



## Research project “Emporer”: An Open Source Based Application Framework for the Development of Environmental Management Information Systems (EMIS)

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- Motivation and project aims
- Architecture
- Open-source
- Status Quo
- Outlook

- Application Field: Environmental Management Information Systems
  - focussing on industrial environmental protection questions
  - processing environmental and environmentally relevant data
  - supporting planning and controlling of environmental protection actions of companies
- Different methods, techniques from different disciplines may be used as well as diverse software tools
  - Modelling and Simulation
  - Computer graphics
  - Data and functional Integration
  - LCA
  - ...

➔ There is no software tool that fulfils all requirements in this field

- Desires regarding EMIS-software...
  - Method pool (Scientific and practical)
    - Implementation of new methods
    - Modification of existing methods
    - Linking together different methods
  - Data
    - Binding of new data sources
    - Export of created data
    - Updating of external data
    - Report creation
  - Software pool



## Motivation

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### ■ Two basic approaches to use new data and methods:

- Use and expand existing software tools
  - You can use the software's core functionality
  - Software might not be open enough
  - You are limited to the software's philosophy
  - High effort
- Build your own application
  - Even higher effort
  - You have to "reinvent the wheel"

➔ Idea: Providing an expandible software platform containing a basic infrastructure with typical reusable methods and components for the field of EMIS



## Project aims

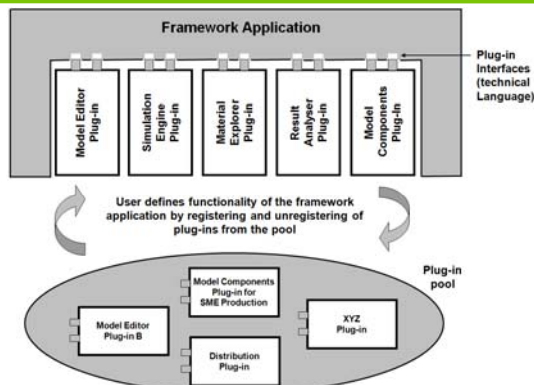
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- Method toolbox for environmental management information system (EMIS) based on an open plugin-framework using .Net-technology
- Base-Framework (Infrastructure)
  - Provides typical EMIS base functions
  - Extendible through plugins
  - Included GUI
- Exemplary plugins from the EMIS-domain (methods)
  - Material flow analysis
  - Simulation
- Diverse application contexts and usage purposes



## Project aims ("Vision")

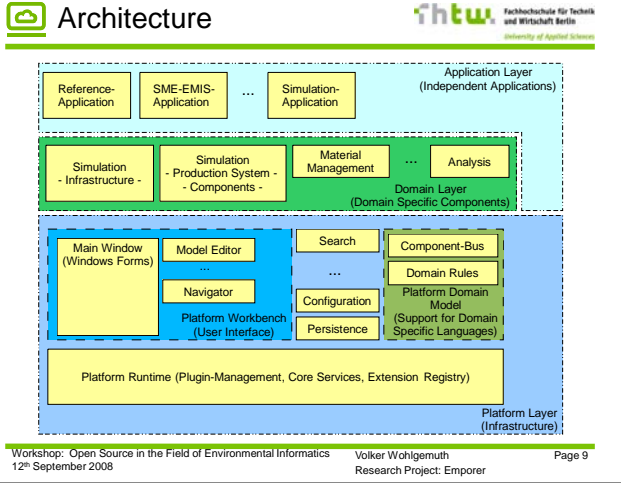
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## Architecture

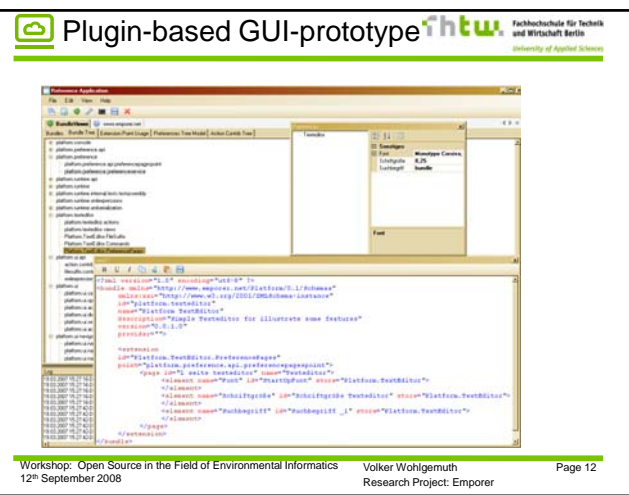
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- Integratable, integrating and extensible...
- Plugins, extensions and extension points
- API, interfaces, technical languages (domain specific language - DSL)
- Separation of GUI and application logic
- Layered
- Development of custom plugins to custom applications is possible

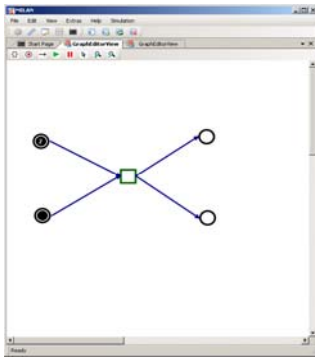


- ## Open source
- Use of open source
    - No limitations to a certain software's philosophy
    - Minimizes effort
    - Avoidance of double implementations
    - Expandable
  - Other open-source software
    - Eclipse
  - Providing software as open-source
    - Community-building, feedback
    - Specific plugins submitted by users
    - Lower hurdle in testing and using
    - Educational and practical focus
- Workshop: Open Source in the Field of Environmental Informatics  
12<sup>th</sup> September 2008  
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- ## Status Quo
- Platform runtime
  - Platform workbench
  - Platform domain model
  - XML-based configuration
    - Plugins
    - Components
    - Technical languages
  - GUI-prototype
- Workshop: Open Source in the Field of Environmental Informatics  
12<sup>th</sup> September 2008  
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## Plugin-based Example



■ Petri Net Simulator

## Summary and outlook

- Platform is largely complete and efficient
- Going public: Beginning of 2009
- Integration in teaching
  - Projects
  - Bachelor and Master Thesis
- Expansion to further industry sectors
  - Solar panel production
  - Printing
- Expansion to further domains
  - Reviews for health risks
  - Visualization of environmental data

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**WWW.EMPORER.NET**



*Thanks for your attention!*

## Project introduction

- Material flow analysis and simulation as starting point for environmental management information systems (EMIS) based on an open plugin-framework using .Net technology
- Project supported by the German Federal Ministry of Education and Research (BMBF) at the FHTW Berlin (Industrial Environmental Informatics). Runtime from the end of 2006 until the end of 2009
- Network partners: SMEs, software company and the Leuphana University of Lüneburg
- 1 Project Leader, 3 Developers, 4 Student Developers