Software Excellence and Outsourcing Experiences at PSE
October 2006, Budapest
Agenda

- PSE as a global software service supplier
- Software Excellence at PSE
- Outsourcing Experiences
PSE as a Global Software Service Provider
PSE a Global Software Service Supplier

PSE History

- Division of Siemens Austria
- Founded around 1960 in Vienna
- 2200 engineers by 1990
- One of the biggest Software development centers in Europe
why PSE went global

- Limited growth possibilities in Austria
- Increase of development cost
- Sales opportunities for software products in CEE
Decision in 1990 to build up development centers (companies) in the neighbouring CEE countries
PSE a Global Software Service Supplier

- 7000 employees
- 22 locations
- Sales FY 06 appx. € 566 million

Represented in USA by Siemens Shared Services LLC

- San Jose
- Minneapolis
- Nanjing
- Hangzhou
- Prague
- Brno
- Zilina
- Piešťany
- Bratislava
- Budapest
- Cluj
- Brașov
- Zagreb
- Osijek
- Split
- Hamburg
- Linz
- Graz
- Salzburg
- Vienna
- Istanbul
- Ankara

Software Excellence and Outsourcing Experiences
PSE. Intelligent Net Working
Present situation of PSE

- more than 7000 engineers
- 9 countries
- software development in 22 locations
- more than 55% in low cost countries
PSE organization: business units and regions

PSE
Program and System Engineering

AS
Automation Solutions

BS
Business and Healthcare Solutions

CSS
Communication Solutions & Services

KAM
Key Account Management PSE

E&I
Energy & Information

EAI
Enterprise Applications and Industry

MCS
Mobile Communication Systems

ECT
Enterprise Networks & Communication Technologies

PRO
Products and Solutions

SMC
Solutions for Multi-Service Communication

BF
Divisional Functions

CO
Controlling

GSC
Group Strategy & Communications

QM / PS
Quality Management; Process Support

REG
Regional Strategy

KB
Competence Base

ANF DATA
Czech Republic

PSE CN
China

PSE CRO
Croatia

PSE DE
Germany

PSE HU
Hungary

PSE RO
Romania

PSE SK
Slovakia

PSE TR
Turkey

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global PSE business units in a matrix organization with PSE countries

PSE a Global Software Service Supplier

AS
Automation Solutions

BS
Business and Healthcare Solutions

MCS
Mobile Communication Systems

CSS
Communication Solutions & Services

KB
Competence Base

PSE AT
Austria

PSE HU
Hungary

PSE SK
Slovakia

PSE CRO
Croatia

PSE RO
Romania

PSE TR
Turkey

PSE HU
Hungary
Software Excellence at PSE
Software Excellence at PSE

ISO 9000
ISO 9000 global

Software Excellence
Software Excellence at PSE

ISO 9000
ISO 9000 global

CMM
CMMI

Software Excellence
Software Excellence at PSE

Why **CMMI** at PSE?

- **CMMI** exactly addresses all the key process areas of Software Development

- Siemens Process Assessment (SPA) is a derived methodology based on SEI and Bootstrap method, which was introduced by Siemens Corporate Technology to focus especially on **process improvement**
Software Excellence at PSE

- **First steps with CMM in 1993 – 1994**
  - according to 1984 defined PSE software development method (SEM) -> Level 2.75
  - initiated some very important improvement activities
    - Web based SEM
    - „Support Centers“ (internal consulting groups) -> Start PSE specific technology management
    - PROWEB: Tool for project controlling and metrics

- **1997 – 2001 CMM Assessments in all business units**
  - Level 2.25 to 3.75 reached
  - again new improvement projects where initiated
    - PSE Metric Catalog
    - Risk Management Toolbox
    - TechnoWeb / Interest Nets / Expert Nets (Technology Management)
Software Excellence at PSE

Analysis of all PSE‘s Business Units showed a very high correlation between CMM-Level and Customer Satisfaction!

<table>
<thead>
<tr>
<th>CMM-Level</th>
<th>BU1</th>
<th>BU2</th>
<th>BU3</th>
<th>BU4</th>
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Customer Satisfaction

Rating of customer satisfaction from 1 (very good) to 6 (very bad), mean value from 6 criteria
CMM level from 1 Initial (very bad) to 5 Optimizing (very good)
Status from 12/2001
Software Excellence at PSE

- **2004 Transition CMM to CMMI**
  - Level 4 reached for development process
  - Assessment for all business units started
  - regions of PSE included in business unit assessments
Software Excellence at PSE

- **CMMI Checks**: a continuous improvement method

  - **self assessment** done by PSE assessors on project level
  - helps to keep high quality standard
  - defined process based on **CMMI questionnaire**
  - **cost efficient** (2-3 days per project)
  - **mandatory** in all PSE business units and regions
  - Quality Goal: at least **one CMMI Check per year** in each organizational unit
Software Excellence at PSE

