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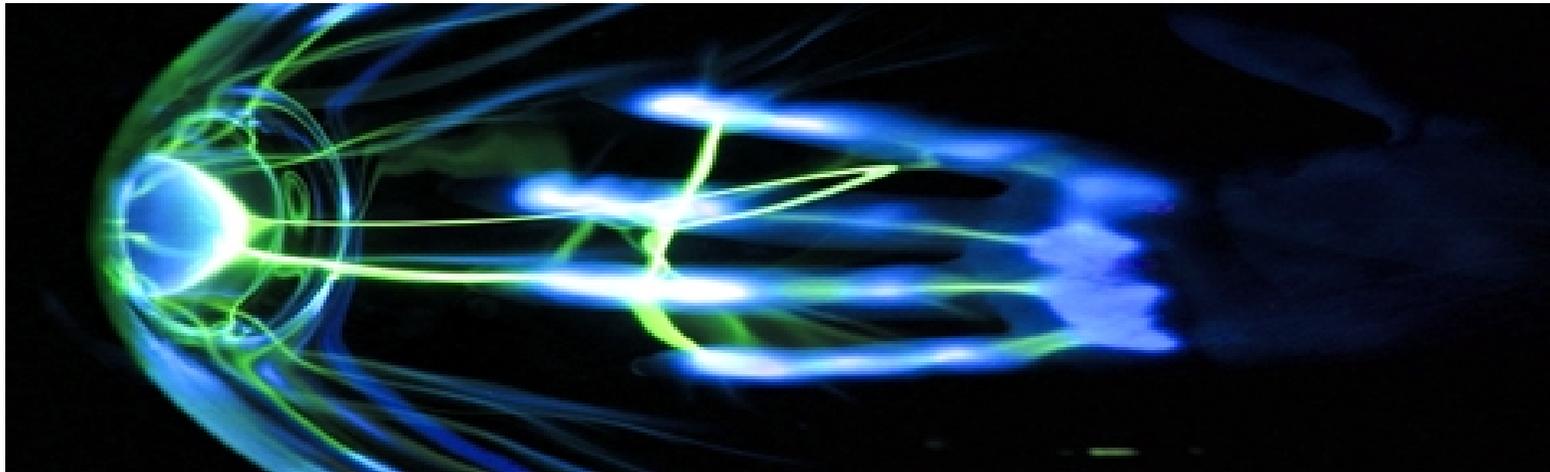
The Challenge of Internationalization – Can you handle Prapawadee Jaroenrattanatarakoon* ?
# 12.09.2008

