Managing in the Digital World

Dr Tomo Popović

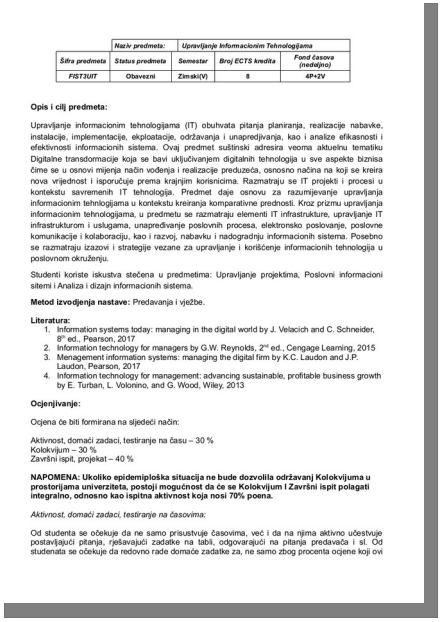
Managing Information Technology
L1-FIST3UIT

Teachers

- Tomo Popović, PhD, Assistant professor
- Stevan Čakić, MSc, Teaching Assistant
- Zoja Šćekić, Teaching Assistant

Managing Information Technology

- Semester schedule
- Course description



	Naziv predmeta:	Upravljanje Infomacionim Tehnologijama		
Šifra predmeta	Status predmeta	Semestar	Broj ECTS kredita	Fond časova (nedeljno)
FIST3UIT	Obavezni	Zimski(V)	8	4P+2V

Opis i cilj predmeta:

Upravljanje informacionim tehnologijama (IT) obuhvata pitanja planiranja, realizacije nabavke, instalacije, implementacije, eksploatacije, održavanja i unapređivanja, kao i analize efikasnosti i efektivnosti informacionih sistema. Ovaj predmet suštinski adresira veoma aktuelnu tematiku Digitalne transformacije koja se bavi uključivanjem digitalnih tehnologija u sve aspekte biznisa čime se u osnovi mijenja način vođenja i realizacije preduzeća, odnosno načina na koji se kreira nova vrijednost i isporučuje prema krajnjim korisnicima. Razmatraju se IT projekti i procesi u kontekstu savremenih IT tehnologija. Predmet daje osnovu za razumijevanje upravljanja informacionim tehnologijama u kontekstu kreiranja komparativne prednosti. Kroz prizmu upravljanja informacionim tehnologijama, u predmetu se razmatraju elementi IT infrastrukture, upravljanje IT infrastrukturom i uslugama, unapređivanje poslovnih procesa, elektronsko poslovanje, poslovne komunikacije i kolaboraciju, kao i razvoj, nabavku i nadogradnju informacionih sistema. Posebno se razmatraju izazovi i strategije vezane za upravljanje i korišćenje informacionih tehnologija u poslovnom okruženju.

Studenti koriste iskustva stečena u predmetima: Upravljanje projektima, Poslovni informacioni sitemi i Analiza i dizajn informacionih sistema.

Metod izvođenja nastave: Predavanja i vježbe.

Literatura:

1. Information systems today: managing in the digital world by J. Velacich and C. Schneider, 6th ed., Pearson, 2017
2. Information technology for managers by G.W. Reynolds, 2nd ed., Cengage Learning, 2015
3. Menagement information systems: managing the digital firm by K.C. Laudon and J.P. Laudon, Pearson, 2017
4. Information technology for management: advancing sustainable, profitable business growth by E. Turban, L. Volonino, and G. Wood, Wiley, 2013

Ocjenjivanje:

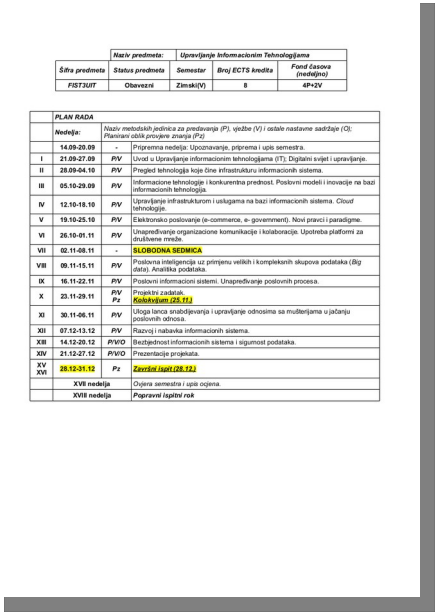
Ocjena će biti formirana na sljedeći način:

Aktivnost, domaći zadaci, testiranje na času – 30 %
Kolokvijum – 30 %
Završni ispit, projekat – 40 %

NAPOMENA: Ukoliko epidemiološka situacija ne bude dozvolila održavanj Kolokvijuma u prostorijama univerziteta, postoji mogućnost da će se Kolokvijum I Završni ispit polagati integralno, odnosno kao ispitna aktivnost koja nosi 70% poena.

Aktivnost, domaći zadaci, testiranje na časovima:

Od studenta se očekuje da ne samo prisustvuje časovima, već i da na njima aktivno učestvuje postavljajući pitanja, rješavajući zadatke na tabli, odgovarajući na pitanja predavača i sl. Od studenata se očekuje da redovno rade domaće zadatke za, ne samo zbog procenta ocjene koji ovi



