



# Test Internationalisation and Change

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## Who is this guy?



**ROBERT FELDT**

**Professor** at Blekinge Institute of Technology (Karlskrona) and Chalmers (Gothenburg)

**Industrial experience** by consulting in SW dev since 1992

**My research** group focus on Requirements, Testing/Quality and Psychology in SW Development

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# Key terms

Global Software Development (GSD)

Information Technology (IT) sourcing

Offshore Insourcing

Information Systems (IS)

Sourcing

Outsourcing

Software Development

Software Maintenance

Global Sourcing

Distributed

Onshore outsourcing

Development





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## Outsourcing

collaboration  
with third  
party vendors



Software Maintenance

Distributed  
Development



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Offshore

**In sourcing**

collaboration with own subsidiaries (sites of the same company)

Inf

Sourcing

S)

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# Background

## Goals:

- Reduce costs
- Access to resources/competence
- Innovate, deliver new products
- Maintain/improve existing products
- Expand market

## Solutions:

- Use lower-skilled/paid resources
- Involve additional resources
- **Move products to free up resources**



# Different transfers

- **Entire project or product** (existing development)
  - Development
  - Customization
  - Maintenance
- **Selected functionality**
  - Subsystem
  - Module
  - Component
- **Selected development phase**
  - Coding
  - Testing



# Transfer consequences

## Risks

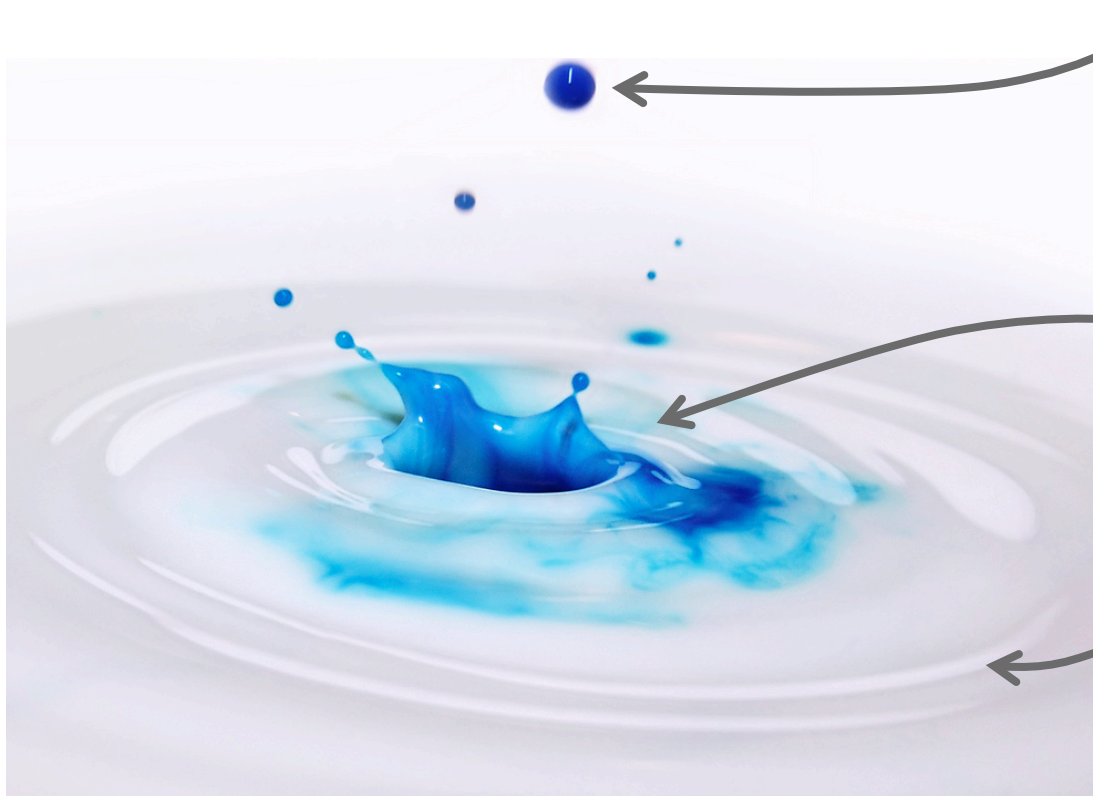
e.g. failure to fulfill transfer plans, deadlines and budget constraints

