IM

Information Management and Knowledge Management (IMKM)

Lecture 2

Business Value of IT

TUM

Chair for Information Systems

Lecture Schedule

Information Systems Strategy

Business Value of IT

- Business IT Alignment
- Guest Lecture: Digital Leadership and the CIO Role
- IT-enabled Strategies
  - Digital Platforms

Information Management

- IT Controlling and IT Governance
- IT Sourcing and IT Off-Shoring
- IT Security, Privacy and Risk Management
- Guest Lecture: Natural Language Processing for IM

Knowledge Management

- Basics
- Tools
- Guest Lecture: Applications

IMKM Lecture 2: Business Value of IT/ IS

Outline

1. **Discussion in Research and Basics**

2. Measuring Business Value of IT
   1. Frameworks
   2. Methods

Learning Objectives

- *You understand the role of information technology (IT) and information systems (IS) for firms.*
- *You can discuss approaches to identify and evaluate the value of IT/ IS and IT/ IS investments.*
- *You know different frameworks and methods for measuring the business value of IT/ IS and assessing IT/ IS investments.*
- *You can apply and discuss measurement methods.*

IT Doesn't Matter

by Nicholas G. Carr

As information technology's power and ubiquity have grown, its strategic importance has diminished. The way you approach IT investment and management will need to change dramatically.

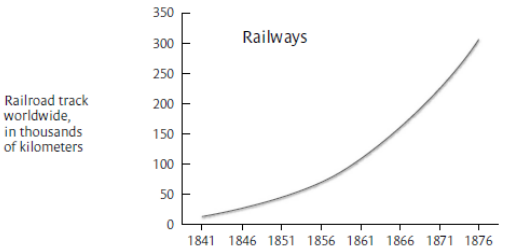
In 1968, a young Intel engineer named Ted Hoff found a way to put the circuits necessary for computer processing onto a tiny piece of silicon. His invention of the microprocessor spurred a series of technological breakthroughs – desktop computers, local and wide area networks, enterprise software, and the Internet – that have transformed the business world. Today, no one would dispute that information technology has become the backbone of commerce. It underpins the operations of individual companies, ties together far-flung supply chains, and, increasingly, links businesses to the customers they serve. Hardly a dollar or a euro changes hands anymore without the aid of computer systems.

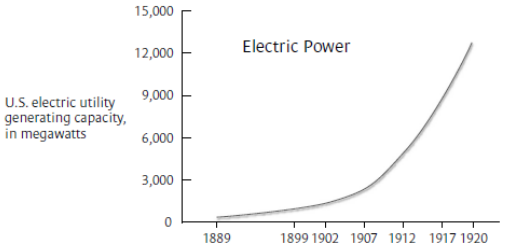
As IT's power and presence have expanded, companies have come to view it as a resource ever more critical to their success, a fact clearly reflected in their spending habits. In 1965, according to a study by the U.S. Department of Commerce's Bureau of Economic Analysis, less than 5% of the capital expenditures of American companies went to information technology. After the introduction of the personal computer in the early 1980s, that percentage rose to 15%. By the early 1990s, it had reached more than 30%, and by the end of the decade it had hit nearly 50%. Even with the recent sluggishness in technology spending, businesses around the world continue to spend well over $2 trillion a year on IT.

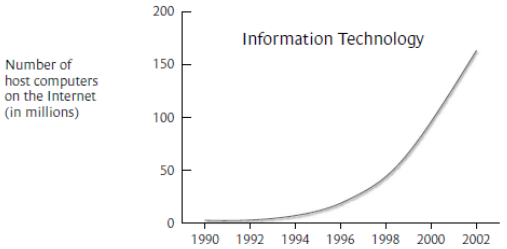
But the veneration of IT goes much deeper than dollars. It is evident as well in the shifting attitudes of top managers. Twenty years ago, most executives looked down on computers as proletarian tools – glorified typewriters and

The Sprint to Commoditization

One of the most salient characteristics of infrastructural technologies is the rapidity of their installation. Spurred by massive investment, capacity soon skyrockets, leading to falling prices and, quickly, commoditization.



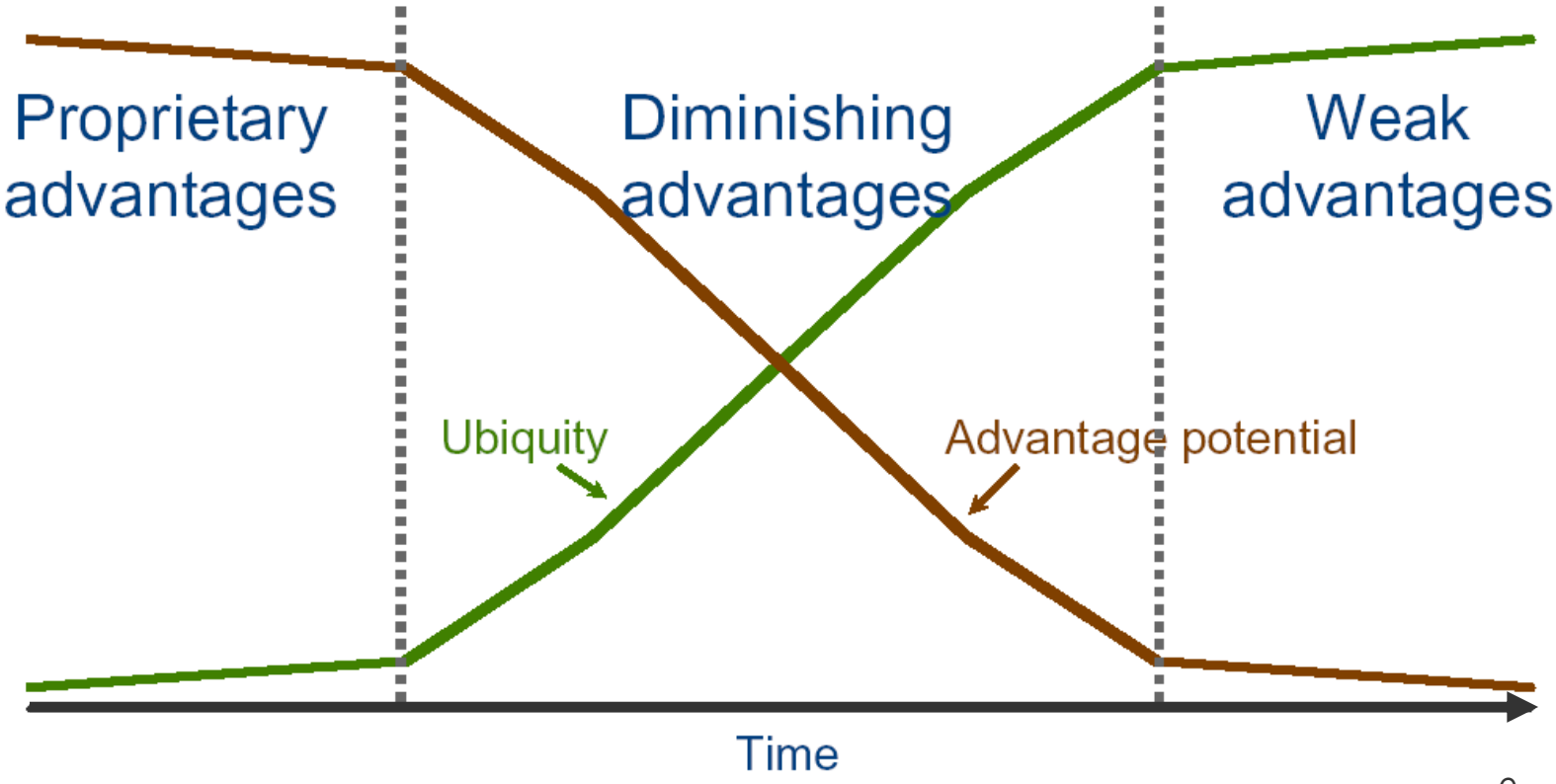




Sources: railways: Eric Hobsbawm, *The Age of Capital* (Vintage, 1996); electric power: Richard B. Duboff, *Electric Power in Manufacturing, 1889–1958* (Arno, 1979); Internet hosts: Robert H. Zakon, *Hobbes' Internet Timeline* (www.zakon.org/robert/internet/timeline/).

Evolution of Technology – Infrastructural vs. Proprietary

IT becomes a simple factor of production!