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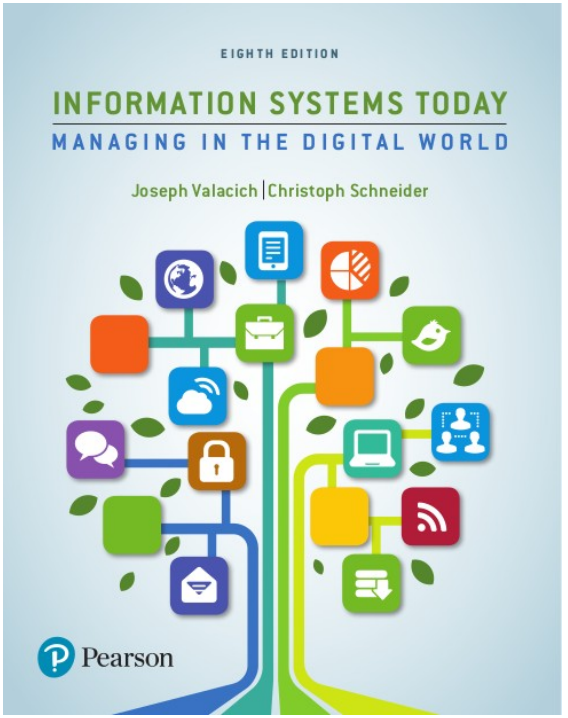
	PLAN RADA		
	Nedelja:	Naziv metodskih jedinica za predavanja (P), vježbe (V) i ostale nastavne sadržaje (O); Planirani oblik provjere znanja (Pz)	
	14.09-20.09	-	Pripremna nedelja: Upoznavanje, priprema i upis semestra.
I	21.09-27.09	P/V	Uvod u Upravljanje informacionim tehnologijama (IT); Digitalni svijet i upravljanje.
II	28.09-04.10	P/V	Pregled tehnologija koje čine infrastrukturu informacionih sistema.
III	05.10-29.09	P/V	Informacione tehnologije i konkurentna prednost. Poslovni modeli i inovacije na bazi informacionih tehnologija.
IV	12.10-18.10	P/V	Upravljanje infrastrukturom i uslugama na bazi informacionih sistema. *Cloud* tehnologije.
V	19.10-25.10	P/V	Elektronsko poslovanje (e-commerce, e- government). Novi pravci i paradigme.
VI	26.10-01.11	P/V	Unapređivanje organizacione komunikacije i kolaboracije. Upotreba platformi za društvene mreže.
VII	02.11-08.11	-	**SLOBODNA SEDMICA**
VIII	09.11-15.11	P/V	Poslovna inteligencija uz primjenu velikih i kompleksnih skupova podataka (*Big data*). Analitika podataka.
IX	16.11-22.11	P/V	Poslovni informacioni sistemi. Unapređivanje poslovnih procesa.
X	23.11-29.11	P/V Pz	Projektni zadatak. ***Kolokvijum (25.11)***
XI	30.11-06.11	P/V	Uloga lanca snabdijevanja i upravljanje odnosima sa mušterijama u jačanju poslovnih odnosa.
XII	07.12-13.12	P/V	Razvoj i nabavka informacionih sistema.
XIII	14.12-20.12	P/V/O	Bezbjednost informacionih sistema i sigumost podataka.
XIV	21.12-27.12	P/V/O	Prezentacije projekata.
XV XVI	28.12-31.12	Pz	***Završni ispit (28.12.)***
	XVII nedelja		Ocjena semestra i upis ocjena.
	XVIII nedelja		*Popravni ispitni rok*

Textbook

- Information systems today: managing in the digital world by J. Velacich and C. Schneider, 8 th ed., Pearson, 2017



Additional Literature

- Information technology for managers by G.W. Reynolds, 2nd ed., Cengage Learning, 2015
- Menagement information systems: managing the digital firm by K.C. Laudon and J.P. Laudon, Pearson, 2017
- Information technology for management: advancing sustainable, profitable business growth by E. Turban, L. Volonino, and G. Wood, Wiley, 2013

Additional Literature

- Scientific and technical **conference proceedings**
- Scientific and technical **journals**
- **Online courses** (respectable sources)
- Other **Internet sources**

Testing and Grading

- Activities in class, testing, homework **30%**
- Midterm exam **30%**
- Final exam, project **40%**

- Midterm/Final exams require **75% attendance**

Testing and Grading

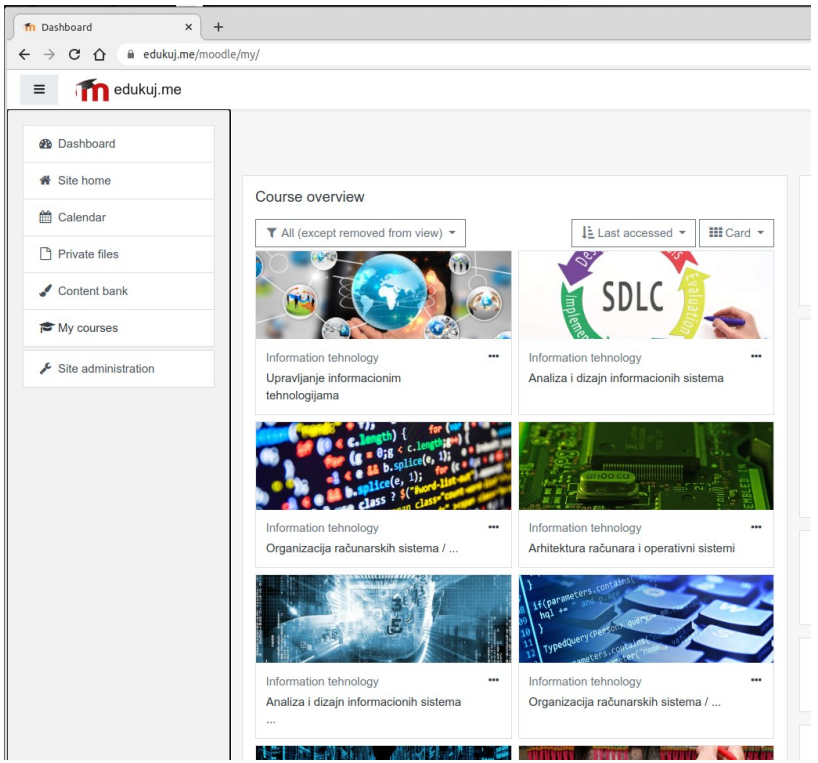
- 50-59 points » 6
- 60-69 points » 7
- 70-79 points » 8
- 80-89 points » 9
- 90-100 points » 10

Homework assignments

- Essays
- Mini projects
- Final project

LMS Platform - Moodle

- Online https://edukuj.me
- Possible use of Zoom, MS Teams, Google Meet



Digital Transformation

- Integration of digital technology in all aspects of a business operation
- Changing the way how to operate business
- New perspective on delivering value to end users (customers)

source: https://enterprisersproject.com/

Digital Transformation

- You need to develop a deep understanding of this **process**.
- Your **course project** needs to address a challenge of digital transformation with a **concrete example**.
- **COVID19** as a driver for digital transformation.
- Several **ongoing projects** at UDG and in Montenegro.