## Effect during transfer

e.g. additional costs

## Effect after transfer

e.g. poor product quality, failure to satisfy customers



# Two dimensions of challenges/benefits

## Distance dimension

Processes	Dimension		
	Temporal Distance	Geographical Distance	Socio-Cultural Distance
Communication	<ul style="list-style-type: none"> <li>☺ Time zone effectiveness</li> <li>☹ Delayed communication</li> <li>☹ Delayed feedback</li> </ul>	<ul style="list-style-type: none"> <li>☺ Proximity to market/customer</li> <li>☹ Lack of informal communication</li> <li>☹ Dependency on ICT</li> <li>☹ Increased effort to initiate contact</li> <li>☹ Providing technical infrastructure</li> <li>☹ Cost of travel</li> </ul>	<ul style="list-style-type: none"> <li>☺ Innovation and shared best practices</li> <li>☹ Asynchronous communication preferred by non-native speakers</li> <li>☹ Language differences and misunderstandings</li> <li>☹ Managing frames of reference</li> </ul>
Coordination	<ul style="list-style-type: none"> <li>☹ Time zone efficiency</li> <li>☹ Reduced hours of collaboration</li> <li>☹ Synchronised team meetings difficult</li> <li>☹ Availability of technical infrastructure</li> <li>☹ Coordination complexity</li> <li>☺ Modularisation of work</li> <li>☹ Lack of mechanisms for creating shared understanding</li> <li>☹ Management of project artefacts</li> </ul>	<ul style="list-style-type: none"> <li>☺ Access to large labour pool</li> <li>☹ Standardisation in work practices</li> <li>☺ Allocation of roles and team structure</li> <li>☹ Reduced trust</li> <li>☹ Lack of awareness/team spirit</li> <li>☺ Modularisation of work</li> <li>☹ Lack of mechanisms for creating shared understanding</li> <li>☹ Coordination complexity</li> </ul>	<ul style="list-style-type: none"> <li>☺ Mix of skills and experiences</li> <li>☹ Language and cultural training</li> <li>☹ Lack of domain knowledge</li> <li>☹ Doubtful of others' capabilities</li> <li>☹ Lack of mechanisms for creating shared understanding</li> <li>☺ Standardisation in work practices</li> <li>☹ Coordination complexity</li> <li>☹ Lack of awareness/team spirit</li> </ul>
Control	<ul style="list-style-type: none"> <li>☹ Management of project artefacts</li> <li>☺ Time zone effectiveness</li> </ul>	<ul style="list-style-type: none"> <li>☹ Lack of concurrent engineering principles</li> <li>☺ Allocation of roles and team structure</li> </ul>	<ul style="list-style-type: none"> <li>☹ Perceived threat from low-cost alternatives</li> <li>☹ Adapting to local formalized norm structures</li> <li>☹ Different perceptions of authority/hierarchy</li> </ul>



