EXITE
A middleware for integrating simulations

EXTESSY

www.extessy.com

Hans-Martin Schulz
21.10.2004

Agenda

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- Introduction to EXTESSY AG
- **EXI**TE
- Application Examples
- Demo

Presentation of EXTESSY AG

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EXperts for TESt and SYstemengineering

- Start-up of research assistants from the TU Braunschweig in September 2000
- since March 2001 EXTESSY AG (Inc.)
- Based in Wolfsburg
- 2002 investment by AutoVision GmbH
- 15 employees
- Managing board: Dr. Gert Bikker, Hans-Martin Schulz

USP

- We enhance the use of development tools and the collaboration of developers among different domains.
- Our know-how enables the technical integration of tools for the first time.

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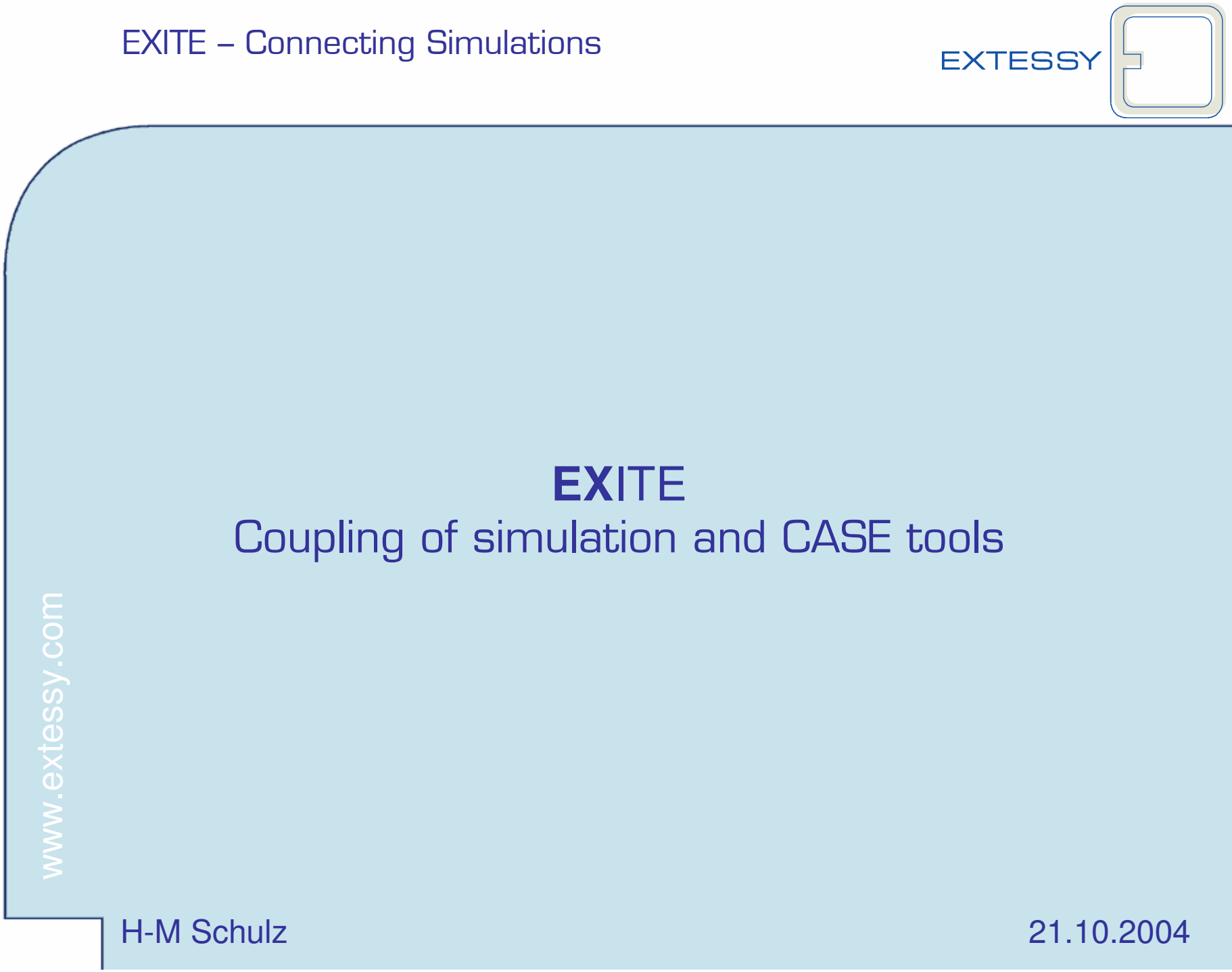