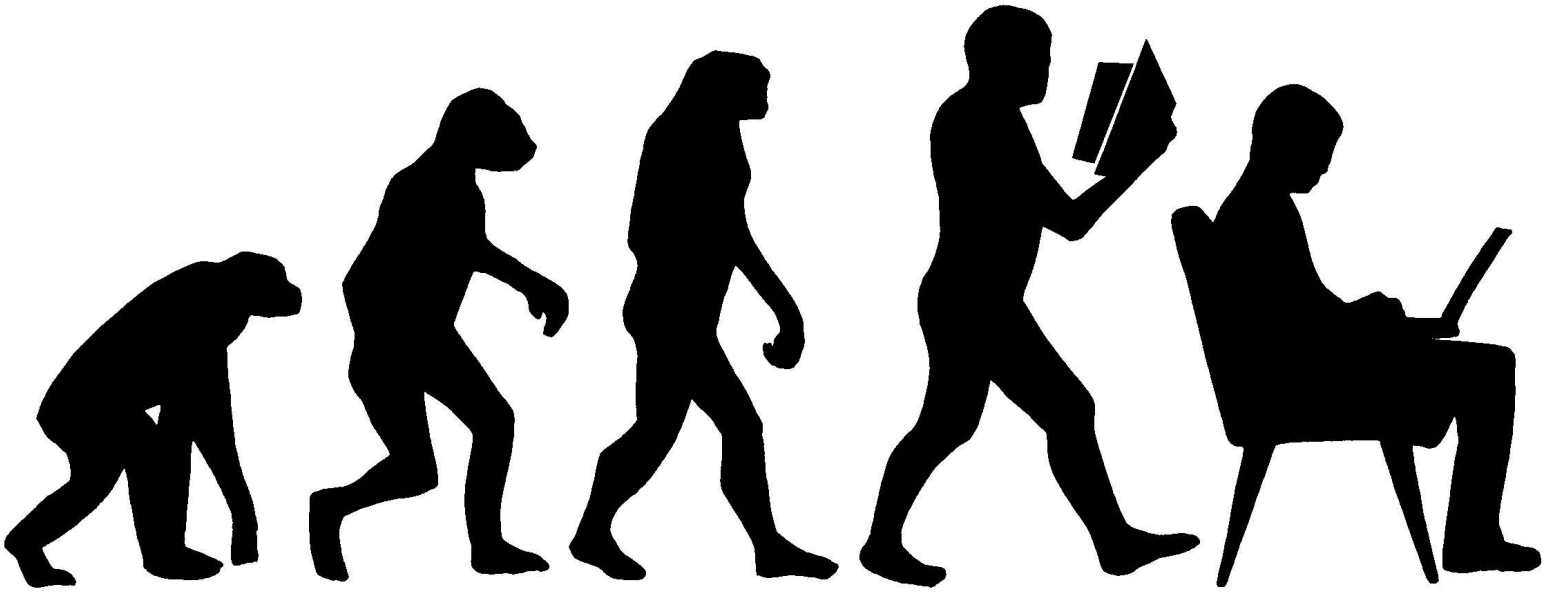
Course Project

- High-performance computing (HPC)
- Artificial intelligence/ Machine learning (AI/ML)

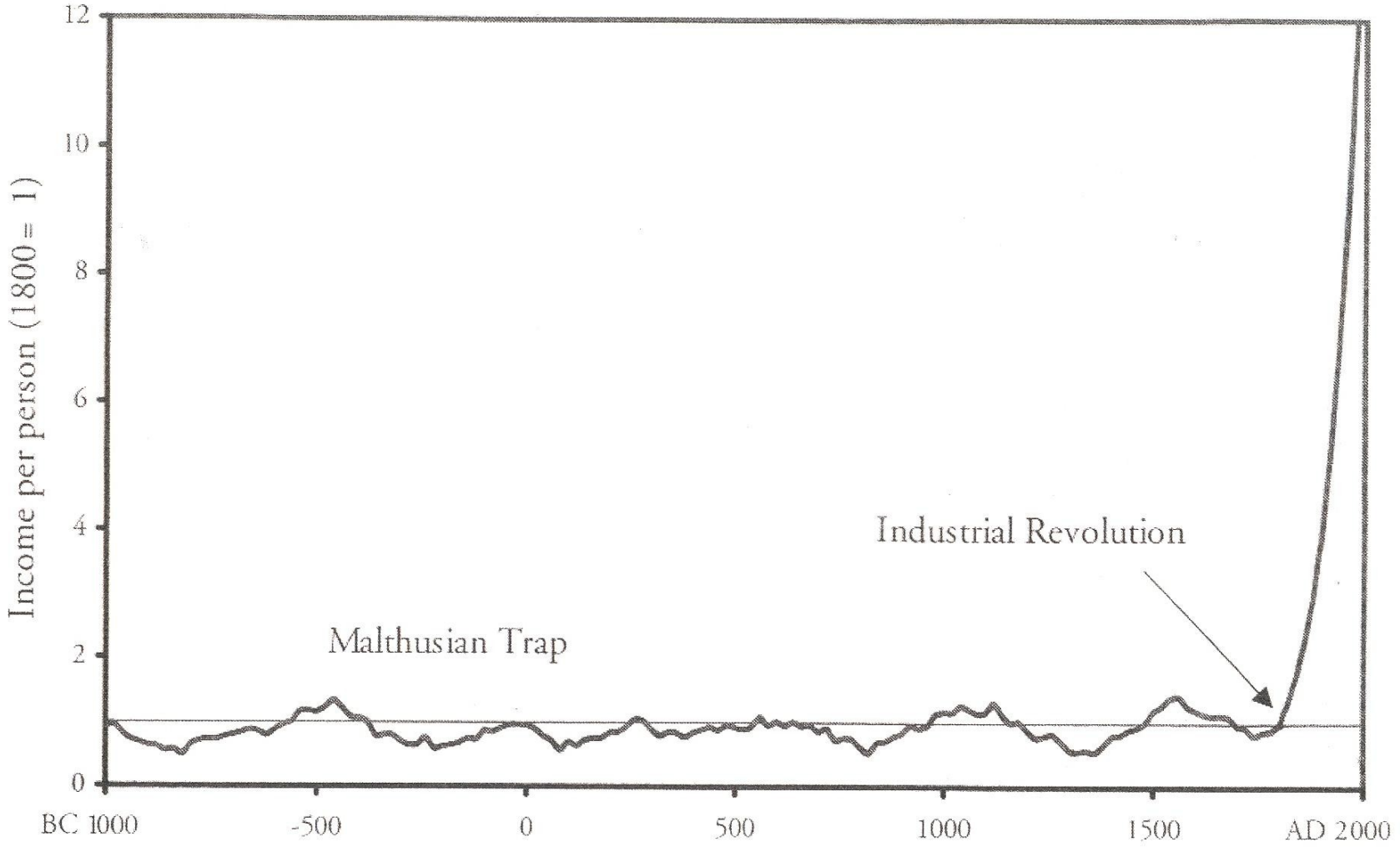
- Questions:
  - Why is this important to us?
  - Technical aspects
  - Business aspects / Digital transformation