# Positive consequences of transfers

Reduced  
development costs

Awareness of customer's needs  
and locality-specific features

Expanded competence

Rescue of products  
to be phased-out

Ability to ease future transfers

Minimize product stagnation

Demonstration of  
goodwill to the market





# Negative consequences

Increase in problem resolution intervals

Initial reduction in scope of delivery

Lack of co-located expertise of all system's domains

Temporary productivity decrease

Long-term decrease in quality

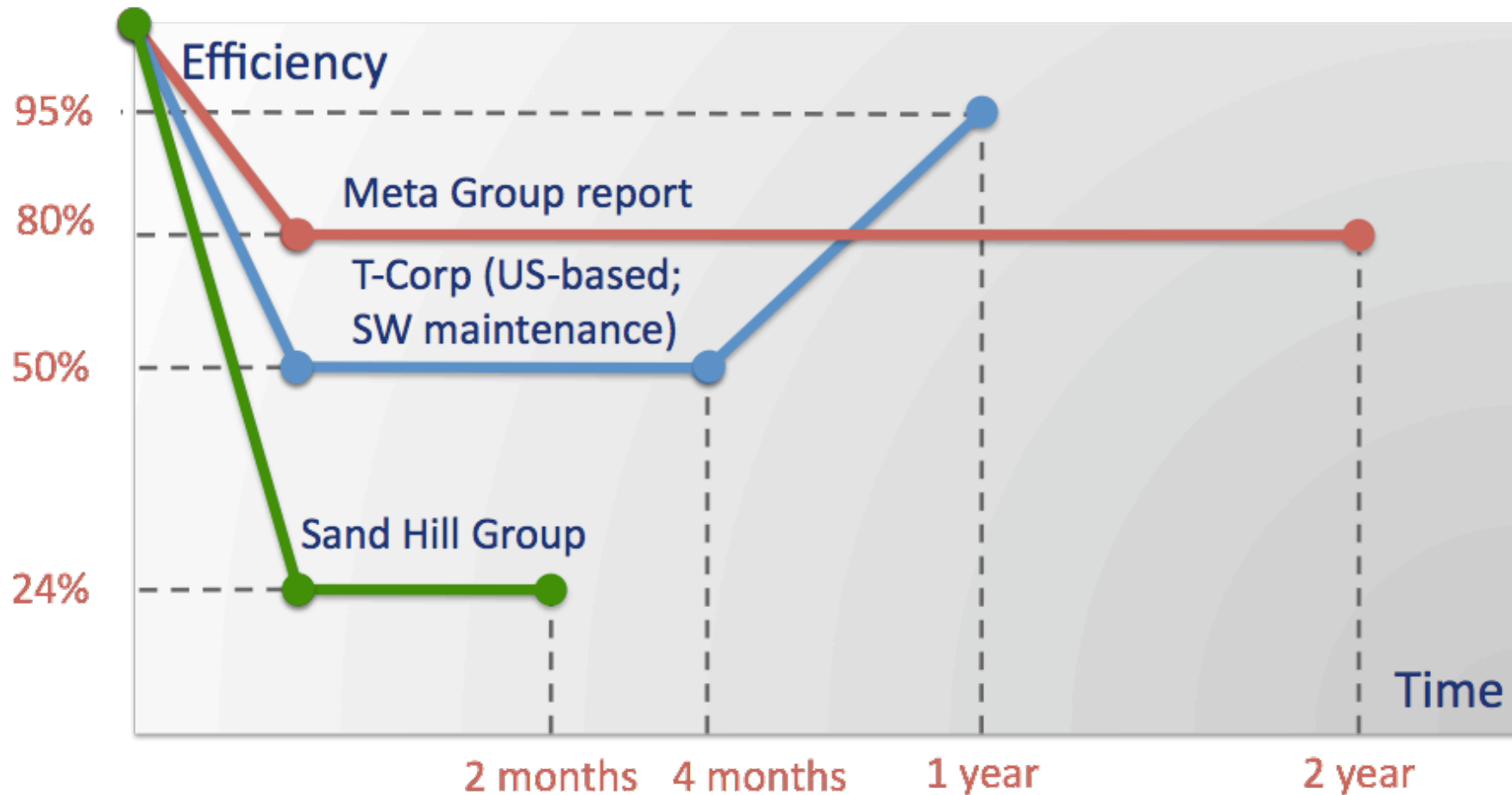
Loss of knowledge and experience within the product

Difficult maintenance escalations require involvement of experts from the original site





# Negative Effects on Productivity

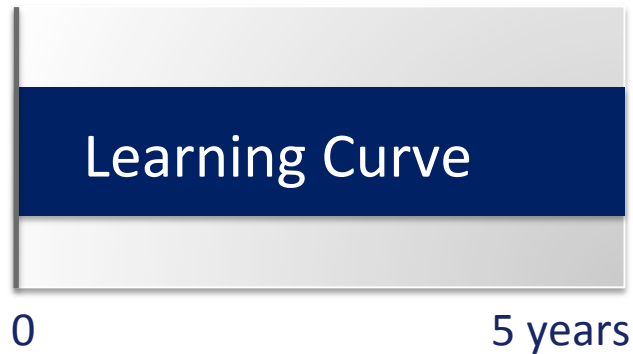


- Offshoring Information Technology: Sourcing and Outsourcing to a Global Workforce by Carmel & Tjia. Cambridge University Press, NY, 2005
- The hidden costs of offshore outsourcing by Overby. CIO Magazine, Sep. 1, 2003

**Important: Productivity decrease happens irrespective of the transfer destination!**



# Time for recovery



Over time efficiency rises as they get access to and master the required knowledge and skills

Philips:

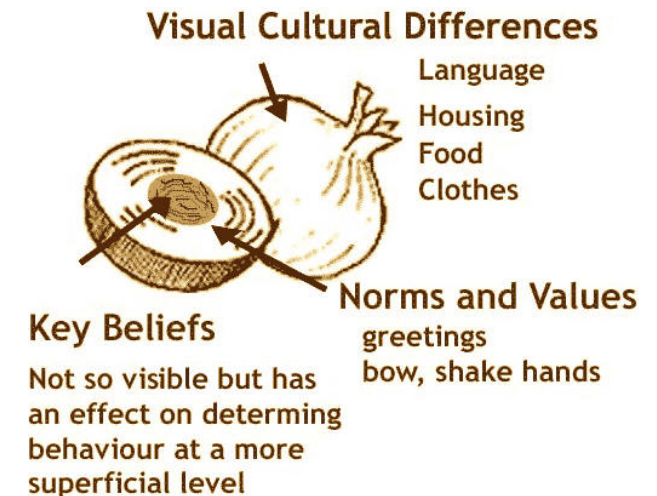
Started to develop TV software in India, however it took more than 5 years before the offshore group had enough application domain knowledge to co-operate with the TV software integration center in Bruges, Belgium effectively

