Information Economy 37E00100

Esko Penttinen, Associate Professor

Information Systems, Information and Service Management

Esko Penttinen

-1996	1996-2001	2001-2007	2007-2015	2015-2021	2021-
High school studies	MSc studies	PhD studies	Project manager	Professor of Practice	Associate Professor
Helsingin II normaalikoulu Main interests: mathematics & languages	Helsinki School of Economics (HSE): Management science ESC Dijon (1999-2000): Finance Internship work at PSA Peugeot Citroën, Paris, France (2000) Thesis work at Accenture, Helsinki (2000-2001)	HSE, Doctoral dissertation in Information Systems Science: "Moving from Products to Services Within the Manufacturing Business" (supervisor Timo Saarinen, opponent Stefan Klein) Visiting PhD student: HEC Paris, France (2005) and College of William & Mary, US (2002)	Setting up two national development programs on electronic financial value chain: Real-Time Economy (2007) and XBRL Finland (2012), both evolved into key focus areas for Finnish government Employed 50% Aalto University School of Business and 50% Tieto Corporation	Research: (i) Interplay between human work and AI-infused systems, (ii) Coordination of information intensive knowledge work, (iii) Structured data and digital platforms Visiting scholar: The University of Queensland (2020) and University of Auckland Business School (2020)	Research: new topics include technical debt, organizational deployment of AI (envelopment) Teaching: Strategic IT Management (MSc), Information Economy (MSc), Scientific Reading and Writing in ISS (PhD) Service: Editorial duties at EJIS, BISE, ICIS, and ECIS; IRIS president 2023

Main achievements:

Publications: 30 peer-reviewed journal articles (incl. 8 "AIS Senior Scholars' Basket of Journals" papers) – 43 peer-reviewed conference papers – 8 peer-reviewed teaching case publications – Ranked #2 among IS scholars in Europe (employment in a European University) by the number of AIS Senior Scholars' Basket of Journals articles published in 2019

Awards: Information Systems Scholar of the Year 2020 – Teacher of the year 2010, 2011, honorable mention 2018 (department of Business Technology and department of Information and Service Management, Aalto University School of Business) – Outstanding AE in Service Science and IS track, ICIS2017 – Best paper award in SIGSVC Track at ECIS2016 – Best paper award in Global Mobility Roundtable Conference 2008

Community building: Real-Time Economy with >100 organizations and >1000 industry experts – XBRL Finland consortium with 19 organizations – IRIS board member 2019-2023

What is Information Economy?

- Think for a minute with your partner:
  - “What comes to your mind when we say information economy?”

Themes of the course

- Information Economy
  - Why are information goods different?
  - Digitalizing service economy
  - Digital transformation
- Platform-mediated Networks and Services
  - Core concepts
  - Platform control
  - Network mobilization
  - Mobile service platforms
  - Platform business
- ICT Intensive Services
  - Crowd-sourcing, sharing economy
  - Blockchain and digitalization of payments
  - Artificial Intelligence
- Information Society

Week	Date	Topic	Review article
1	26.2.2024	Introduction to course - information goods	NA
	28.2.2024	Platform-mediated networks 1	Eisenmann, T., Parker, G. & Van Alstyne, M.W. (2006). "Strategies for Two-Sided Markets", *Harvard Business Review* , October 2006, pp. 92-101
2	4.3.2024	Platform-mediated networks 2	Cusumano,M.A., Yoffie, D.B. & Gower, A. (2020). "The Future of Platforms", *MIT Sloan Management Review*
	6.3.2024	Sharing economy platforms - visiting talk by Virpi Tuunainen	Constantiou, I. Marton, A. & Tuunainen, V.K. (2017). "Four Models of Sharing Economy Platforms", *MIS Quarterly Executive* , Dec 2017 (16:4)
3	11.3.2024	Crowdsourcing the era of Internet - visiting talk by Wael Soliman	Blohm, I., Leimeister, J.M. & Krcmar, H. (2013). "Crowdsourcing: How to Benefit from (Too) Many Great Ideas", *MIS Quarterly Executive* , December 2013 (12:4)
	13.3.2024	Data platforms and information infrastructures	Otto, B., & Jarke, M. (2019). Designing a multi-sided data platform: findings from the International Data Spaces case. Electronic Markets, 29(4), 561-580.
4	18.3.2024	Digitalization of transportation - visiting talk by Niina Mallat & Kari Koskinen	Rowe, F., Jeanneret Medina, M., Journé, B., Coëtard, E., & Myers, M. (2023). Understanding responsibility under uncertainty: A critical and scoping review of autonomous driving systems. Journal of Information Technology, 02683962231207108.
	20.3.2024	Teaching case Autonomous Vehicles: Smooth or Bumpy Ride Ahead?	NA
5	25.3.2024	Applications of AI	Davenport, T.H. & Ronanki, R. (2018), "Artificial Intelligence for the Real World", *Harvard Business Review* . Jan-Feb 2018.
	27.3.2024	Blockchain - visiting talk by Venkata Marella	Iansiti, M. & Lakhani, K.R. (2017). "The Truth about Blockchain", *Harvard Business Review* , January-February 2017
6	8.4.2024	Essay clinic	NA
	10.4.2024	Information society	Zuboff, S. (2015), "Big other: surveillance capitalism and the prospects of an information civilization", *Journal of Information Technology* (2015) 30, 75-89.

Etymology of information economy

information (n.)

