Software complexity

consequences for testing and certification

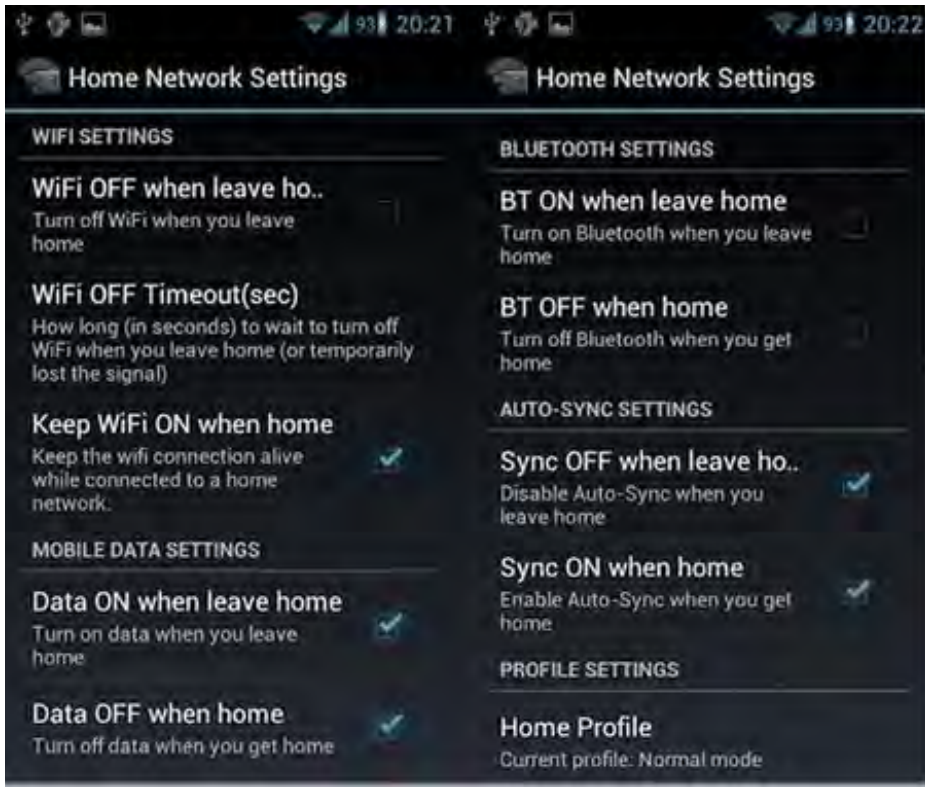
LUND, SWEDEN, OCTOBER 22, 2012

CC alijavam at Flickr

Select an app…

LUND UNIVERSITY

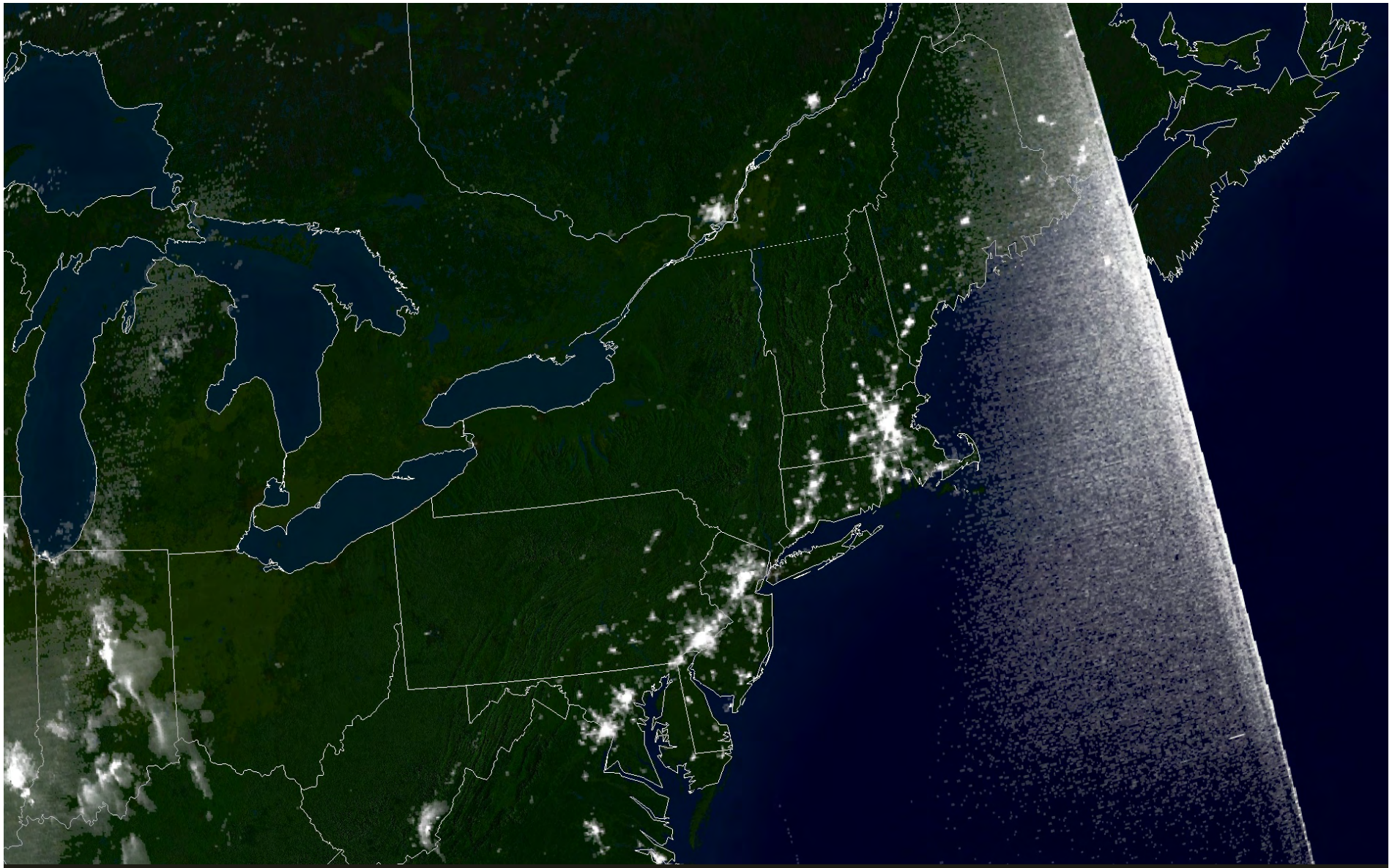
Test the app…



- Wifi: on/off
- Bluetooth: on/off
- 3G: on/off
- SD-card: size/brand
- Language: sv/en/ty/ fr/cn

2 * 2 * 2 * 5 * 20 * 5 = 4000 combinations

LUND UNIVERSITY



August 14, 2003 – satelite image over North America. **And later**

SecurityFocus™

Joseph Bucciero, …, said the public should not lose confidence in utilities.