VDMA

* Gold Medalist at the Olympic Games in Beijing 2008

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Embedded Software Revenues

AAGR16 %

Revenue in Mrd. $

2004   2009
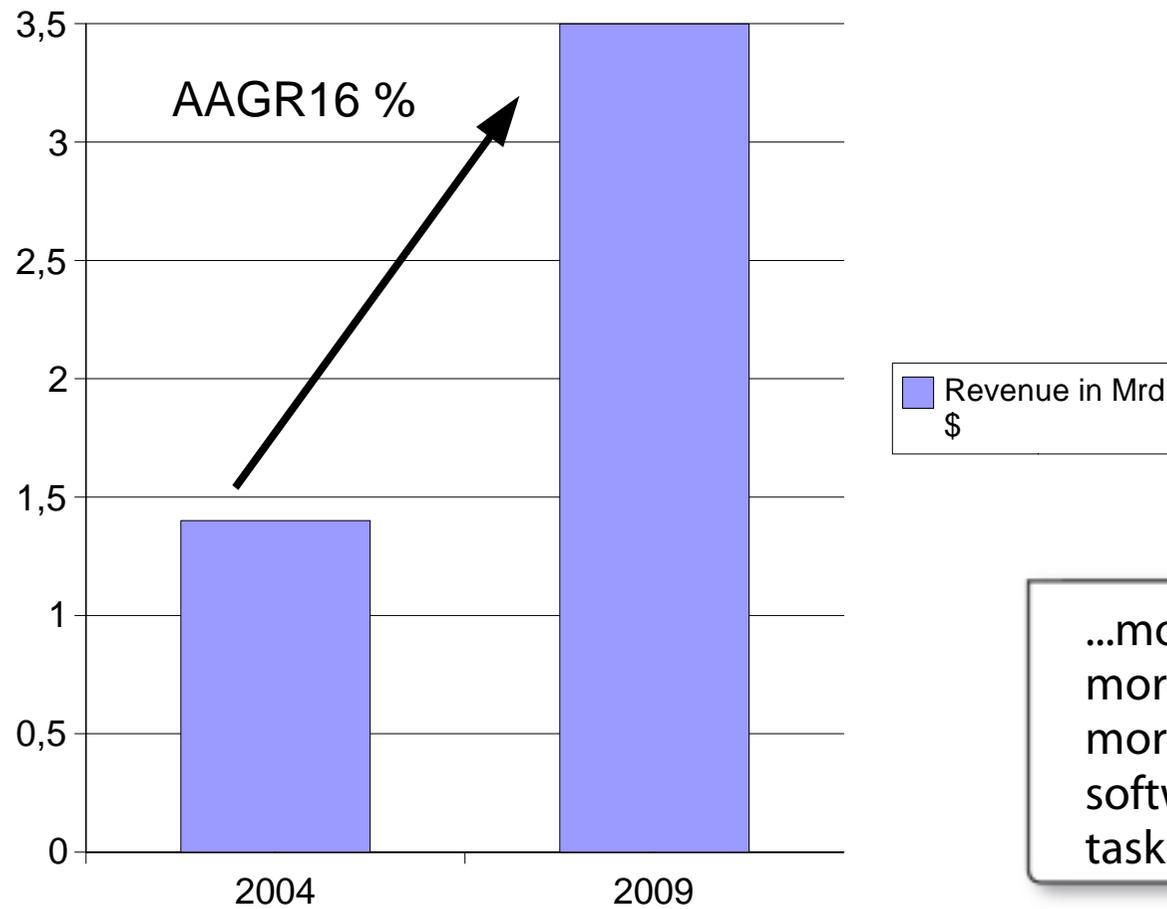
Source: BCC, Inc. estimated 2006

...more people in more countries use more embedded software for various tasks!

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What is Software Internationalization ?

Developing Software

Generel Rules

Checklist

Based in Kiel, Customers in various industries

- Software for...

