e-stat: Views, Methods, Applications

E. Cramer, W. Härdle, U. Kamps, R. Witzel
Humboldt-Universität zu Berlin & Universität Oldenburg

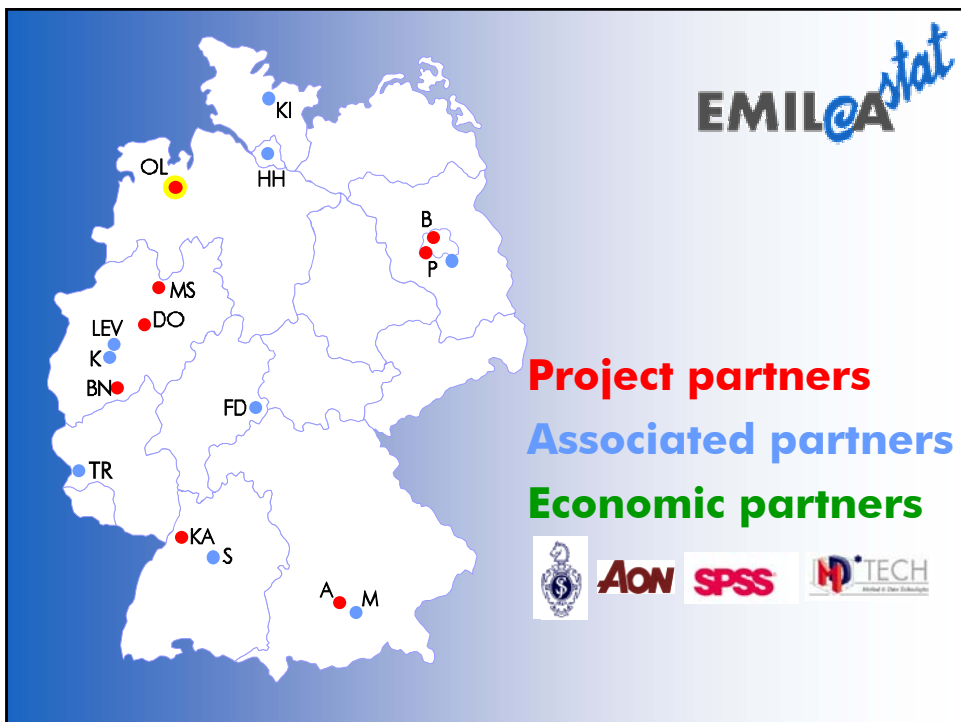
- **The project e-stat**
- **The teaching and learning environment EMILeA-stat**
- **Architecture of EMILeA-stat**
- **Statistical Engines**

- **supported by the German Federal Ministry of Education and Research (bmb+f)**
- **"New Media in Education Funding Programme"**
- **project period: 04/2001 – 03/2004**
- **grant: 2.9 Mio. €**
- **located at 8 German universities**
- **about 70 people involved**

E. Cramer, W. Härdle, U. Kamps, R. Witzel ISI 2003, 14.08.2003

Project partners
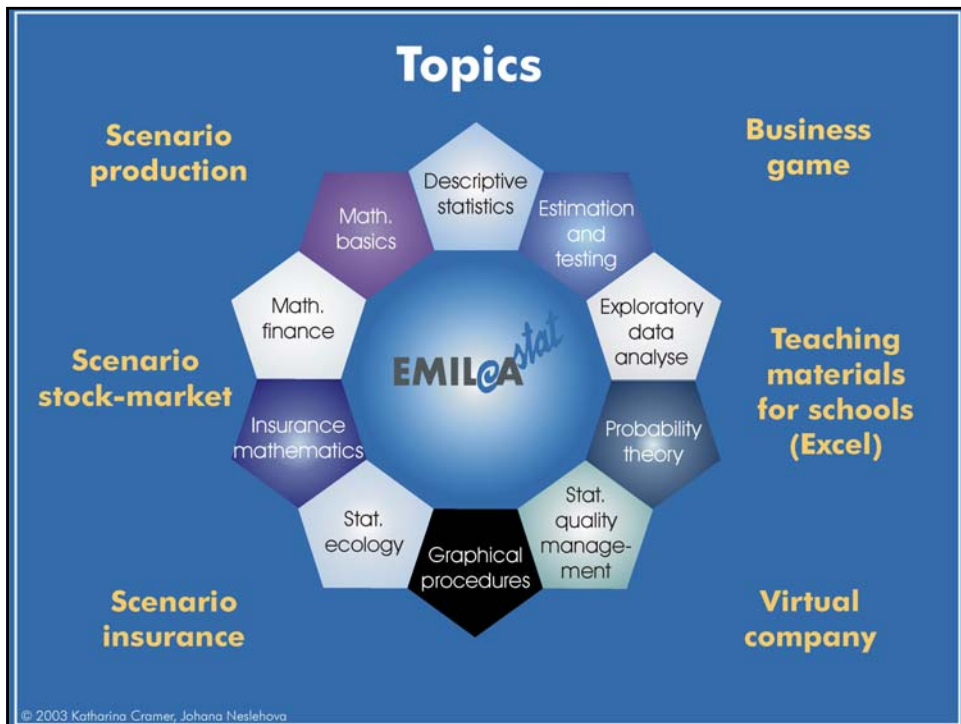**Associated partners**
Economic partners

Statistical education has become fundamental in ...

