



A System Dynamics Perspective into Offshore  
Software Outsourcing - Uncovering  
Correlations between Critical Success Factors

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motivation



- software offshore outsourcing is a challenging and risky task
- in order to manage the risk, its cause needs to get uncovered

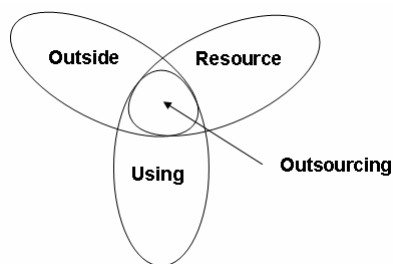
## agenda



### system dynamics and offshore software outsourcing

- foundations
- challenges
- evaluation
- system dynamics

## foundations



outsourcing is...  
the procuring of services or  
products from an outside  
supplier or manufacturer

- outsourcing usable if
  - service or process is digitized
  - different location of the production and the customization of products
  - examples: call-center, data entry, medical diagnostics, invoicing, calculation of salaries... (BPO)
- necessary characteristics of outsourceable products
  - standardized
  - modular
  - easy to handle

→ software is outsourceable

## foundations



In-house production	Onshore outsourcing	Offshore outsourcing
	in-house production	Captive offshoring
	National	International



## software development offshore and global software development



- offshoring software development: organization establishes a division in a remote location (abroad) and wholly or partially distributes software development to that location
- Global Software Development:
  - implies teams of knowledge workers located in various parts of the globe developing software
  - may be characterized by moving centralized software development from one centralized team to dispersed teams and/or external organizations in remote locations

## success of software offshoring



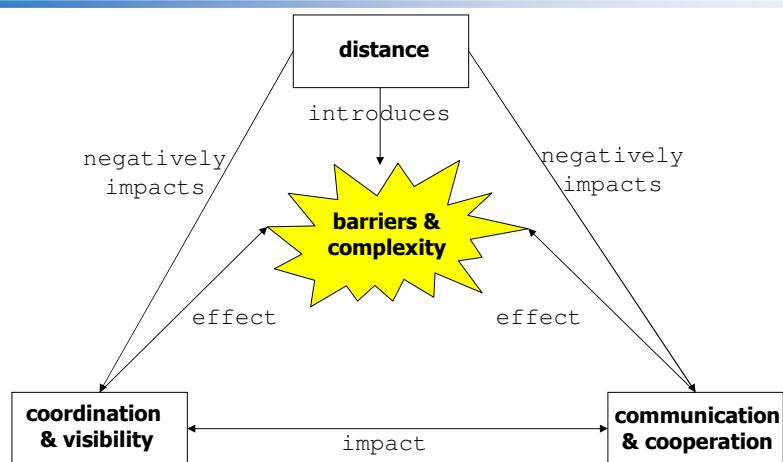
- 40 % of all outsourcing projects are not successful
- 33 % offshoring projects not successful
  - reason: mismanagement, lack of experience in companies

three dimensions of success:

- quality
- costs
- time

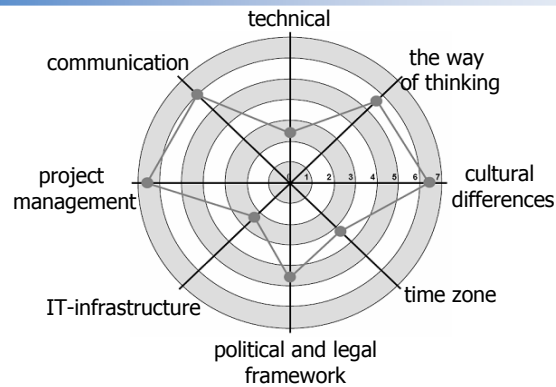
} risk in software offshoring

## impacts of the distance in the offshore software outsourcing



[Casey, Richardson 2004]

## challenges in IT-offshoring projects



- questions about an IT-offshoring project:
  - how to evaluate its success?
  - how to manage the risk?

