# Digital Society Trends: Challenges in Distributed Knowledge

# Panel Members

- Manfred Grauer, University of Siegen, Germany
- Marko Jäntti, University of Kuopio, Finland
- Thomas Neubauer, Secure Business Austria, Austria
- Lubomir Stanchev, IPFW, USA
- Andrea Bellandi, University of Pisa, Italy
- Perry Fizzano, Western Washington University, USA

# Current State of Semantic Web

- The web contains vast amount of data: billions of Web pages

- Most retrieval is text based (e.g. Google, Yahoo)

- Problems with current state:

  - Too many results displayed

  - Results depend on vocabulary

  - Results are single Web pages, not knowledge

# The Semantic Web

- We add meta information to each resource on the internet (e.g., web page, picture, video, RSS feed, web service, etc.)
- We now should be able to retrieve content based on semantics, not based on keyword matching.
- In order for this to work, all resources must reference a common Ontology or we need a way for merging ontologies.
- For example, a query asking for pictures of chairs from the European Renaissance should return pictures about all chairs crafted between the 14th and 17th century.
- The result:
  - is constructed from many websites
  - is produced based on available knowledge (e.g., ontology)

# Roadblocks to Adopting the Semantic Web

- Query answering is more complicated (need to reason with ontology)
- Efficient ways to compute answers not currently available for large data
- Queries must me specified using syntax that assumes knowledge of the ontology
- Most industry work is based on information retrieval e.g.
  - try to guess what the user is interested in from text input
  - extracting meaning from resources (e.g., image recognition and natural text processing to name a few)

# Challenges in Question Answering

Perry Fizzano

Dept of Computer Science
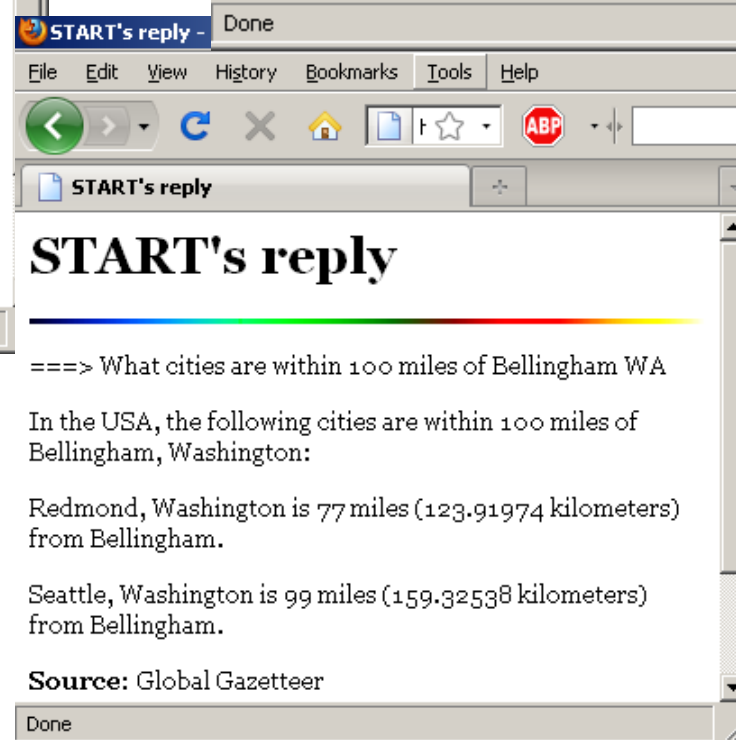
Western Washington University