Digital Transformation

Technology evolution



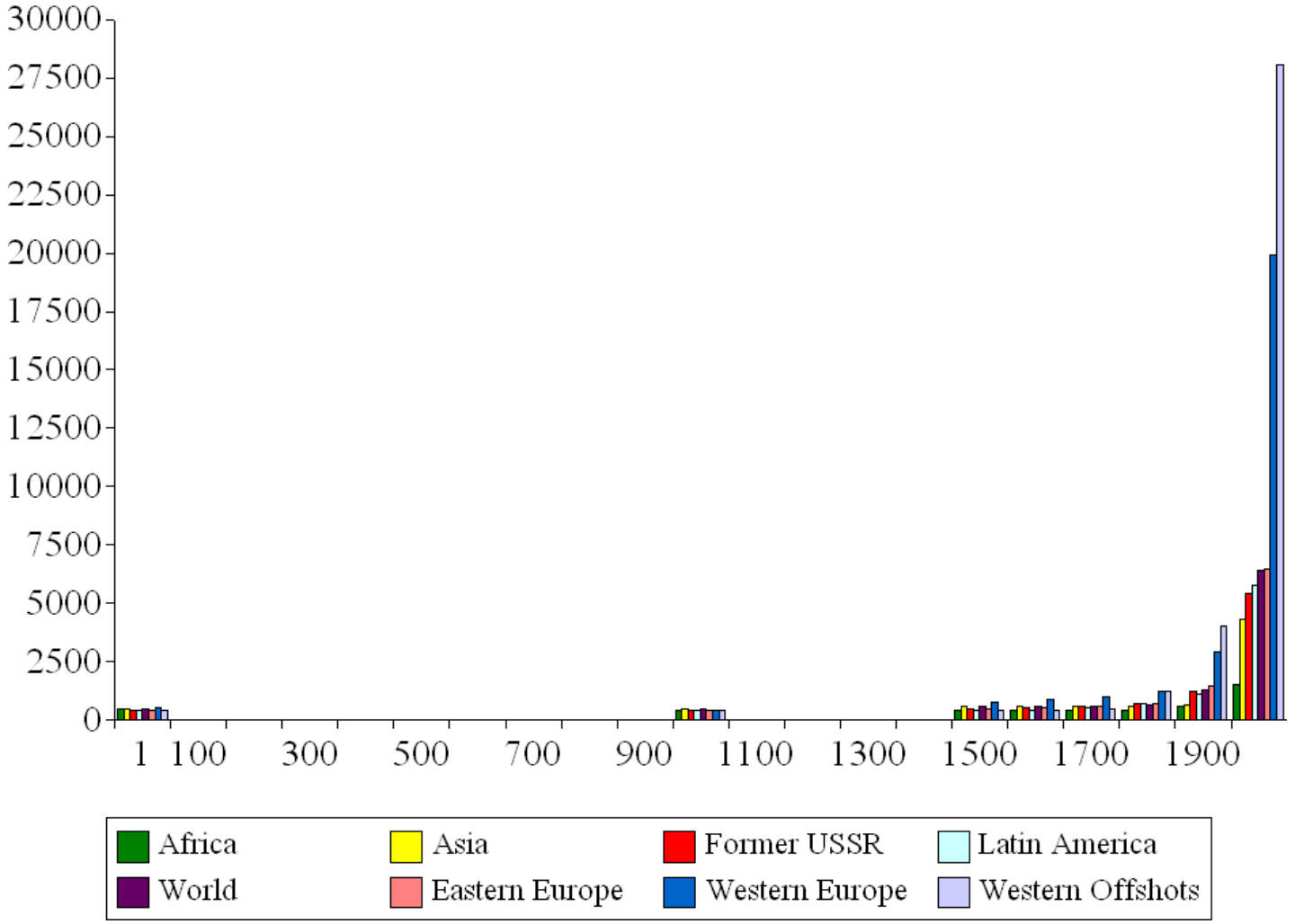
Mathusian Trap



source: rynotebook.wordpress.com/2014/03/13/the-malthusian-trap/

Thomas Robert Malthus
1766-1834

Gross Domestic Product (0-2000)