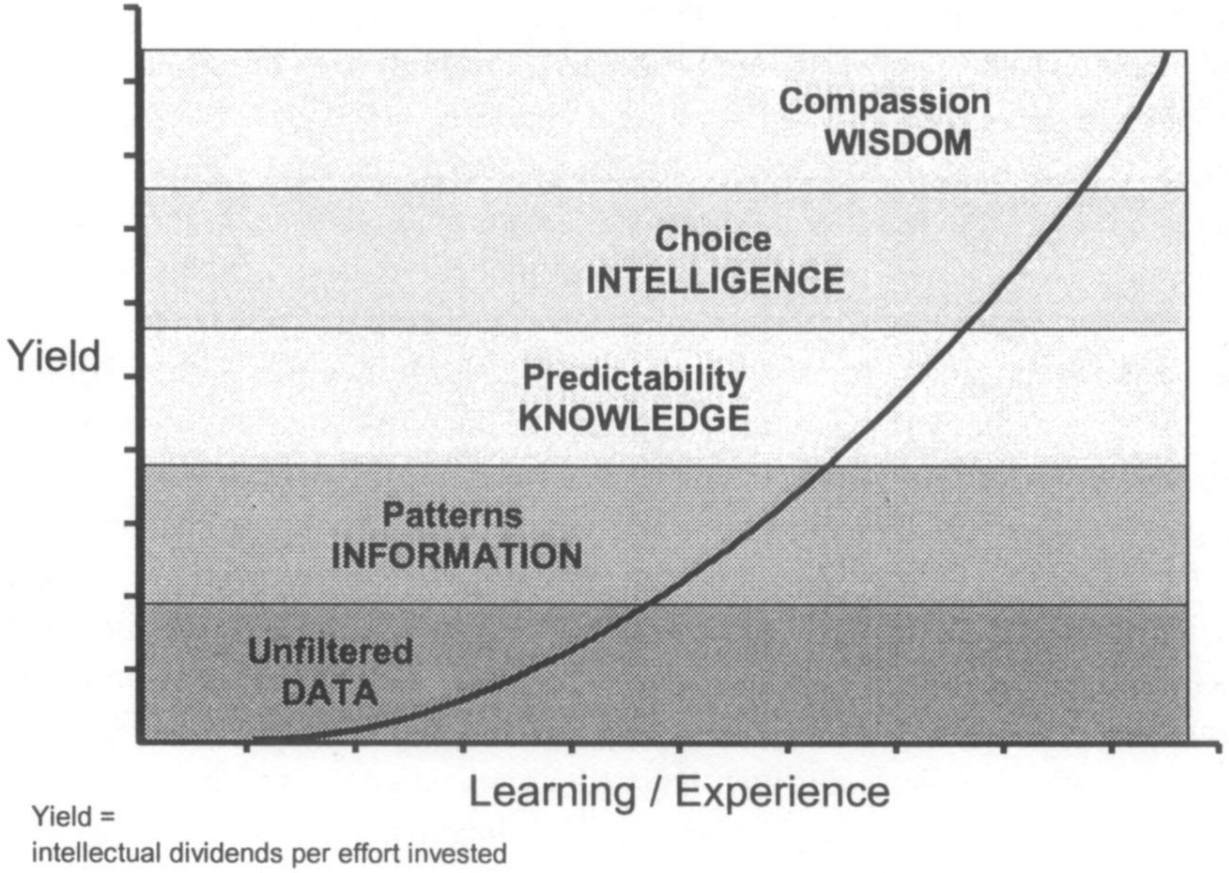
- Late 14c., informacion, "act of informing, communication of news," from Old French informacion, enformacion "advice, instruction," from Latin informationem (nominative informatio) "outline, concept, idea," noun of action from past participle stem of informare "to train, instruct, educate; shape, give form to" (see inform). The restored Latin spelling is from 16c.
- Meaning "knowledge communicated concerning a particular topic" is from mid-15c. The word was used in reference to television broadcast signals from 1937; to punch-card operating systems from 1944; to DNA from 1953. **Information theory** is from 1950; **information technology** is from 1958 (coined in "Harvard Business Review"); **information revolution**, to be brought about by advances in computing, is from 1966. **Information overload** is by 1967.

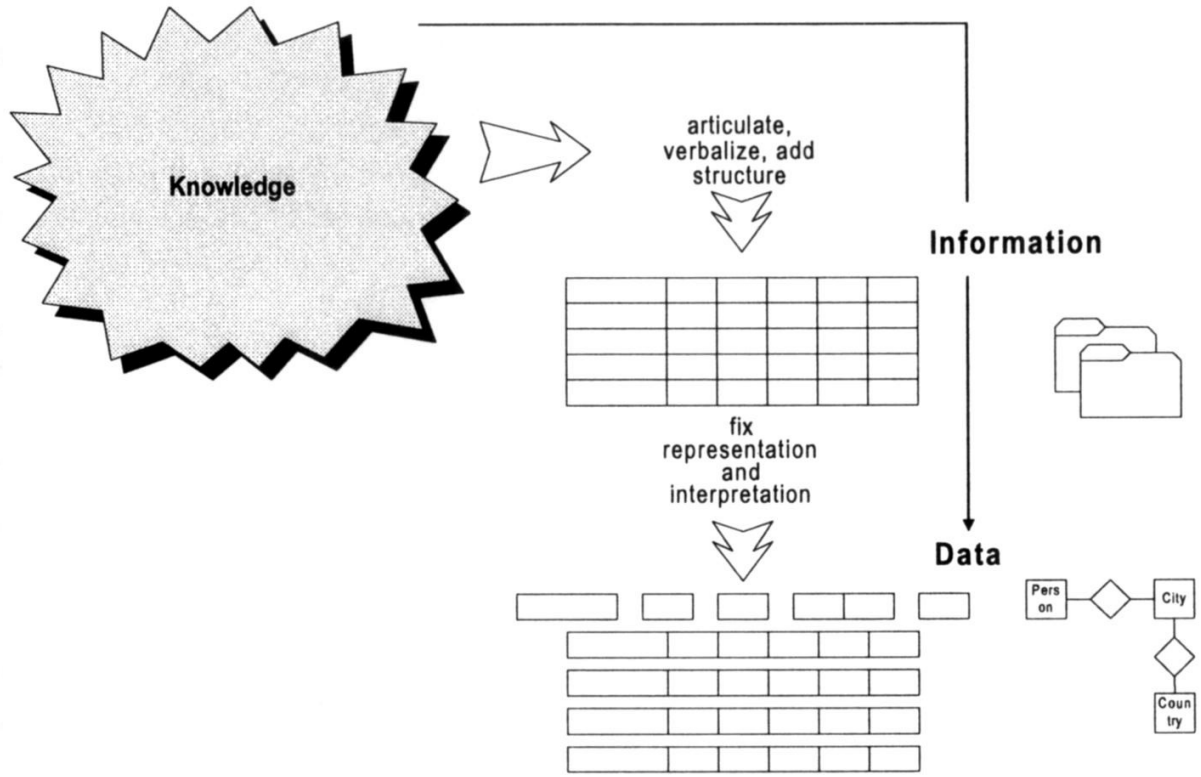
economy (n.)