# Question Answering

- Definition
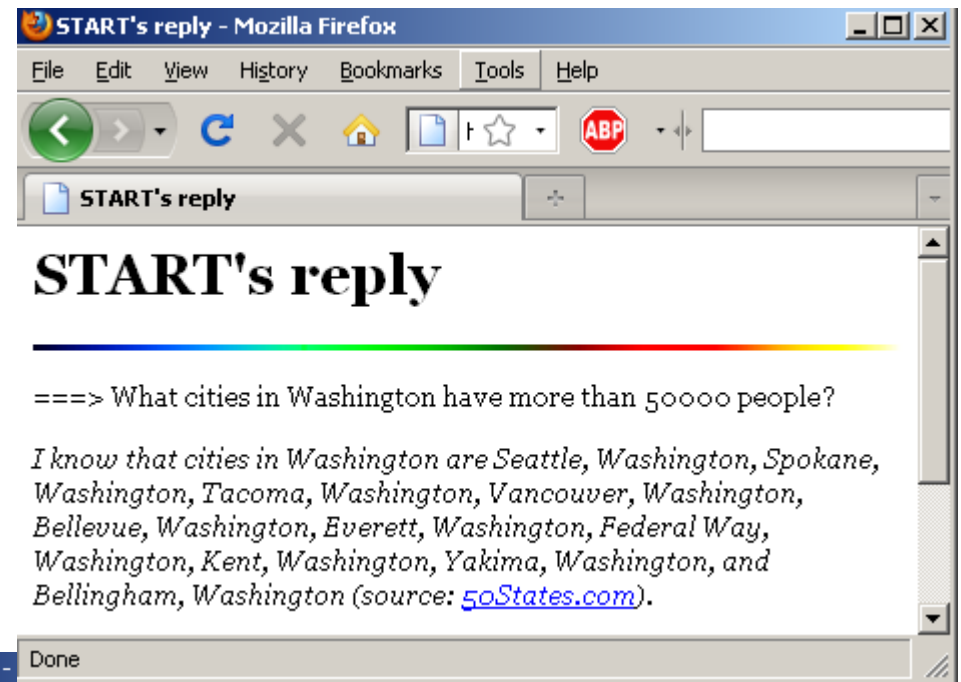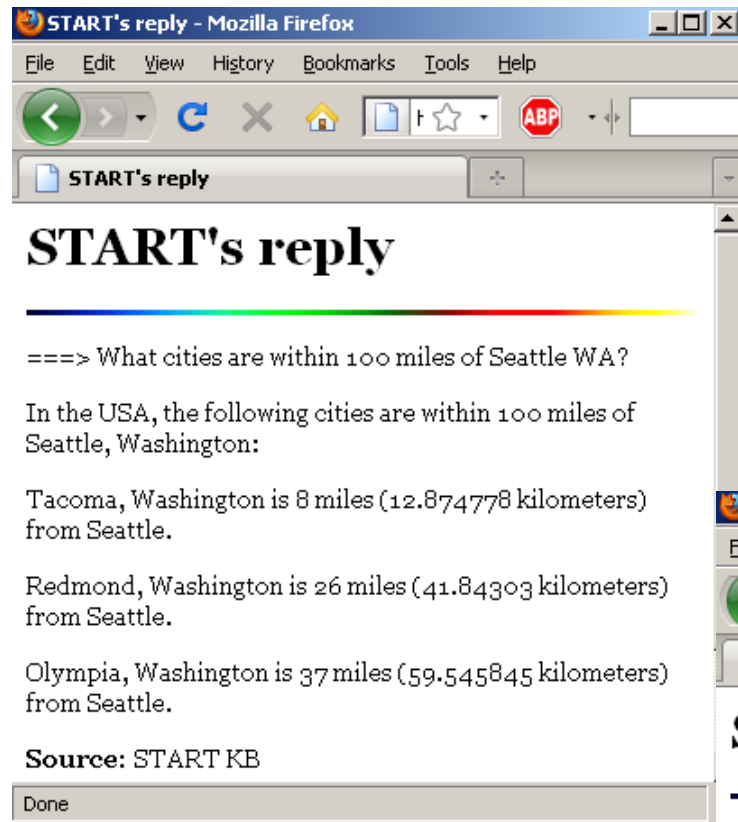  - Q.A. systems aim to provide succinct answers to a question as opposed to providing links
- Current systems
  - START – InfoLab group at MIT started in 1993
  - Lymba – Private company in Texas
  - AskMSR – Microsoft Research project
  - Many more are being developed

# Challenges

- Some relate to natural language processing

- Others relate to combining knowledge from different sources

# Example of Distributed Knowledge Challenge

## START's reply

===> What cities are within 100 miles of Seattle WA?

In the USA, the following cities are within 100 miles of Seattle, Washington:

Tacoma, Washington is 8 miles (12.874778 kilometers) from Seattle.

Redmond, Washington is 26 miles (41.84303 kilometers) from Seattle.

Olympia, Washington is 37 miles (59.545845 kilometers) from Seattle.

**Source:** START KB

## START's reply

===> What cities in Washington have more than 50000 people?

*I know that cities in Washington are Seattle, Washington, Spokane, Washington, Tacoma, Washington, Vancouver, Washington, Bellevue, Washington, Everett, Washington, Federal Way, Washington, Kent, Washington, Yakima, Washington, and Bellingham, Washington (source: 50States.com).*

## START's reply

===> What cities are within 100 miles of Bellingham WA

In the USA, the following cities are within 100 miles of Bellingham, Washington:

Redmond, Washington is 77 miles (123.91974 kilometers) from Bellingham.

Seattle, Washington is 99 miles (159.32538 kilometers) from Bellingham.

**Source:** Global Gazetteer

**International Conference on Information, Process, and Knowledge Management (eKNOW 2010), February 10-16, 2010, St. Maarten**

# Digital Society Trends: Challenges in Distributed Knowledge - Value Creation Chains and SME`s

**Manfred Grauer, University of Siegen, Germany**

# The Problem of Value Chains

- **Value Creation in R&D shifts from OEM`s to SME`s (last decade from ca. 45 % to 70 %).**