## evaluation methods for offshore software development projects - ROI



- calculation of the return of invest (ROI)
  - the ratio of money gained or lost on an investment relative to the amount of money invested
  - measures how effectively the firm uses capital to generate profit
  - in software offshore outsourcing projects:
    - $\text{savings} - (\text{setup costs} + \text{transaction costs})_{\text{outsourcing}}$
- problems:
  - calculation of the reference costs
  - hard to pre-estimate the development effort

→ ROI practicable in simple cases only.

## outsourcing scorecard (OSC)



- OSC [Berger et al `04] is based on the idea of Balanced Scorecard (BSC) [Kaplan & Norton `96] that enables an insight into business from four perspectives

### BSC perspectives

- customer
- internal
- innovation and learning
- financial

### OSC perspectives

- service provider
- SW development project
- outsourcing company
- financial

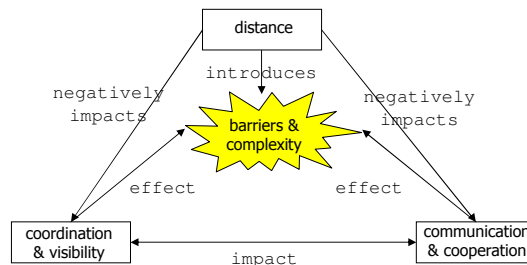
### Not sufficient to evaluate software outsourcing because:

- does not consider interdependencies between critical success factors
- provides an ex post picture solely → too late for decision support [Amberg et al. `05]
- overall performance „score“ balanced among the four perspectives [Gold `05]

## system dynamics



- complex system:
  - „any system featuring a large number of interacting components whose aggregate activity is nonlinear...“ [Rocha `99]
  - „can be analyzed into many components having relatively many relations among them ... the behavior of each component depends on the behavior of others“ [Simon `69]
- a software offshore outsourcing situation builds a complex system

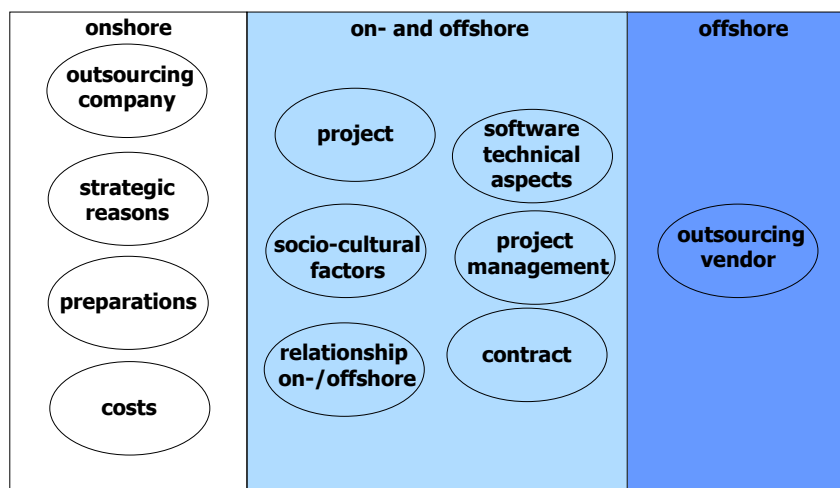


## system dynamics and offshore software outsourcing



- system dynamics is an approach to understanding the behavior of complex systems from two aspects
  - relationships between system components
  - behavior of individual components
- the understanding is essential for the
  - risk management and
  - cost reduction.
- only 25 % of firms achieve a cost reduction > 10 % through offshoring, in spite of much higher labor costs differences  
→ transaction costs
  - contract negotiations, restructuring, communication process changes/improvements, lower level of productivity, cultural differences, traveling, management
- ... **But, what are the individual components, what are the relationships between them and how do individual components behavior...?**

