Option Based Risk Management

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Agenda

1. Overview of the option-based risk management (OBRiM) framework
    a. Real-Options Theory
    b. OBRiM
2. Integration of risk management process and OBRiM in “Irish financial services organization” (IFSO)
3. Benefits of OBRiM for the business value of IT

Option-based risk management (OBRiM) framework

Real Options

- Real option: *Right*, but not obligation, *to undertake some business decisio*n
- Real option refer to involving tangible assets (machinery, land, buildings), not financial instruments

- Real options create managerial *flexibility* (within uncertain market)
- real options ~ high-level risk mitigation strategies
- Real options have economic value (ROT) -> inform decisions, create shareholder value by managing real options

- Five types of real options: Waiting-to-Invest option, Growth option, Flexibility option, Exit option and Learning option

Sources:

1. Real Option Definition (investopedia.com)
2. Real options theory - IS Theory (theorizeit.org)

Real-Options Theory (ROT)

Problem:

- No empirical studies of the *connections* between *risk factors* and *risk countermeasures*
- No adequate ways to *quantify risk and risk countermeasure* (consequence on the cost and value of an IT investment)
- No assessment of optimality of *combination* of risk countermeasures

Sources:

1. Benaroch et al. (2006), Real Options in IT Risk Management: An Empirical Validation of Risk-Option Relationships, In MIS Quarterly Vol. 30, No. 4 (Dec, 2006), pp. 827-864
2. Real options theory - IS Theory (theorizeit.org)

Real-Options Theory (ROT)

- ROT applies financial options theory to *quantify* the value of management flexibility in a world of uncertainty -> characterize and communicate the strategic value of an investment project
- establish the importance of flexibility in risky (IT) investments.

Benefits IT risk management:

- theoretical basis for managing software development risk from an economic perspective
- enables deployment of risk countermeasures contingent on the materialization of risk
- justify certain IT project management practices relating to risk
- crucial success factor in IS development

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Option-based risk management (OBRiM)

Challenges:

- IT managers follow *intuition* but suboptimal practices -> supplement with formal real option models

- apply IT risk management from an economically reasonable perspective
- choice of adequate mitigation strategy (including how to combine multiple strategies)

Option-based risk management (OBRiM)

Main Ideas:

- size up and identify relevant risks
- build sufficient flexibility into investment
- evaluate surfacing information and take corrective steps
- control risk and maximize value in information technology investment decisions.
- get better quantitative insights into which risk mitigations to pursue and combine in order to effectively address the risks most worth controlling.

OBRiM Option Types I

Approach: mapped options to risk factor

Type	Use Case
defer investment commitment	learn about the nature of uncertain payoffs
invest in pilot/ prototype	explore magnitude of technical and organizational risks
stage investment	discover technical complexity, user involvement, architectural compliance
alter scale of investment	react to observed conditions concerning technical risk, user involvement risk, etc

OBRiM Option Types II

Approach: mapped options to risk factor

Type	Use Case
abandon investment	put resources to alternate uses provides partial insurance
outsource development/ operations	transfer risk/ business conditions are sufficiently unfavorable
lease investment resources	investment can be abandoned to save the residual cost of resources
strategic growth through investment	existing capabilities and opportunities for follow-up investments

OBRiM Risks Mapped to Operating Options

Risk Factor	Options
firm cannot afford the project	pilot
staff lacks needed skills and experience	defer, prototype, stage, outsource
demand exceeds expectations (follow-up opportunities exist)	defer, pilot, expand
parties slow to adopt the application	pilot, stage, abandon, contract, lease

Integration of risk management process in "Irish financial services organization" (IFSO)