- **Concepts & Tools for using Distributed Knowledge are still underdeveloped!**
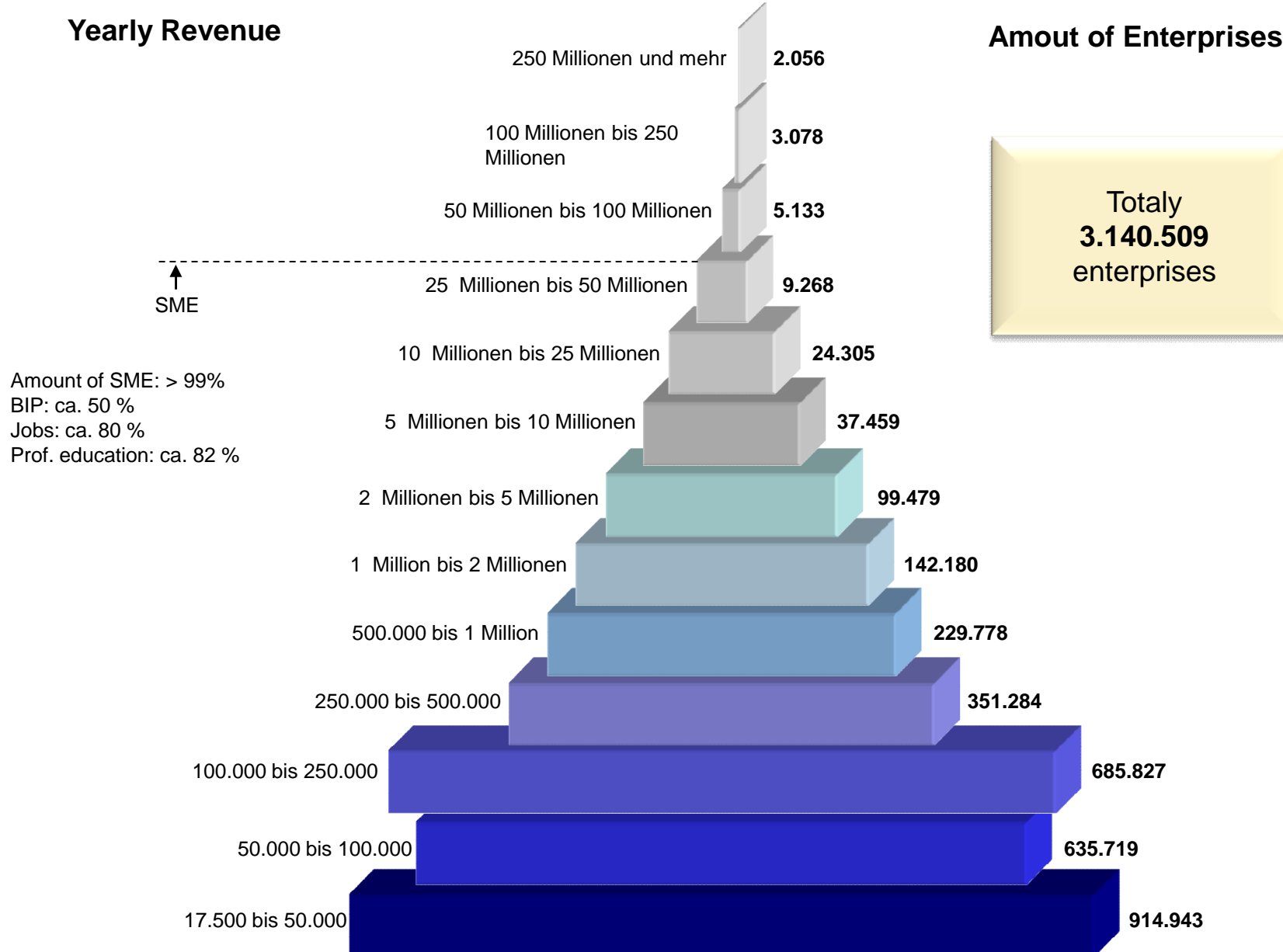
- **The case of German Automotive Industry: ...**