## considered system components



## key variables and their relationships

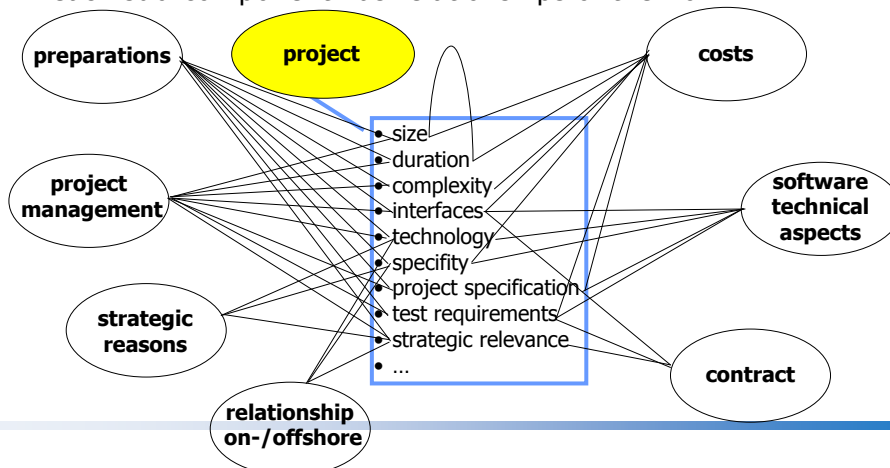


	preparations	strategic reasons	costs	contract	socio-cultural factors	software technical aspects	project management	project	onshore/offshore relationship
preparations		x	x	x	x	x	x	x	x
strategic reasons	x		x	x	x	x	x	x	x
costs	x	x		x	x	x	x	x	x
contract	x	x	x		x	x	x	x	x
socio-cultural factors	x	x	x	x		x	x		x
software technical aspects	x	x	x	x	x		x	x	x
project management	x		x	x	x	x		x	x
project	x	x	x	x	x		x	x	x
onshore/offshore relationship	x	x	x	x	x	x	x	x	

## sub-components of the key variables and their relationships



- each key variable consists of multiple sub-components
- each sub-component has relationships of their own



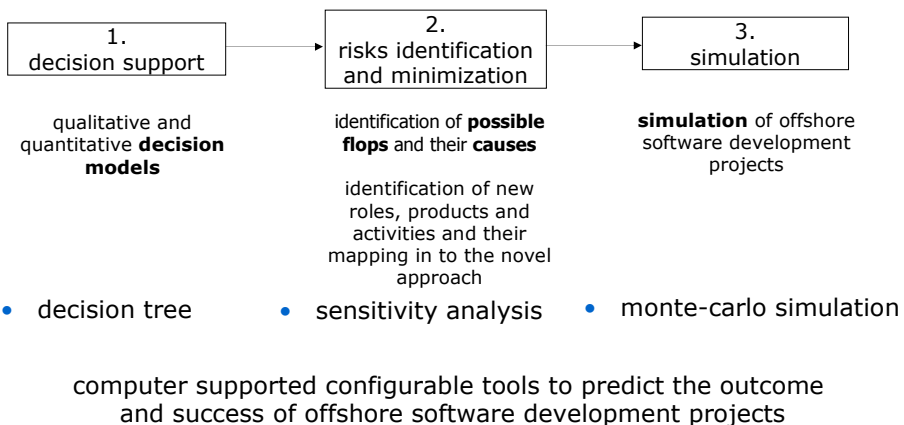


## the use of the system dynamics in analyzing offshore outsourcing



- identification of the most relevant / critical factors and their causalities and relationships
  - critical factors are potential high risk components
- development of an approach to manage the risk of software offshore outsourcing
- simulation of offshore outsourcing projects in order to deliver a-priori risk valuation
- development of a simulation model
- development of software tools to support outsourcing decisions

## goal: tools and methods to analyze offshore software development



## summary and outlook



- the dependencies between single components are manifold
- through identification of most significant factors the space reduction possible and useful
- the presented approach builds one fundament for the development of simulation tools for risk management of offshore outsource software development
- the decision about offshore outsourcing as well as the monitoring may be supported by adequate software tools



Thank you for your attention!

Your questions are welcome

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