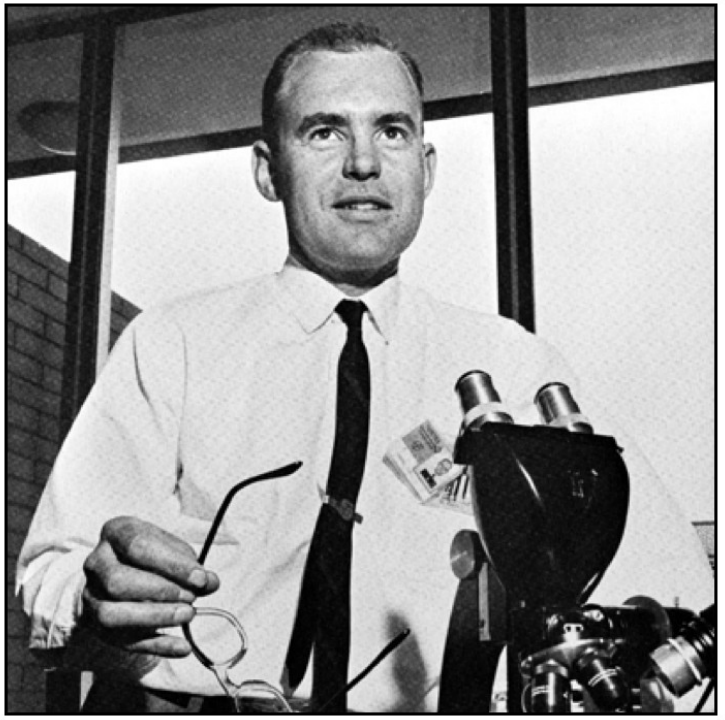


source: www.towardsoneworld.eu

Moore’s Law

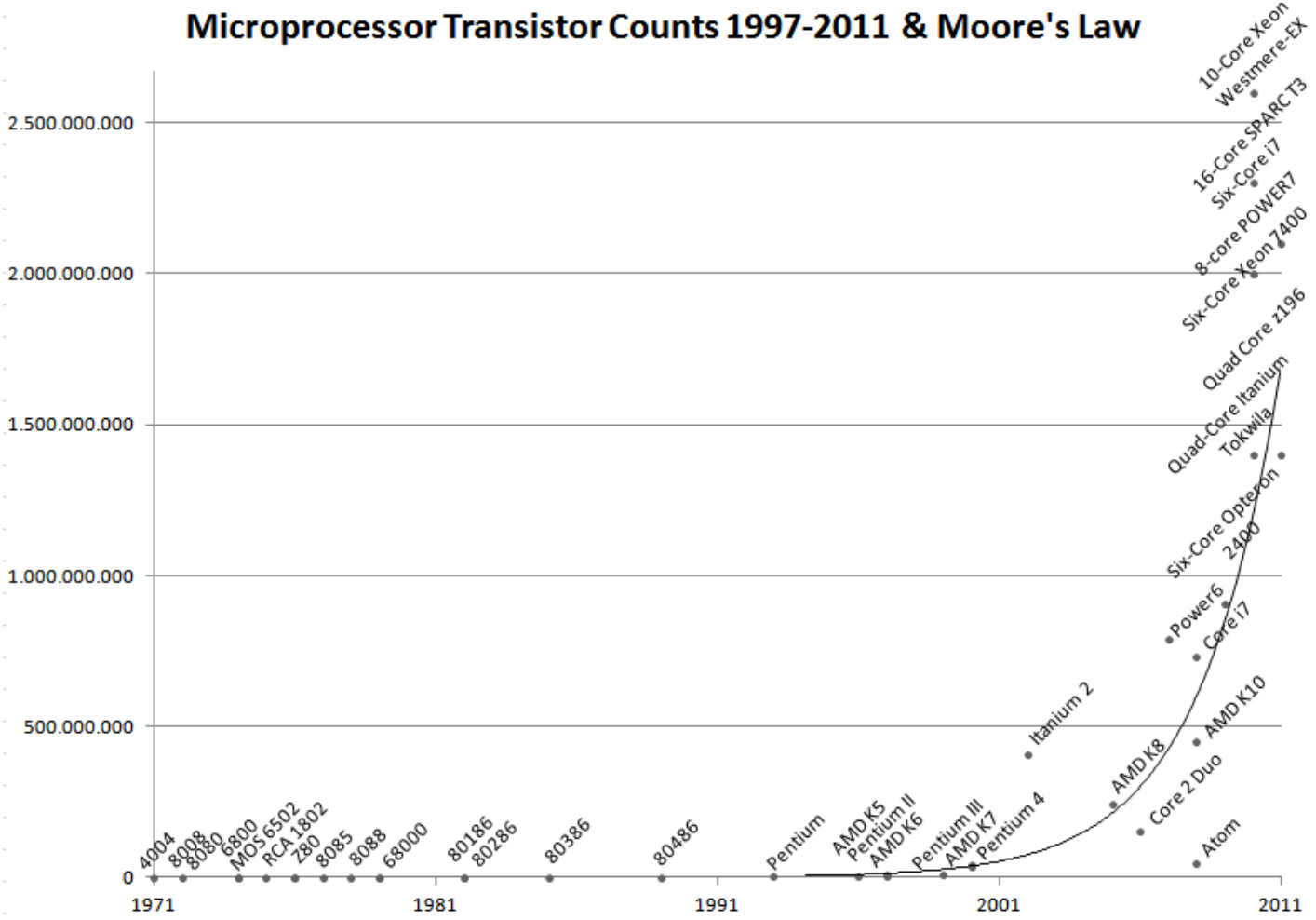
- the number of transistors in a dense integrated circuit **doubles** about **every two years**

Moore, Gordon E. (1965) “Cramming more components onto integrated circuits”, *Electronics*, April 19, 1965, pp 114-117