Philips experiences in global distributed software development by R.Kommeren, P.Parviainen in Empirical Software Engineering, 2007



# Testing experiences

- Cultural practice of not communicating issues or asking reasons for tasks requested by clients, but instead trying to satisfy the client requests
- Culturally different practices of reporting (e.g. hierarchical structures in some companies)
- Different models/proxies of productivity
  - Offshore team's view: productivity is measured in the extent to which tasks, requested by the customer, are accomplished
  - Perceived customer view: productivity is measured in numbers (e.g., number of test cases created/tested over a given time period),



# Ethnographic Study of Global Testing



Studied 3 offshore testing teams  
with 24 testers in total + managers



# Challenges in Global Testing

- Lack of sufficient information
  - Expected setup, data or behavior
  - How to reproduce bugs
  - How bugs have been fixed
  - Priority of testing tasks
  - Documents only partially updated



# Challenges in Global Testing

- Ineffective communication channels
  - Key persons not available or unwilling to talk
  - Lack of local decision authority
- Delays in development decreases test time
  - Rework (testing has to start on unstable code)
- Different views/culture/understanding
  - Clients know more/less about automated testing => discussions/conflict
  - Number focus in evaluating testing team

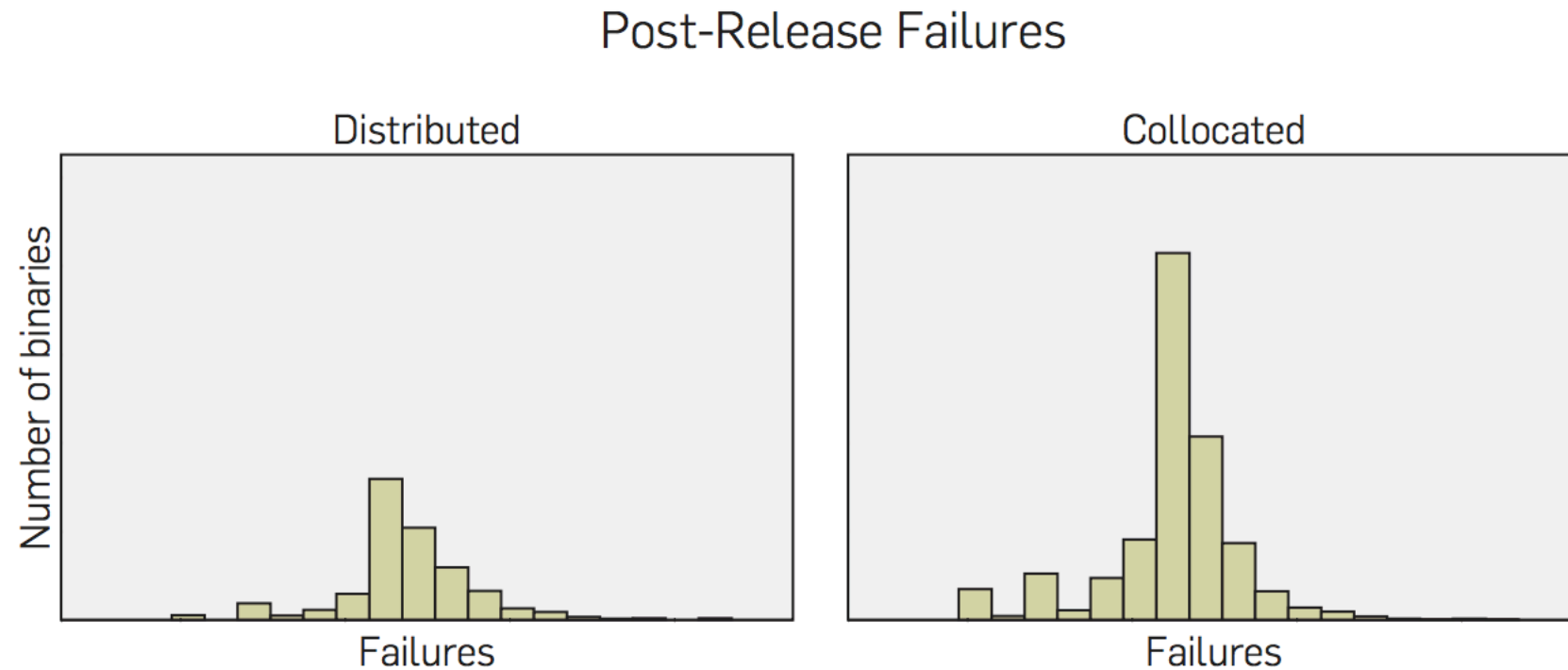


# Solutions in Global Testing

- Maintain good communication
  - Being open
  - Announce risk in advance
  - Testing team needs appreciation to stay motivated
- Schedule a mix of easy and hard tasks
- Provide support to client developers
  - Help in explaining requirements
  - Help in resolving bug ownership