ISO 9000
ISO 9000 global

CMM
CMMI
CMMI Check

Software Excellence

Balanced Score Cards
Software Excellence at PSE

ISO 9000
ISO 9000 global

CMM
CMMI
CMMI Check

EFQM

Balanced Score Cards

Software Excellence
Outsourcing Experiences at PSE
15 different In-house Offshoring Collaboration Models

- Distance from center’s national culture
  - Domestic
  - Both
  - Foreign

Intra-firm

Collaboration Models

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

- High Cost
- Low Cost

Required knowledge networking maturity

Adapted from Carmel, Agarwal, 2001, “Tactical Approaches for Alleviating Distance in Global Software Development”, IEEE Software
Cost Trends for Different Collaboration Stages (with high collaboration maturity)

\[ C_{\text{total}} = C_{\text{op}} + C_{\text{distr}} \]

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005

**\( C_{\text{op}} \) … Operative Costs:**
all costs that would also be applicable for a one-person project
mainly **labor costs**

**\( C_{\text{distr}} \) … Distribution Costs:**
costs that occur because work is not performed by a single person
**coordination, communication, travel, rework due to misunderstandings…**
Cost Trends for Different Collaboration Stages (with high collaboration maturity)

Stage 1

One-person project at a high-cost site

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005

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Cost Trends
for Different Collaboration Stages
(with high collaboration maturity)

Stage 2

100% $C_{op,HC}$

$C_{total} = C_{op} + C_{distr}$

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005

Only project members from high-cost sites,
working within one office

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Cost Trends for Different Collaboration Stages (with high collaboration maturity)

Stage 3

Cost Trends for Different Collaboration Stages (with high collaboration maturity)

Stage 3

Cost

100% $C_{op,HC}$

$C_{total} = C_{op} + C_{distr}$

100% $C_{op,LC}$

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005

Only project members from high-cost sites, distributed within one building

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Cost Trends for Different Collaboration Stages (with high collaboration maturity)

Stage 4

Only project members from high-cost sites, distributed within one city

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005
Cost Trends for Different Collaboration Stages (with high collaboration maturity)

Stage 5

Only project members from high-cost sites, distributed within one country

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005
Cost Trends for Different Collaboration Stages (with high collaboration maturity)

A globally recruited team working on one site

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005

<table>
<thead>
<tr>
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<td>key function</td>
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<tr>
<td>◯</td>
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Cost Trends
for Different Collaboration Stages
(with high collaboration maturity)

Offshoring non-critical work to low-cost sites

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005
Cost Trends for Different Collaboration Stages (with high collaboration maturity)

Development tasks at low-cost sites without key functions

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005

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Cost Trends for Different Collaboration Stages (with high collaboration maturity)

Cost

$$C_{total} = C_{op} + C_{distr}$$

Stage 9

Cost Trends for Different Collaboration Stages (with high collaboration maturity)

Some key functions are assigned to the low-cost site

Source: S. Lasser, M.Heiss, Proc. of IEEE IPCC, 2005

Symbol role

- A: acquisition
- ▲: overall project management
- ▲: sub-project management
- ■: key function
- ○: non-critical tasks
- ●: development
- ◯: on-demand expertise
Cost Trends for Different Collaboration Stages (with high collaboration maturity)

Stage 10

Cost

\[ C_{\text{total}} = C_{\text{op}} + C_{\text{distr}} \]

100% \(C_{\text{op,HC}}\)

100% \(C_{\text{op,LC}}\)

Collaboration Stage

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005

A local sub-project manager at the low-cost site
Cost Trends for Different Collaboration Stages (with high collaboration maturity)

Cost

\[ C_{\text{total}} = C_{\text{op}} + C_{\text{distr}} \]

Stage 11

More than one complete sub-project at low-cost sites

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005
Cost Trends for Different Collaboration Stages (with high collaboration maturity)

Stage 12

Cost

\[ C_{\text{total}} = C_{\text{op}} + C_{\text{distr}} \]

100% \( C_{\text{op, HC}} \)

\( C_{\text{op}} \)

\( C_{\text{distr}} \)

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005

Only the overall project manager comes from the high-cost site

Collaboration Stage

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PSE. Intelligent Net Working
Cost Trends for Different Collaboration Stages (with high collaboration maturity)

\[ C_{\text{total}} = C_{\text{op}} + C_{\text{distr}} \]

100% \( C_{\text{op,HC}} \)

\( C_{\text{op}} \)

\( C_{\text{distr}} \)

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005

Full project responsibility at the low-cost site, with just the business responsibility at the high-cost site

Legend:
- \( \text{A} \): acquisition
- \( \text{A} \): overall project management
- \( \text{A} \): sub-project management
- \( \text{A} \): key function
- \( \text{o} \): non-critical tasks
- \( \text{o} \): development
- \( \text{on-demand} \): expertise

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PSE. Intelligent Net Working
Cost Trends for Different Collaboration Stages (with high collaboration maturity)

Cost

\[ C_{\text{total}} = C_{\text{op}} + C_{\text{distr}} \]

Stage 14

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005

Additionally, the low-cost site takes the responsibility for customer acquisition.