  - *Printing machines*

  - *X-ray material testing*

  - *Textile machines*

  - *Aeroplanes*

  - *Ships*

  - *SCADA Systems*

  - *...*

A macio GUI for a register control machine in the printing industry

Register control

- *Workflow for Touch Screen*

- *Authentifiication is possible while system is running*

- *Language und units can be switched seperately*

- *configuration by XML*

- *running in countries all over the world*

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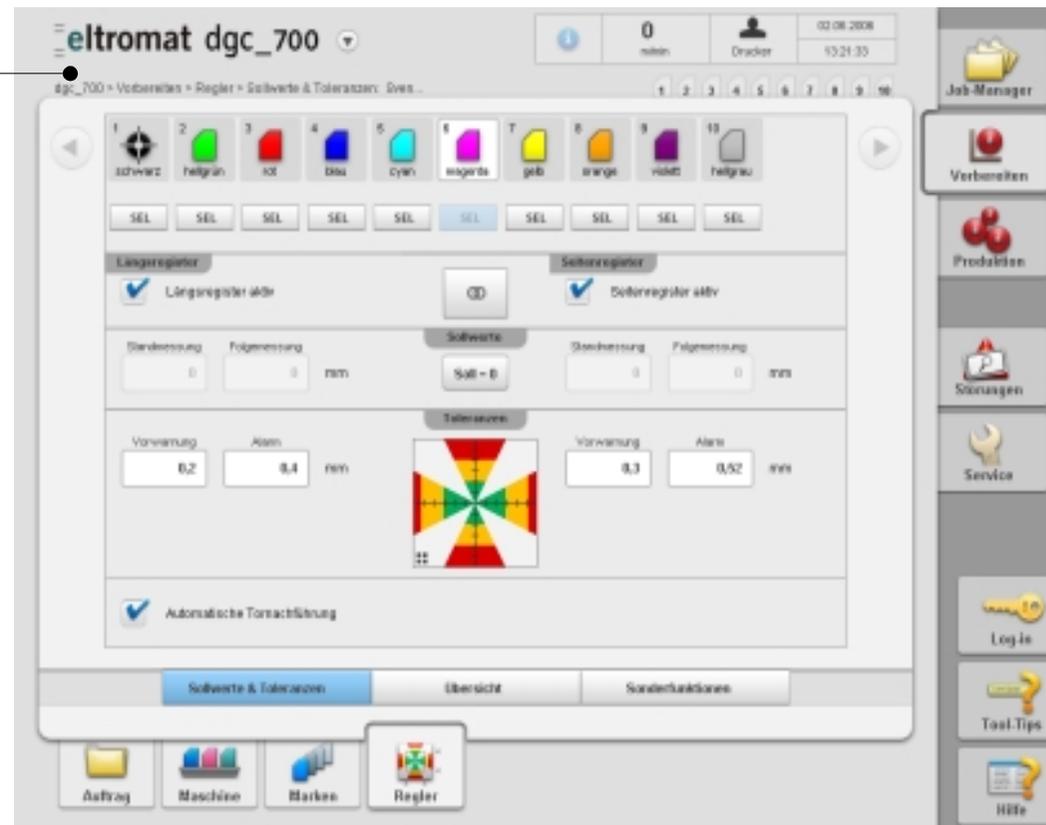
It is a trade-off!