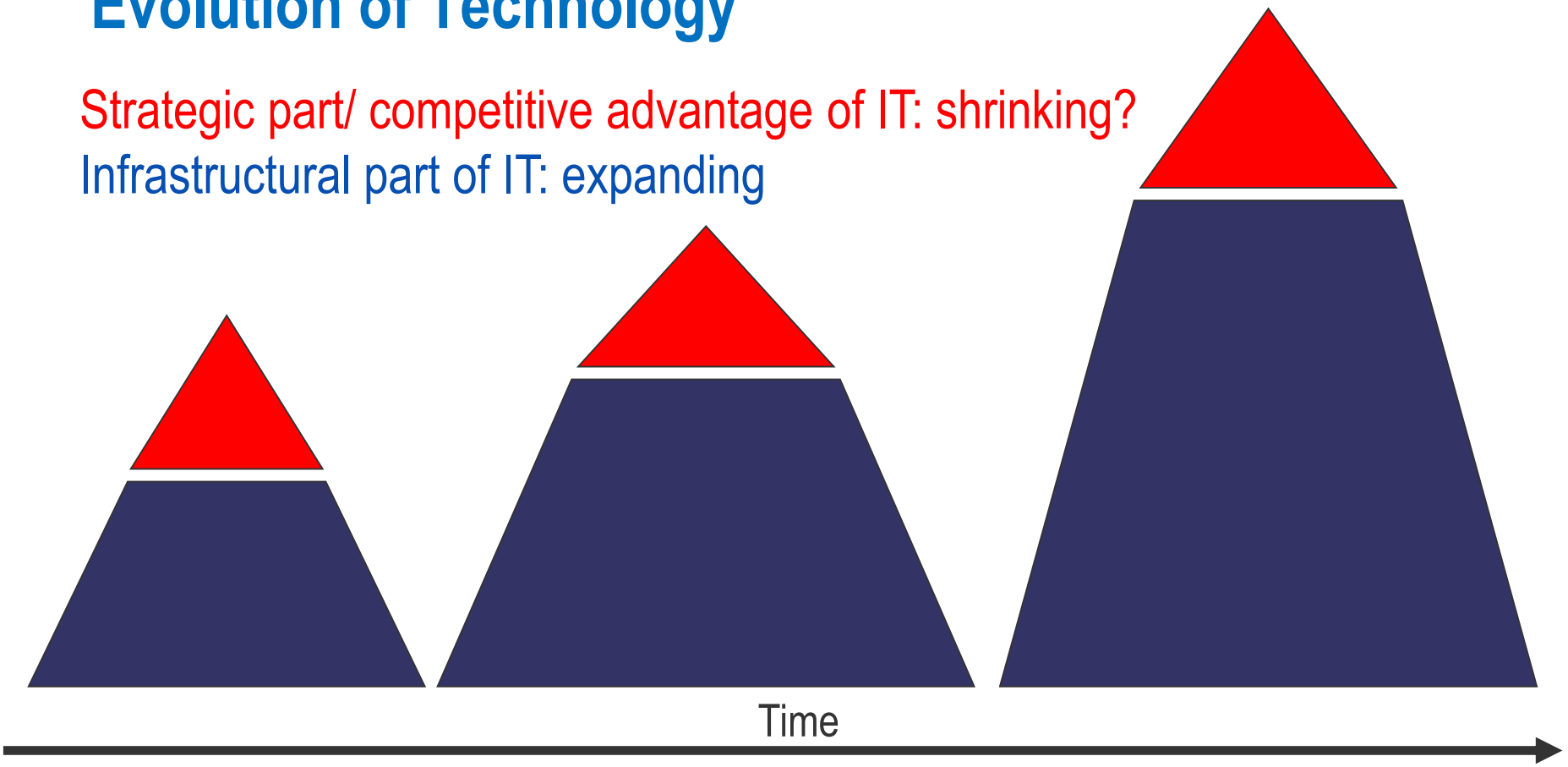


Carr, N. G. (2004).

Evolution of Technology

Strategic part/ competitive advantage of IT: shrinking?

Infrastructural part of IT: expanding



- The software stack continues to be commoditized, yet specialized software remains strategic
- The best business software is invisible; it still needs to be managed

2003

"IT Doesn't Matter" – Nicholas Carr

2007

"The CIO Dilemma: The Sinking CIO" – Information Week

2009

"The cost of IT is not the value of IT." – Hunter & Westermann

2011

"IT Spending: No longer the first thing cut" – Information Week

(69% of Companies expected an IT budget increase in 2011)

2014

"CIOs Must Market IT's Value" – Adam Dennison (cio.com)

2017

"IT as the champion of your Digital Transformation" – William Geller (cio.com)

What we know so far….(based on research findings)

- **IT/ IS does create value**
  - Value can be of different types (financial – ROI, intermediate – process-related, affective – perception-related)

- **IT/ IS creates value under certain conditions**
  - Has to be a part of a business value creating process with other organizational factors operating in a synergistic manner (resource-based view, IT capabilities)

- **IT/ IS-based value manifests itself in many ways**
  - Different ways (productivity, profitability, consumer surplus, and innovativeness)
  - and at different levels (individual, group, process, firm, and industry)

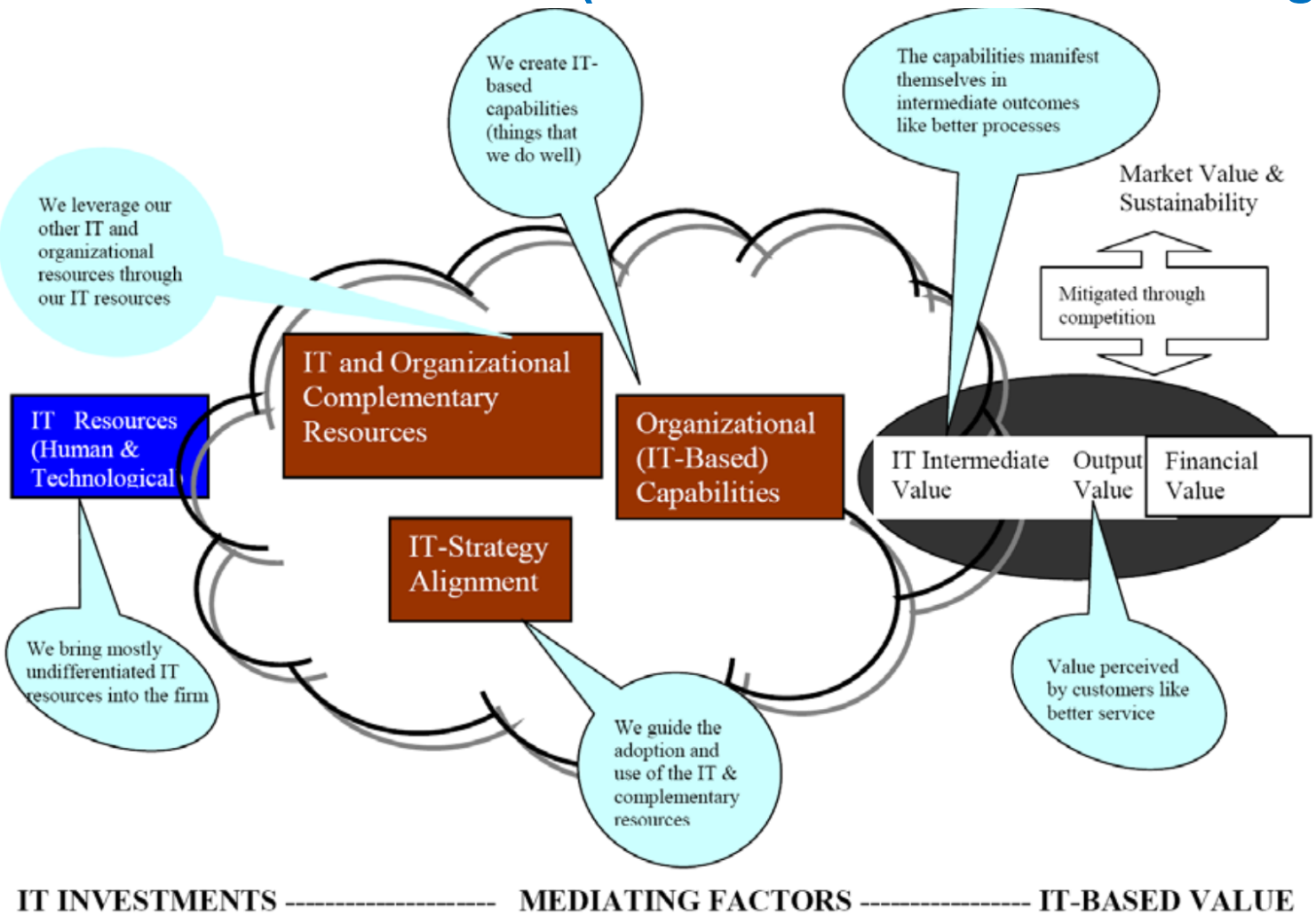
Source: Kohli & Grover (2008, p.27)

What we know so far….(based on research findings)

- **IT/ IS-based value and IS-based competitive advantage are not the same**
  - Competitive advantage stems from creating “differential value”, can be achieved through leveraging IS and complementarities
- **IT/ IS-based value could be latent**
  - IS-based value creation is not immediate, there is a time lag (often in the scale of years)
- **Numerous factors mediate IT/ IS and value**
  - Business-IT/ IS alignment, Business Process Reengineering (BPR)/ Business Process Management (BPM), IT Usage, etc.
- **Causality for IT/ IS value is elusive**
  - It is difficult to fully capture and attribute the value generated by IT/ IS investments

Source: Kohli & Grover (2008, p.27)

What we know so far….(based on research findings)