- 1530s, "household management," from Latin oeconomia (source of French économie, Spanish economia, German Ökonomie, etc.), from Greek oikonomia "household management, thrift," from oikonomos "manager, steward," from oikos "house, abode, dwelling" (cognate with Latin vicus "district," vicinus "near;" Old English wic "dwelling, village," from PIE root *weik- (1) "clan") + nomos "managing," from nemein "manage" (from PIE root *nem- "assign, allot; take"). Meaning "frugality, judicious use of resources" is from 1660s. The sense of "wealth and resources of a country" (short for political economy) is from 1650s.

Source: Online etymology dictionary

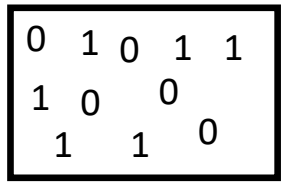
Contradicting views on data-knowledge relationship





Tuomi, Ilkka. "Data is more than knowledge: Implications of the reversed knowledge hierarchy for knowledge management and organizational memory." *Journal of Management Information Systems* 16.3 (1999): 103-103.

Digital data



Regulating the internet giants

The world's most valuable resource is no longer oil, but data

The data economy demands a new approach to antitrust rules

The Economist 6.5.2017

APR 13, 2017 @ 02:22 PM 5,459 The Little Black Book of Billionaire Secrets

What Will We Do When The World's Data Hits 163 Zettabytes In 2025?

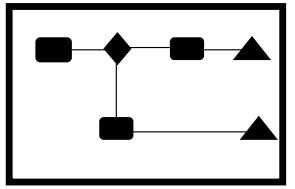
Forbes 13.4.2017

Structured vs. Unstructured Data

Structured data is far easier for Big Data programs to digest, while the myriad formats of unstructured data creates a greater challenge. Yet both types of data play a key role in effective data analysis.

Datamation 3.8.2017

Digital algorithms



BUSINESS DAY

A.I. Has Arrived in Investing. Humans Are Still Dominating.

By CONRAD DE AENLLE JAN. 12, 2018

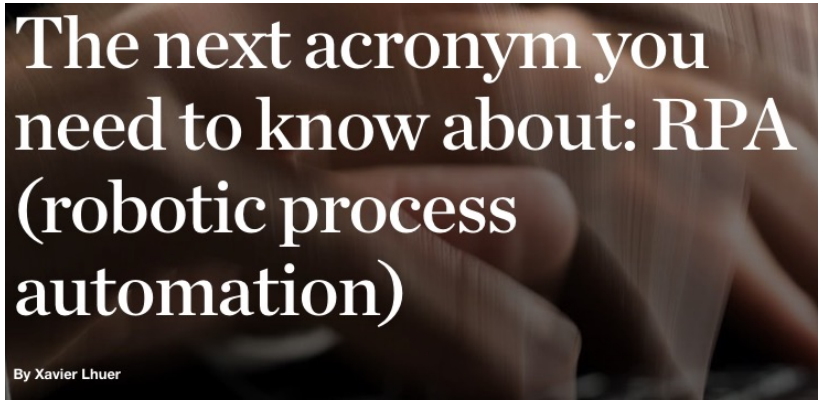
The New York Times 12.1.2018

Big Data + Add to myFT

How machine learning creates new professions – and problems

Leaders face an explosion in demand for knowledge and skills

Financial Times 29.11.2017



McKinsey&Co December 2016

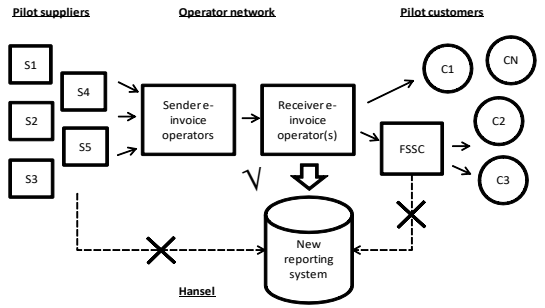
Multiple levels of Information Economy

Level	Description	Examples
Societal	Continuously evolving societal technological change towards information economy and digital age. Many aspects of government processing is increasingly digital.	E-citizenship in Estonia; digital tax declarations
Organizational	Organizational change in which digital technologies are used to improve business outcomes, leading to profound changes in the way an organization works and generates value.	Machine learning-based algorithms and data-driven decision making; software robots
Individual	Development towards digital self in which – in the extreme - human thoughts and sensory systems are transformed or copied into digital format and – in the milder forms – wearables collect and analyze human's body data.	Neuralink; wearables; second life
Artefact	Transition from using physical objects and artefacts to using digital objects and informational artefacts – the so-called "digital first - ontological reversal".	Travel tickets; eXtensible Business Reporting Language; digital music

Why is Information Economy interesting?

- Emerging digital experience economy
  - ICT & supporting software → social media as service platforms
  - Value co-creation, role of user communities and commons in innovation and service creation
  - Platform-based companies
  - Digital natives vs. digital immigrants
- Information and digitalization changing the rules of the game in many industries
  - Retail, finance, manufacturing,..
  - New Big Players: Google (Alphabet), Amazon, …
  - Tablets (e.g. iPad), e-readers (e.g. Kindle)
  - Increasing importance of mobile services, cloud services
  - Social media, Crowdsourcing,…
  - Entertainment (iTunes, Spotify, Netflix …)
  - Role of Social Media Technologies and services (Facebook, Twitter,…)
  - Open data and related services
  - …
- Renewal of wellness, administrative and educational services
  - eHealth, eLearning, eGovernance, …
  - Digital divide?