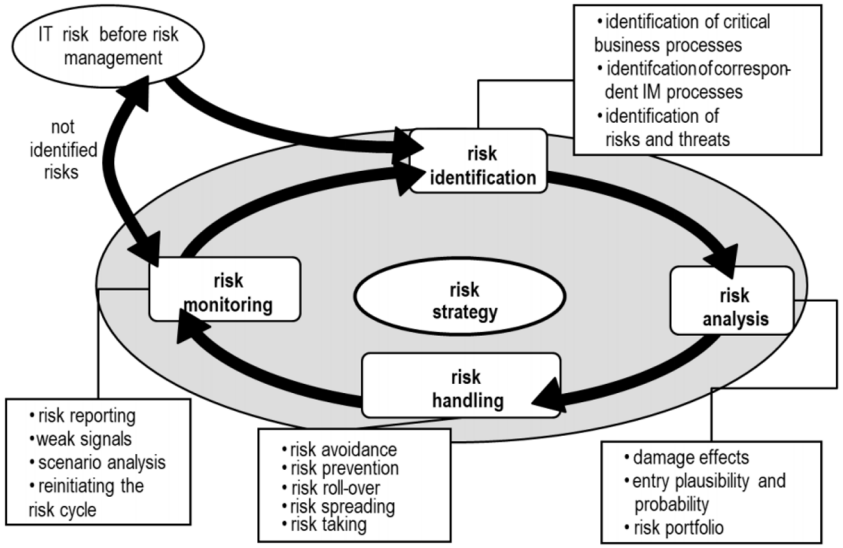
Irish financial service organization

- 10000 employees
- revenue > 1 Bio. €
- dedicated department for IT investments: Project investment department (PID)
- every case has an adequate risk management plan

Sources:
1. Benaroch et al. (2006), Real Options in IT Risk Management: An Empirical Validation of Risk-Option Relationships, In MIS Quarterly Vol. 30, No. 4 (Dec, 2006), pp. 827-864

Risk identification

- Each investment project gets its own risk management lifecycle
- Identifying possible risks for each project (PID Managers are responsible for it)



Sources:
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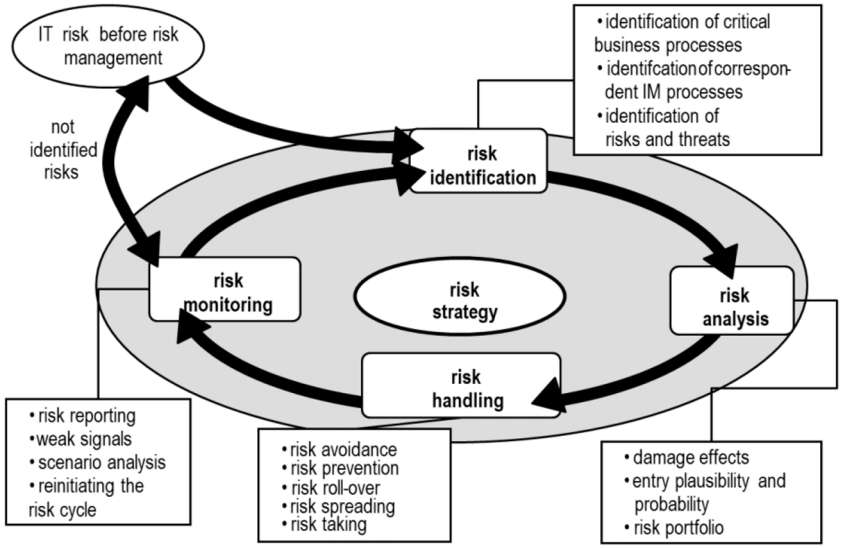
2. Benaroch et al. (2006), Real Options in IT Risk Management: An Empirical Validation of Risk-Option Relationships, In MIS Quarterly Vol. 30, No. 4 (Dec, 2006), pp. 827-864

Risk analysis

- investments are mostly monetary based → might be easier to quantify
- prioritize risks

Methods like Value-at-risk, that calculate probabilities if a loss limit will be exceeded, will help the IFSO to determine which investments are reasonable or not



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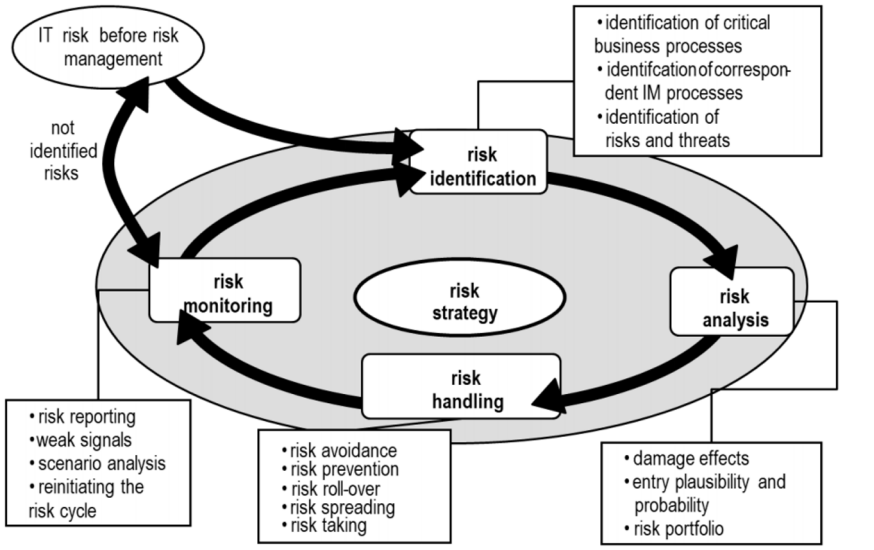
Risk handling

