



Aalto University  
School of Business

# Capital Budgeting (22E12000)

## Information Technology Investments

March 21, 2024  
Jari Huikku

# Case of Forest Companies: Business and Investment Planning

(In ForestBioFacts – a digital learning environment; one of the 16 themes/modules)

- A thorough presentation of investment process phases in a capital-intensive industry
- Please register & and have a look at the Business and Investment Planning module for the March 26 lecture (You will obtain a link through MyCourses)



## Business and investment planning

Investment project fundamentals ▶  
Business and investment planning in the forest industry ▶  
Conceptual phase ▶  
Pre-feasibility phase ▶  
Feasibility phase ▶  
Organisational learning in investment projects ▶

# Content

---

Features of IT investments

---

Costs in IT investments

---

Benefits of IT investments

---

Approaches suggested for IT investment evaluation

---

Use of IT evaluation methods

---

Enterprise Resource Planning system

---

Trends in IT

---

Conclusions

---

# What are the features of IT investments?



IT can be defined as “*the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data*”



Both costs and benefits of IT are difficult to measure



IT's Productivity paradox



“Success rates” low: hard to achieve the benefits

- exaggerated benefits
- unclear benefits ex ante & ex post



The most important investments in many corporations

# What are the costs in IT investments?

## Direct costs

- Hardware & Software
- Installation & Configuration
- Facility costs
- Running & Maintenance
- Systems breakdown & Security
- Training

## Indirect costs (human & organizational)!

# What are the benefits of IT investments?

## Different benefits per project type:

### Efficiency

Saving (or avoiding) time, manpower and money

### Functionality

Being able to carry out either new activities or existing ones at a higher quality level

### Communication

Linking different systems and exchanging information

### Management

Improving the quality of management and enhancing individuals' jobs

### Strategy

Enabling corporate objectives to be met or gaining competitive advantage

# What are the approaches suggested for IT investment evaluation?

## Joshi & Pant

- Discretionary – mandatory approach

## Ward et al.

- A six-stage approach to developing business cases

## Many other suggestions (e.g. Hochstrasse)

- Using only hard methods is not sufficient
- Different evaluation methods for different investment

# IT Investment evaluation

## Discretionary-Mandatory approach (Joshi and Pant, 2008)

- Different evaluation methods for different IT projects
- Classification based on the degree of discretion
- Affect classification: technical factors, functional requirements, alignment with strategy, competitors, time frame and laws/regulations

Level of discretion	Purely mandatory	Mainly mandatory	Mainly discretionary	Purely discretionary
Project characteristics	No flexibility in terms of project adoption or time frame	Some choice in the time frame for implementation; otherwise compulsions for project adoption	Some non-economic compulsions like competitor action for project adoption	Complete flexibility in undertaking & time frame for completion