# Structure of Economy in Germany
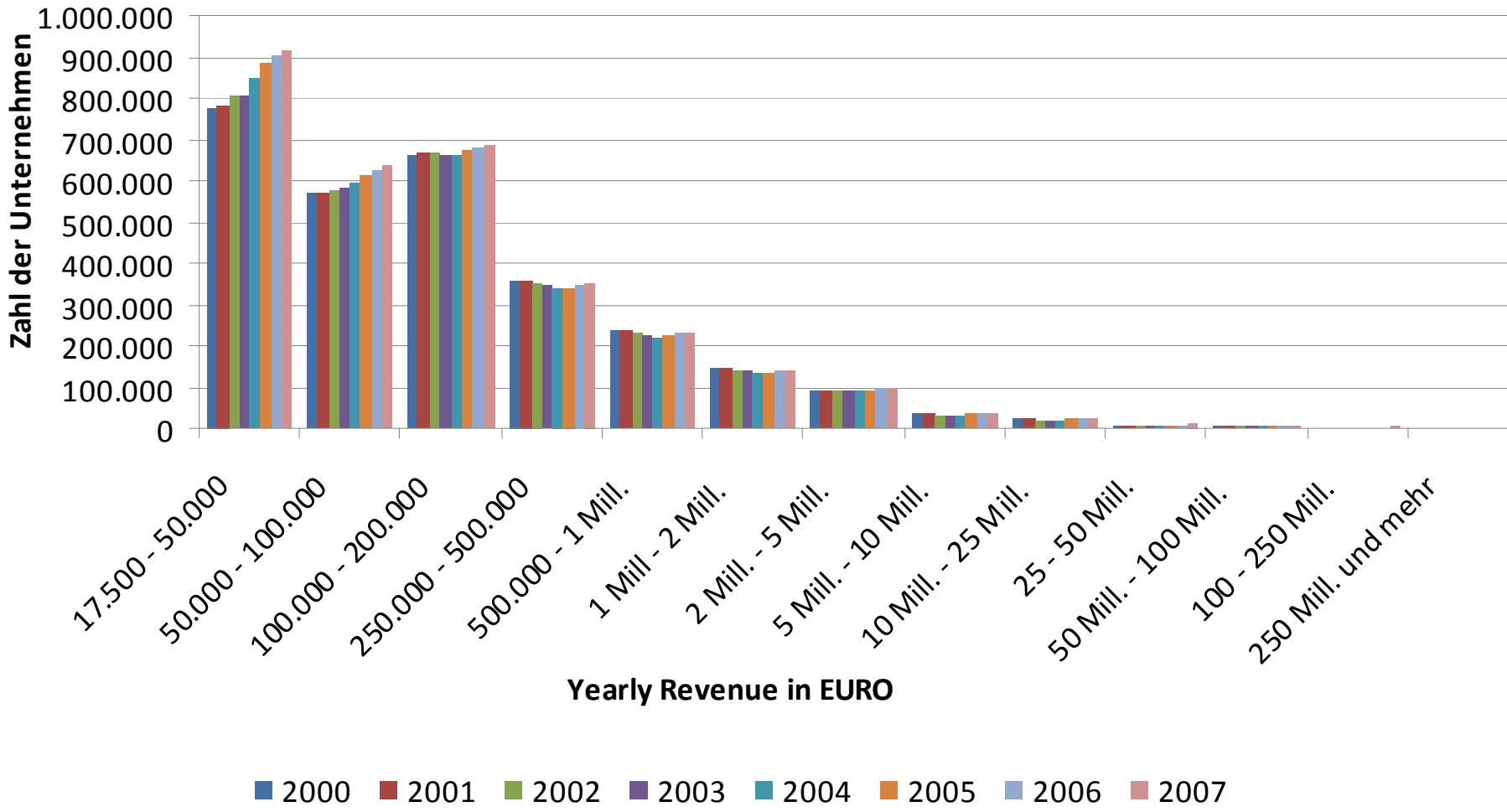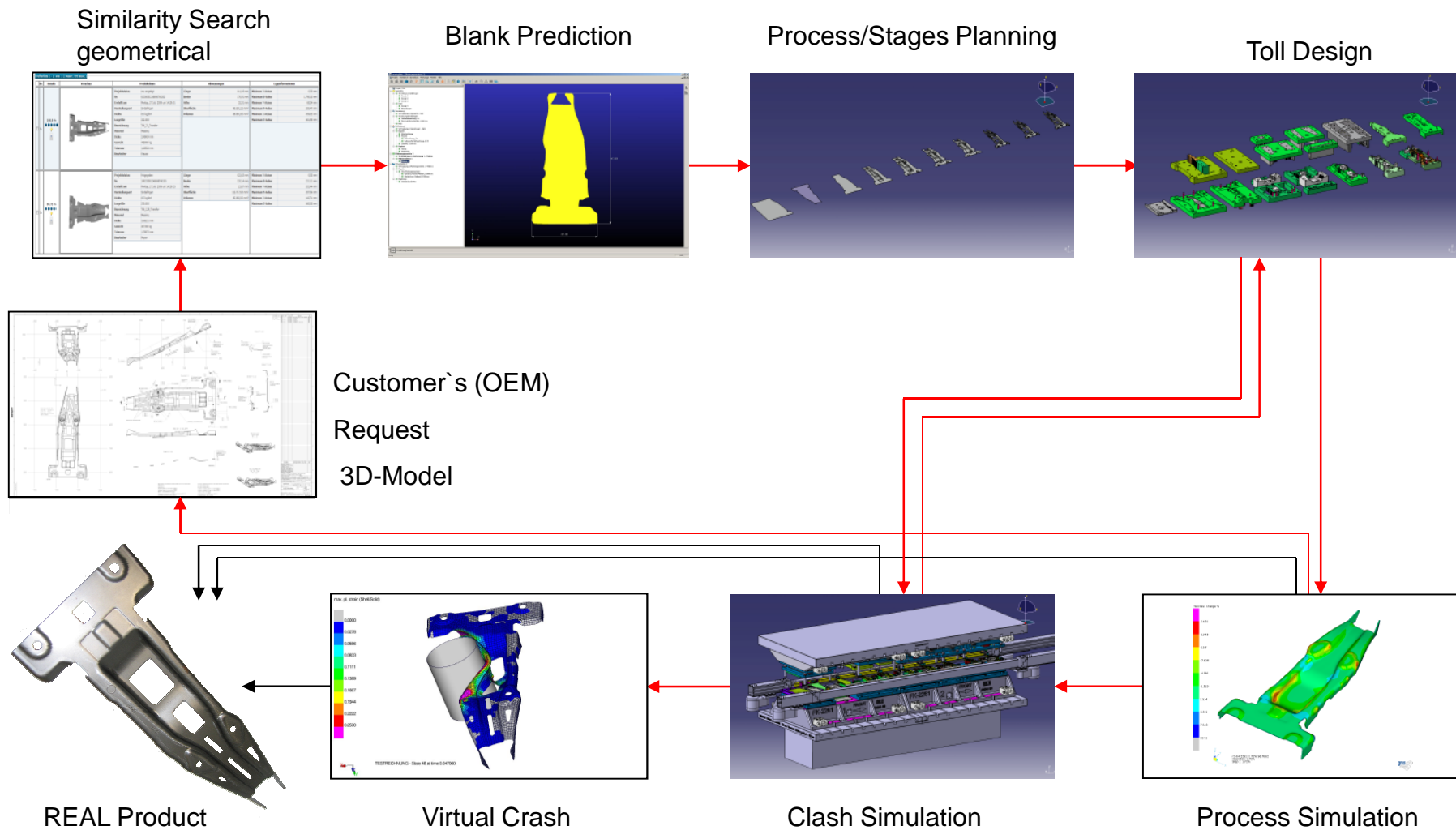
[2007, Stat. Bundesamt, in €]