Icons and more...

Software Internationalization means to develop software that can be adjusted to local market requirements concerning the Look & Feel of the software.

Colours and Numbers

Names and text lengths

Fonts and Sorting

What is Software Internationalization ?

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Example of a software architecture

User Interface

Business-Layer

Data

Persistence

Communication/Interface

PLC, Server…

Internationalization
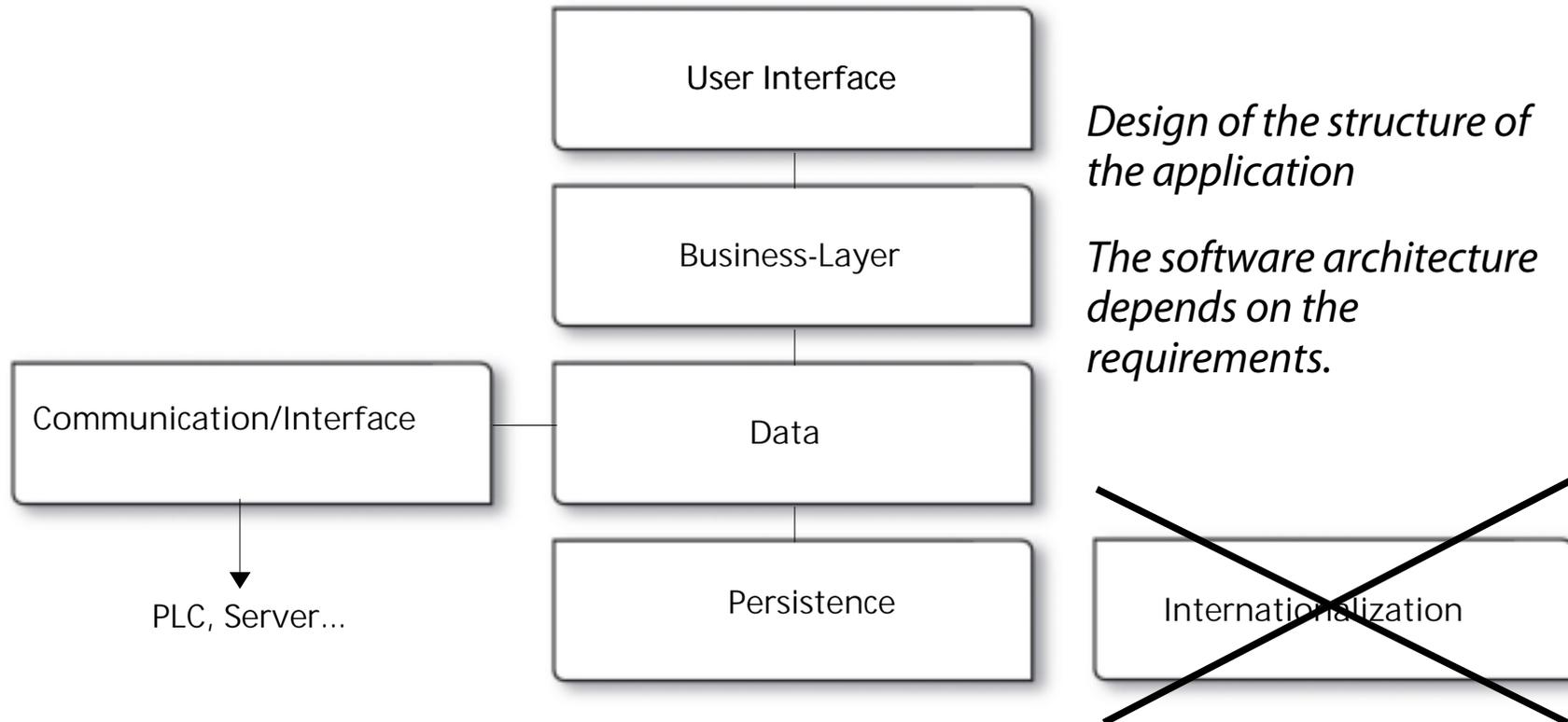
Design of the structure of the application