source: www.computerhistory.org

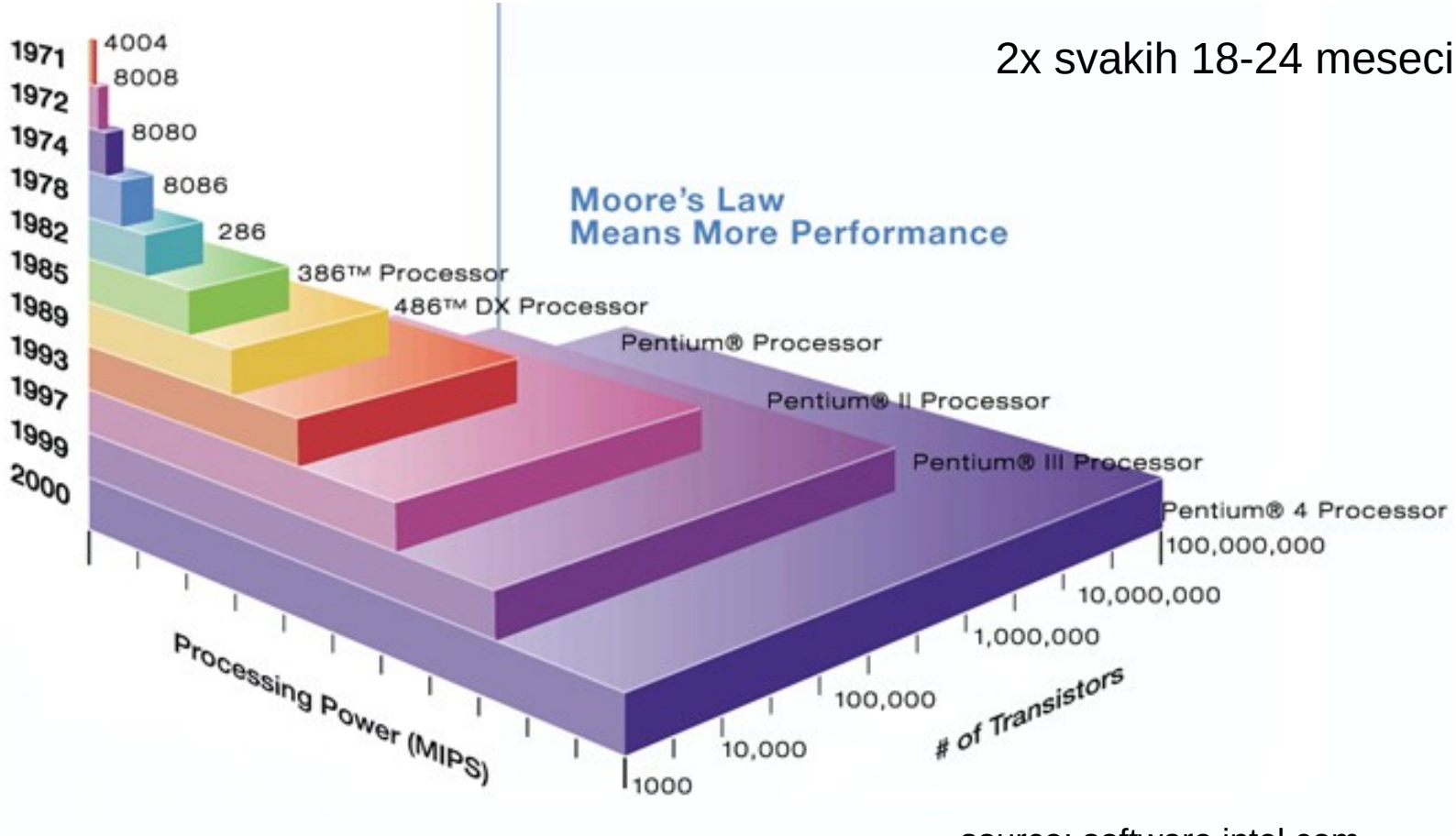
Moore's Law



source: www.hymax.co.za/the-power-of-moores-law/

Moore's Law vs. Performance

2x svakih 18-24 meseci



source: software.intel.com

Memory Capacity/Performance

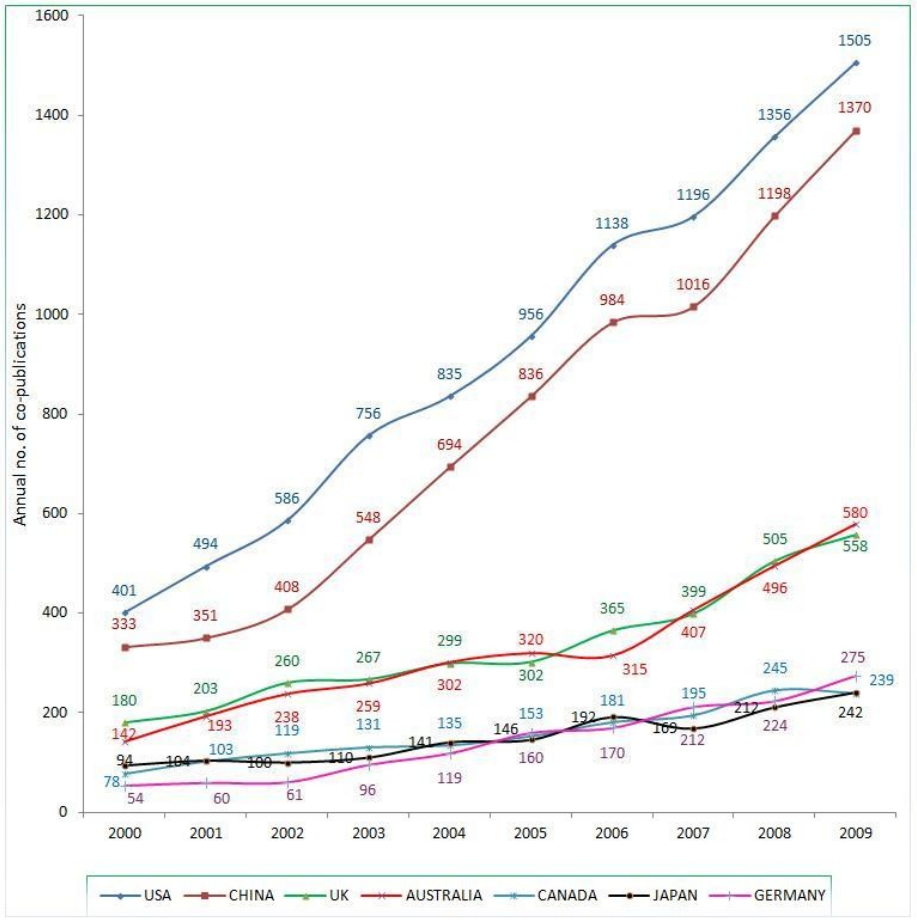
1956, 3MB, 1t

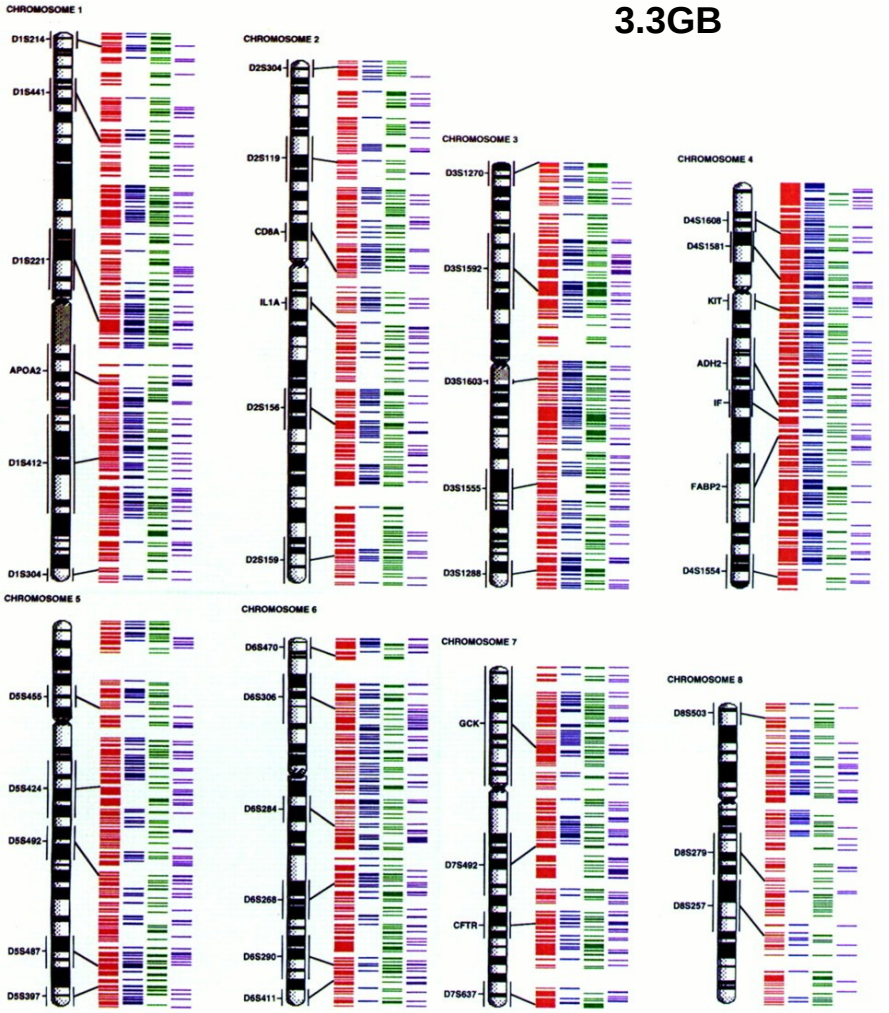
2005

2014

Personal Computers

Science Development





source: genome.cshlp.org

Linear vs. exponential

- 5 years, 32 times
- 10 years, 1000 times
- 20 years, 1000000 times
- 30 years, 1000000000 times

- **Singularity** 2029-2045

source: Time Magazine

