



Aalto University
School of Science

Evaluating the Business Value of IT

Case study on Game Management System

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In a nutshell

- How to handle the complexity of evaluating IT's impacts on business value
 - Exploring **system dynamics** methods for tackling the issue
 - Action research, a case with service provider and its customer
⇒ Initial Proof-of-concept
- Means for understanding the value, to be used for many kind of decisions... pushing the 'sharp point' [A.Finkelstein RE'14]
 - BUT NOT introducing concrete methods for linking value insights with RE practices

Outline

- Motivation and goals
- Background
 - Challenges with IT business value
 - Systems thinking and System dynamics
- Research desing
 - Action research
 - Case description
- Phases and outputs
- Results and implications
- Conclusions

Motivation and goals

- IT business value needed for decision making
 - Investments, focusing development, improving IT and business alignment
- Challenges of evaluation: mesh of impacts, different viewpoints and value realisation over time => complexity

Terms

- **IT business value** = contributions of IT to company performance
- **Contributions** = impacts, both benefits and sacrifices

- Goal: seeing the IT as a part of **business system** and analysing this system
 - How IT impacts on value – system **structure**
 - How much and When value is realised – system **behaviour**

Research question



How **System Dynamics (SD)** can be used in evaluating IT business value

Challenges* in evaluating IT value

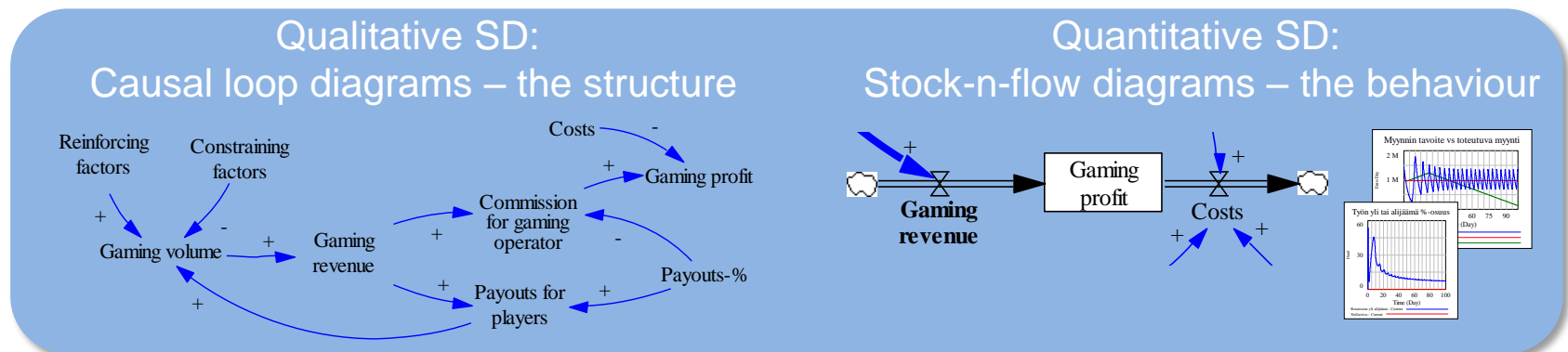
Indirectness	Links between IT immediate impacts and observed benefits/costs are not straightforward
Delays and dynamics	Benefits and costs are realised over varying periods of time, and value realisation is not static
Complementarity	IT is not used in a vacuum, the usage is affected by surrounding factors e.g. processes, skills and organisational changes
Intangibility	Benefits and costs can be complicated to identify and quantify
Measures and units	Measures for benefits and costs are not comparable, single financial measures are insufficient

⇒ Costs and benefits are separated by time and structure

* Please, check the article for detailed literature references

System dynamics (SD)

- Background: *systems thinking* for holistic approach
 - The system is more than the sum of its elements
 - Structure of elements and interconnections create a dynamic behaviour
 - "...seeing patterns of change rather than snapshots" [Senge, 1990]
- *System dynamics (SD)* as a tool for opening the 'black box' of IT: seeing both structural and behavioral aspects