The software architecture depends on the requirements.

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Software Design aspects – Internationalization is in line with others

User Interface

Business-Layer

Communication/Interface

Data

PLC, Server…

Persistence

- *Performance*
- *Service*
- *Modifications*
- *Modul based*
- *Security*
- *platform independence*
- *Internationalization*
- *Costs*

Example: Presenting Text

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User Interface

```
Speed        18        km/h
```

Ressource-
Manager
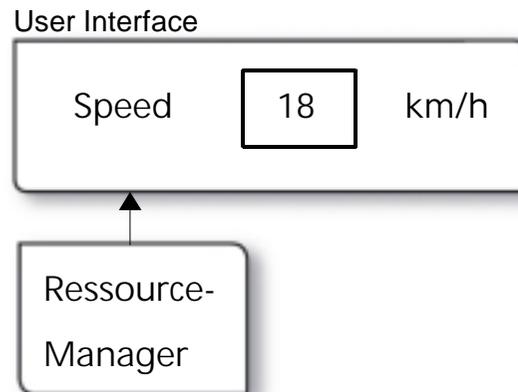
```
// Do not use hard coded text !!!
label.setText ("Speed");
```

```
// Use Resource-IDs which are independent from languages
String speedString = Resourcemanager.getText (ID_SPEED_LABEL);
```

Example: Units

*Software Internationalization is important for all software layers!*

User Interface

Speed | 18 | km/h

Business-Layer

Data

Float-Speed = 5

Persistence

Float-Speed = 5

Unit-Manager

Ressource Manager

Unit persistent

Datafaormat z.B. m/s

Example: Saving Data

```
┌─────────────────────────┐
│                         │
│      User Interface     │
│                         │
└─────────────────────────┘
             │
┌─────────────────────────┐
│                         │
│      Business-Layer     │
│                         │
└─────────────────────────┘
             │
┌─────────────────────────┐
│                         │
│          Data           │
│                         │
└─────────────────────────┘
             │
┌─────────────────────────┐
│                         │
│       Persistence       │
│                         │
└─────────────────────────┘
```
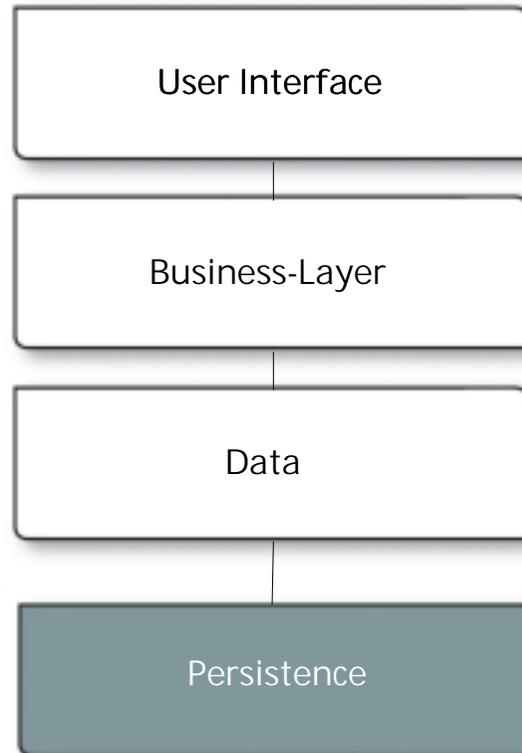
- *Do not save Data that contain localized information*