> **many courses of studies (e.g., bio or life sciences, computer sciences, economics, engineering, mathematics, psychology, etc.)**
> **schools**
> **teacher-training courses**
> **in-service training courses and further vocational training**

E. Cramer, W. Härdle, U. Kamps, R. Witzel ISI 2003, 14.08.2003

Topics

- Descriptive statistics
- Estimation and testing
- Math. basics
- Math. finance
- Exploratory data analyse
- Probability theory
- Insurance mathematics
- Stat. ecology
- Graphical procedures
- Stat. quality management

Scenario production
Business game
Scenario stock-market
Teaching materials for schools (Excel)
Scenario insurance
Virtual company

EMIL@Astat

© 2003 Katharina Cramer, Johana Neslehova

Features

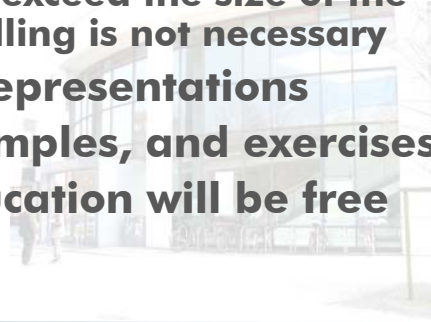- **learning and teaching environment**
- **intelligent statistical encyclopaedia for "everyday-statistics"**
- **multimedia, web-based, interactive**
- **teaching, selective support of teaching, and web-based learning**
- **supervised and self-directed learning**
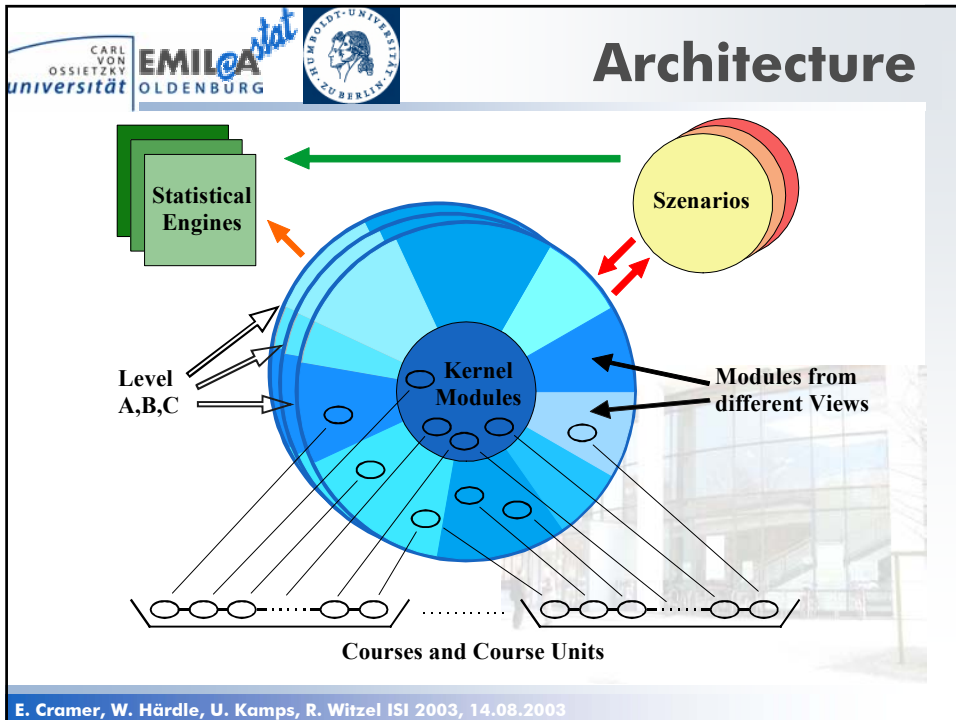- **accessible anywhere, anytime, and for anyone**

- **user-oriented product**
  "different users have different needs"
  - **three levels of abstraction:**
    - **A**: elementary
    - **B**: basic
    - **C**: advanced
  - **incorporation of different views**
    - Economics
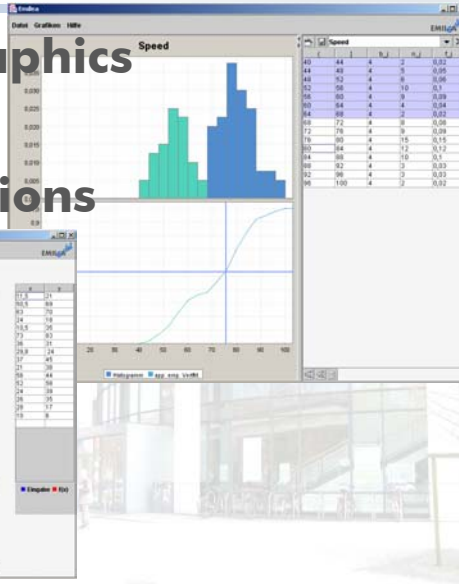   - Psychology
    - ...