Digitalization in Business



- Pressures created by global economy
- Digital technologies as enablers of significant business process improvements
- Ontological reversal from physical objects to digital ones (e.g., flight ticket)
- "App economy" and startups (making bootstrapping easier)
- Platformization
- Changing consumer behavior

Facebook status of companies' relationship to digital transformation: "it's complicated"

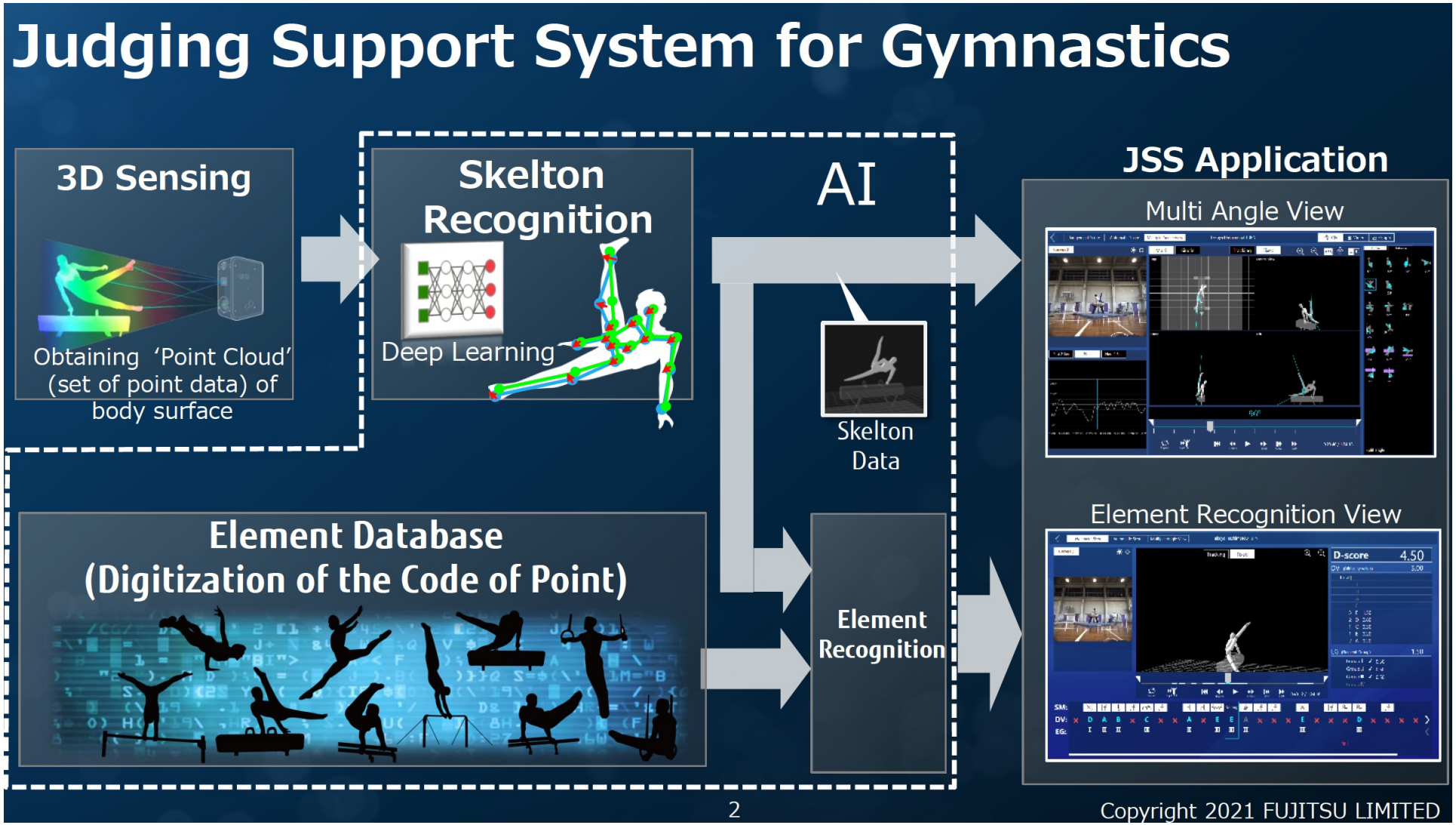
Digitalization of “traditional” industries

- Multichannel retail
- Industrial enterprises: from products to services
  - E.g. Kone, ABB, etc
  - Focus on customer experience also in B2B
  - Digitalization of industrial services crucial for survival
- Digitalization aspects of transportation
- Embedded digital components in physical products