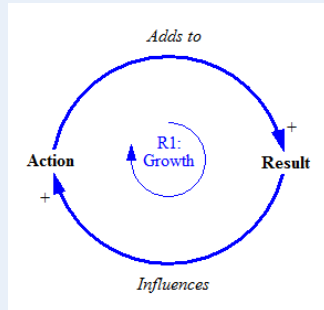
Two examples with CLDs & SFDs

Backup slide

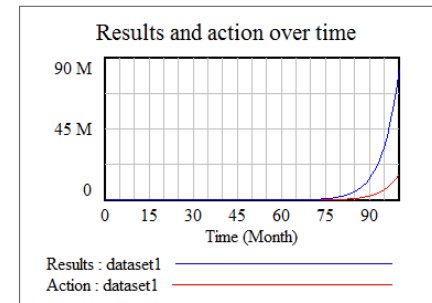
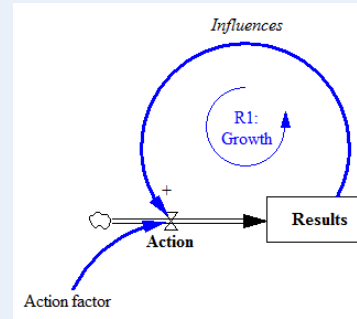
Focus on feedbacks!

Sample 1: Reinforcing loop for exponential growth

Causal-loop diagram

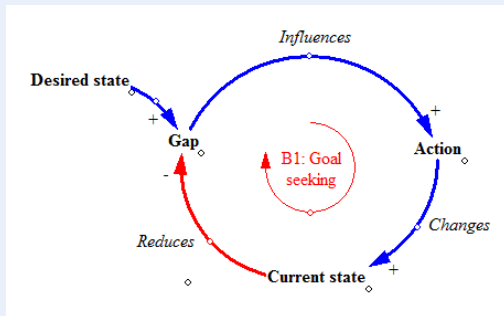


Stock'n'flow diagram

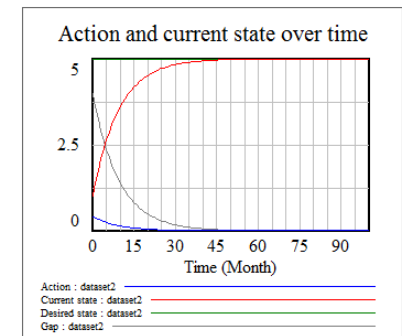
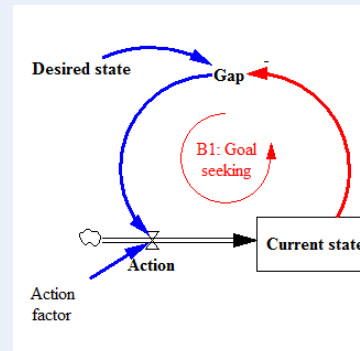


Sample 2: Balancing loop for goal seeking

Causal-loop diagram



Stock'n'flow diagram



Research design

- Case study with QA service provider (Host Company) and Finnish national betting agency (Pilot Company)
 - Modelling the value creation of Game Management System (GMS)
 - Defining measures for GMS's value creation
- Action research: 1.3.–31.12.2013
 - **Host team:** 2 participating and 2 steering group members
 - **Pilot team:** 5 members from different GMS stakeholder roles
 - Piloting period of 4 months
 - **Researcher** participating within host team: pilot planning, execution and retrospective activities

Phase	Description	Context & methods
Problem Diagnosis	Analysing current situation and defining the problem	<ul style="list-style-type: none"> • Interviews • Prototyping • Literature reviews
Action Intervention	Planning improvement actions and implementing the planned actions	Context: Host Company Context: Pilot Company <ul style="list-style-type: none"> • Workshops • Modelling iterations
Reflective Learning	Analysing the effects of the improvement actions and identifying learnings	<ul style="list-style-type: none"> • Interviews • Pilot retrospective • Literature reviews

Phases and outputs - overview

Problem diagnosis

Problem relevancy

- Host Company needs & reqs.
- Research gaps

Complex nature of value

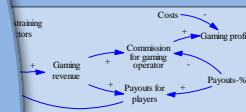
- How IT impacts
- How much and When

SD's potential & challenges

Action intervention

Piloting with Pilot Company

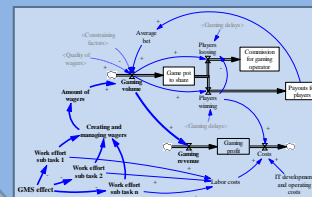
- Workshopping
- Value creation modelling
- Identifying measures