- *Example Log-File:*

  log.write („26.05.08   Speicher ist voll");   // bad

 *log.write(Timestamp,ID_MEMORY_FULL);   // good*

Important is also the system that you communicate with
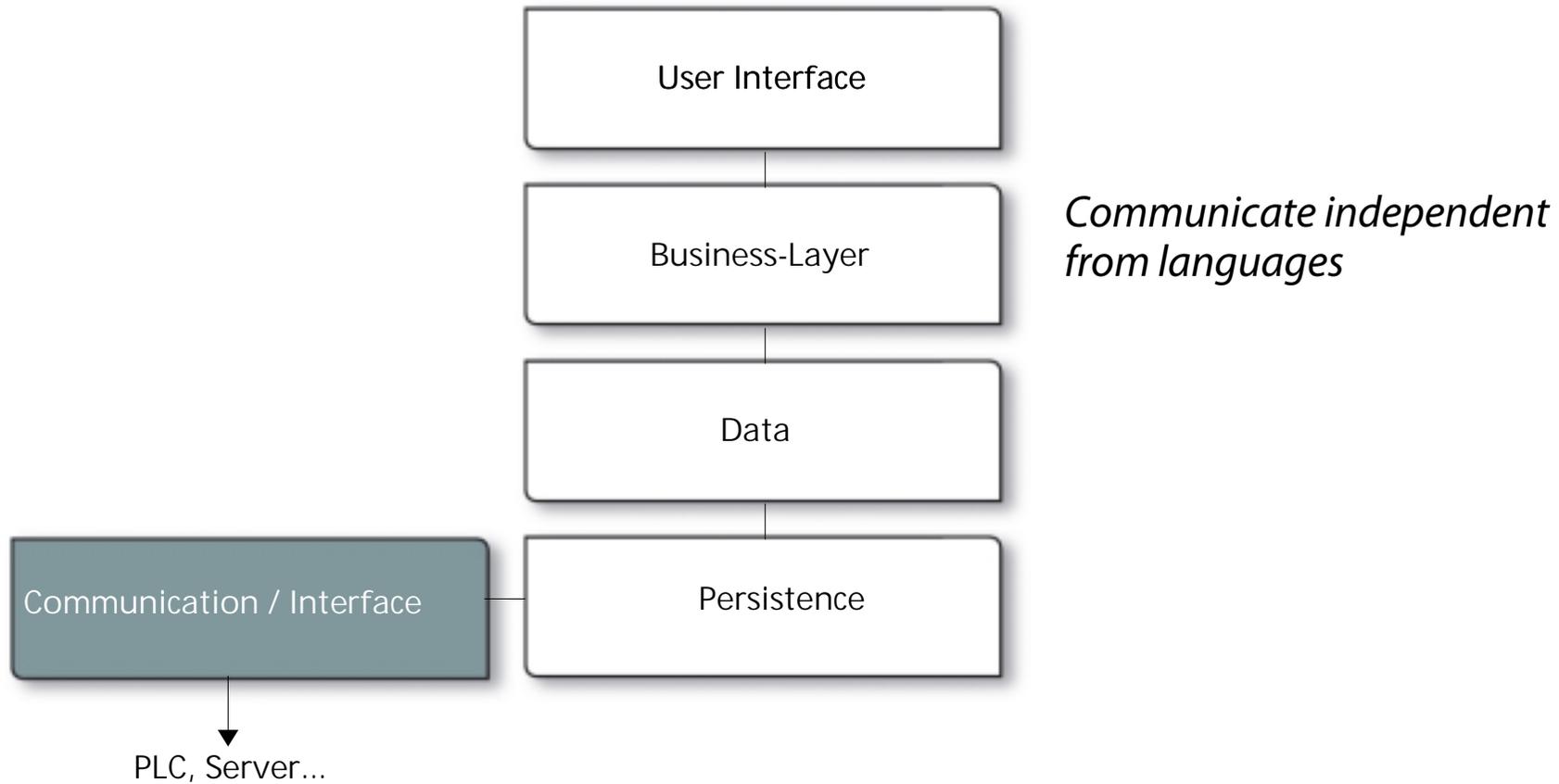
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```
        ┌─────────────────────────┐
        │     User Interface      │
        └─────────────────────────┘
                    │
        ┌─────────────────────────┐
        │     Business-Layer      │          *Communicate independent*
        └─────────────────────────┘          *from languages*
                    │
        ┌─────────────────────────┐
        │          Data           │
        └─────────────────────────┘
                    │
┌──────────────────────────┐  ┌──────────────────────────┐
│ Communication / Interface │──│       Persistence        │
└──────────────────────────┘  └──────────────────────────┘
        │
        ▼
    PLC, Server...
```

Embedded Software has to deal with a variety of product functions

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```
┌─────────────────┐  ┌──────────┐
│  User Interface │  │          │
└─────────────────┘  └──────────┘
        │
┌─────────────────┐  ┌──────────┐
│  Business-Layer │  │          │
└─────────────────┘  └──────────┘
        │
┌─────────────────┐  ┌──────────┐
│      Data       │  │          │
└─────────────────┘  └──────────┘
        │
┌─────────────────┐  ┌──────────┐
│   Persistence   │  │          │
└─────────────────┘  └──────────┘
```
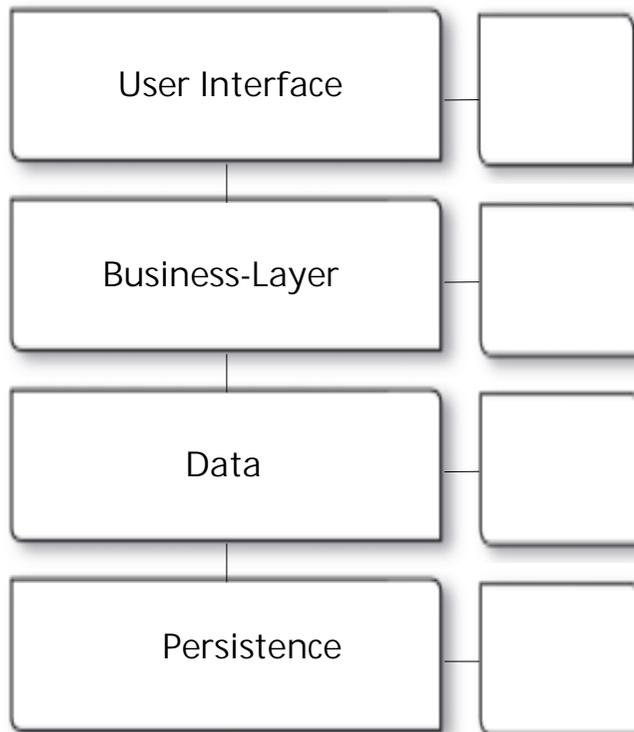
Example washing machines in Israel

one software version supports all country versions

LAYOUT MANAGER

- Is a flexible layout necessary or do the requirements not change over time?

- Text lengths!