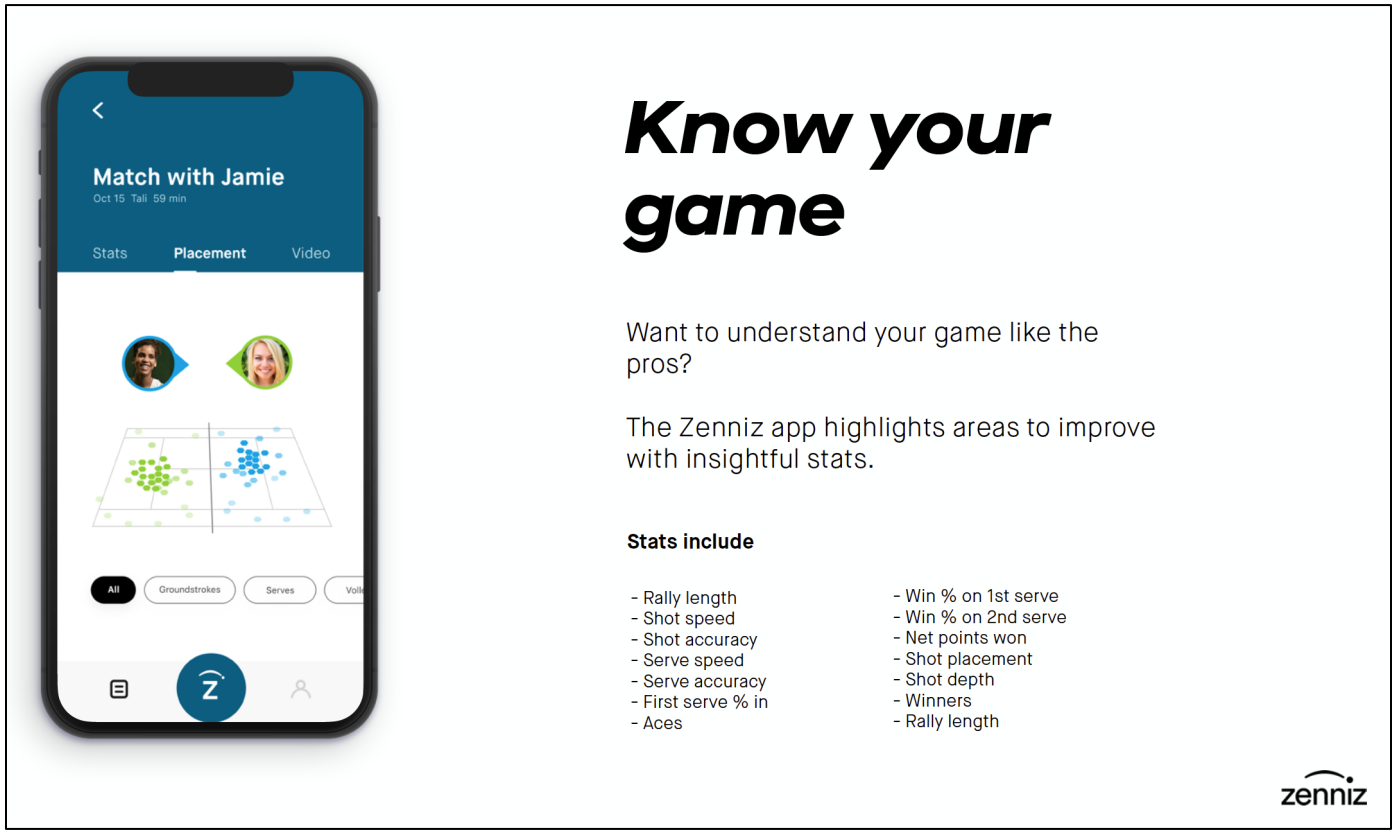
Digitalization of other areas of life

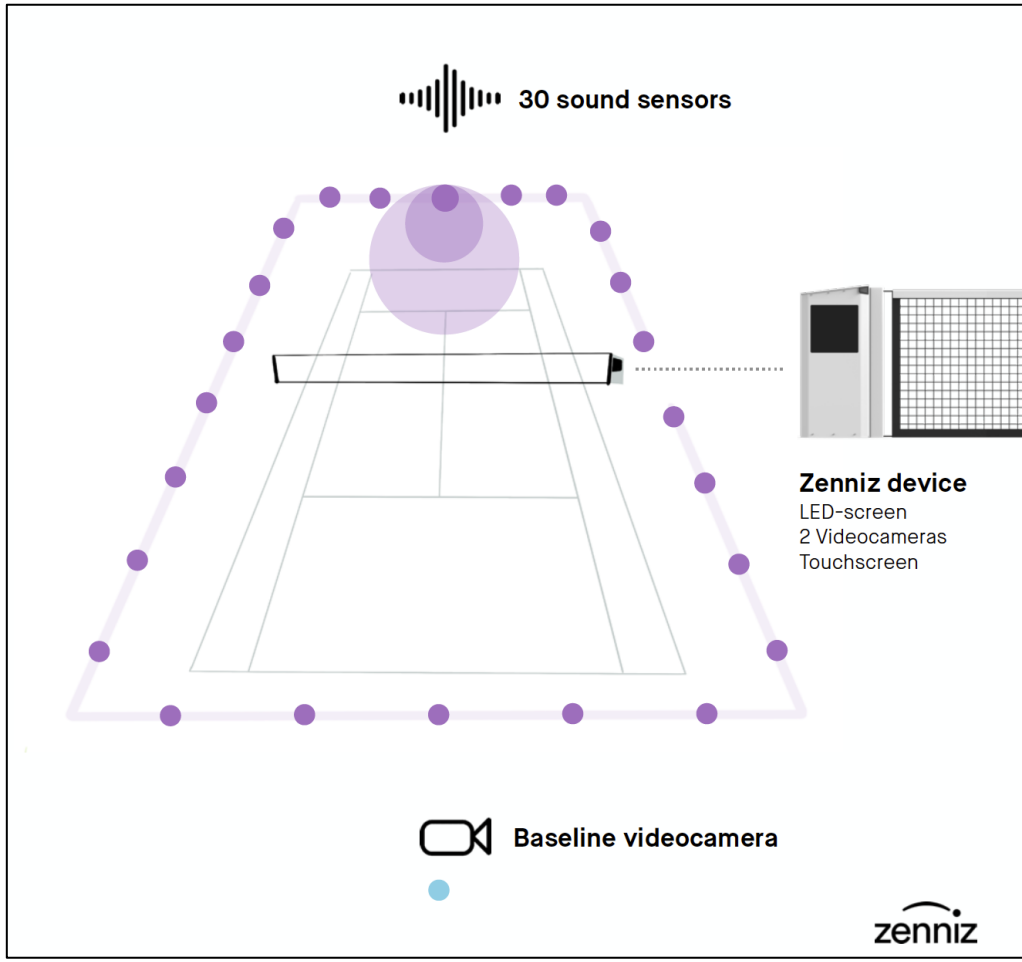
- Online dating (e.g. Tinder, recent IPO of Bumble $8bn market cap, today valued at $1.79bn)
- Digitalization of sports
  - Case gymnastics judging
  - E-sports

Digitalization in gymnastics – Case Fujitsu



Digitalization in tennis – Case Zenniz





https://www.youtube.com/watch?v=YUMQSl-_rpw

INFORMATION GOODS

The following slides are adapted from “Information Rules – A Strategic Guide to the Network Economy by Carl Shapiro and Hal Varian

Information goods – examples?