Earnings logic



Linking IT with Processes & usage & earnings logic

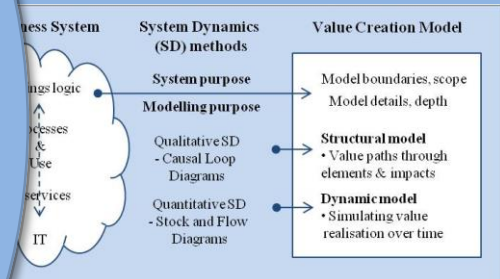


Simulating value realisation

Reflective learning

Retrospective

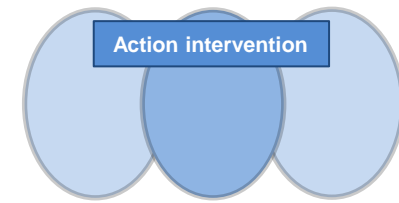
- Documenting workflow & observations
- Feedback



Problem diagnosis

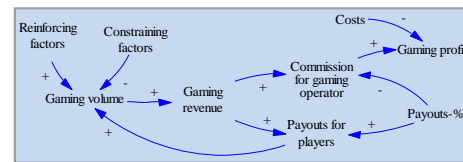
- Analysing problem relevancy: for practice & research
 - Host Company interviews: complexity as a problem, need for estimating IT realised value and success, shortage of methods
 - Host Company requirements for IT value measuring solutions
 - Methodical, support for communication & learning, tool support
 - Narrow existing empirical research base for utilising SD with IT business value evaluation
- Analysing challenges of IT value evaluation
 - relating benefits and costs: *IT impacts on benefits and costs are often separated by time and structure*
- Analyzing SD's potential for matching the complexity issues with value
 - Qualitative SD: elaborate value creation elements and their connections
=> the structure: **How** *IT impacts on value creation*
 - Quantitative SD: elaborate dynamic value realisation over time
=> the behaviour: **How much** and **When** *value is realised*

Action intervention

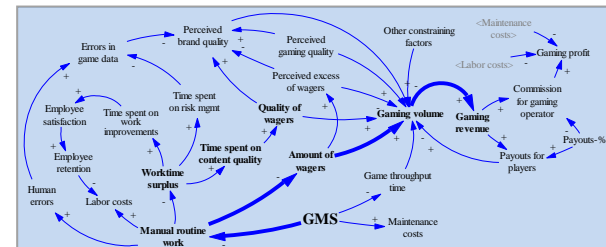


- Modelling value creation of Pilot Company's Game Management System (GMS)
 - Three workshops and modelling iterations

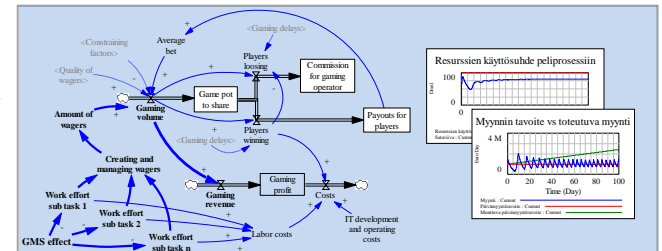
- 1) Earnings logic as a starting point
 - Reference points for the business system's purpose



- 2) Elements implementing the earnings logic, including IT/IT services
 - **Structural value creation model**
 - Value paths: IT impact chains in model