• **Number of letters in the "english" String**	• **space needed, compared to German**
• *1 to 6*	• *15 Charcters*
• *7 to 25*	• *2,2 times the charcters*
• *26 to 40*	• *1,9 times the charcters*
• *41 to 70*	• *1,7 times the charcters*
• *to 70*	• *1,5 times the charcters*

LAYOUTMANAGER

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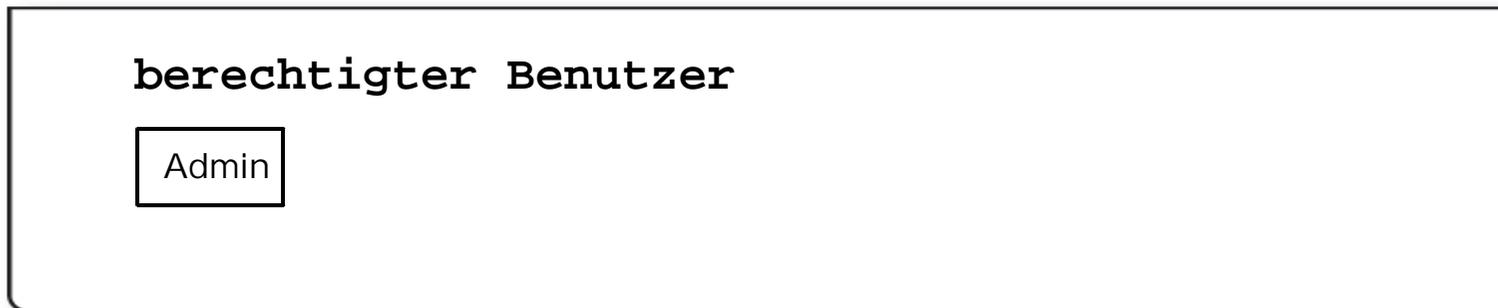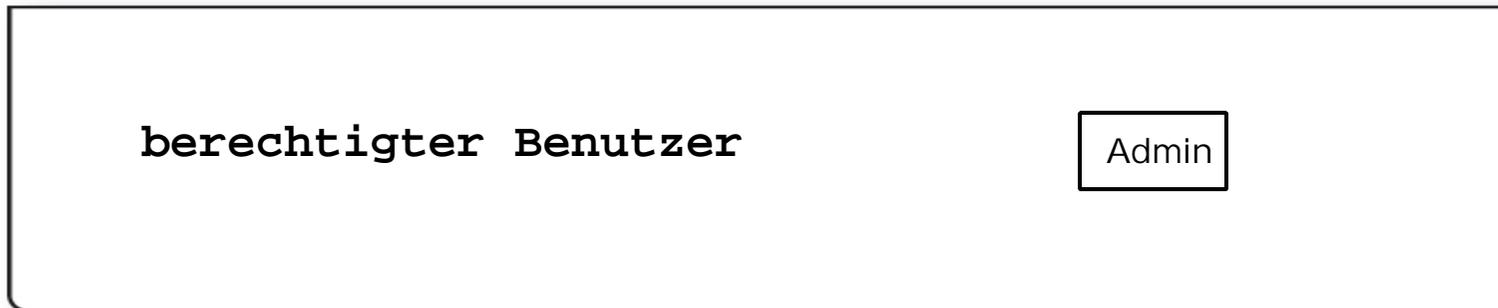
Authorized User | Admin |