**Yearly Revenue**

**Amout of Enterprises**

Totaly
**3.140.509**
enterprises

| Yearly Revenue | Amount of Enterprises |
|---|---|
| 250 Millionen und mehr | **2.056** |
| 100 Millionen bis 250 Millionen | **3.078** |
| 50 Millionen bis 100 Millionen | **5.133** |
| 25 Millionen bis 50 Millionen | **9.268** |
| 10 Millionen bis 25 Millionen | **24.305** |
| 5 Millionen bis 10 Millionen | **37.459** |
| 2 Millionen bis 5 Millionen | **99.479** |
| 1 Million bis 2 Millionen | **142.180** |
| 500.000 bis 1 Million | **229.778** |
| 250.000 bis 500.000 | **351.284** |
| 100.000 bis 250.000 | **685.827** |
| 50.000 bis 100.000 | **635.719** |
| 17.500 bis 50.000 | **914.943** |

SME

Amount of SME: > 99%
BIP: ca. 50 %
Jobs: ca. 80 %
Prof. education: ca. 82 %

# Evolution of the Structure of Economy in Germany
## for the years 2000 till 2007



**Zahl der Unternehmen** (y-axis: 0, 100.000, 200.000, 300.000, 400.000, 500.000, 600.000, 700.000, 800.000, 900.000, 1.000.000)

x-axis categories: 17.500 - 50.000, 50.000 - 100.000, 100.000 - 200.000, 250.000 - 500.000, 500.000 - 1 Mill., 1 Mill - 2 Mill., 2 Mill. - 5 Mill., 5 Mill. - 10 Mill., 10 Mill. - 25 Mill., 25 - 50 Mill., 50 Mill. - 100 Mill., 100 - 250 Mill., 250 Mill. und mehr

**Yearly Revenue in EURO**

Legend: 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007

# Virtual Value Creation Chain in Sheet Metal Forming

Similarity Search geometrical

Blank Prediction

Process/Stages Planning

Toll Design

Customer`s (OEM)

Request

3D-Model

REAL Product

Virtual Crash

Clash Simulation

Process Simulation

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# Distributed Knowledge in SME`s
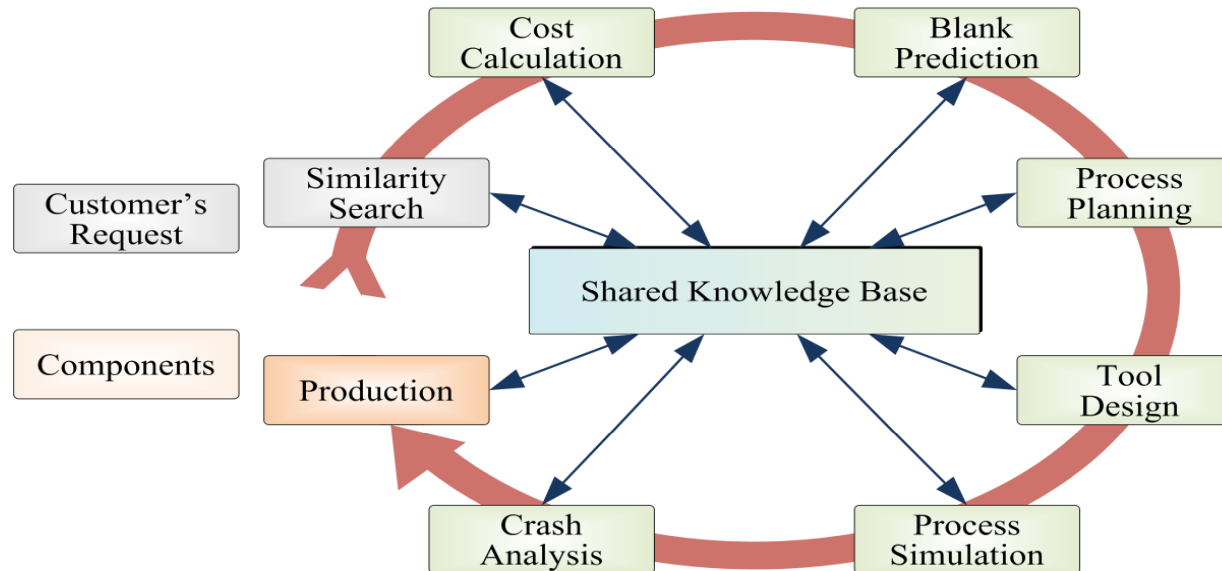
**Thank you for your attention.**

**I like your comments.**

# Digital Society Trends:
# Challenges in Distributed Knowledge

# Security and Privacy

**Thomas Neubauer**

Secure Business Austria

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# Introduction

- IT security has been generally perceived by company managers merely as a **cost factor.** Something that requires financial resources without providing any added value.

- Information system security and privacy are increasingly becoming important to society at large.

- Corporate leaders and managers are coming to realize the potential of new IT-based services, for which security is a core requirement.