- Turn to your partner and…
  - … think of examples of information goods
  - … discuss what makes information goods unique compared to some other types of goods

Cost structure of information goods

- Information is costly to produce but cheap to reproduce!
- High fixed cost, low marginal cost
  - Not only fixed, but sunk costs
  - No significant capacity constraints
  - Particular market structures
    - Monopoly or Dominant firm model
      - Cost leadership
    - Product differentiation (versioning)
- Reproduction costs
  - Digital technology dramatically reduces the cost of making perfect reproductions
- Distribution costs
  - Digital technology allows these reproductions to be distributed quickly, easily, and cheaply

Consumption characteristics of information goods

- Experience goods
  - Consumer needs to experience the good in order to put value to it
  - Browsing (look at headlines at the (electronic) newsstand, watch previews)
  - Consumers don’t know what it is worth until they experience it
    → Reputation and brand identity
- Information Overload
  - Problem for consumers and customers is not information access but information overload
  - Economics of attention or Attention fragmentation
  - Perils of multitasking
  - ICT Interruptions

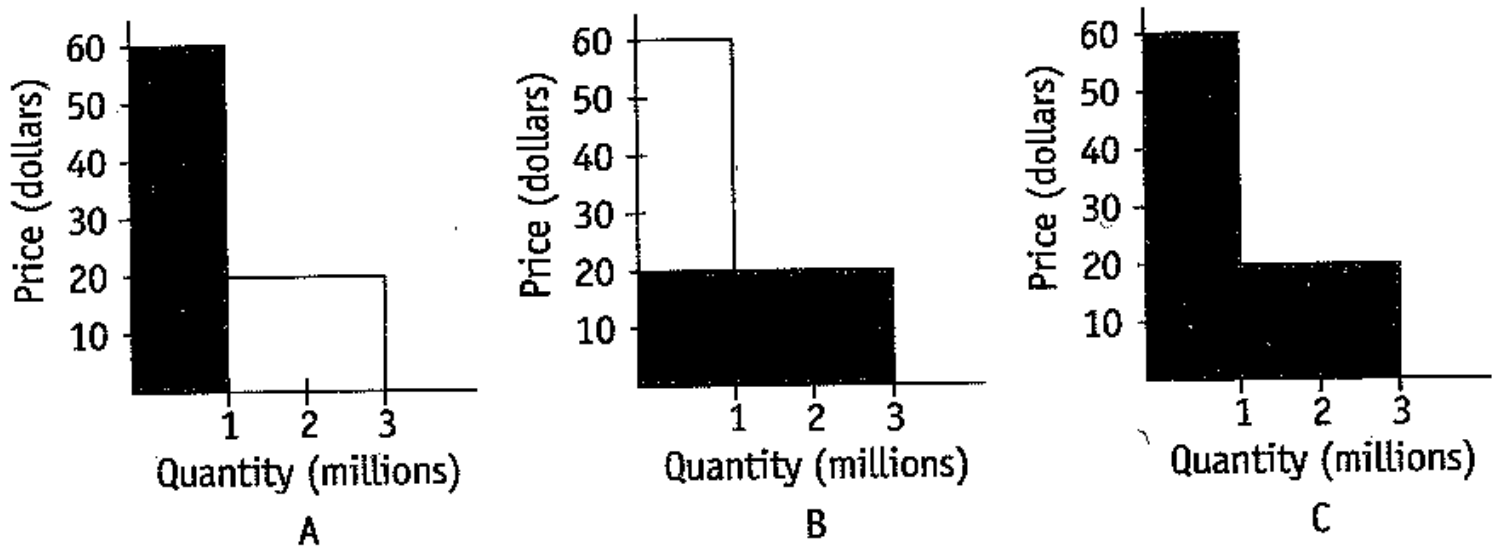
How to price information?

- Cost-based pricing?
- Price against the competition?
- Need for value-based pricing
  - Consumers differ greatly in how they value information

Pricing

- High, low, and differential pricing (Shapiro & Varian 1999)

Figure 2.1. *High, Low, and Differential Pricing*



Differential pricing

- Promotional pricing might be problematic for information goods
- Three types of differential pricing
  - Personalized pricing (first-degree price discrimination): sell to each user at a different price
  - Versioning (second-degree): offer a product line and let users choose the version of the product most appropriate for them
  - Group pricing (third-degree): set different prices for different groups of consumers
- Money side vs. subsidy side in multisided platforms

Personalized pricing (first degree price discrimination)

- Selling to each user at a different price
  - Database provider Lexis-Nexis used to sell to every user at a different price
    - Type of enterprise (corporation, small business, government, academic)
    - Size of organization
    - When you access the databases (during daytime/nighttime)
    - How much you use the databases (volume discounts)
    - Which databases you use
    - Whether you print the information or just view it on the screen
    - Zip code
    - …
  - “Special offer” might just be a premium price!

Value-based pricing

- Negatives to charging different prices from different customers
  - Annoying or alienating customers if they charge different prices for the same product
    - Telia example
  - Legal issues
    - Retail stores cannot set an array of prices for the same good
- If price discrimination is difficult/dangerous/illegal, how could we price according to value?
  - The answer is versioning! -> Offer a product line a watch choices

Versioning

- Product line or quantity variations
- Menu of different versions
  - Target different market segments
  - Pricing accordingly
- Dimensions to use in creating a menu
  - Delay (Fed Ex, Kauppalehti)
  - Image resolution (Photodisk)
  - Speed of operation (Mathematica)
  - Format (Lexis/Nexis, print-out vs. screenshot)
  - Capability (voice recognition software)
  - Features (Quicken deluxe)
  - Comprehensiveness (New York Times archives)
  - Advertisement (with or without)
- Need to know predictable relationship between versions and distribution of WTP across consumers

Numerical example

Making self-selection work: you may need to cut price of high end

- Willingness to pay (100 customers)
  - 40 type As: $100 for speed, $40 for slow
  - 60 type Bs: $50 for speed, $30 for slow
- Identity based-pricing
  - Revenues: $7,000
- Offer only speedy
  - Revenues: $5,000 (set price to $50 to maximize profits)
- Offer only slow
  - Revenues: $3,000 (set price to $30 to maximize profits)
- Versioning
  - Revenues: $5,360 (set price $89 for speedy, $30 for slow to maximize profits)

Goldilocks pricing

1. Mass market software (word, spreadsheets etc.)
   - One or two versions (basic, professional)
   - Network effects
   - User confusion if too many versions (difficult to identify appropriate product)
2. Goldilocks pricing
   - Default choice: 3 versions
   - Extremeness aversion
     - Small/large vs. small/large/jumbo
     - Small/medium/large

"The term Goldilocks pricing is commonly used to describe the practice of providing a "gold-plated" version of a product at a premium price in order to make the next-lower priced option look more reasonably priced; for example, encouraging customers to see business-class airline seats as good value for money by offering an even higher priced first-class option." From: Butler 2019. Strategic Marketing Management

Examples

- Microwave oven example
  - Bargain basement at $109, midrange $179
    - Midrange chosen 45% time
  - High end at $199 added
    - Mid-range chosen 60% time
- Wines
  - Second lowest price

Making self-selection work

- May need to cut price of high end
- May need to cut quality at low end (Value-subtracted versions)
  - May cost more to produce the low-quality version
    - Think about Kauppalehti (added storage capability)
- In design, make sure you can turn features off!

