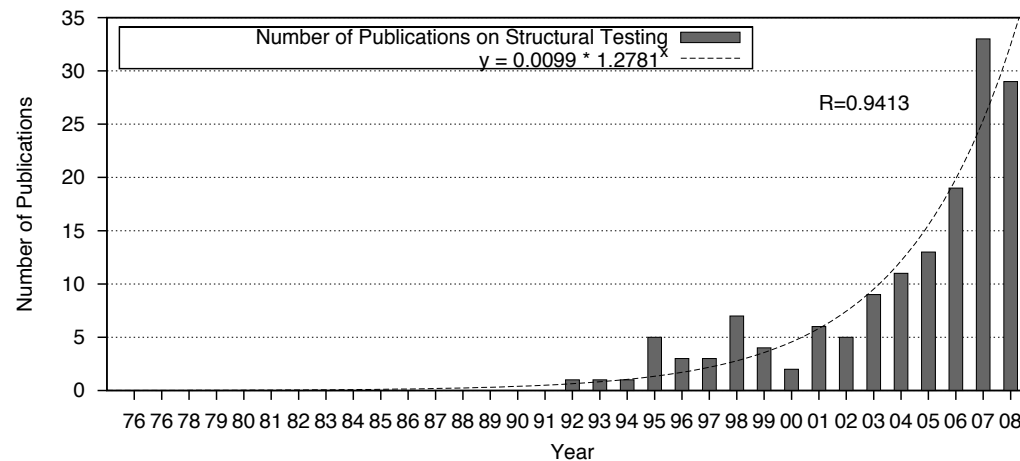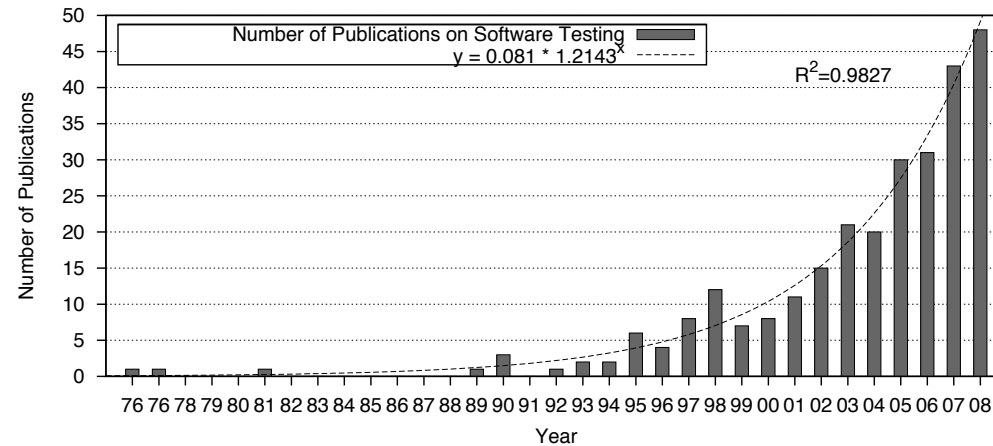
Trends in SBSE publication Growth