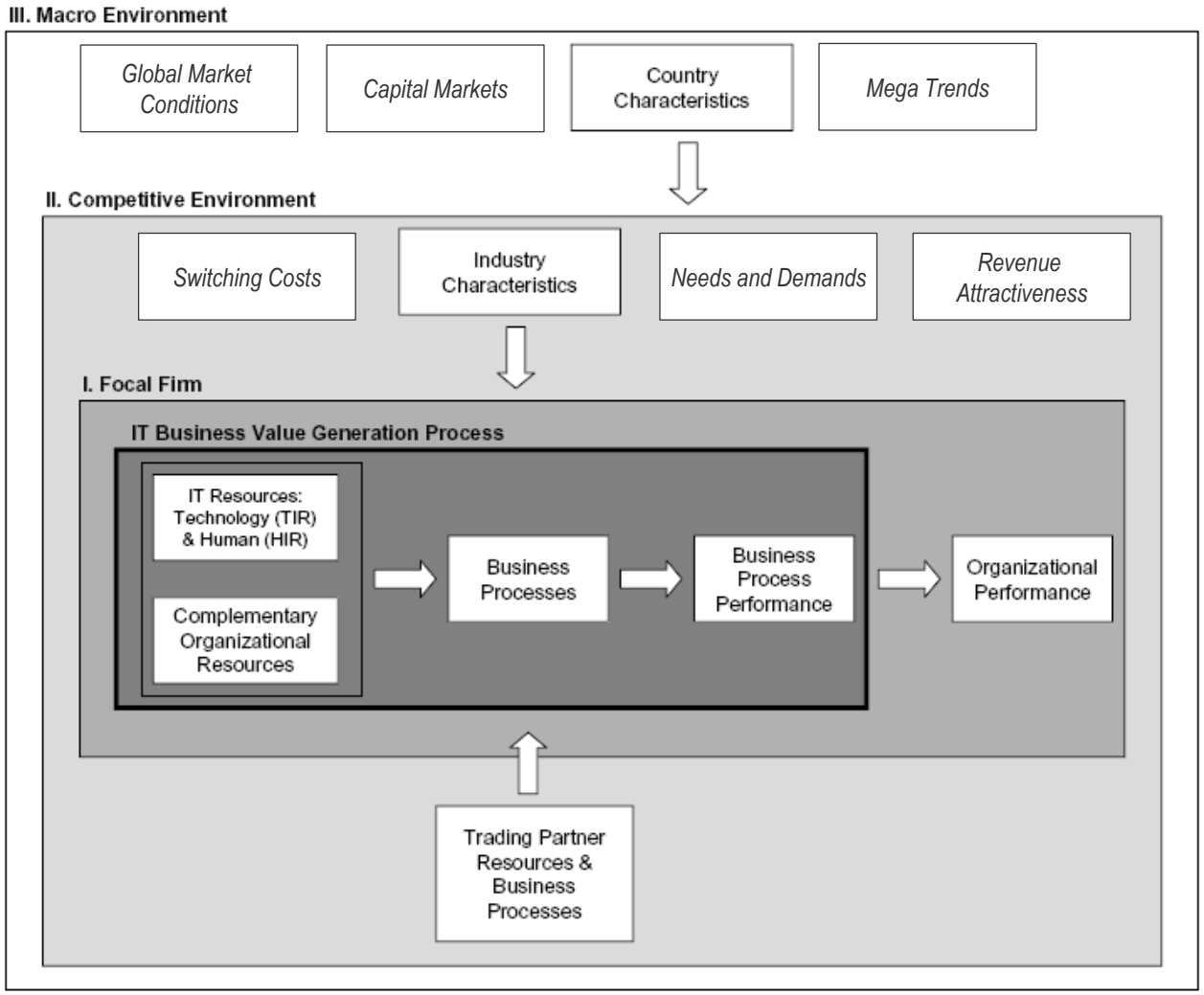
Source: Kohli & Grover (2008, p.27)

IT/ IS -Potentials and their Organizational Benefit

IT-Potential	Organizational Influence/Benefit
Automate	Reduction of Manual Actions
Informate-up	Providing information to top management.
Informate-down	Providing information to employees across the firm.
Sequential	Natural Order of Activities or Even Paralleling Processes
Precise/targeted	Continuous Process Monitoring
Analytical	Complex Analysis of Existing Information
Integrative	Pooling of Heterogeneous Activities
Knowledge creating	Creation of Knowledge and Expertise
Simplifying	Removing of Intermediaries and Business Process Redesign
Geographical	Overcoming Space
Transform	Redefining the business model, business processes and relationships of the firm

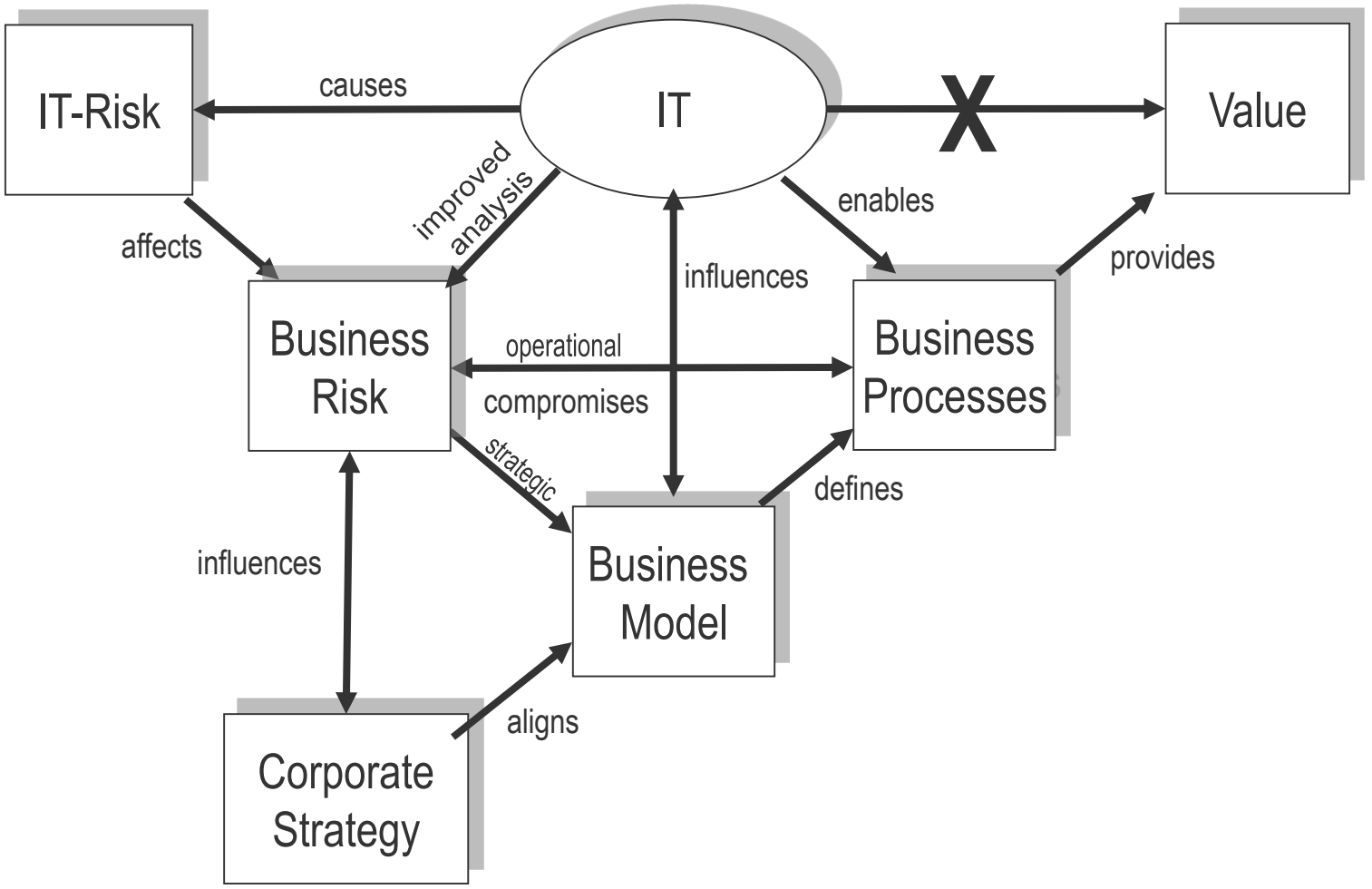
Source: Davenport (1993, p. 51); Vial (2019, p. 132)

Contextual Factors influencing Business Value of IT/IS



Melville et al. (2004);
Osterwalder, A., & Pigneur, Y. (2010)

IT – Benefit mechanics



Consequences of IT/ IS Value Ambiguity

- **When we can't articulate the value, we tend to focus on the cost!**

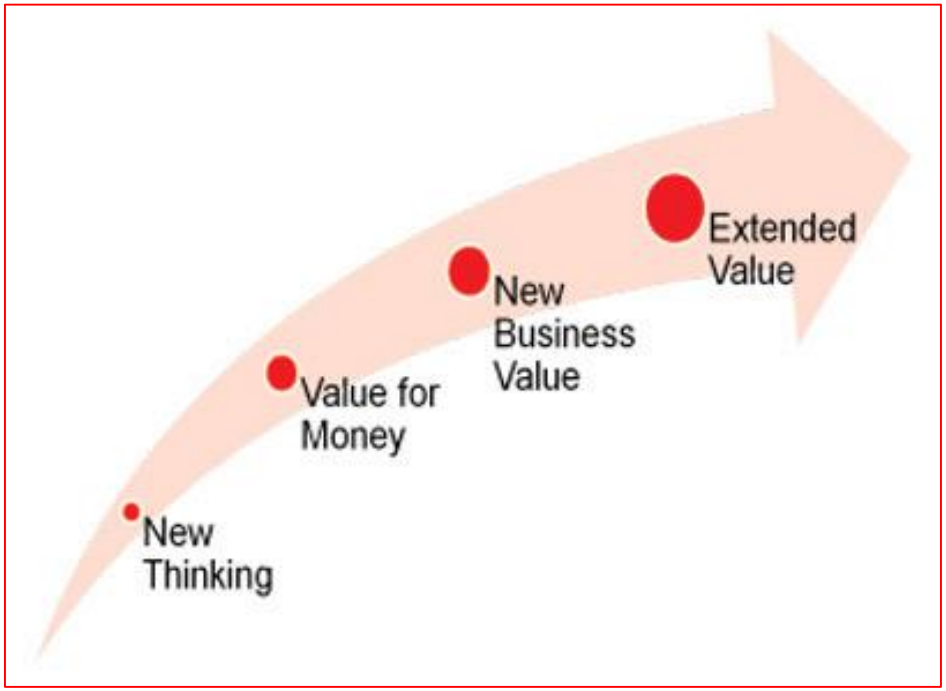
- **To many executives, the cost of IT/ IS appears:**
  - substantial; even excessive
  - never-ending
  - not well managed