"There are a lot of systems out there and they are running for many years already, and this is the first time a problem like this has arisen," he said.

Bucciero said the software bug surfaced because of the number of unusual events occurring simultaneously ...

LUND UNIVERSITY

Terms

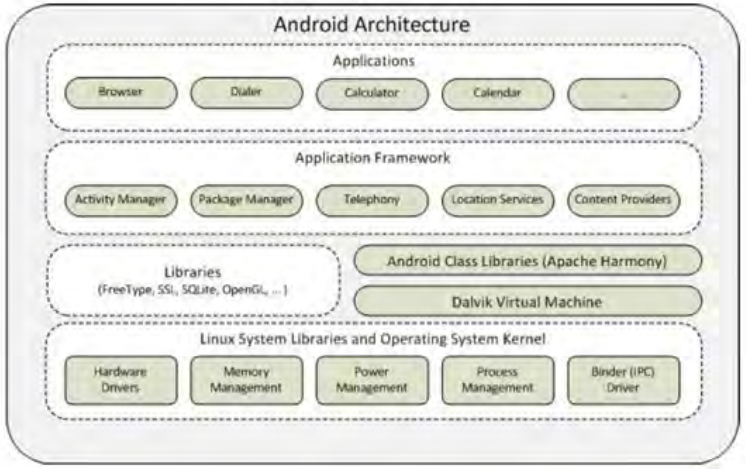
Testing. The dynamic execution of test cases to

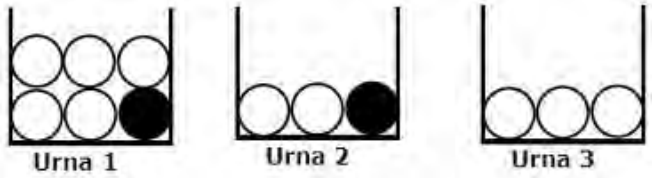
1. find faults, and/or
2. demonstrate absense of faults.

Certification. Demonstration of fulfillment of standards.