- Challenges arise because information systems evolve into distributed systems (Web services, pervasive computing, P2P,…).

*organizational*                                                                     *technical*

| Risk Management | Data Security | Malware/Coding |
|---|---|---|

**[SECURE]**
**Business Austria**

# IS Risk Management and Compliance (1/2)

- Information security risk management as one of the top ten grand challenges in information technology security.

- The lack of information security knowledge at the management level is one reason for inadequate or nonexistent information security risk management strategies.

- Raising the management's level of information **security awareness and knowledge** leads to more effective strategies.

- Formal knowledge representation of information security. Semantic Web technologies (e.g.., OWL), can be used for defining ontologies that allow the modeling and reasoning about information and could be used to define security, privacy, and trust requirements and values.

- Analyzing **business processes** is fundamental to risk management. Sound methods are required to measure business process security and robustness and to choose the risk-reducing measures best suited to an organization's needs

**[SECURE]**
Business Austria

# IS Risk Management and Compliance (2/2)

- While an entire range of risk management approaches has been developed over the last decades, but there are still open research issues.
  - How can organizations and especially management decision makers be supported in making an appropriate risk versus cost trade-off when investing in IT security solutions?
  - How can they be supported in determining which IT security solutions are worth investing in?

- Metrics to measure IT-security and cost/benefit analysis.

- Interactive selection of countermeasures and scenario-based analysis.

- Considering the growing number of certification initiatives, especially in sensitive business sectors, research methods for automatically determining the information security status of an organization regarding well-established standards, such as ISO 27001, are needed.

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# Data Security and Privacy (1/2)

- Pervasiveness of electronic devices. Almost permanent surveillance of everyone. Permanent storage of personal data that is used and analyzed by corporations or intelligence services.

- It is a fundamental right of every individual to expect privacy. More and more people are giving up their right for the chance to win a lottery or for even less.

- Bruce Schneier "If we ignore the problem and leave it to the 'market', we'll all find that we have almost no privacy left".

- **Privacy enhancing technologies:** Good privacy protection involves several instruments, which can be considered as a privacy toolkit. We have to take into account l
  - legal,
  - organizational,
  - cultural and
  - technical conditions

  when improving the role of privacy in our society.

**[SECURE]**
Business Austria

# Data Security and Privacy (2/2)

- **Enterprise rights management (ERM)** as a method to enforce privacy for companies trying to maintain control over their own data. The main criticism of ERM is that it

  - already is a threat to privacy as access to all individual files may be logged by an ERM system,

  - acts as a barrier to future historians and, as a result, to the cultural and scientific heritage for future generations.

- **Preservation** of digital information is considered to require more attention and effort than the preservation of information stored on other media in order to efficiently prevent information (even information created a decade ago) from being lost, which could lead to a **digital "Dark Age"**.

- Future research has to consider the field of tension resulting from the benefit of using ERM to give corporations control over their internal, highly sensitive data and the risk of preventing archiving, which may also be a legal obligation.

**[SECURE]**
Business Austria

# Secure Coding and Code Analysis (1/2)

- In the context of national security, recent assaults on entire countries (e.g., attacks on Estonia, Lithuania and Georgia) demonstrate the gaps in the Internet driven information technology.

- There is a real economy behind **botnets** (phishing, denial-of-service attacks, or mass mailings).
  - How does the economy of these underground networks work?
  - How do these people cover their tracks while establishing and maintaining at least a minimum amount of trust among the networks' members, which is necessary in any kind of trade environment?
  - How do botnet modules operate? How are they controlled, maintained and upgraded?

- In addition to general research on malware detection, there is work that focuses specifically on the
  - analysis and detection of botnets and
  - novel anti-drive-by download technologies.

**[SECURE]**
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# Secure Coding and Code Analysis (2/2)

- Inherently unsecure software applications are one of the major reasons for the
  - success of malware attacks,
  - fraudulent transactions and
  - a resulting distrust of people in information technology.

- Research has to improve development processes in terms of
  - security architecture,
  - how to avoid errors and mistakes by programmers, and
  - static and dynamic **code analysis**.

- Third, in cases where protection was not sufficient and some kind of criminal activity has been conducted or suspected on a specific computer system or network, **digital forensics** is needed. Focus on
  - efficient aggregation,
  - event-correlation and
  - visualization of the identified data.

**[SECURE]**
**Business Austria**

Marko Jäntti, eKNOW 2010 panel

# Digital Society Trends: Challenges in Distributed Knowledge -IT Customer Support & Maintenance

ITÄ-SUOMEN YLIOPISTO

**UNIVERSITY OF EASTERN FINLAND**

# Challenges in IT Customer Support & Maintenance

**Typical challenges related to IT Customer Support & Maintenance**

- Customer's do not know to whom they should report problems
- Simple problem reports are sent directly to specialists
- Number of lost problem reports is high
- Knowledge sharing challenges between IT support providers and their tools