How many versions?

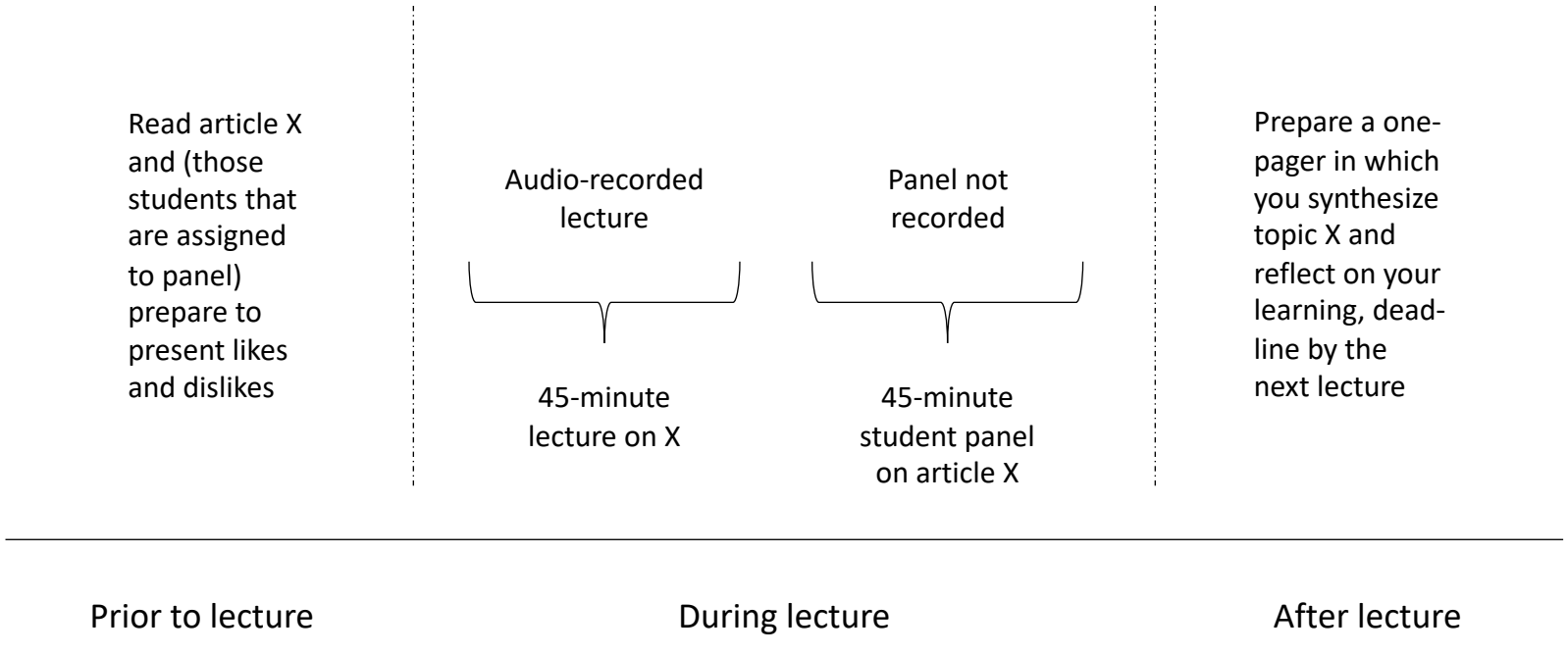
- One is too few
- Ten is (probably too many)
- Two things to do:
  - Analyze the market
  - Analyze the product

COURSE ORGANIZATION

Course organization

- Course will be delivered in Otaniemi campus
- No mandatory class participation, expect for one student panel (check your date on the slides) and case session on Wednesday 20.3.2024
- Course material in MyCourses
  - Lecture slides and possibly recordings
  - Articles to be reviewed and instructions for the reviews
  - Teaching Case and Case Questions
  - Instructions for the essay assignment
  - Other material

Lecture format on topic X (X = 1 … 9)



Students assigned to panel discussions

Article 1	
Paula	Allinen
Tommaso	Andaloro
Aaro	Angerpuro
Rebekka	Anttila
Eelis	Arokoski
Anselmi	Aumo
Matias	Berglund
Katarzyna	Brander
Qiyue	Chu
Tuomo	Filatow
Xiuming	Guan
Emmi	Gutvilig
Tomi	Haapakoski
Joonas	Hakamäki

Article 2	
Iida	Hakola
Miili	Halkka
Jarno	Halme
Michaela	Hartwich
Ridwan	Hashi
Pinja	Hirvinen
Ahti	Holli
Waqif	Hossain
Melissa	Huuskonen
Eetu	Hyyryläinen
Kassymkhan	Intykbayev
Kim	Jokinen
Linda	Jokinen

Article 3	
Hanna	Juntunen
Erkka	Jussila
Minerva	Kannisto
Jeremias	Katajamaa
Olli	Kauppinen
Heta	Kenttämaa
Elias	Kerttula
Shradha	Khanal
Kirill	Kisko
Konrad	Kivekäs
Essi	Kivelä
Jan	Kivijärvi
Sofia	Kontro Rosales
Kare	Korhonen

Article 4	
Julita	Koski
Jaakko	Kuivanen
Oula	Kuure
Linh	La
Mirko	Laine
Eetu	Laitinen
Oskari	Lamberg
Linda	Lamponen
Siiri	Latola
Valtteri	Lausala
Trang	Lê Forsell
Leo	Lehtinen
Emmi	Lehto

Article 5	
Oliver	Leino
Ruut	Linnapuomi
Zheyuan	Liu
Joel	Liukkonen
Kalle	Lounela
Emilia	Lumio
Niklas	Länsiö
Raiymbek	Manarbek
Simal	Maqsood
Mira	Merinen
Veikko	Milton
Viktor	Musijenko
Hanna-Mari	Mustaniemi
Ville	Mäntysalo