Methods

- Independent layers or modules
- Representative selection of test cases
- Let the user test
- Standards and certification

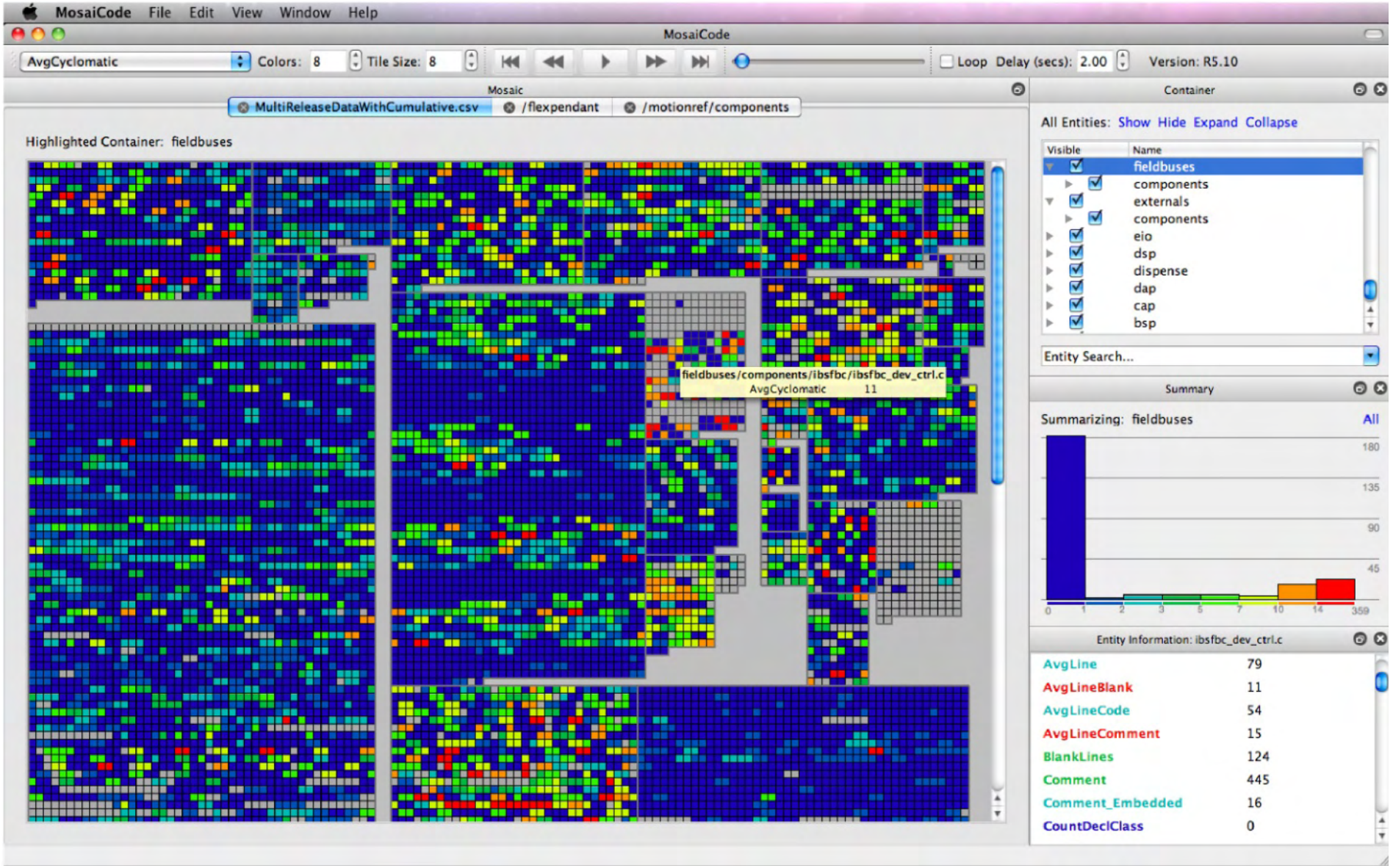


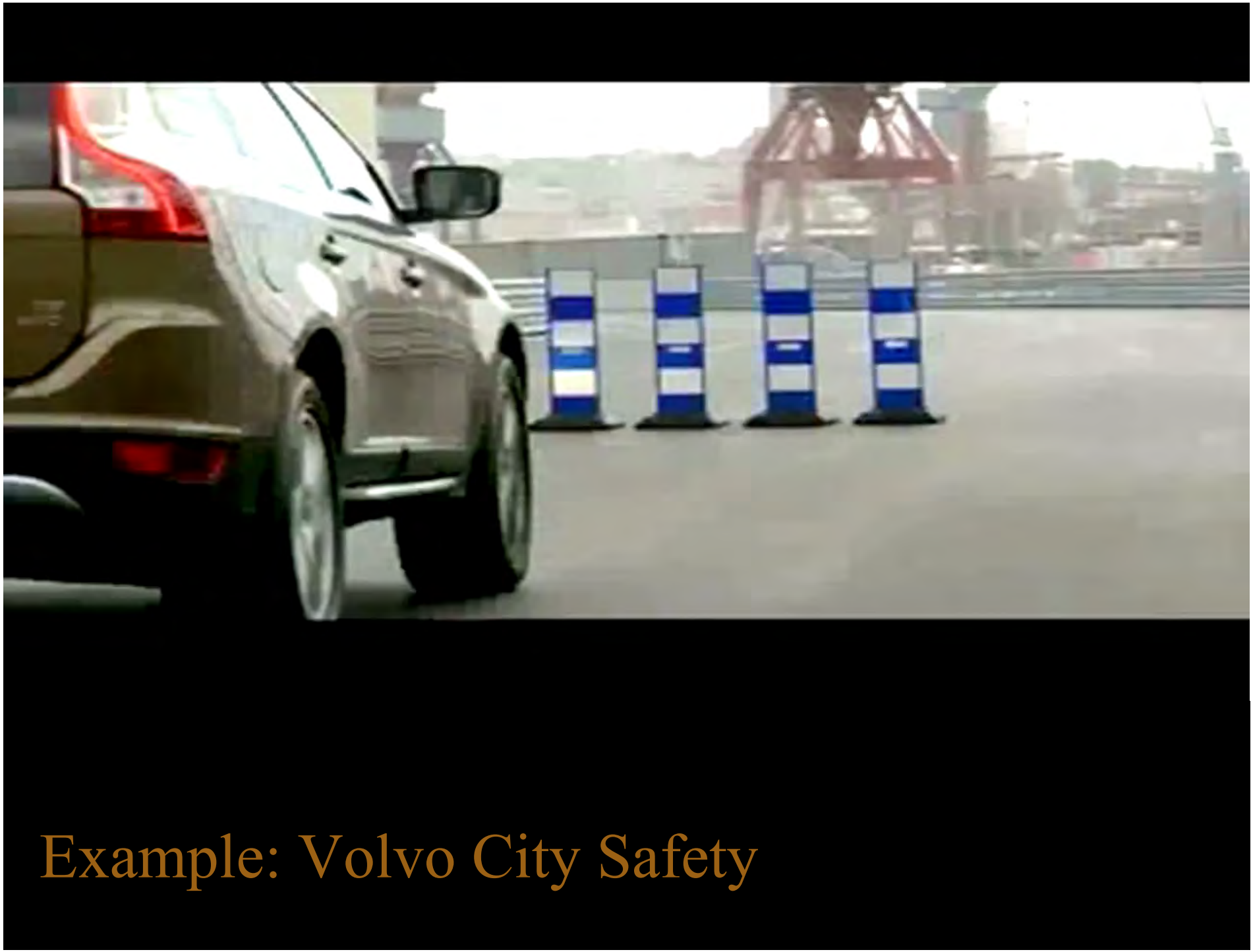


LUND UNIVERSITY

CC Sweet Chi at Flickr

Ongoing research: visualization supported test selection



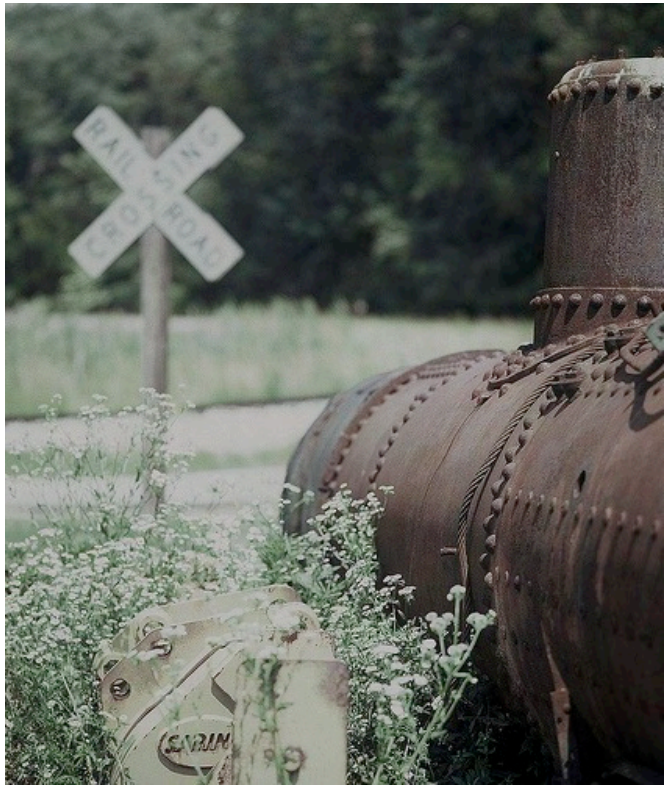


Example: Volvo City Safety

Historical analogy: Steam engines

- High pressure steam boilers more effective, but unsafe
- 1816-48 in the US: 233 steamboat explosions, killing 2 562 persons, injuring 2 097
- Disasters not prevented until national standards for safety were in place in the late 1800s

High-Pressure Steam Engines and Computer Software – Leveson, 1994



1. Complexity
2. Invention vs evaluation
3. Theory vs practice
4. Automated systems need human supervision
5. Human-technology interaction
6. Competency

CC kevin dooley at Flickr

CC Darkroom Daze at Flickr