What Happens in an **Internet Minute?**

And **Future Growth** is **Staggering**

Today, the number of networked devices = the global population

By **2015**, the number of networked devices = 2x the global population

In **2015**, it would take you **5 years** to view all video crossing IP networks each **second**

intel

source: intel

Open Source

- **Internet** and globalization, in 1990s
- **Linux** operating system, **development tools**, applications, **scientific** computing
- Wide presence in **academia** and **industry**

Open Innovation

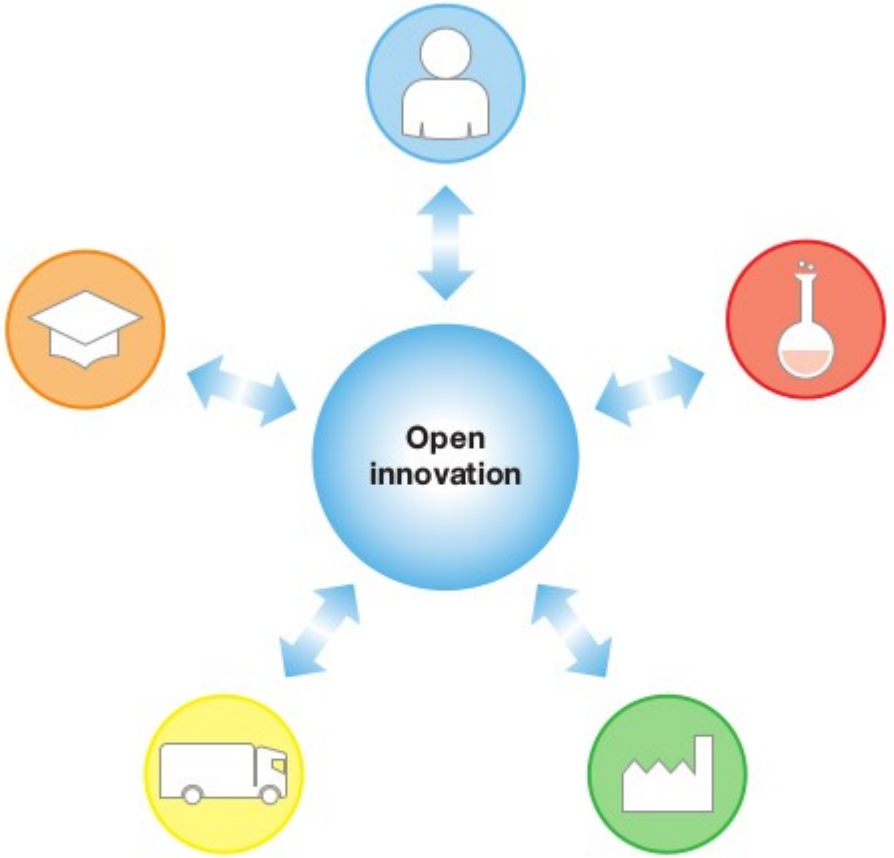
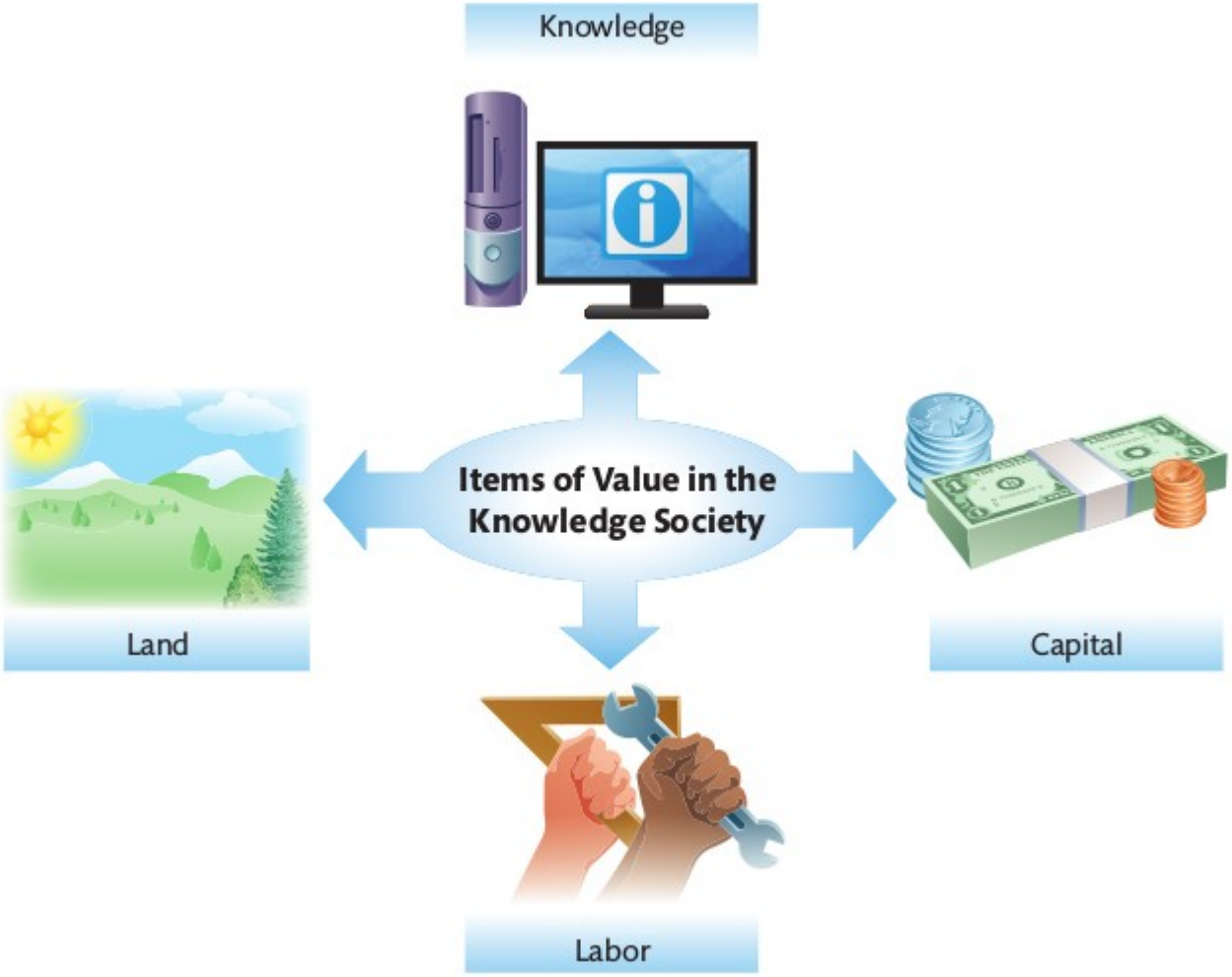