Article 6	
Mariia	Nedelkina
Jonatan	Nuutinen
Minttu	Ojanaho
Jarno	Oksanen
Tuomas	Orhanen
Ifrah	Osman
Oona	Paloheimo
Jere	Pankka
Antti	Pentikäinen
Victor	Peterson
Tuomas	Piilonen
Leeni	Piiponniemi
Riikka	Pirskanen

Article 7	
Teemu	Pitkänen
Kari	Puustinen
Belinda	Puutio
Nuutti	Pyysiäinen
Tiia	Rantanen
Eino	Rask
Heidi	Rautamaa
Tuukka	Retva
Juho	Ristimäki
Jacek	Rzepny
Eevi	Saari
Otto	Saarinen
Ella	Salo

Article 8	
Walter	Segerstam
Juulia	Sillanpää
Eero	Suikkanen
Aleksi	Suuronen
Jenna	Tiainen
Huy	To
Valtteri	Tuominen
Vilho	Tuomisto
Emmi	Turunen
Nea	Vaalavirta
Teemu	Valkonen
Sini	Valmari
Antti	Viilo

Article 9	
Daniel	von Plato
Jasmin	Vulli
Matthias	Vuorenheimo
Aleksanteri	Vuoristo
Yijuan	Wei
Paul	Westerlund
Runze	Wu
Ji	Yang
Man	Yao
Ihsan	Yilmazkurtdag
Ciara	Yrjö-Koskinen
Naiyue	Zhu

	Review article	Panel date	Reflection paper due date
Article 1	Eisenmann, T., Parker, G. & Van Alstyne, M.W. (2006). "Strategies for Two-Sided Markets", Harvard Business Review, October 2006, pp. 92-101	28.2.2024	4.3.2024
Article 2	Cusumano,M.A., Yoffie, D.B. & Gower, A. (2020). "The Future of Platforms", MIT Sloan Management Review	4.3.2024	6.3.2024
Article 3	Constantiou, I. Marton, A. & Tuunainen, V.K. (2017). "Four Models of Sharing Economy Platforms", MIS Quarterly Executive, Dec 2017 (16:4)	6.3.2024	11.3.2024
Article 4	Blohm, I., Leimeister, J.M. & Krcmar, H. (2013). "Crowdsourcing: How to Benefit from (Too) Many Great Ideas", MIS Quarterly Executive, December 2013 (12:4)	11.3.2024	13.3.2024
Article 5	Otto, B., & Jarke, M. (2019). Designing a multi-sided data platform: findings from the International Data Spaces case. Electronic Markets, 29(4), 561-580.	13.3.2024	18.3.2024
Article 6	Rowe, F., Jeanneret Medina, M., Journé, B., Coëtard, E., & Myers, M. (2023). Understanding responsibility under uncertainty: A critical and scoping review of autonomous driving systems. Journal of Information Technology, 02683962231207108.	18.3.2024	20.3.2024
Article 7	Davenport, T.H. & Ronanki, R. (2018), "Artificial Intelligence for the Real World", Harvard Business Review. Jan-Feb 2018.	25.3.2024	27.3.2024
Article 8	Iansiti, M. & Lakhani, K.R. (2017). “The Truth about Blockchain”, Harvard Business Review, January-February 2017	27.3.2024	29.3.2024
Article 9	Zuboff, S. (2015), "Big other: surveillance capitalism and the prospects of an information civilization", Journal of Information Technology (2015) 30, 75-89.	10.4.2024	12.4.2024

How to pass the course?

- 30% = 9 reflective article reviews/learning diaries (individual work; 1-pagers) + panel participation
- 30% = 1 teaching case on autonomous vehicles (individual work, class discussion)
- 10% = 1 essay (individual work)
- 30% = exam (individual work)

- All assignments need to be completed in order to pass the course

Assignments

- 9 article reviews/learning diaries (max 1 page each)
  - Your own opinion on key issues in the article
  - Reflections on learning from that lecture + panel discussion
  - Do NOT copy-and-paste from the article
- 1 case on autonomous vehicles (individual work, max 3 pages)
  - Answer to the case questions posted on MyCourses and participate to the case session on Wed 20.3.2024
- Essay (individual)
  - Around 2000 words
  - Topic from the course, see instructions
- Return all assignments through MyCourses

Due dates

- Case report is due on 12.4.2024
- Essay is due on 12.4.2024
- Article reviews due dates on the right

	Review article	Reflection paper due date
Article 1	Eisenmann, T., Parker, G. & Van Alstyne, M.W. (2006). "Strategies for Two-Sided Markets", Harvard Business Review, October 2006, pp. 92-101	4.3.2024
Article 2	Cusumano,M.A., Yoffie, D.B. & Gower, A. (2020). "The Future of Platforms", MIT Sloan Management Review	6.3.2024
Article 3	Constantiou, I. Marton, A. & Tuunainen, V.K. (2017). "Four Models of Sharing Economy Platforms", MIS Quarterly Executive, Dec 2017 (16:4)	11.3.2024
Article 4	Blohm, I., Leimeister, J.M. & Krcmar, H. (2013). "Crowdsourcing: How to Benefit from (Too) Many Great Ideas", MIS Quarterly Executive, December 2013 (12:4)	13.3.2024
Article 5	Otto, B., & Jarke, M. (2019). Designing a multi-sided data platform: findings from the International Data Spaces case. Electronic Markets, 29(4), 561-580.	18.3.2024
Article 6	Rowe, F., Jeanneret Medina, M., Journé, B., Coëtard, E., & Myers, M. (2023). Understanding responsibility under uncertainty: A critical and scoping review of autonomous driving systems. Journal of Information Technology, 02683962231207108.	20.3.2024
Article 7	Davenport, T.H. & Ronanki, R. (2018), "Artificial Intelligence for the Real World", Harvard Business Review. Jan-Feb 2018.	27.3.2024
Article 8	Iansiti, M. & Lakhani, K.R. (2017). “The Truth about Blockchain”, Harvard Business Review, January-February 2017	29.3.2024
Article 9	Zuboff, S. (2015), "Big other: surveillance capitalism and the prospects of an information civilization", Journal of Information Technology (2015) 30, 75-89.	12.4.2024

QUESTIONS?

Slides on MyCourses