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Coupling of simulation and CASE tools

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Use Cases

- Integration
  - Hybrid simulations
  - Partitioning of models
  - Know-how protection
- Performance
  - Distributed simulation
- Hardware-in-the-loop
  - Real and virtual bus simulations
  - Extension for HIL
- Virtual prototypes

Classification of couplings

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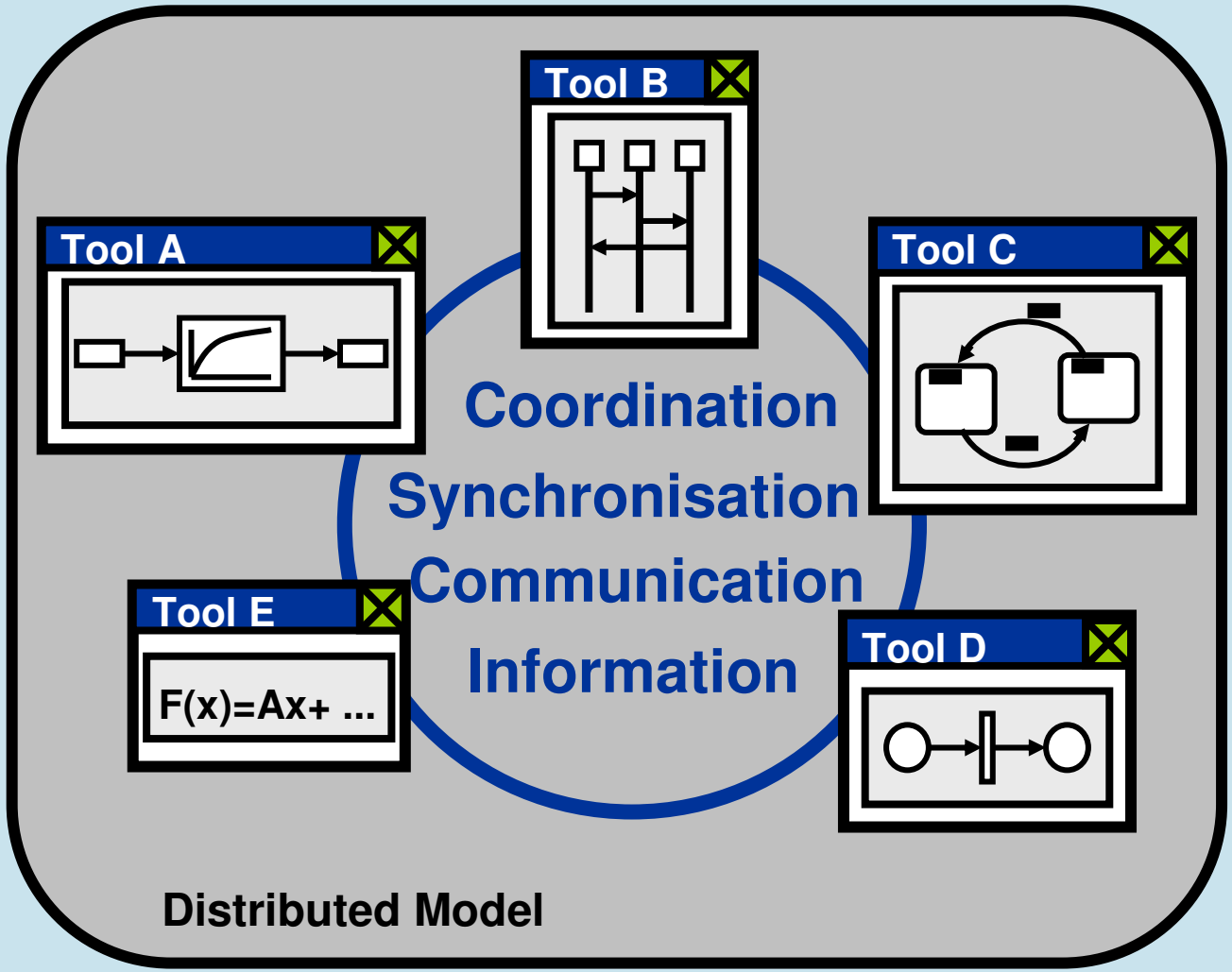
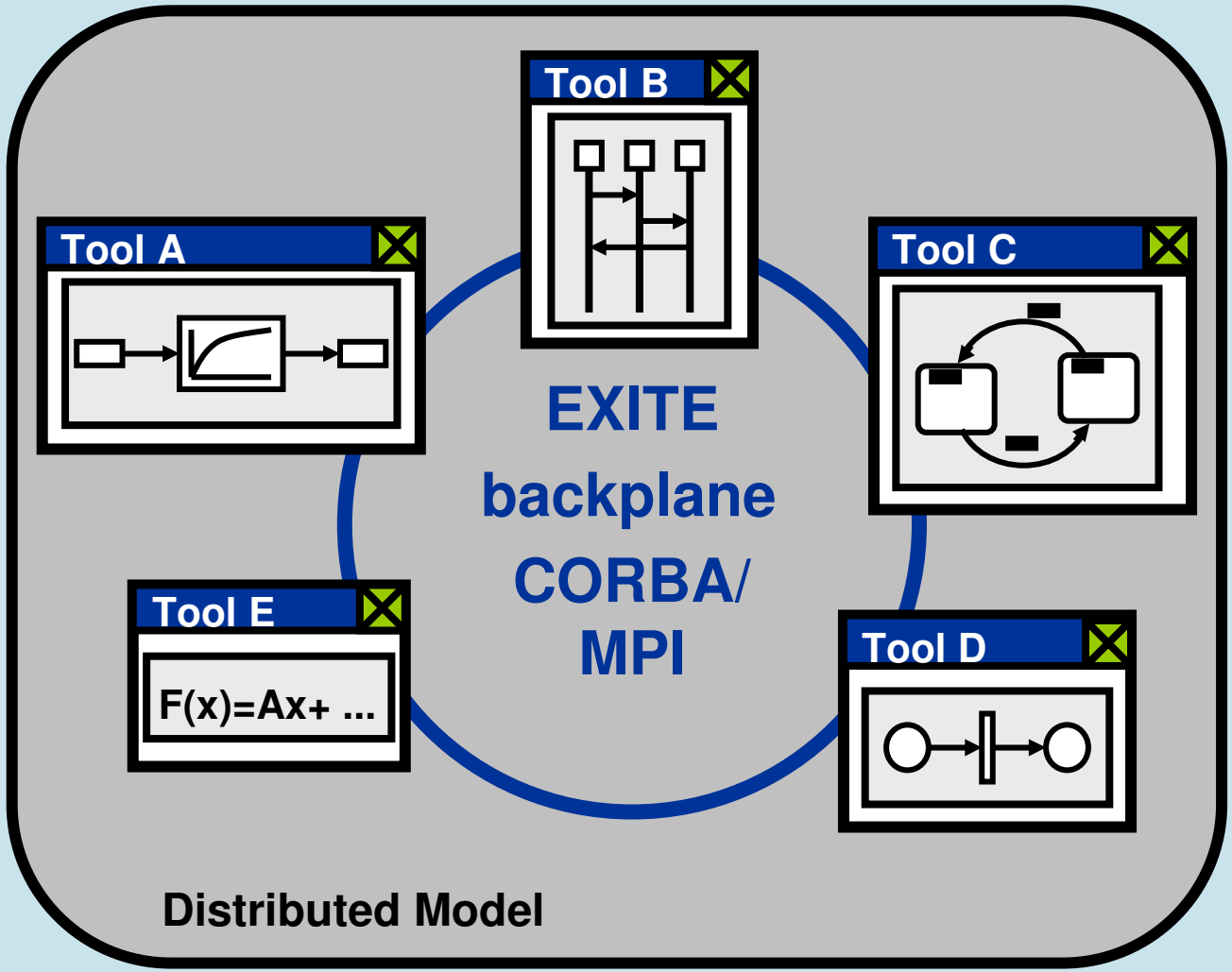
	Static	Dynamic
Abstract	Model transformation	C EXITE ion
Detailed	Code integration	Run time communication platform