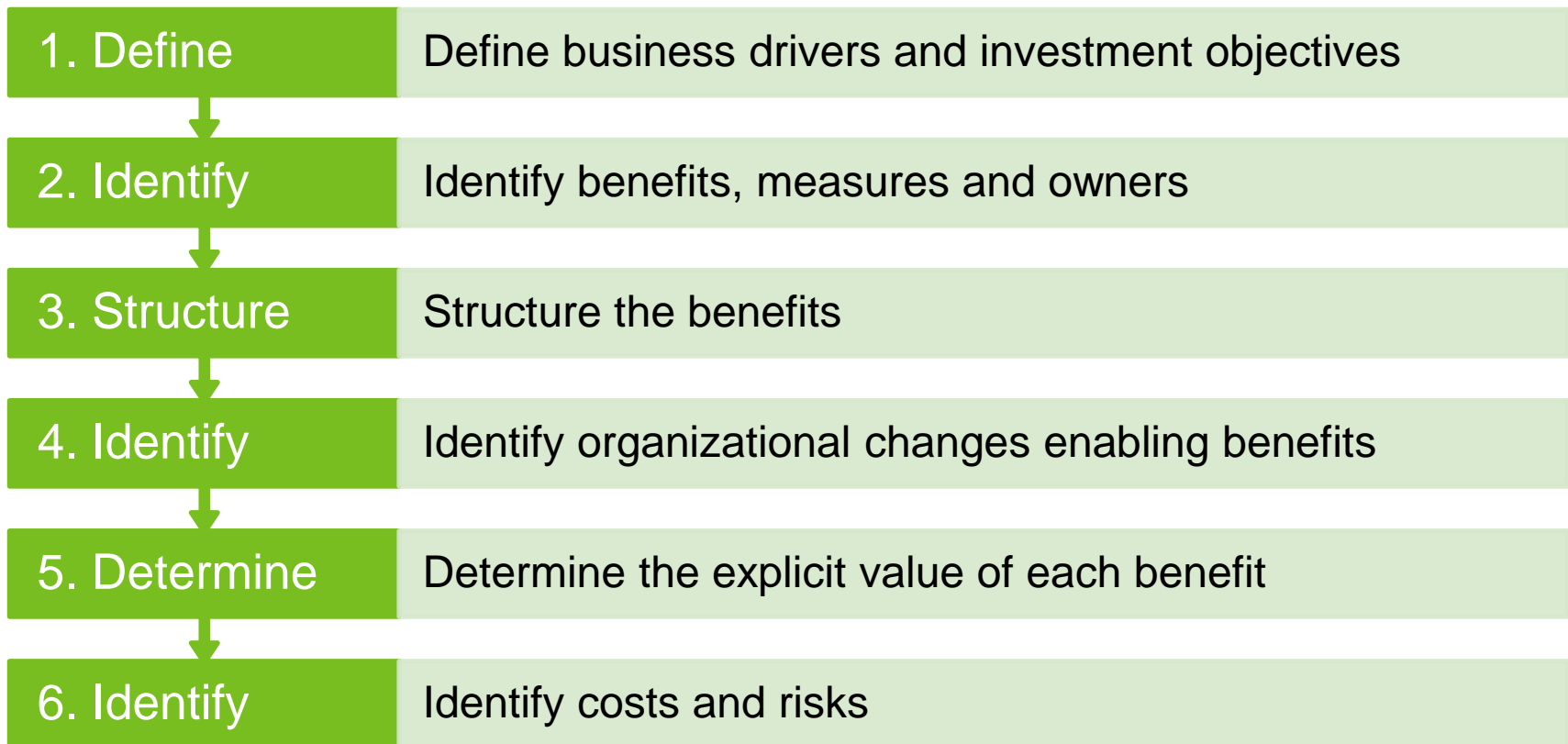
# IT Investment evaluation

## Discretionary-Mandatory approach (Joshi and Pant, 2008)

Level of discretion	Purely mandatory	Mainly mandatory	Mainly discretionary	Purely discretionary
<b>Evaluation Methods suggested</b>	<ul style="list-style-type: none"> <li>-Avoid spending too much time in evaluation</li> <li>-Focus on developing cost-effective alternatives</li> </ul>	<ul style="list-style-type: none"> <li>-Plan timing</li> <li>- Otherwise as in PM</li> </ul>	<ul style="list-style-type: none"> <li>-First order techniques appropriate; Continue with second order analysis</li> <li>-Think timing</li> <li>-Benchmark</li> </ul>	<ul style="list-style-type: none"> <li>-First order techniques appropriate; Continue with second order analysis</li> <li>-Detailed cost and tangible benefit analysis</li> </ul>
<p>-First order techniques: based on quantified (money) benefits: NPV, IRR, Payback, ROI            → If first order based analysis show acceptance, no significant need to continue with second order analysis</p> <p>-Second order techniques: evaluation of intangible benefits and their risks (e.g. value analysis &amp; information economics)</p>				