# Effects on Distributed Windows Dev

**Figure 3. Histograms of the number of failures per binary for distributed (left) and collocated (right) binaries. Although numbers are not shown on the axes, the scales are the same in both histograms.**



No Negative effects on Quality!



## Why did it work for Microsoft?

- Sites have existed & collaborated for years
- Facilitators: Senior engineers & managers (Indian heritage) moved (back) to India
- Face-to-face virtual meetings daily
- Consistent use of tools
- End-to-end code/feature ownership



## Alignment between people is key

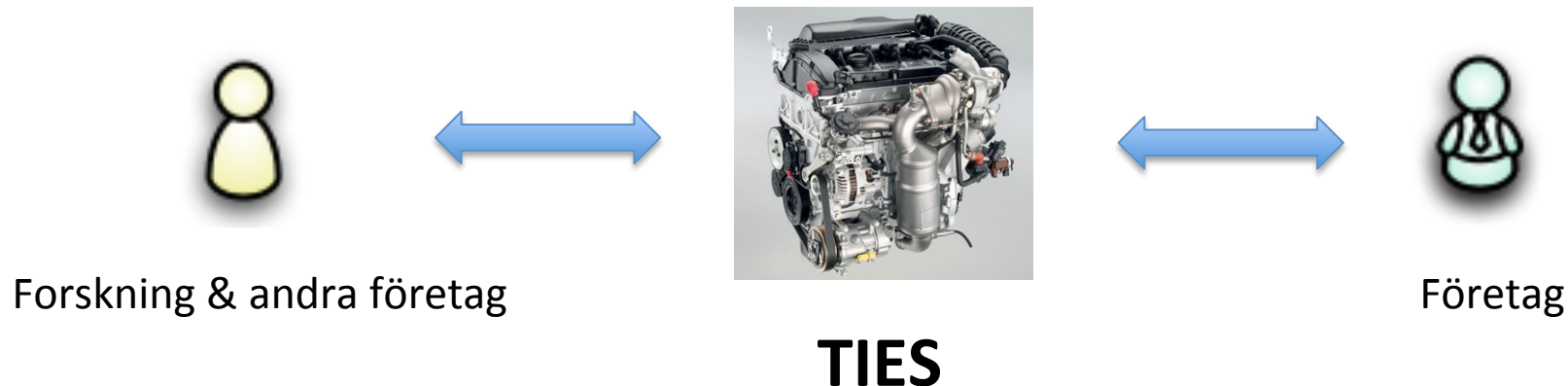
- Aligned views, values and expectations
- Communication is key in the daily alignment
- But Education is the base for understanding each other
- Not Education as in basic education or knowledge, but in current techniques/tools





# Test Innovation Engine Sweden - TIES

- Interactive E-Learning baserad på senaste testforskningen
- Mål: Korta tiden till nya innovationer används från 10 år till 1 år
- Individualiserade “kurser” för att skapa intraprenörer





# Conclusions (1)

- Transferring software work is not a straightforward task
- Numerous challenges that have direct impact on efficiency, but also secondary harder-to-capture impact on quality and productivity
- If addressed, these challenges can be mitigated
- Organizational and cultural differences are more important than the temporal or geographical distances

## Conclusions (2)

- Not all products are equally suitable or economically feasible for a transfer
  - Product future (long life cycle)
  - Complexity of the product
  - Maturity of the product
  - Dependability with other products
  - Product documentation
  - Previous experience with the product and knowledge domain on the receiving site
- Alignment between sites is key
  - Education and shared experiences are means to help create alignment





# Questions



THANKS TO MY COLLEAGUE DARJA ŠMITE WHO IS OUR EXPERT  
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