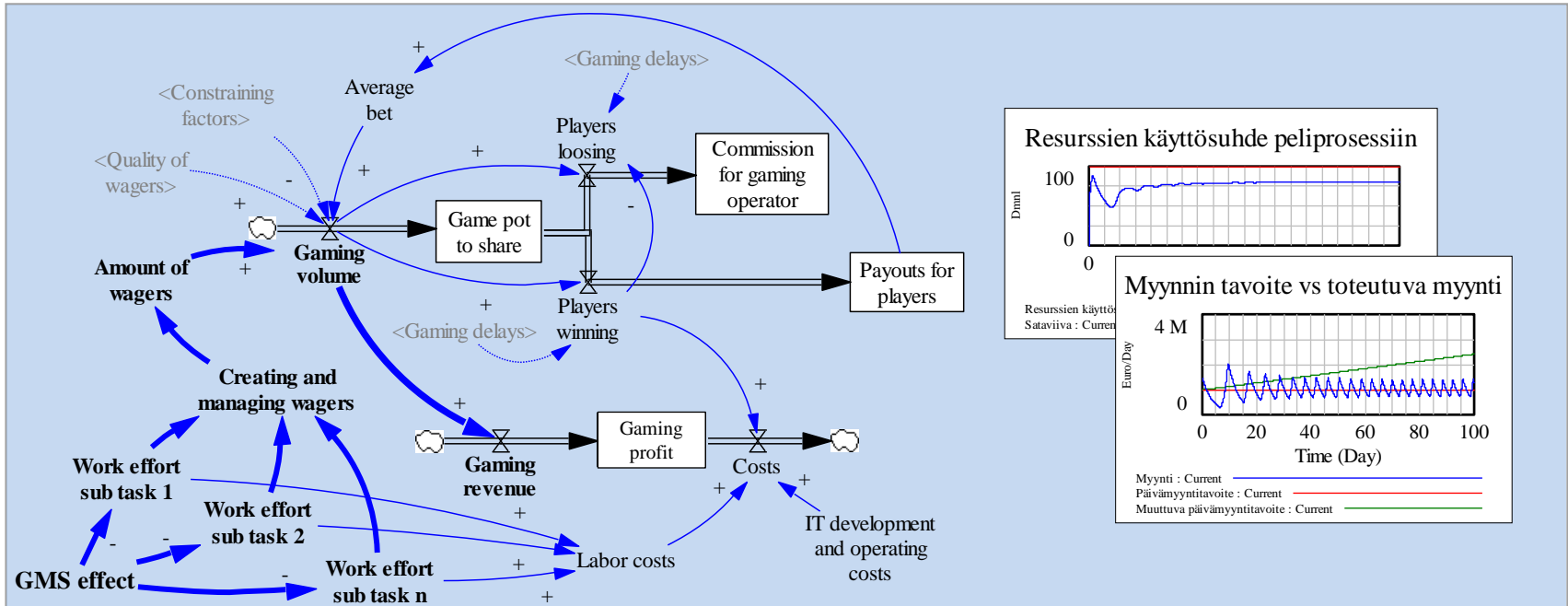
- 3) Behaviour with delays, accumulations and quantified relationships
 - **Dynamic value creation model**
 - Simulating value realisation



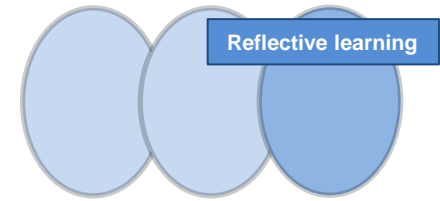
- Identifying measures for monitoring value creation

Sample models 2/2

Backup slide



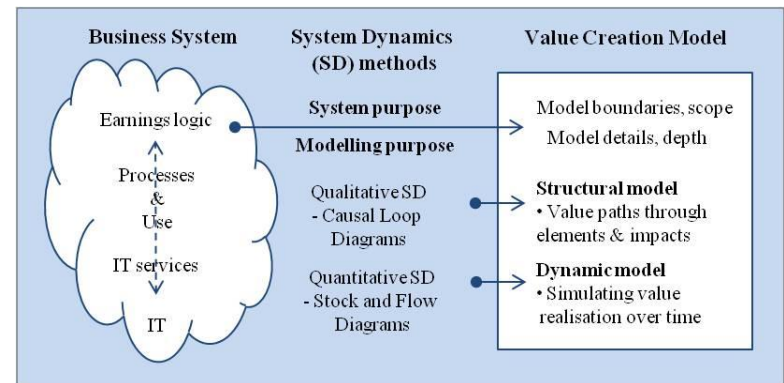
Dynamics and simulation
= how much and when