- define measures to handle risk that is identified and has high importance according to the risk analysis
- measures are subject to marginal cost → PID manager need to calculate if the measure is maximizing the marginal cost



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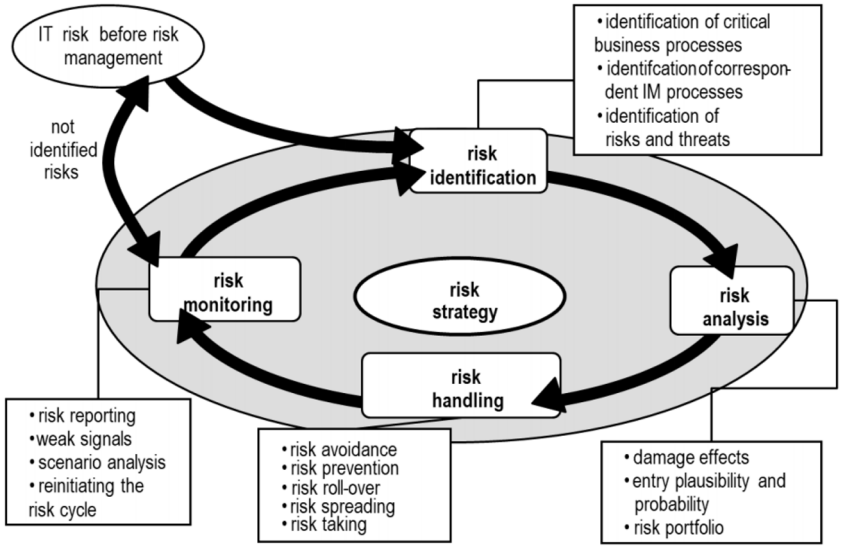
Risk monitoring

- monitoring investment projects from the beginning and the after effects of the investment
- IFSO has to make sure that the risks are still monitored after an investment was made to determine the outcome



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Integration of OBRiM

Situation & identified Problems

- Managers often intuitively rely on the logic of option-based-risk management
- Similar criteria to decide which and how many options are needed for the IT investment
- But Intuition alone can lead to suboptimal or even counterproductive decisions:
  - Multiple options available for the mitigation of the same risk
  - Options are typically created at a cost
  - The cost for creating the options can be higher than the cumulative value of the options
  - Different combinations of options possible for mitigation the same risks

→ difficult to decide for the best

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1. Benaroch et al. (2006), Real Options in IT Risk Management: An Empirical Validation of Risk-Option Relationships, In MIS Quarterly Vol. 30, No. 4 (Dec, 2006), pp. 827-864

Integration of OBRiM

Support of OBRiM

- Helpful to have formal ROT models as supplements
  - Help to quantify the value that the options add
  - Set the creation cost and the mitigation in relation
- Recognize positive risk and use follow-up investment opportunities

Integration of OBRiM

- Full adoption add benefits but also comes with cost
- Better training of IT personnel in financial concepts needed
- Creating a simplified version of OBRiM