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Cost Trends for Different Collaboration Stages (with high collaboration maturity)

Local **business unit** at the low-cost site

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PSE. Intelligent Net Working
Cost Trends
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(with high collaboration maturity)

Even for organizations with high collaboration maturity an
Offshoring Cost Plateau exists: during the plateau you
invest without getting immediate return

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005
The Change of PSE over time

Cost

Offshoring Cost Barrier or at least plateau

100% $C_{op,HC}$

$C_{total} = C_{op} + C_{distr}$

100% $C_{op,LC}$

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005

Collaboration Stage

PSE 1961  PSE 1990  P S E 2 0 0 5

time
The Collaboration Maturity is influenced by

- maturity of **processes and tools** at all sites,

- mature **communication** culture (openness, trust, respect),

- effective knowledge **networking**,

- **management** skills and organizational **structure**,

- **architectural skills** (modularity)…
Impact of the Collaboration Maturity:
the lower the maturity the higher the barrier

\[ C_{\text{total}} = C_{\text{op}} + C_{\text{distr}} \]

\[ C_{\text{distr}} = \frac{C_{\text{distr,mature}}}{\text{Collaboration Maturity}} \]

Source: S. Lasser, M. Heiss, Proc. of IEEE IPCC, 2005

low collaboration maturity \(\rightarrow\) high distribution cost \(\rightarrow\) high offshoring cost barrier
What can be done to improve productivity?

- Optimize your **processes and tools**
- Communicate with **openness, trust, respect.** Take care everybody gets the relevant information.
- **Involving experts increases productivity:**
  - It is more efficient to ask the proper expert for help than to waste the customers time
- Find the right **project manager** and **requirement engineer.**
- Try to find the best available **architect**
A mature Inquiry Culture increases the Collaboration Maturity and therefore the Productivity.
Requirements Communication

- Requirement Communication takes place at and among all levels of the project organization.

- The one who knows about the requirement – the **Sender S**

- The one who receives the requirement – the **Receiver R**
Small project task, all project members collocated

Requirement: We jump at 3!

1, 2, 3, jump!

1, 2, jump!
Why is the Inquiry Culture so important?

Legend:
- Sender
  - convinced
  - not convinced
- Receiver
  - convinced
  - not convinced
Why is the Inquiry Culture so important?
It is the only chance to leave fatal states.

Legend:
Sender
- convinced
- not convinced
Receiver
- convinced
- not convinced

There is no „laser pointer“ showing us where we are.
What is not an Inquiry Culture?

- Trade-off between too much and too less inquiries:
  Utopia: One of the answers: **The perfect employee should deliver what I want (not what I have asked for) and ask no questions!**

- Strategy: Management communicats: **Ask, if you do not understand something** is not enough.

- Inquiry culture is not a behavior of the individuals within the organization, **inquiry culture is a organizational property and impacts directly the organizational maturity**
Ideal Inquiry Culture – Definition
"There are no stupid questions, only stupid answers"

An ideal inquiry culture is marked by:

- asking questions **the right person** (use your **networks**)
- at the **optimal time**
- **not** being **too proud** to ask questions, but **not** being **too shy** to ask questions
- addressing problems **openly** and **formulating** the question **accurately**, so that the other person understands it
- creating an environment of **confidence** and **trust** e.g. by showing interest in **colleagues' activities** and giving information on
  - one's **own activities** and organizational structure
- recognizing any **lack of knowledge**
- accepting **responsibility** for one's **own activities** and **lack of activities**
- providing **alternative solutions**
- considering the **entire business** process


Inquiry Practices Conclusion

- Employees’ awareness about the variety of inquiry practices
- If one of the “inquiry sources” is not successful, it is not a reason to stop it!!
- Communicate the increased importance of the personal networks within and outside of organization
Requirements Communication - Mechanism for establishing of Inquiry Culture

- **PSE Practices for communicating requirements:**
  - **Customer Workshops**
  - Clear defined **Review Process with obligatory reviewers**
  - Involvement of **experts within the PSE e.g. for reviews**
  - **Developers involvement** during the requirements elicitation phase
  - Using **Knowledge Networks** to fill the lack of information

- By communicating requirements you should keep in mind:
  - Summarize your interpretation of the “understood” requirement
  - Involve different perspectives-do not become too one-sided!
Inquiry Culture – Supporting Structures

- Training-weeks collocated in Vienna
- Project experience workshops
- Kick-off meetings
- Clear defined formal communication
- Frequent informal communication
- Readiness to travel
- Using the same development process
- Emphasizing the importance of high quality documentation
- Using the same terminology
- Task description/ Responsibility description
- Communicate: Sharing Knowledge is an asset, not a danger!
- Defining the escalation strategy
  but not any conflict is worth to be escalated
- Criticism is welcome, but NOT destructive
- Readiness to respect the differences, they can help us
Thank You for Your Attention