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New emerging areas

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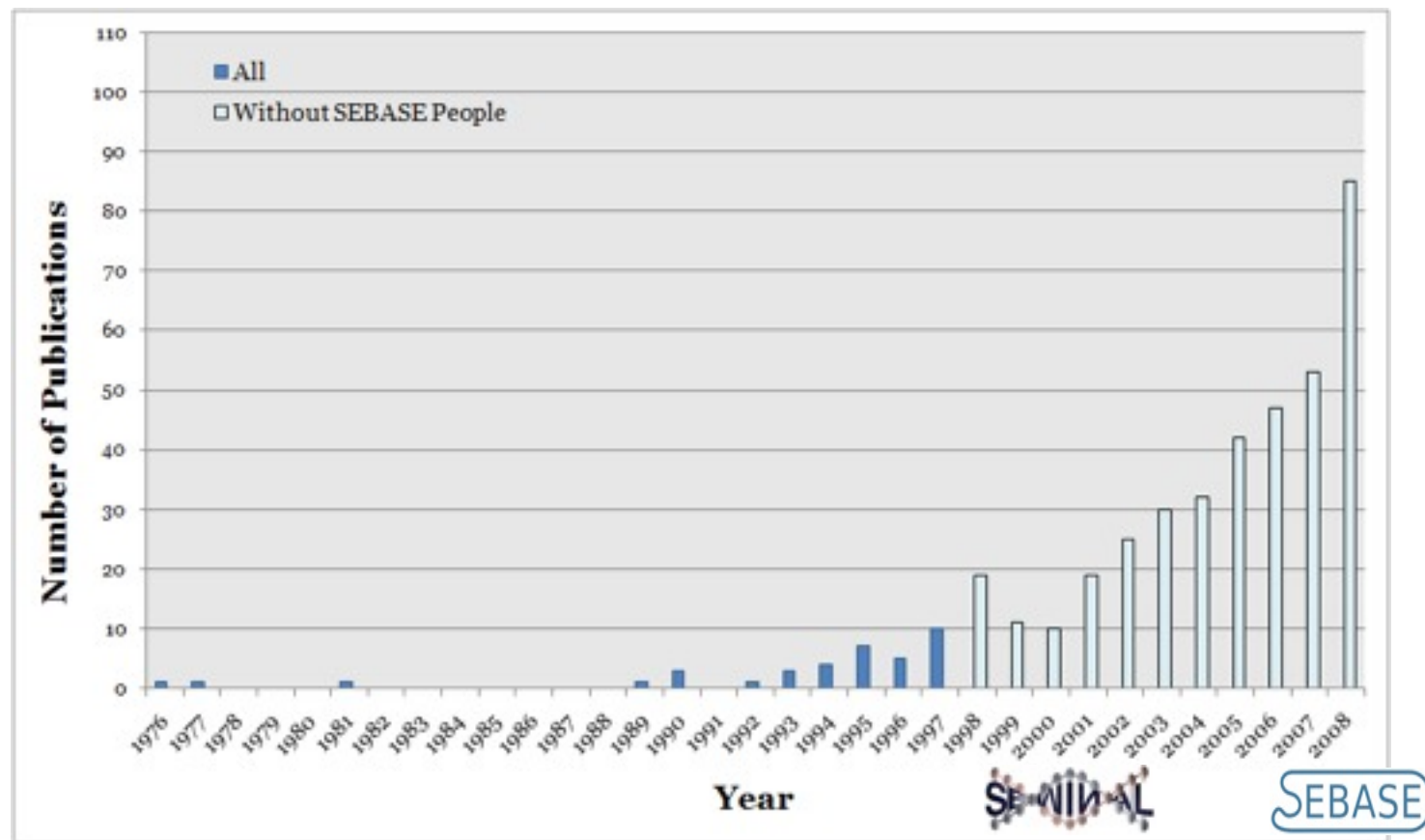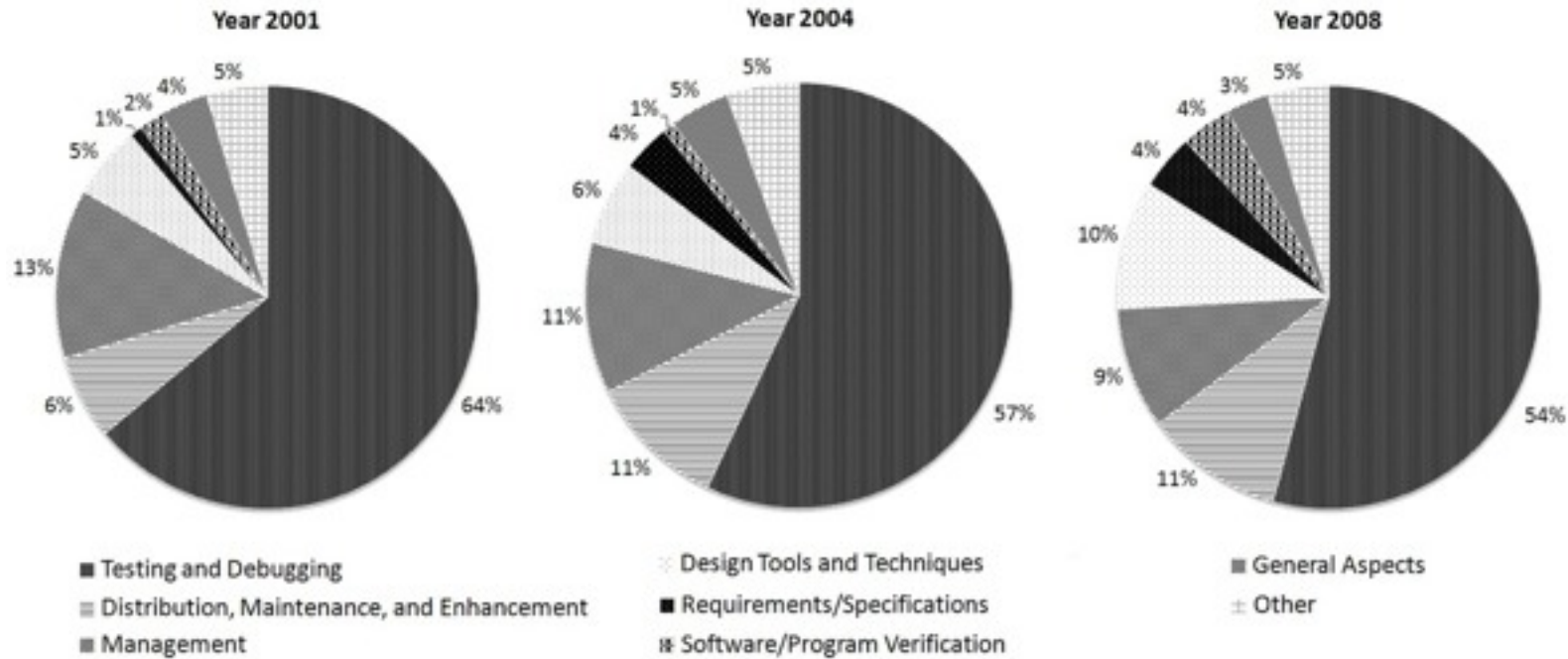
1st COW/SEBASE workshop

Talks and Lots of discussion

Lunch and refreshments will arrive here

Dinner tonight upstairs

Wireless

Recording of talks NOT discussion

A brief note about COWs

Thanks
- Yue and Jian for organisation
- EPSRC for funding

Logistics
- fire alarms
- toilets

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Introductions ...