Customer

IT Company 1
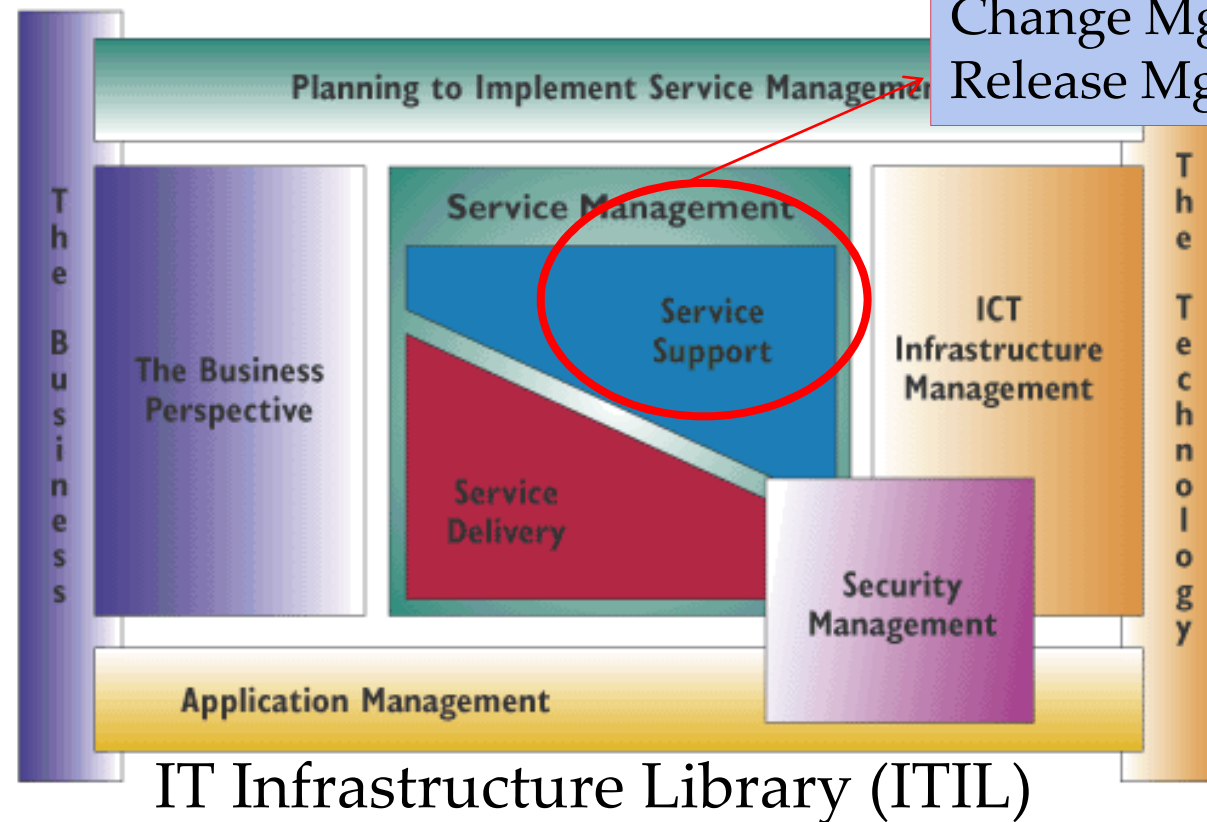
IT Company 2

IT Company 3

Developer
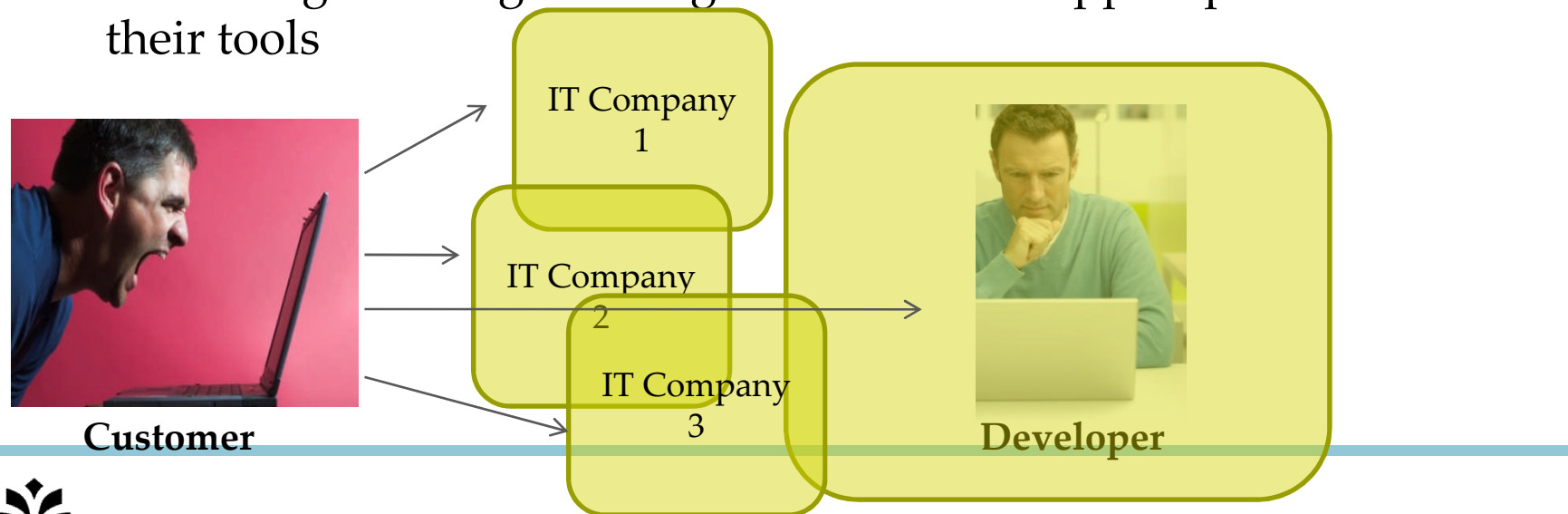
# Solution to challenges??