- **Creates IT/ IS direction toward:**
  - under-investment
  - down-sizing
  - outsourcing

The Path to Communicating IT/ IS Value for a CIO

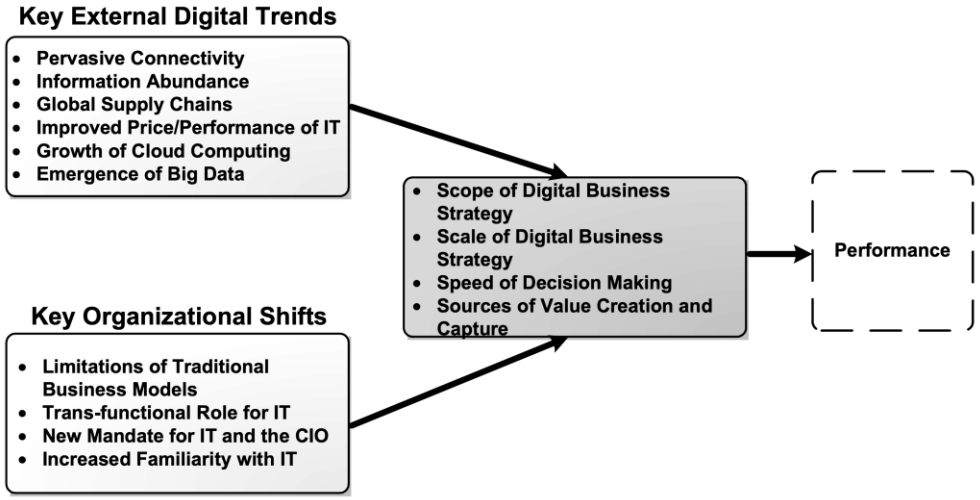
- **Step 1:** Change thinking to avoid the value traps.
- **Step 2:** Show that IT/ IS provides value for money.
- **Step 3:** Show how IT/ IS improves business performance.
- **Step 4:** Show how value is created beyond and behind IT/ IS.

Successful IT/ IS leaders communicate value in a particular way and in a particular order.



Hunter & Westerman (2009, p.7)

More recent Discussion in Research: Digital Business Strategy

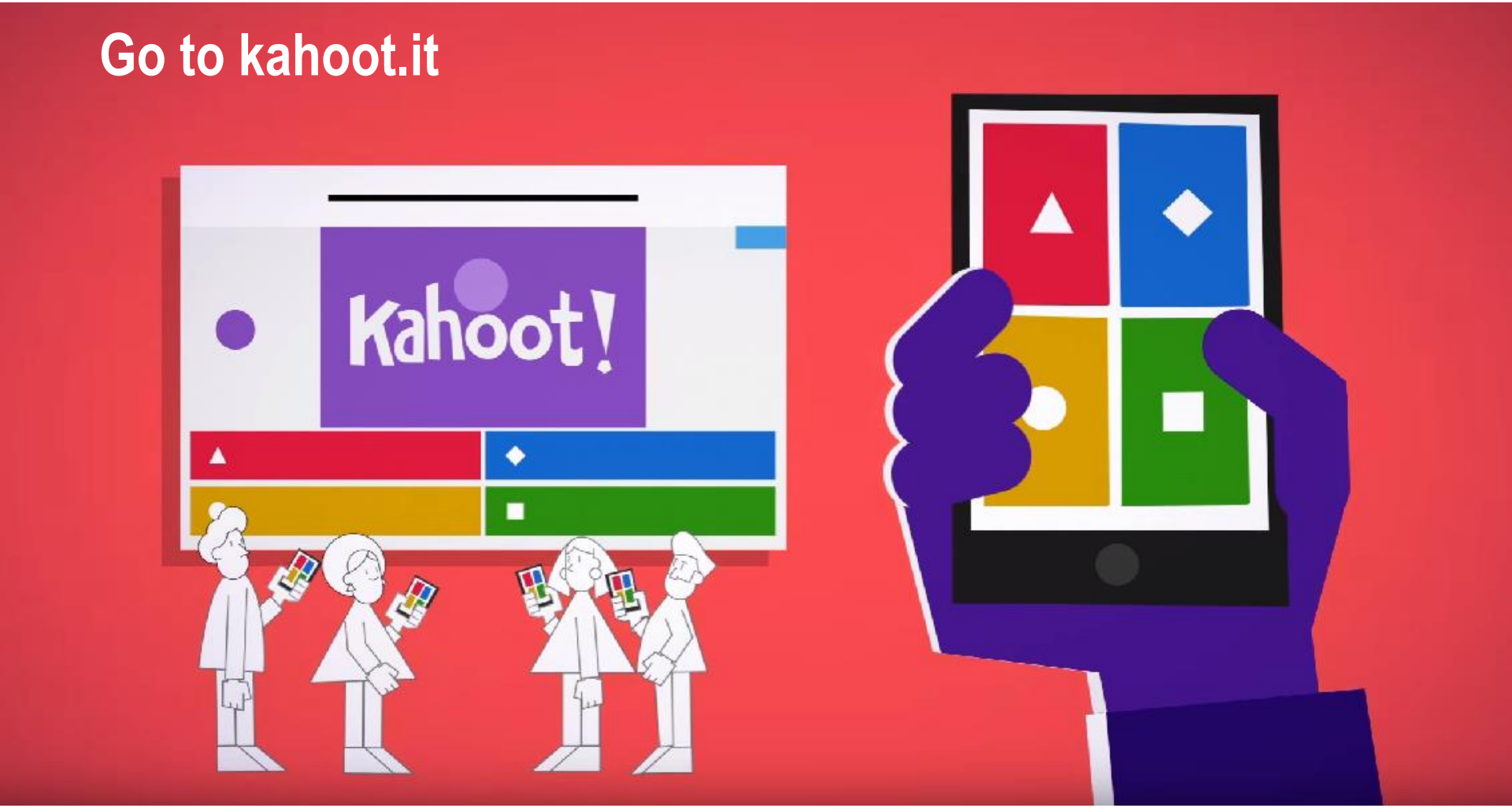


- Adapt business infrastructure to the new digital era
- Traditional business strategy reshaped by digital technology: modular, distributed, cross-functional
  - Embedded technology in products and services
  - Digital platforms
  - IT as a ubiquity
- From business-IT alignment to fusion of business and IT towards a digital business strategy

Bharadwaj et al. (2013)

Quiz Time!