Paradigms of coupling



EXITE Framework



Comparison von **EX**ITE

- HLA RTI
  - Greater protocol functionality
  - Slower
  - On code level not model level
- Direct tool coupling
  - Shared Memory → no distribution
  - Not universal, difficult to extend
- Code integration
  - Cross compilation necessary
  - Changed simulation behaviour

Good arguments for **EX**ITE

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- User friendly, multi-user
- Plug-Ins for a growing number of modelling tools
  - Simulink, Real-Time Workshop, ASCET, Dymola, Saber, Rhapsody, ARTiSAN RtS, …
- Extendible (Developer License)
  - C/C++ API
- Interoperable (based on CORBA or MPI)
- Performance
  - typ. 300µs, EXITE HiPer < 30µs latency time
  - No bottleneck by architecture
- Professional by continued development and support of EXTESSY AG

EXITE look

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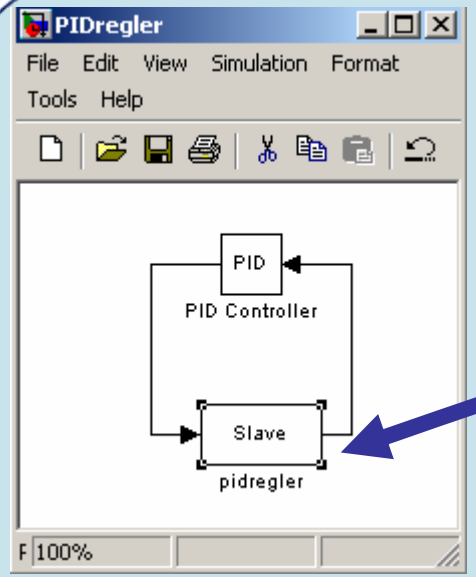
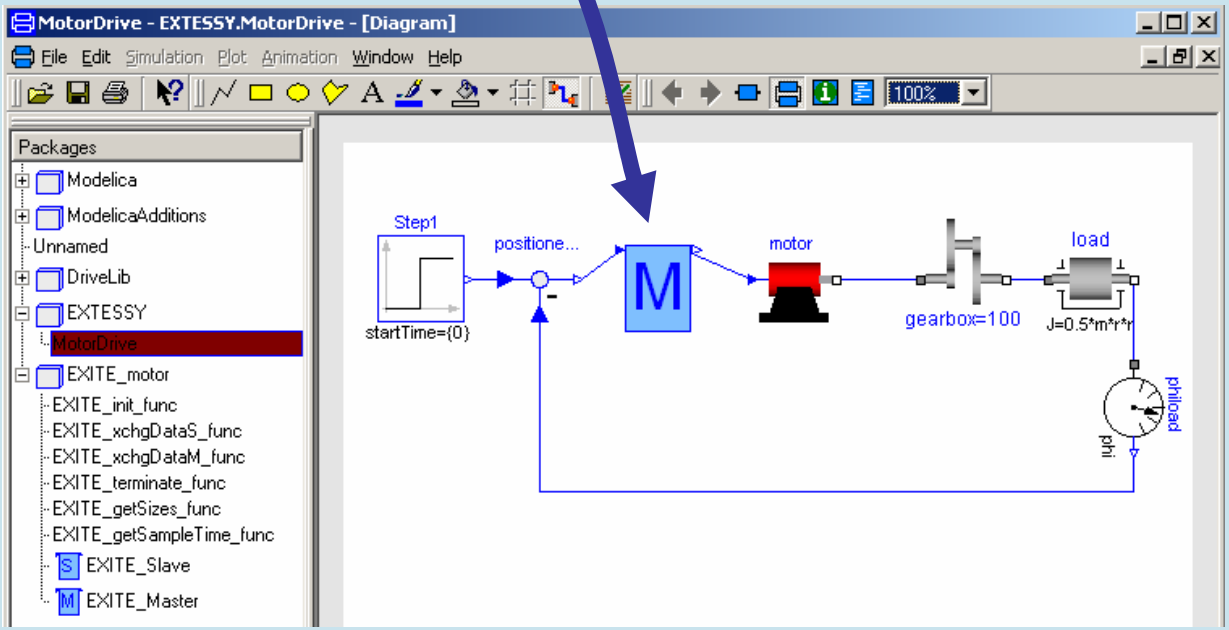