berechtigter Benutzer | Admin |

berechtigter Benutzer

| Admin |

FLEXIBLES LAYOUT

AUTHORIZED USER Admin

BERECHTIGTER BENUTZER Admin

FLEXIBLES LAYOUT

Frei definierbare Regeln für wachsende Controls
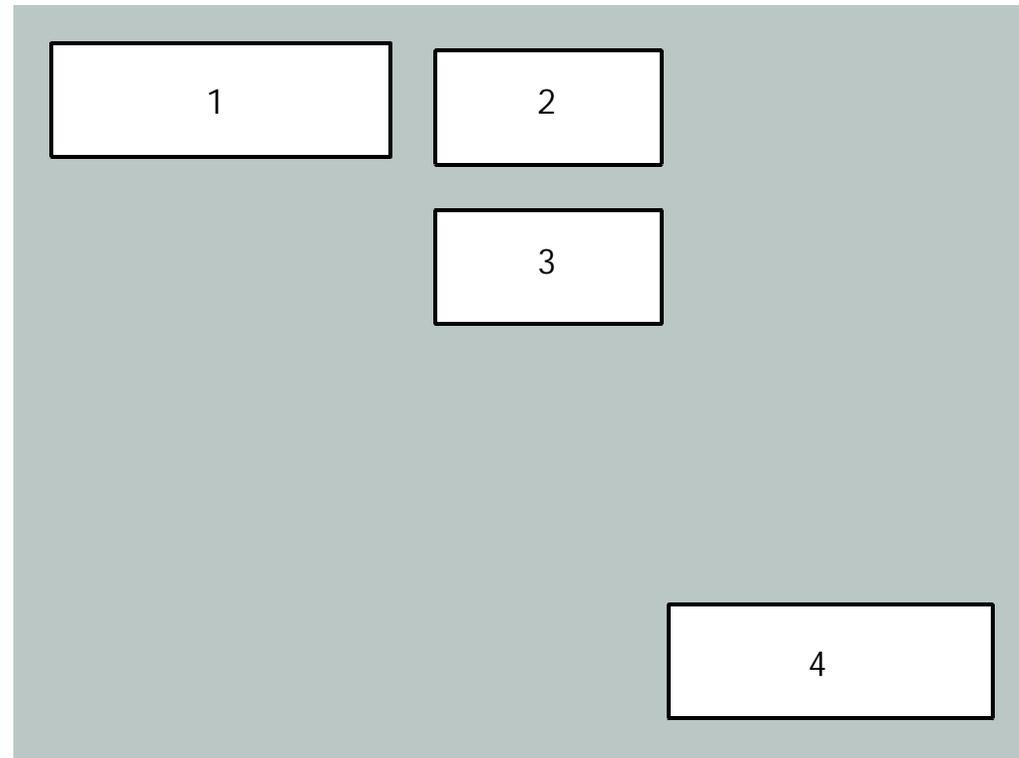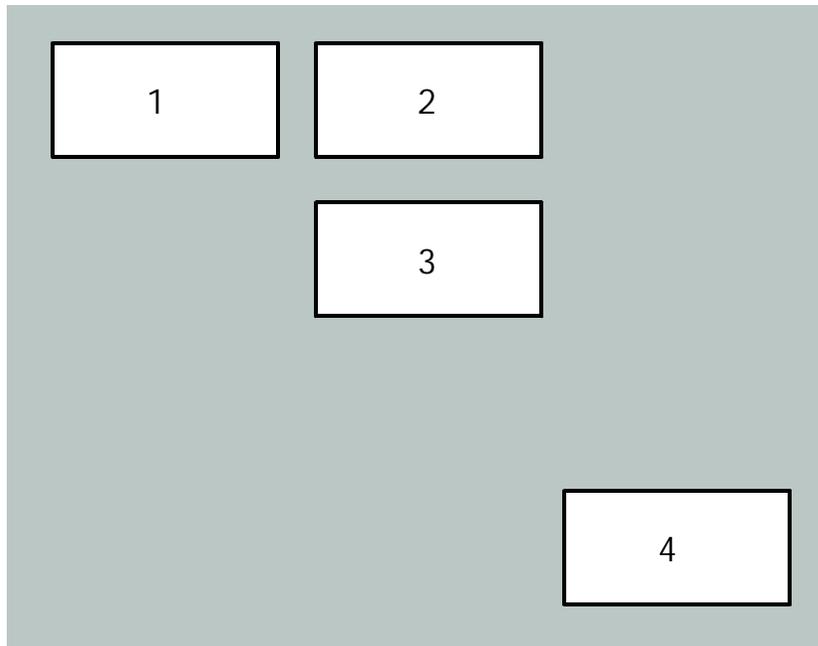
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Learnings about software internationalization

- do not use hard coded text!

- distinguish between User Interface and Business Layer

- use small modules that can be replaced easily
  (outsource the text into textfiles or a dll)

- use managers to have modules –make it easy to extend the
  software later
  ==> BUT: stick to the common development guidelines

- integrate "software internationalization" into your requirements
  engineering – it is part of it

- internationalization is also not special – it is part of your
  development process+

- be aware, that later on it is much more expensive to make a
  software capable of localizations.