Go to kahoot.it



IMKM Lecture 2: Business Value of IT/ IS

Outline

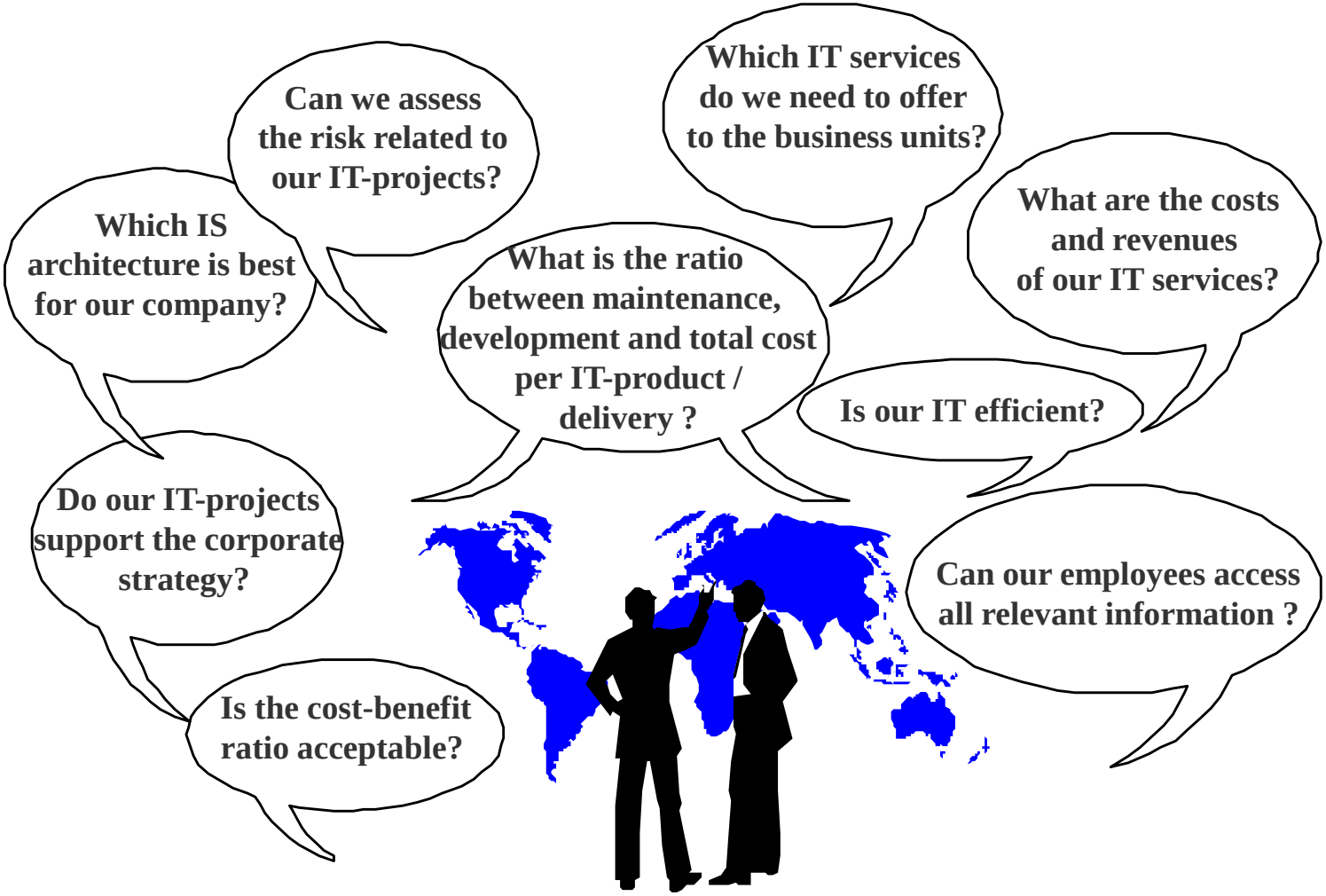
1. Discussion in Research and Basics

2. **Measuring Business Value of IT**
   1. **Frameworks**
   2. **Methods**

Learning Objectives

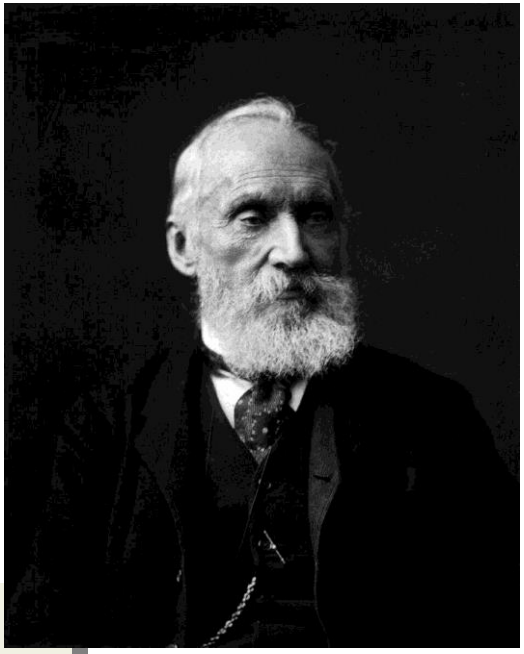
- *You understand the role of information technology (IT) and information systems (IS) for firms.*
- *You can discuss approaches to identify and evaluate the value of IT/ IS and IT/ IS investments.*
- *You know different frameworks and methods for measuring the business value of IT/ IS and assessing IT/ IS investments.*
- *You can apply and discuss measurement methods.*

Business Value of IT is difficult to measure



Measures of IT/ IS Value

- Earnings growth
- Market share
- Customer awareness and satisfaction

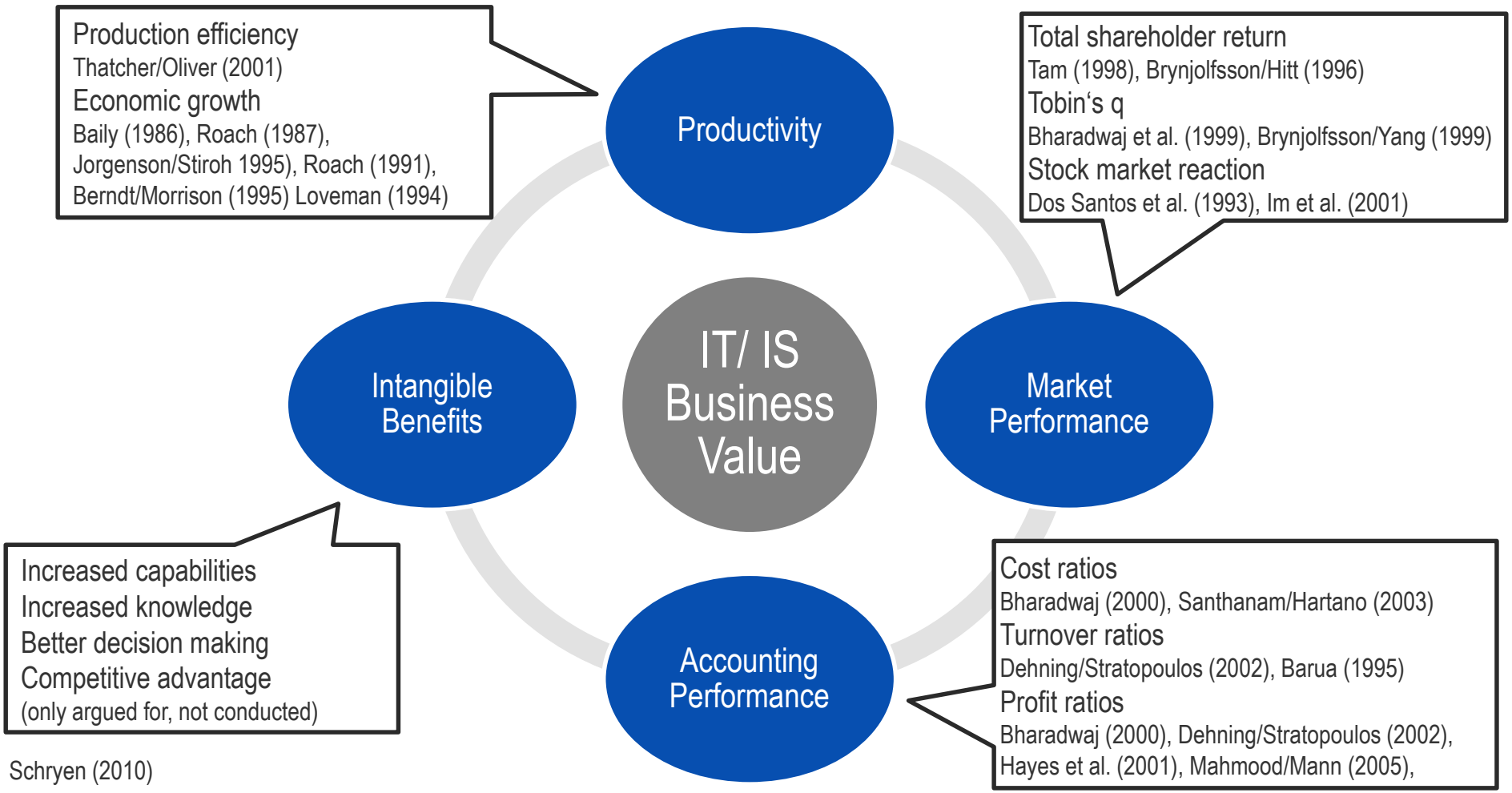


One of my favorite quotes:

When you cannot measure, your knowledge is of a meager and unsatisfactory kind.