→ **Partial adoption of OBRiM would lead to the best results!**

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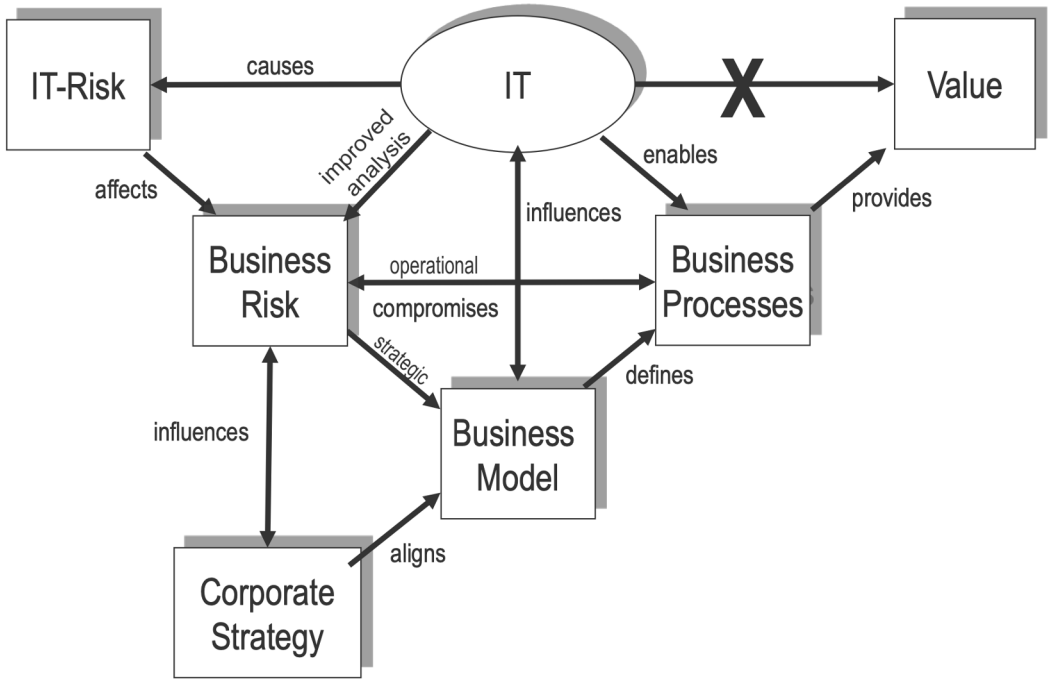
1. Benaroch et al. (2006), Real Options in IT Risk Management: An Empirical Validation of Risk-Option Relationships, In MIS Quarterly Vol. 30, No. 4 (Dec, 2006), pp. 827-864

Benefits of OBRiM for the business value of IT

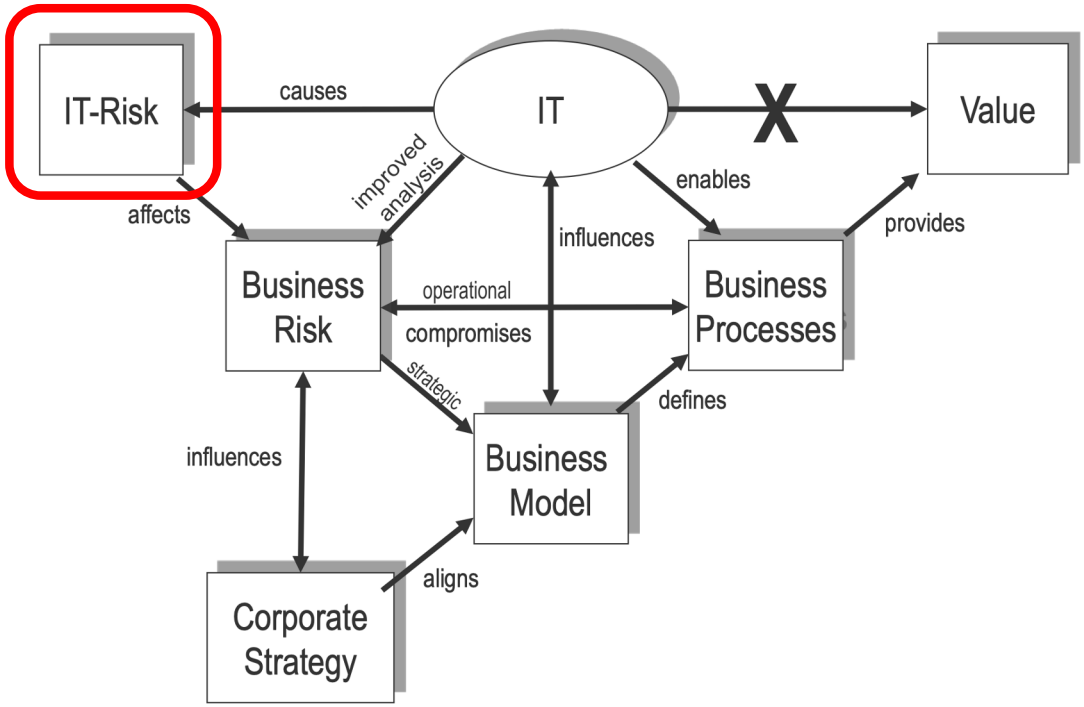
Influence of IT on business value



Source:

1. Lecture 02 - Business value of IT p.13

Influence of IT on business value



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Benefits of OBRiM for business value of IT

- No direct influence on business value
- Controls/mitigates risk
- Helps to make more accurate predictions during process of evaluating investments in IT/IS

  → (Theoretically) indirect positive impact on business value

- Possible problems when applying theoretical concept to practice can result in negative impact on business value

Questions for discussion

1. On the wish of a client, company A decides to build a native App- version of their Web-Service: Which risks may arise and which options could help?

2. What could be shortcomings of OBRiM?

3. Which steps of the risk management process according Krcmar covers OBRiM?