- **Content is strictly modular**
  - **module:** smallest element
  - **e.g., definition, remark, theorem, proof, example, exercise**
  - **a module should not exceed the size of the screen such that scrolling is not necessary**
- **focus on graphical representations**
- **includes theory, examples, and exercises**
- **non-commercial education will be free of charge!**

Architecture

Statistical Engines

Szenarios

Kernel Modules

Level A,B,C

Modules from different Views

Courses and Course Units

Standards

- XML
- MathML
- Tools
  - XML editor (XML Spy)
  - MathType
  - LaTeX content can be converted using MD*Book (www.md-book.com)
- Content is stored in Tamino-XML database

Standards

> **Interactive Graphics**
> - **Java applets**
> - **Flash animations**

Statistical Engines

> **XploRe (XQC), R (Rweb)**
> **SPSS (locally)**
> **always available**
> learning of statistical theory and its applications at the same time

e-stat GUI, XploRe

Gehe Zu | Warenkorb | Optionen | History | Drucken | Hilfe

EMIL@stat

Stöbern in e-stat

Inhaltsverzeichnis

Inhalte von Prof. Dr. Härdle > Zeitreihenanalyse > Zeitreihe > Allgemeines Zeitreihenmodell > ARMA
Saisonaler ARMA(p,q)-Prozeß

Level A | Level B | Level C

Einführung | Schätzung | XploRe-Beispiel (Flugpassagiere)

Entwicklung des Flugpassagieraufkommens

Es werden zwei saisonale Zeitreihenmodelle an die bekannten Box und Jenkins Flugpassagierdaten angepasst. estatzeitreihe1.xpl [Click to start XQC] zeigt eine Graphik, die die jaehrlichen Veraenderungen in den Wachstumsraten der Anzahl an internationalen Flugpassagieren (in Tausend) von Februar ... bis Dezember 1960 wiedergibt.

Modell 1

$$y_t = (1 + \theta_1 L)(1 + \theta_{s,1} L^{12})\varepsilon_t$$

$$= \varepsilon_t + \theta_1 \varepsilon_{t-1} + \theta_{s,1} \varepsilon_{t-12} + \theta_1 \theta_{s,1} \varepsilon_{t-13}$$

Beim Modell 1 handelt es sich um ein multiplikatives saisonales ARMA–Modell. Das Quantlet estatzeitreihe2.xpl [Click to start XQC] schaetzt dieses Modell.

Modell 2

$$y_t = \varepsilon_t + \theta_1 \varepsilon_{t-1} + \theta_{12} \varepsilon_{t-12}$$

Das zweite Modell ist ein ARMA(0,12)–Modell mit Nullrestriktionen auf den meisten Koeffizienten. Das Quantlet estatzeitreihe3.xpl [Click to start XQC] schaetzt dieses Modell.

Als Ergebnis sieht man, dass die geschaetzte Varianz der Residuen fuer das erste Modell ...

XploRe® | SPSS | R

XploRe Output

CARL VON OSSIETZKY universität OLDENBURG | EMIL@stat | HUMBOLDT-UNIVERSITÄT ZU BERLIN

XQC
XQC Program Help
Output/Result

Welcome to XploRe Quantlet Client
Version 1.3

Contents of _tmp

[1,] "================================"
[2,] " Estimation results for the SARIMA(0,1,1)x(12,0,1,1)
[3,] "
[4,] " Convergence achieved after 11 iterations
[5,] " 131 observations included
[6,] "
[7,] "   Variable   Coefficient   t-stat
[8,] "
[9,] "   theta_1   -0.3776   -4.3206
[10,] "   theta_s,1   -0.5728   -8.2073
[11,] "
[12,] "   Sum of squared resids 0.1819   s2
[13,] "   R2   0.3343   adj. R2
[14,] "   AIC   -3.7110   SIC
[15,] "================================"

XQC
XQC Program Help

Status of calculation

XploRe - The Interactive Statistical Computing Environment

- **All features of XploRe can be used to analyse data**
- **Xplore can be embedded into Java applets**
  - **methods**
  - **graphics (e.g., 3d plots, boxplots, etc)**

Questions, ideas, remarks, ... are

very much appreciated!

www.emilea.de

Dr. Katharina Cramer
(project coordinator)

Prof. Dr. Udo Kamps
(project leader)

Carl von Ossietzky Universität Oldenburg
Fakultät V
Institut für Mathematik
26111 Oldenburg
Tel.: 0441/798-3216
Fax: 0441/798-5614
e-stat@uni-oldenburg.de