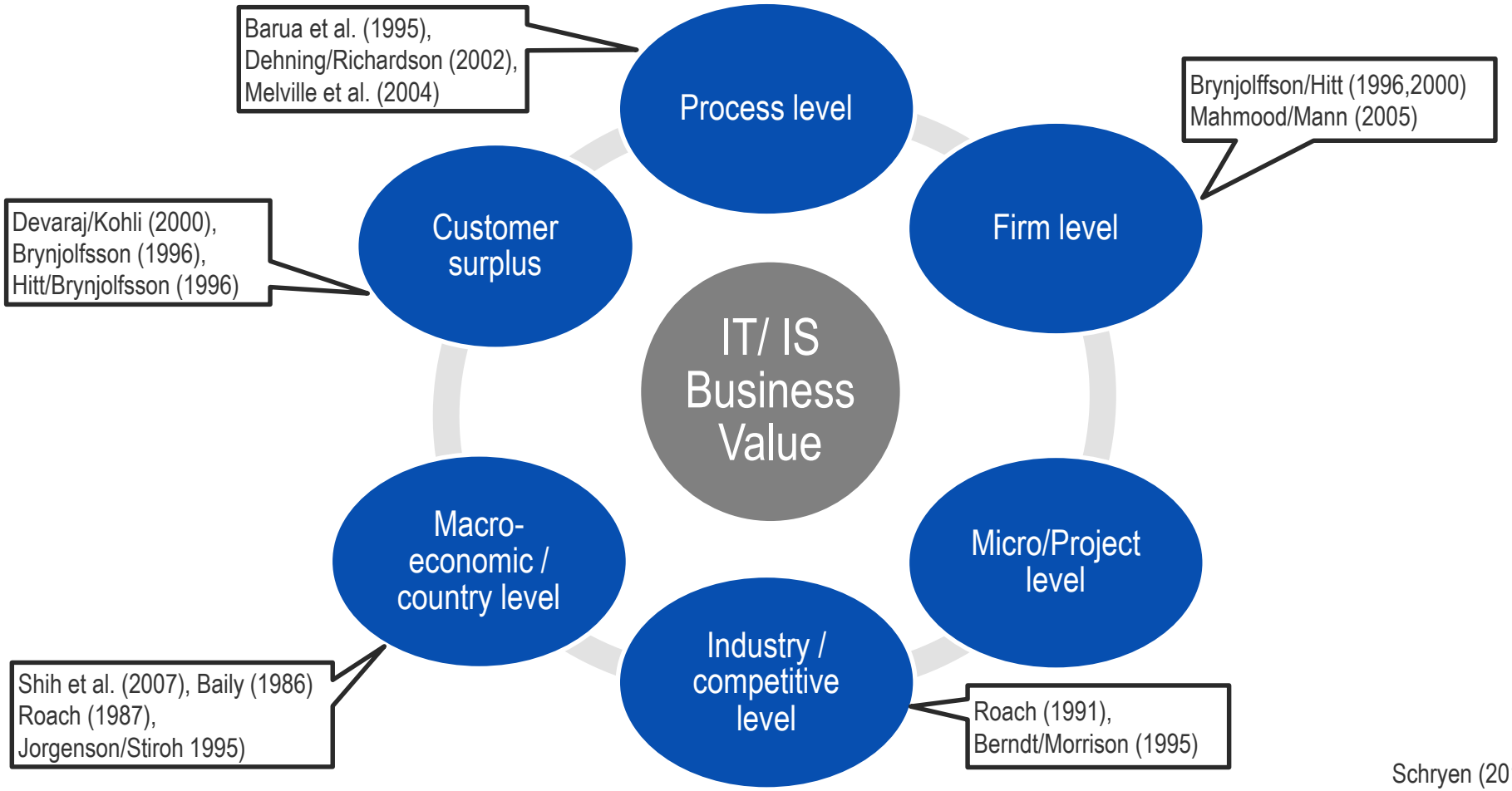
William Thomson, 1. Baron Kelvin

Performance Measures



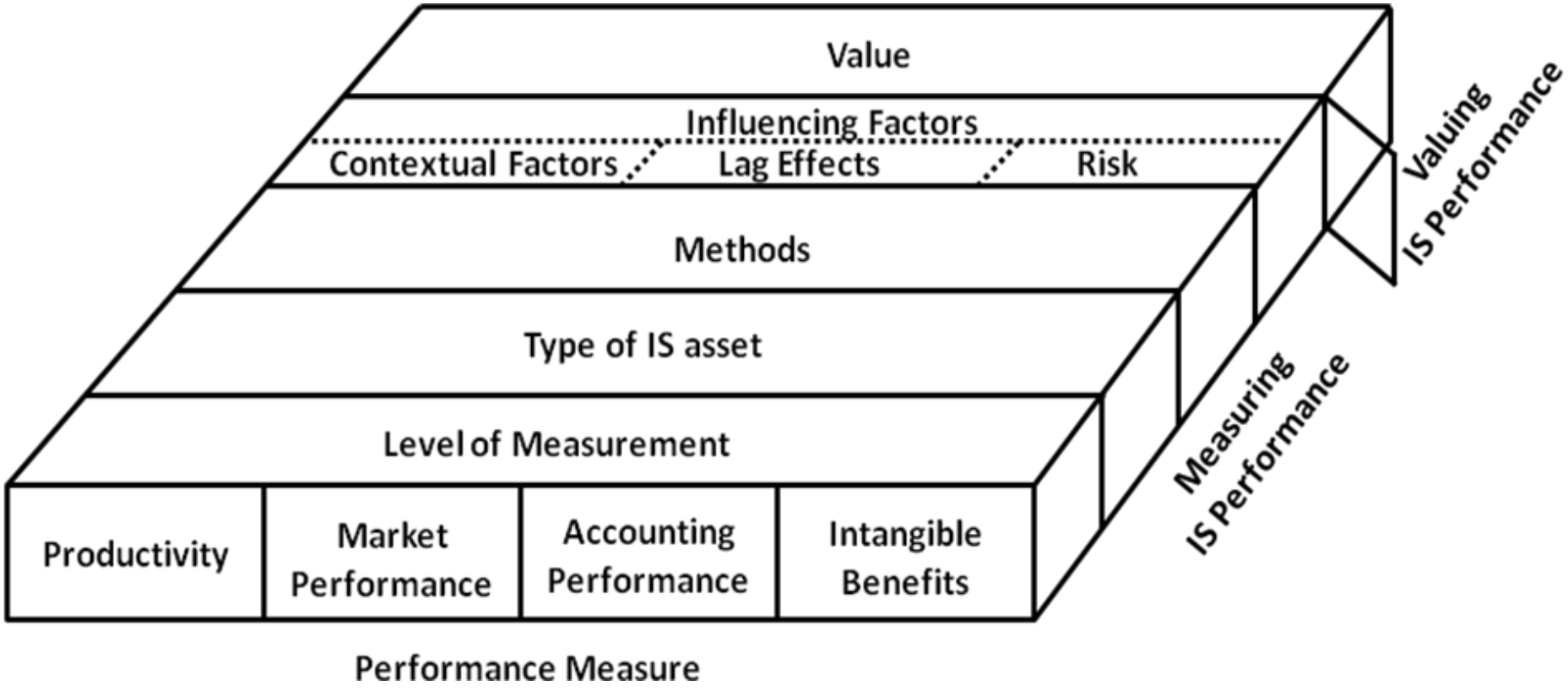
Schryen (2010)

Level of Measurement



Schryen (2010)

A Taxonomy of IT/ IS Business Value Research



Schryen (2010)

IT/ IS Business Value – Distinction

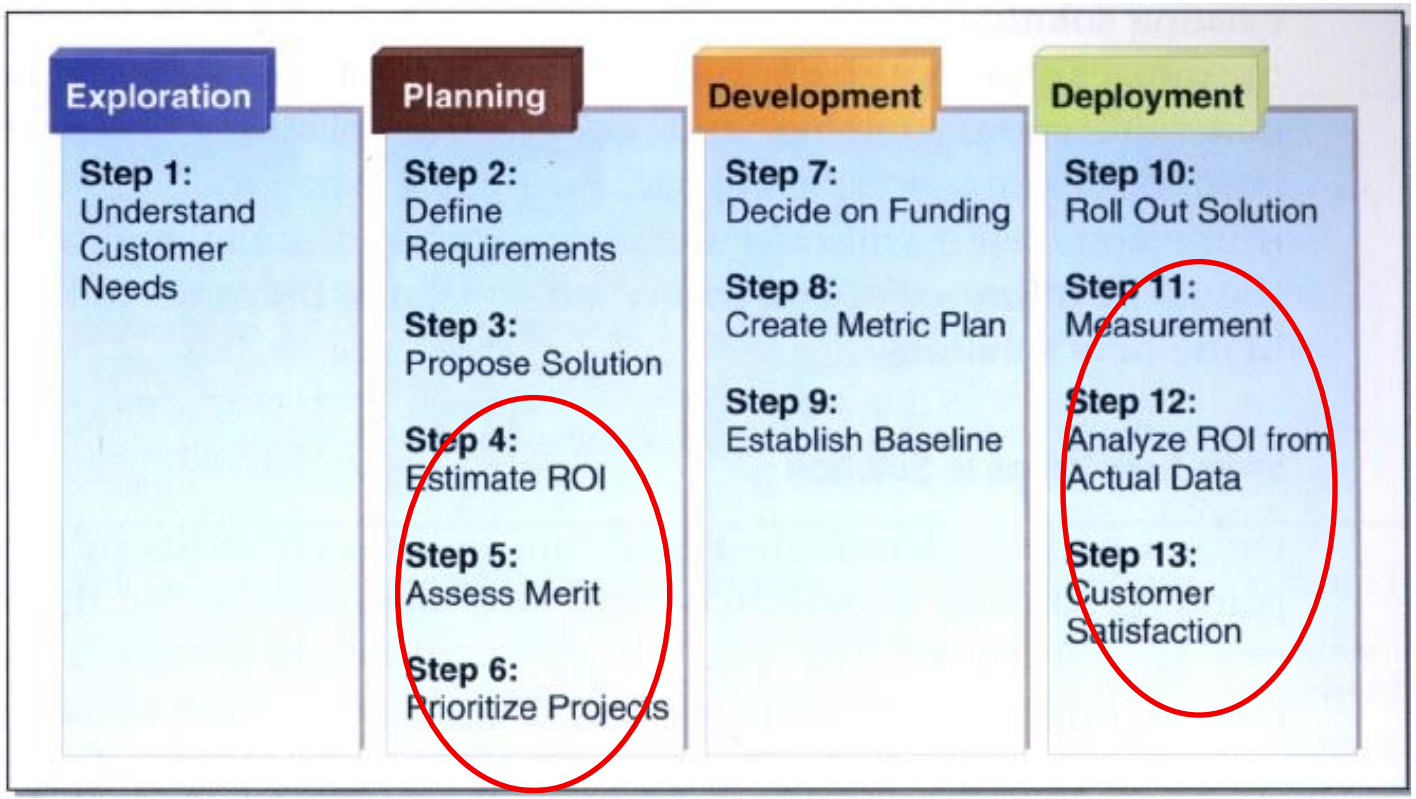
- **Measuring the business value of IS**
  - Assessing the business value of current systems and technologies
  - Post-investment

  Is the system resulting in some performance gain? Can this gain be measured? How should we measure it?

