



# Virtualized Embedded Systems for Testing and Development

Test- och mjukvaruplattform för virtualiserade inbyggda system

Project Length: 3 Years

*Charlotta Barker*

**Scania CV AB**

*Professor Karl Meinke*

**KTH Stockholm CSC**



KTH Computer Science  
and Communication

# 'Autonomous vehicles: How safe are trucks without human drivers?'



'Experiments are already under way testing out trucks that can drive themselves. But how safe will these juggernauts be without a human at the helm? Mark Piesing reports'

## FOR

- Reduce fuel consumption to save costs and the planet
- Cut back on congestion as trucks can travel closer together, so will take up less road space
- Eliminate the need to build new roads, as you can fit more trucks on to existing roads



## AGAINST

- Safety – the technology needs to be 100 per cent reliable

## **Testing today**

Limited hardware-in-the-loop testing

Scarce and expensive resources

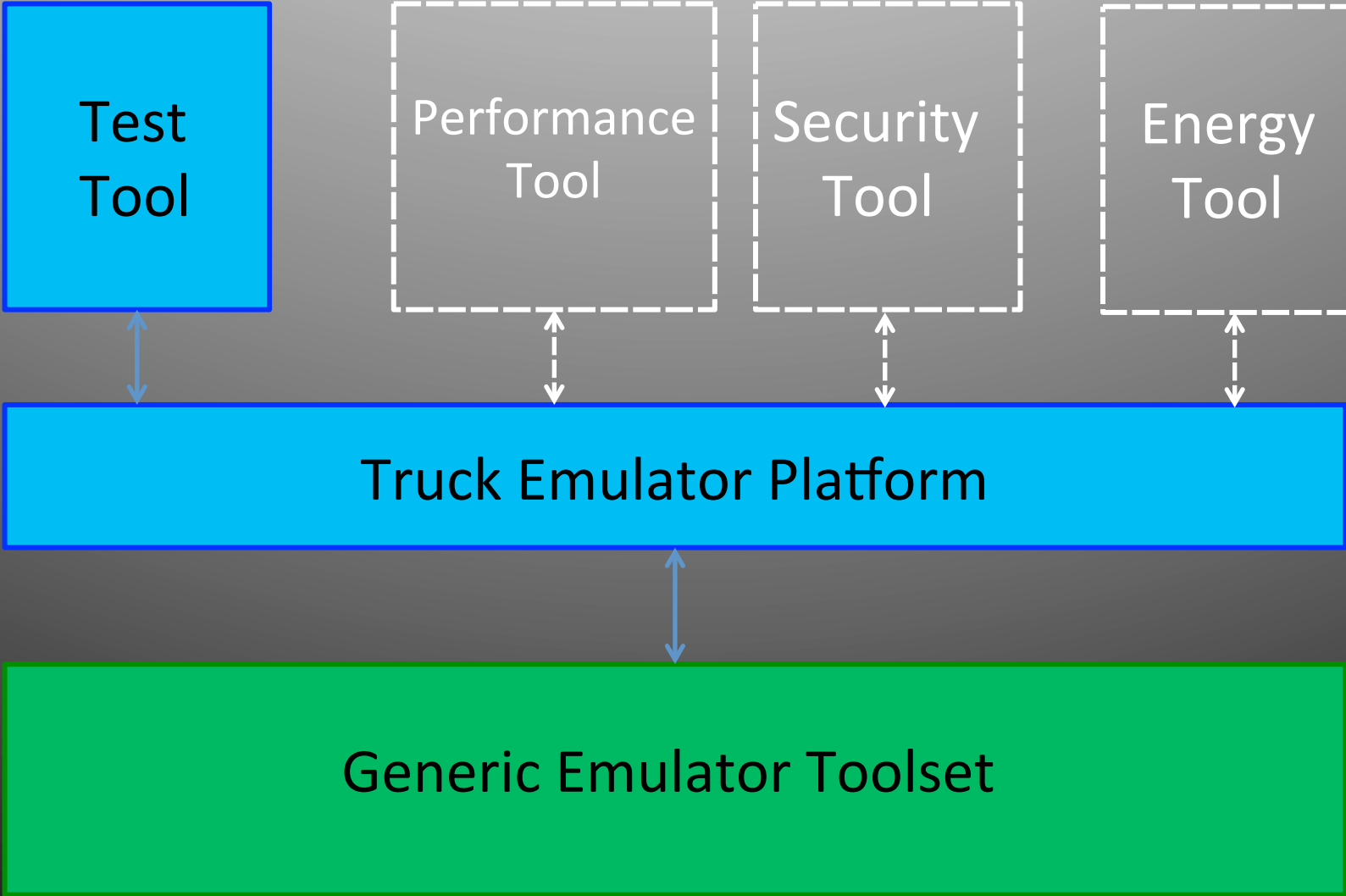
Manually designed test suites – maintenance issues

## **Testing in 3 Years Time**

Extensive hardware-emulation based testing

Low-cost multicore computers

Very large automatically generated test suites  
assuring high software quality



## Project deliverables

Emulator as a future platform for V&V, security, performance, energy consumption analysis etc.

1 Licentiate + 6 Masters theses

Test Tool : LBTest 2.0 sequential and parallel testing (open source)

Case studies : benchmarking, education, dissemination.

## Feasibility

Scania has evaluated technological maturity of commercial emulation tools on a single ECU.

KTH has industrially evaluated LBTest 1.0 ...

from *commercial vehicle software* (Volvo brake-by-wire) 6000 LoC ...

... up to a *commercial database server* 600,000 Loc and 100+ databases.

## Program Relevance

Programområde 2.4.1 :

*Methods and Tools for Vehicle Development*

**Goal:** *“World-class methods and tools for vehicle development”*

1. Fast, flexible and effective development
2. Simplify code maintenance
3. Contribute to *model-based development and V&V*



## **And finally ...Impact**

*New ways to develop reliable software that will reach customers sooner.*

### **Measurable goals**

Reduced testing times by at least 50%

Increased system test coverage by at least 100%

Reduced project development times by at least 10%

Reduced product recalls for software reasons by 20%