Reflective learning

- The framework for utilising SD for IT business value evaluation

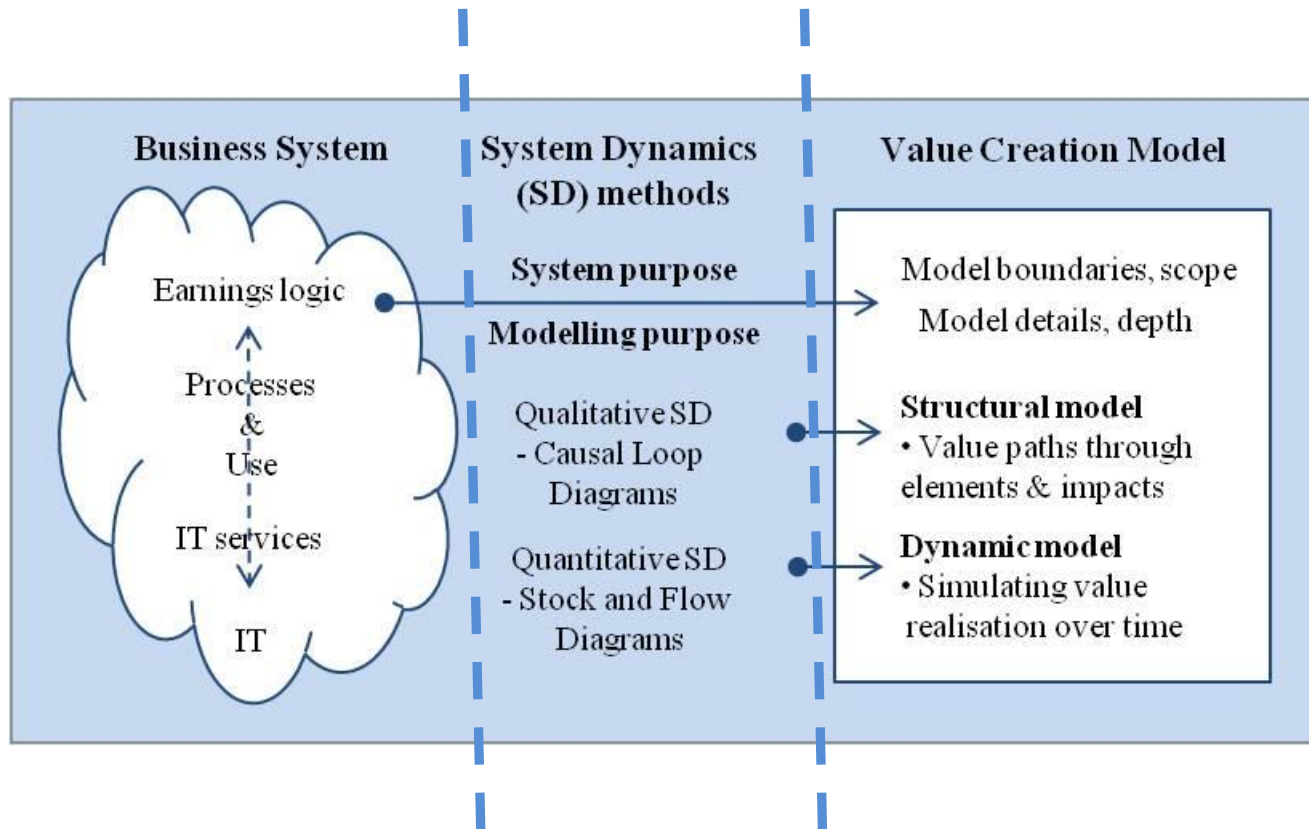
- **Structural value creation model:** common language for technology and business
 - Visual aspects, value paths
- **Dynamic value creation model:** pushing for tangibility, identifying leverage points
 - Requires extra work, skills and data => gradual deepening on needs basis



- Importance of purposes: a) system's purpose, and b) models' usage purpose
 - System's purpose sets stakeholders and highest order valuing baselines
 - Model's usage purpose affects required modelling details and balancing of structural and dynamic modelling
 - The process of modelling itself promotes knowledge sharing and group learning

The framework

Backup slide



Results and implications

Q: "How system dynamics (SD) can be used in evaluating IT business value?"

A: SD provides methods for value creation modelling:

1) Modelling the elements and their interconnections: **how** IT impacts value creation,
and

2) Modelling the dynamic value realisation: how much and when value is realised

Value creation modelling should find value paths connecting IT/IT services with usage and processes executing company's earnings logic

- Managerial implications

- **Opening up IT 'black box'** => communication tool, complementary factors, enriching traditional financial measures
- **Lifecycle view** => business system requirements, prototyping and testing value realisation, promoting continuous value management

- Research implications

- Replicating case studies – explicitly answering "How well it works"
- Why SD is not more common with IT value evaluation: embedded in existing practices or some other reasons?
- Comparing with selected practices, top-down and bottom-up directions
 - Value creation modelling vs. IT governance & management practices?
 - Value creation modelling vs. value practices in IT/SW development and long term planning?

Conclusions

Value creation modelling with SD:
a potential tool for promoting value management over
the **lifecycle of IT**:



For **requirements**:

- Scoping, prioritising
- Complementary factors

For **value realisation**

- Identifying
- Measuring
- Improving