Connection with **EX**ITE



EXITE – Connecting Simulations

Example Embedded HW-Cockpit

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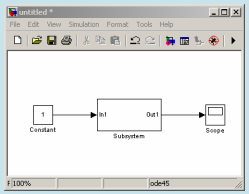
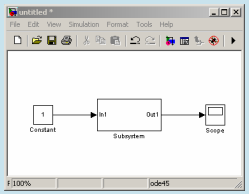
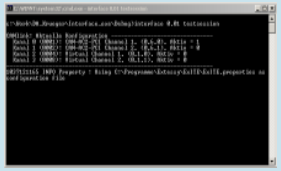
PC1: Master-Model
T = 10ms



PC2: Car-Physics
T = 2,5ms



PC3: CAN-Interface & EXITE Server



Synchronisation on Real time
T = 10ms

CAN

Real Cockpit

Audi Electronics Venture GmbH

Presentation: Audi-Infotag, Dec. 2002, Ingolstadt

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EXITE – Connecting Simulations

Example Flexible Test Environment

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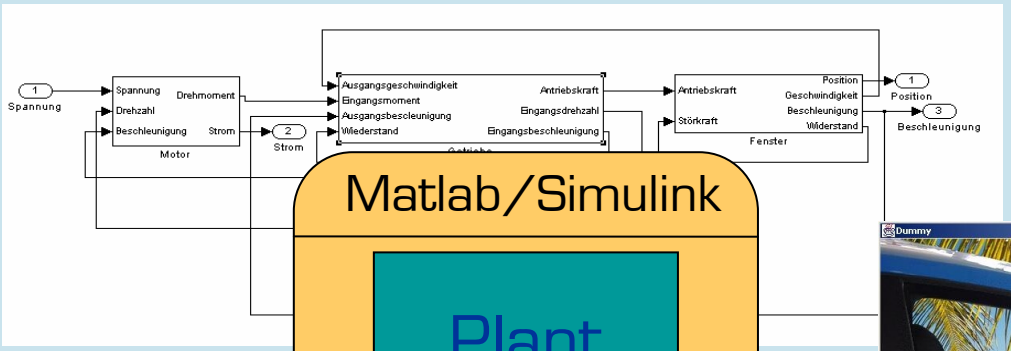