# IT Investment evaluation

## Six-stage approach by Ward et al. (2008)



# IT Investment evaluation

## Six-stage approach by Ward et al. (2008)

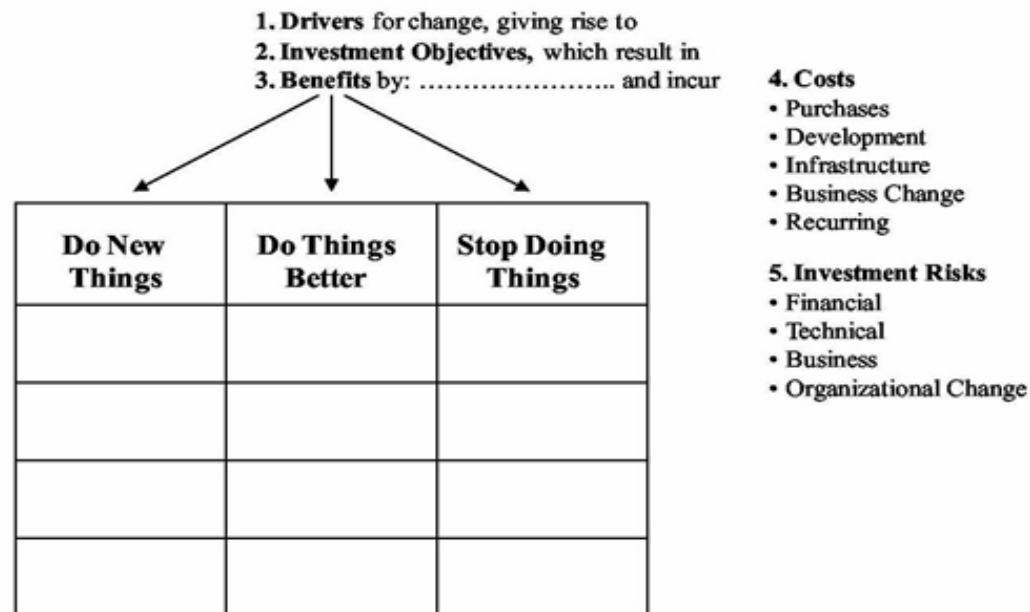
Figure 2: Classifying Benefits by Their Degree of Explicitness

		Type of Business Change		
		Do New Things	Do Things Better	Stop Doing Things
Degree of Explicitness ↑ High  ↓ Low	<b>Financial Benefits</b>	Financial value can be calculated by applying a cost/price or other valid financial formula to a quantifiable benefit.		
	<b>Quantifiable Benefits</b>	There is sufficient evidence to forecast how much improvement/benefit should result from the changes.		
	<b>Measurable Benefits</b>	Although this aspect of performance is currently measured, or an appropriate measure could be implemented, it is not possible to estimate how much performance will improve when changes are implemented.		
	<b>Observable Benefits</b>	By using agreed criteria, specific individuals or groups will use their experience or judgment to decide the extent the benefit will be realized.		

# IT Investment evaluation

## Six-stage approach by Ward et al. (2008)

Figure 4: The Complete Business Case



# Use of formal IT investment evaluation methods: Nordic study (Hallikainen et al., 2006)

%	Finland	Sweden	Norway
Only quantitative methods used (e.g. NPV, IRR, ROI, Payback)	9.8	12.0	3.2
Only qualitative methods are used	0.0	4.4	1.6
Both quantitative and qualitative	68.6	34.1	32.3
Decisions are based on experience and managerial discretion	21.6	49.5	62.9

# The appraisal of ICT projects in the large UK companies (Lefley, 2013)

Formal financial review of benefits and costs undertaken by all firms

Payback period, NPV and IRR typically used

Formal assessment of risk and strategic factors in over half of the companies

Important non-financial factors considered:

- Improved management information
- Strategic importance
- Improved operational efficiency

Similar financial and risk appraisals for ICT and Non-ICT projects

# What is Enterprise Resource Planning (ERP) system?

A packaged business software system that allows a company:

- to automate and integrate the majority of its business processes
- to share common data and practices across the corporation
- to produce and access information in a real-time environment