- IT Service Management framework
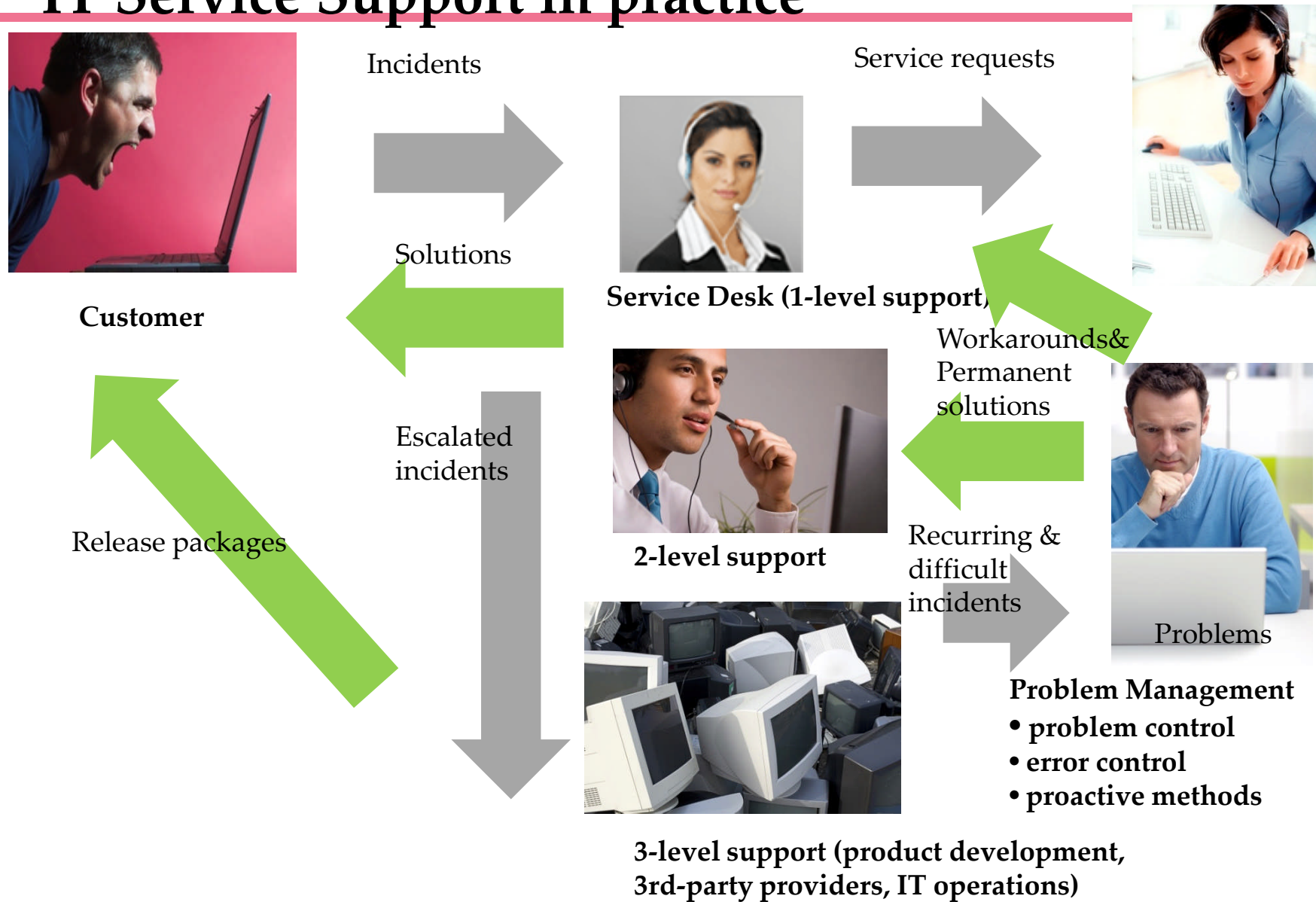
"Customers require that we use ITIL!"

"We have to improve the quality of our support!"

"We need ITIL to win our competitors in the service outsourcing business!"

Service Desk
Incident Mgmt
Problem Mgmt
Config. Mgmt
Change Mgmt
Release Mgmt



IT Infrastructure Library (ITIL)

# IT Service Support in practice



Incidents

Service requests

**Customer**

Solutions

**Service Desk (1-level support)**

Workarounds&
Permanent
solutions

Escalated
incidents

**2-level support**

Recurring &
difficult
incidents

Problems

Release packages

**Problem Management**
- **problem control**
- **error control**
- **proactive methods**

**3-level support (product development,
3rd-party providers, IT operations)**

# New challenges caused by the IT service management frameworks

- ITIL terminology is difficult
- Classifying incidents is difficult in Service desk (selection of SLA, Configuration item and service requires time)
- ITIL is a heavy framework with a lot of roles and processes
- Two versions of ITIL (v2 and v3) available: which one is better?

**- - - > IT-companies need help in implementing and introducing IT service support processes**