Matlab/Simulink

Plant

Stateflow

UML 2.0

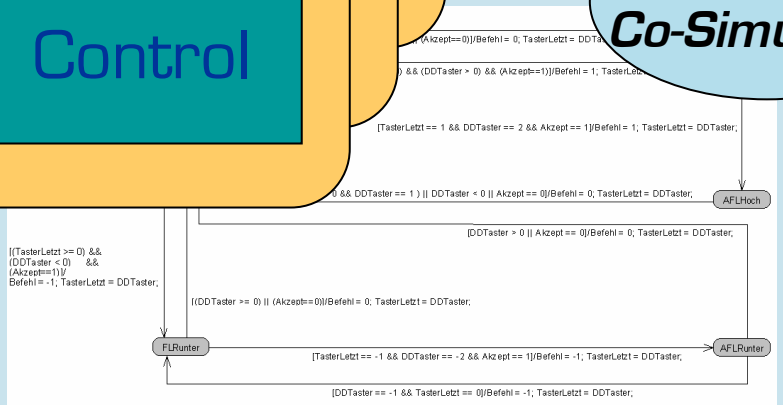
UML

Control

EXITE Co-Simulation

Java / Altia

HMI



Presentation: STEP-X Workshop, Braunschweig, 10.02.03

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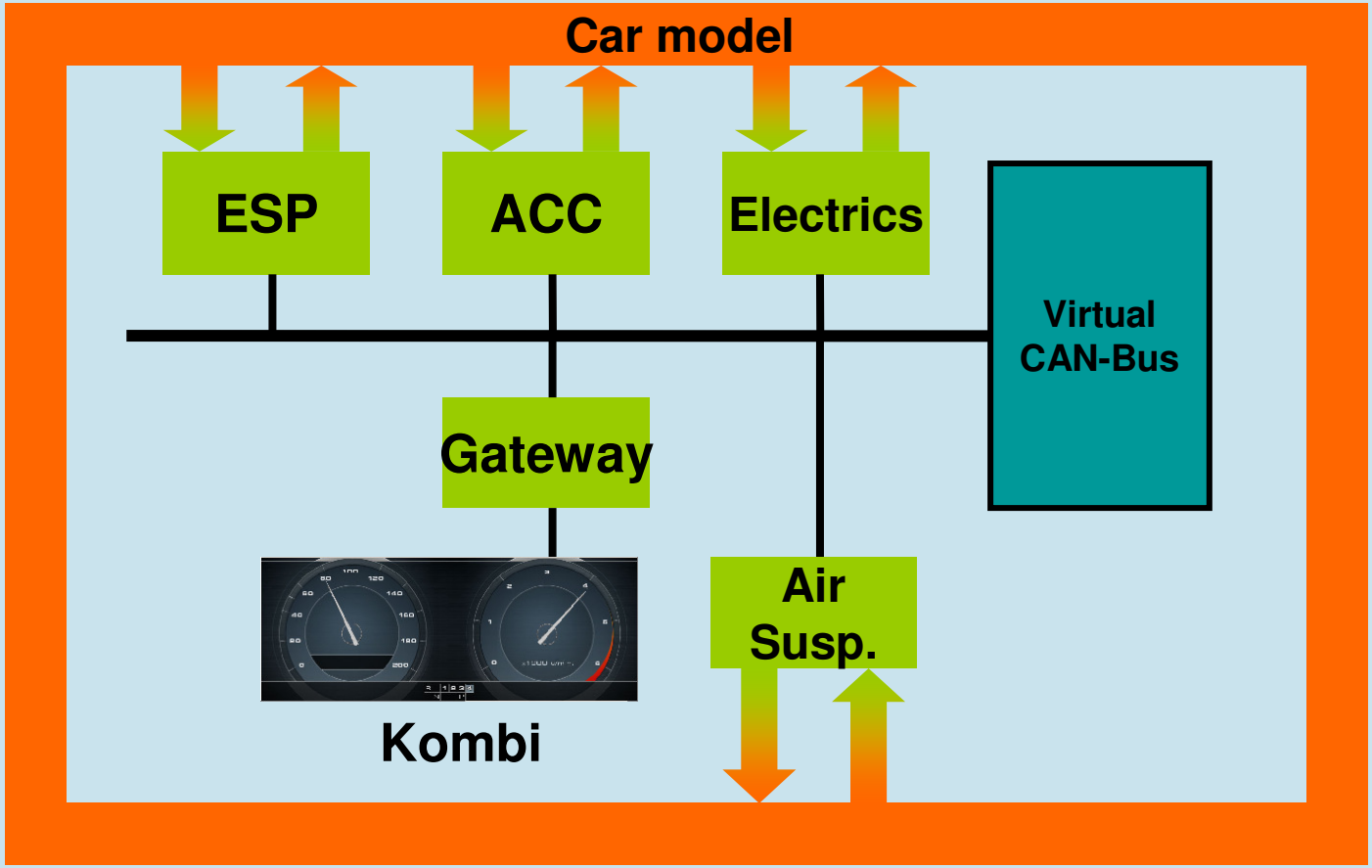
Example complex, distributed systems



Source: „Virtual ECU network", Bertrandt Product-Flyer,
VDI Conference Baden Baden, 2001