- **Evaluating IS investments**
  - Assessing the feasibility of making new investments into IT/ IS
  - Pre-investment

  Should we invest in the new system or technology? How much will it cost? What kind of gains can we expect?

The Business Value Process

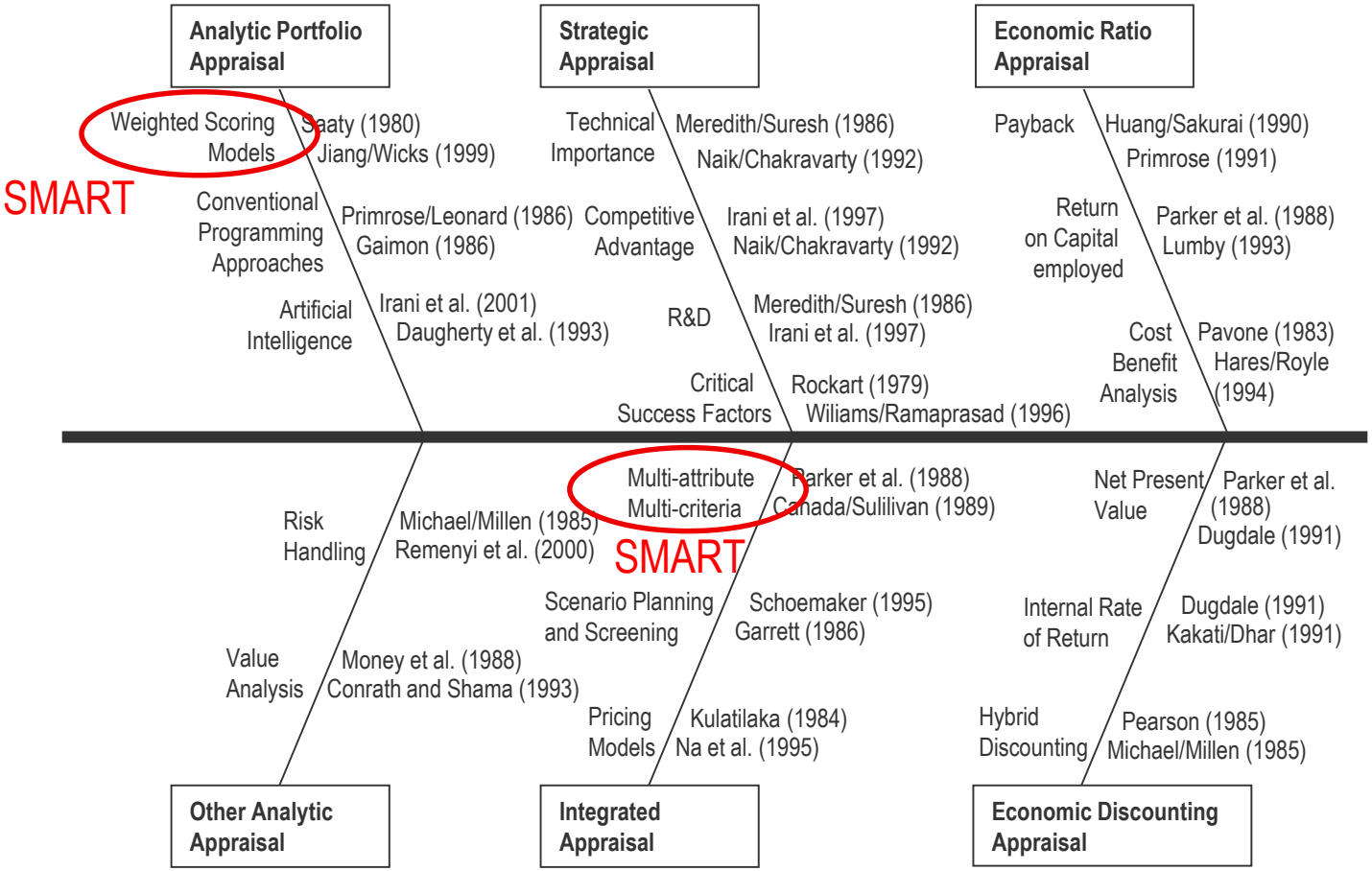


Evaluating IS investments

Measuring the business value of IS

Source: Sward D. (2006)

Approaches to assess IT/ IS Value and Benefit



Adapted from Irani (2001) in: Krcmar (2015), p. 482

Example method: Simple Multi Attribute Rating Technique (SMART)

- A systematic process for decision making
- Based on an
  - identification of the different **alternatives** and
  - their relevant **attributes**,
  - assignment of **weights** for each attribute and
  - calculation the **weighted arithmetic mean** for each alternative.
- Sensitivity analysis

Example method: Simple Multi Attribute Rating Technique (SMART)

1. Identification of decision maker
2. Identification of alternatives
3. Identification of relevant criteria and their effects
4. Measure the value of benefit for every alternative and for every criteria
5. Assign weights for every criteria
6. Calculate the weighted arithmetic mean using all criteria for every alternative
7. Make a provisional decision
8. Sensitivity analysis

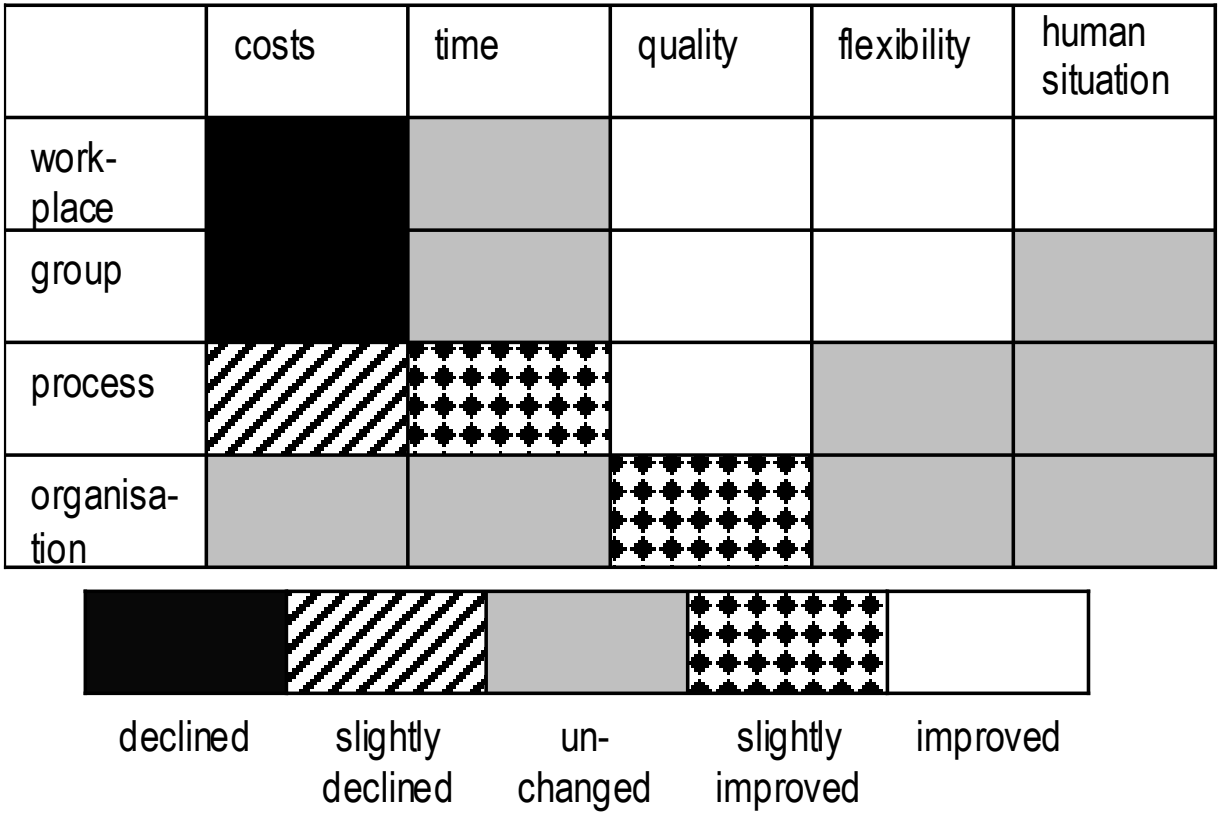
Example method: Simple Multi Attribute Rating Technique (SMART)

	Criterion	Weight	Project			
			1	2	3	4
1	Market share effect	10%	70	70	50	30
2	Competition	5%	30	70	70	70
3	Risk	10%	10	30	50	30
4	Product fit	5%	70	70	50	0
5	Strategic plan alignment	15%	50	50	70	30
6	Customer support	20%	50	50	30	30
7	Payback	10%	70	70	30	10
8	NPV	15%	70	50	30	30
9	ROI	10%	50	50	30	10
	Totals	100%	53	54	43	26.5

TABLE 4-1 WSM Rates

Rating	Score
Poor/not satisfied	0
Below average	10
Average	30
Above average	50
Excellent	70