Integrated system supporting corporate-wide functions

- Financial
- Sales and marketing
- Manufacturing
- Logistics
- Human resources

# A Multiple Case Study of ERP Implementations: Common Benefits in the nine case organisations (Teo, 2017)

## Internal process related

- Conformity to new taxation, laws and regulation
- Improved shared services among the units
- Better reporting and auditing
- Improved data quality
- Improved individual performance/efficiency

## Rationale goals related

- Reduction in cycle times
- Improved overall productivity
- Allows organisation to do business more effectively
- Improved logistics and supply chain management

## Open system related

- Provides greater ease of integration, scalability or portability of systems
- IT-flexibility for organisational changes
- Builds external linkages to other organisations (via system integration)



# Key Trends in IT Technology (Info Tech – Research Group, 2023)

## 1. The Metaverse

A platform that combines multiple technologies to enable social and economic activity in a digital world that is connected to the physical world.

## 2. Generative AI (Artificial Intelligence)

AI can be trained by feeding content into generative adversarial networks, transformers, and variational autoencoders to create new content that is meaningful to people.

## 3. Industry-led data models

Industry-specific expertise is helping turn data into insights, pushing more back-office operations to find analytics-driven efficiencies, and creating new revenue-generating opportunities.

## 4. Sustained digital processes

Ensure your organization is executing the digital transformation it planned with business process mining and discovery.

## 5. ESG analytics and reporting

Preparing for a heightened regulatory environment with timely and accurate reporting on ESG metrics.

## 6. Zero-trust security

The shift from securing network boundaries to a focus on verifying users, assets, and resources

# IT investments: Conclusions

Typically a lot of non-financial benefits involved

Also, costs are not always clear

Not only one correct approach for all IT projects

- Try to find the appropriate evaluation approach for each IT project

In practice, often

- Benefits are overestimated
- Costs are underestimated
- Appropriate evaluation neglected

IT investments should be derived from strategy

Must be driven by business (business ownership)

Think what will happen if we do not make this investment

# Appendix: Multicriteria methods for evaluating IT investments

- Multicriteria (Information economics and Value analysis) appraisal methods consider both financial impacts and non-financial impacts that cannot be expressed in monetary terms
- Information economics
  - Incorporates scoring methodology: Alternatives are assigned weights and scores to various key performance aspects and then the weighted totals are calculated. Alternative with the highest scores wins
- Value analysis
  - Systematic approach to evaluate intangible benefits. Focus rather on value added than cost savings