EXITE Architecture today

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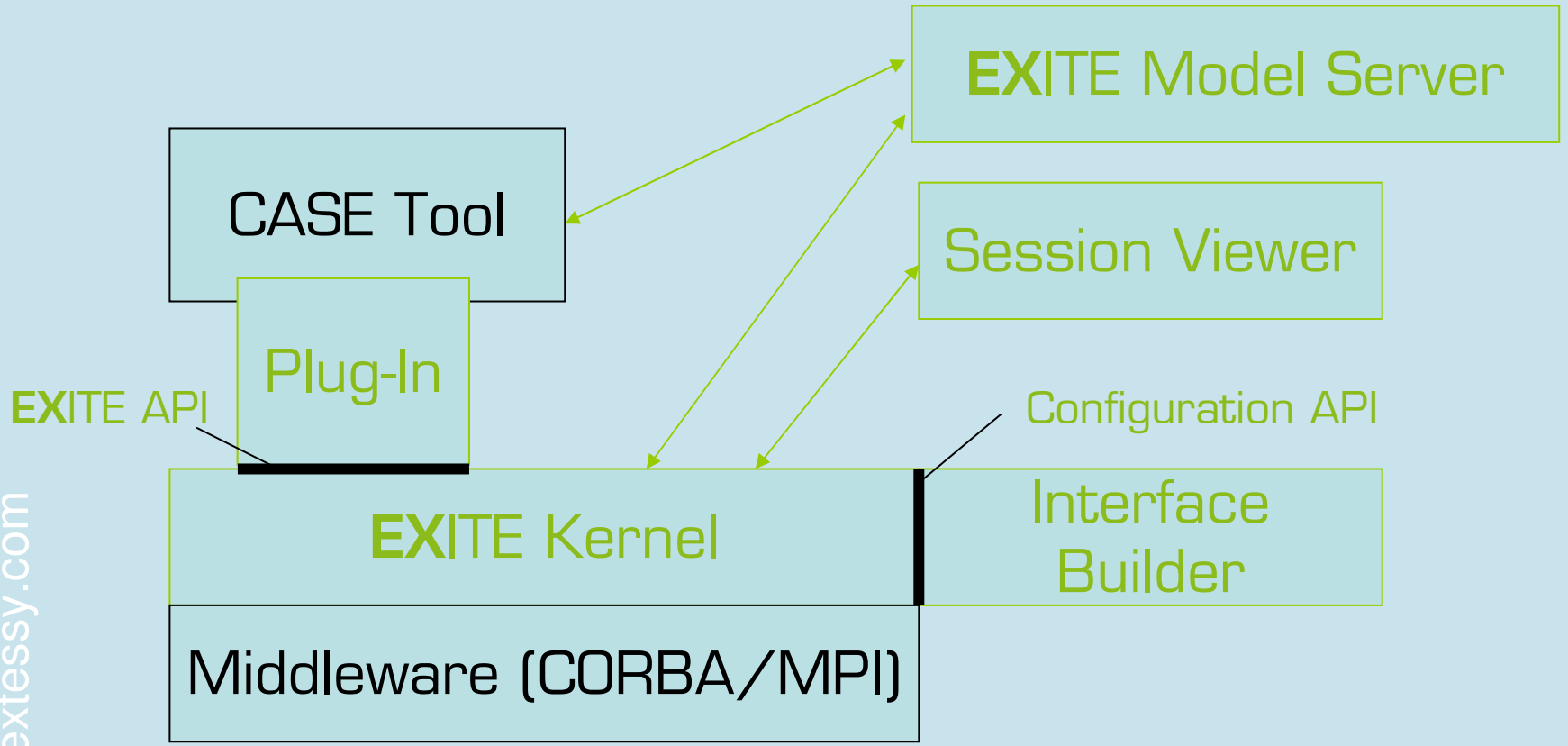

References **EX**ITE

- Bertrandt Ingenieurbüro GmbH
- Audi AG, Audi Electronic Venture GmbH
- Volkswagen AG
- BMW Group
- Deuta Werke
- EADS
- Lineas Automotive GmbH
- Northorp Grummin
- and Multiple Universities

Partners und co-operations

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- ARTiSAN Software Tools
- Telelogic Deutschland
- I-Logix
- The MathWorks Connections Partner
- ETAS

- TU Braunschweig
- C&S Group
- Carmeq GmbH
- AUDI Electronics Venture
- etamax Space GmbH