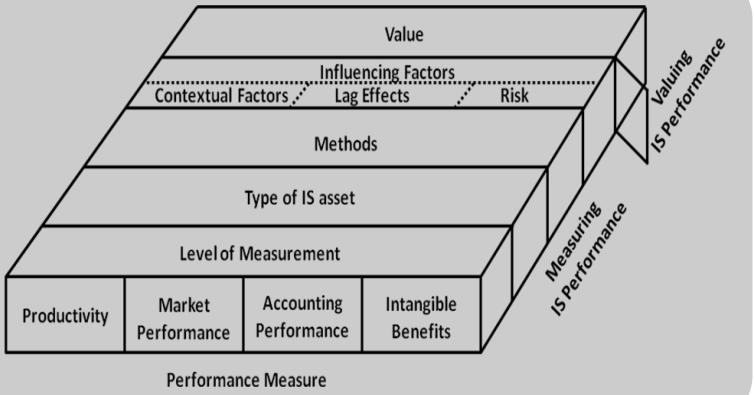
Example criteria for assessing IT/ IS Value



A Model of Layers for Assessing IT/ IS Innovations in Organizations, adopted from Schwabe (1999, p.629) in: Krcmar 2015, p.484

Business Value of IT/ IS

Frameworks

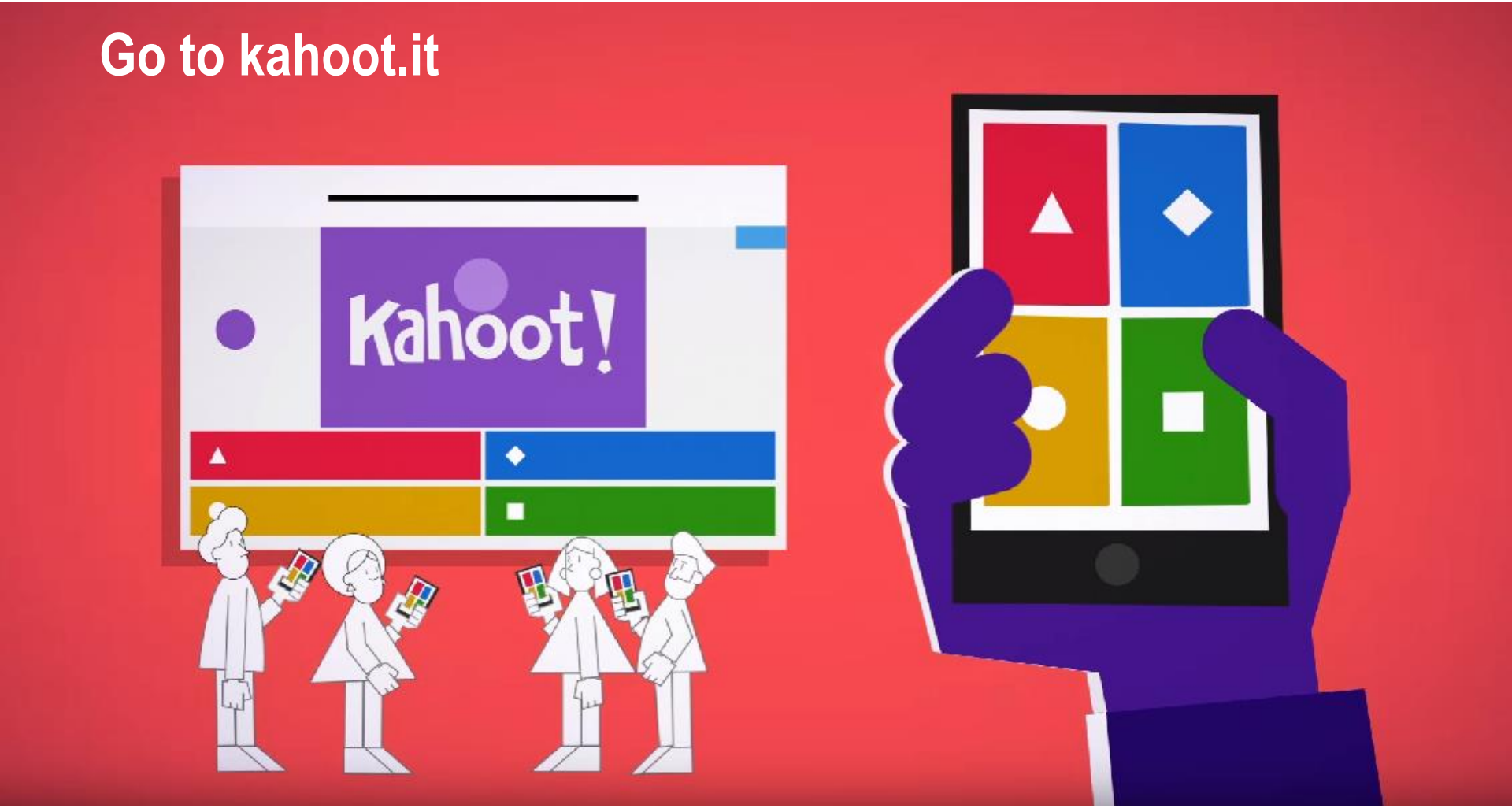


Methods for Measuring

- Discounted Cash Flow
- Total Cost of Ownership (TCO)
- Simple Multi Attribute Rating Technique (SMART)
- Layers for Assessing IT Innovations

Quiz Time!

Go to kahoot.it



Core Literature: Krcmar, Informationsmanagement (2015)

1. Einleitung (pp.1-8)
2. Begriffe und Definitionen (pp.11-26)
3. Modellierung (pp. 31-78)
4. Aufgabe des Informationsmanagements: Informationsmanagement (pp. 85-109)
5. Aufgabe des Informationsmanagements: Management der Informationswirtschaft (pp. 113-165)
6. Aufgabe des Informationsmanagements: Management der Informationssysteme (pp. 173-302)
7. Aufgabe des Informationsmanagements: Management der Informations- und Kommunikationstechnik (pp. 315-385)
8. Führungsaufgaben des Informationsmanagements
   8.3 IT-Controlling (pp. 472-521)
9. Referenzmodelle des Informationsmanagements (pp. 601-630)
10. Einsatzfelder und Herausforderungen des Informationsmanagements (pp. 633-753)
11. Fallstudie „Rockhaus AG“ (pp. 767-783)

Literature

- Barua, A. & Mukhopadhyay, T. 2000 “Information Technology and business performance: Past, Present and Future” in Framing the Domains of IT Management: Projecting the Future through the Past ed. R.W.Zmud(p.65-84).
- Bharadwaj, A., El Sawy, O., Pavlou, P.A., Venkataraman, N.: Digital business strategy: Toward a next generation of insights. MIS Quarterly 37, 471-482 (2013)
- Carr, N. G. (2004). Does IT matter? Information technology the corrosion of competitive advantage. Boston, MA, USA: Harvard Business Press.
- Davenport, T. H. (1993). “Process innovation: reengineering work through information technology:” Harvard Business Press.
- Hunter, R.; Westerman, G. (2009): Real Business of IT: How CIOs Create and Communicate Value, Harvard Business Review Press 2009.
- Irani, Z., & Love, P. E. (2002). “Developing a frame of reference for ex-ante IT/IS investment evaluation.” European Journal of Information Systems, 11:1, 74-82.
- Kohli, R. and Grover, V. 2008:”Business Value of IT: An Essay on Expanding Research Directions to keep up with the times.” Journal of the Association of Information Systems 9:1, 23-39.
- Melville, N., Kraemer, K., & Gurbaxani, V. (2004). “Information technology and organizational performance: An integrative model of IT business value.” MIS Quarterly, 28:2, 283-322.
- Osterwalder, A., & Pigneur, Y. (2010). Business model generation: a handbook for visionaries, game changers, and challengers. Amsterdam: Osterwalder & Pigneur
- Röthig, P., Bergmann, K. and Müller C. 2007 “Empfehlung zur Durchführung von Wirtschaftlichkeitsbetrachtungen in der Bundesverwaltung, insbesondere beim Einsatz der IT (WiBe 4.1)”
- Schryen, G. 2010: Preserving knowledge on IS business value. Wirtschaftsinformatik 52(4). pp. 225-237
- Schwabe, G., & Krcmar, H. (2000). Piloting Socio-Technical Innovation. Paper presented at the European Conference on Information Systems.
- Sward, D. S. (2006). “Measuring the business value of information technology. Practical Strategies for IT and Business Managers.”
- Vial, G. (2019). Understanding digital transformation: A review and a research agenda. The Journal of Strategic Information Systems, 28(2), 118-144.

Discounted Cash Flow / Net Present Value (NPV)

- Based on the concept of time value of money
- Future cash flows are estimated and discounted to get their present values
- The sum of future cash flows (incoming and outgoing is the NPV)

$$C_0(i) = -I + \sum_{t=1}^{T} \frac{Z_t}{(1+i)^t} + \frac{L}{(1+i)^T} = \sum_{t=0}^{T} (1+i)^{-t} \cdot Z'_t$$

- C_0: Net present value of point in time $t=0$
- i: interest rate
- Z_t: Cash flow of period of time t, Z'_t: all kinds of payments
- I: investment spending of the point in time $t=0$
- L: remaining value in point of time $t=T$
- T: considered time frame (in time periods)

Total Cost of Ownership (TCO)

- A cost basis for determining the economic value of an investment
- Includes total cost of acquisition and operating costs
- Differentiation between
  - Budgeted costs (direct & planed)
  - Not budgeted costs (indirect & might be not plannable or measurable)
    - Hinders or delays the user, e.g. downtimes, formal learning, causal learning, self-support and peer support
- Popularized by the Gartner group in 1980‘s