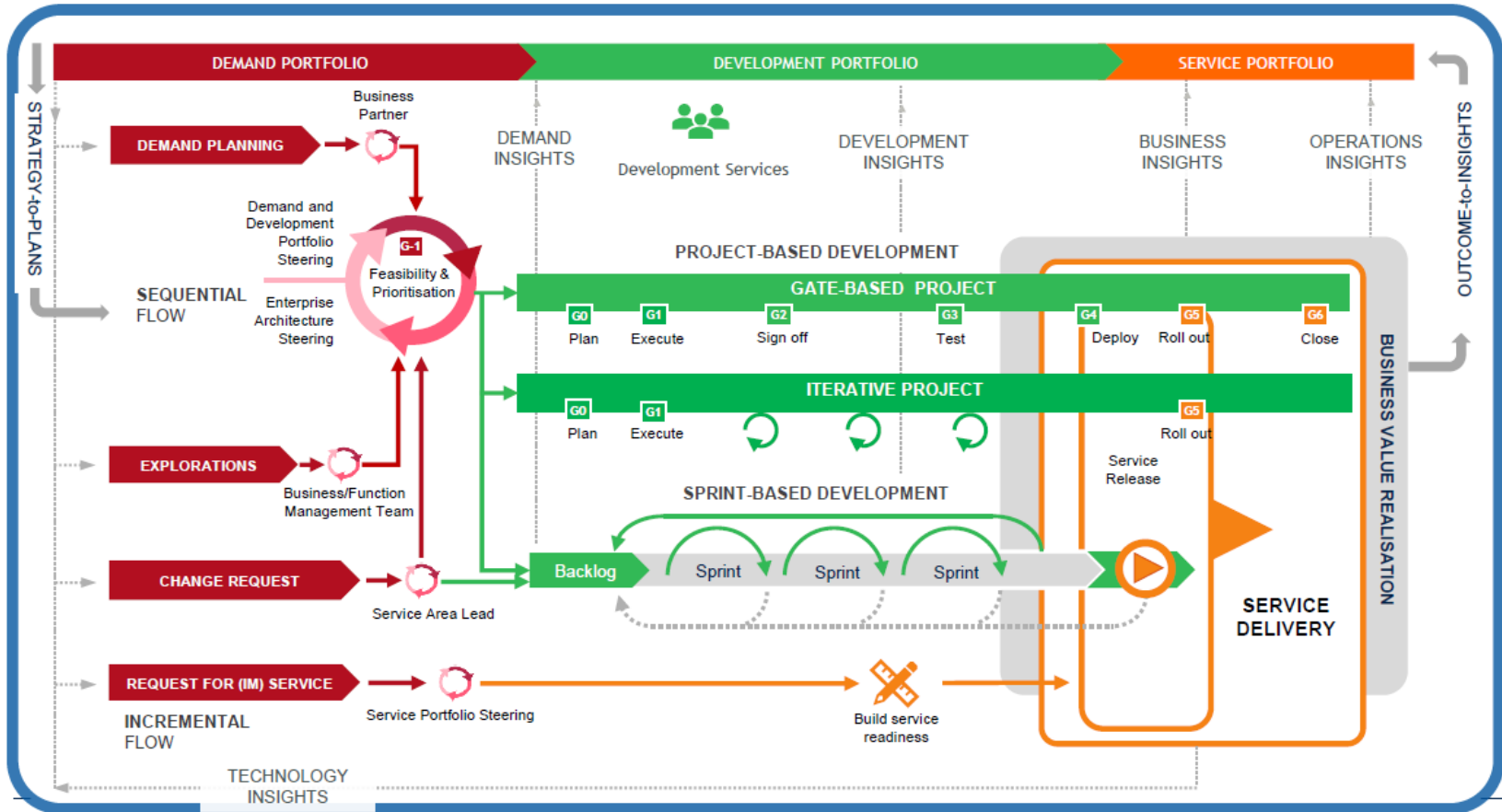
# Appendix: Multicriteria methods for evaluating IT investments

1			BUILD	BUILD	BUY	BUY
2	Factors	Weight	Score	Wt-avg Score	Score	Wt. Avg Score
3	Processing Speed	0.50	4	2.00	2	1.00
4	DB ease of retrieval	0.10	3	0.30	5	0.50
5	Maintainence	0.25	1	0.25	3	0.75
6	Customer Satisfaction	0.10	5	0.50	1	0.10
7	Supplier Satisfaction	0.05	5	0.25	1	0.05
8		1.00		3.30		2.40
9						
10						
11						
12						
13						

These scores are subjective.

# Appendix: Orion Corporation

## Information Management Projects: End-to-End development



# Appendix: Orion Corporation

## Information Management investments: Business Case Evaluation

### **Business case is required for each investment**

- First preliminary and later the final one after the detailed plan is available

### **Business case is typically prepared using standard template**

- Project summary (Project background, Objectives, Benefits, Strategic fit)
- Project scope (Scope, Risks/Dependencies/Constraints, Governance, Timeline)
- Cost/Benefits analysis (Tangible, Intangible, Solution lifecycle costs)

### **Typical Key focus/discussion areas during approval process**

- Are benefits well enough defined
- Are there real business improvement benefits and not only (often theoretical) estimates of saved work time
- How are processes planned to change
- Do we have sufficient IM and Business resources to actually execute the project as planned
- Other risk management areas