FIGURE 1.1

Open innovation entails opening up the innovation process to outside entities, including academia, individual innovators, research labs, other companies, or suppliers.

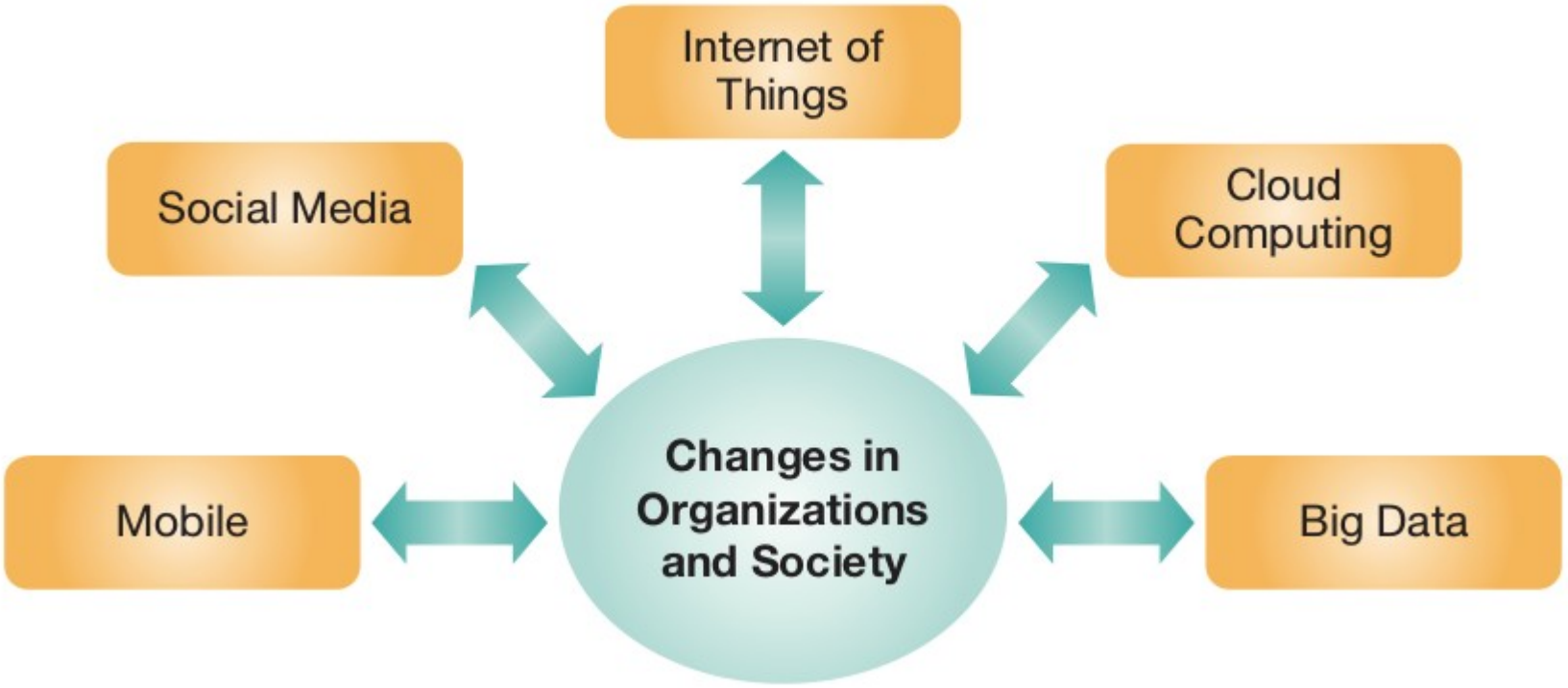
Knowledge Workers/Society



Societal Issues in Digital World

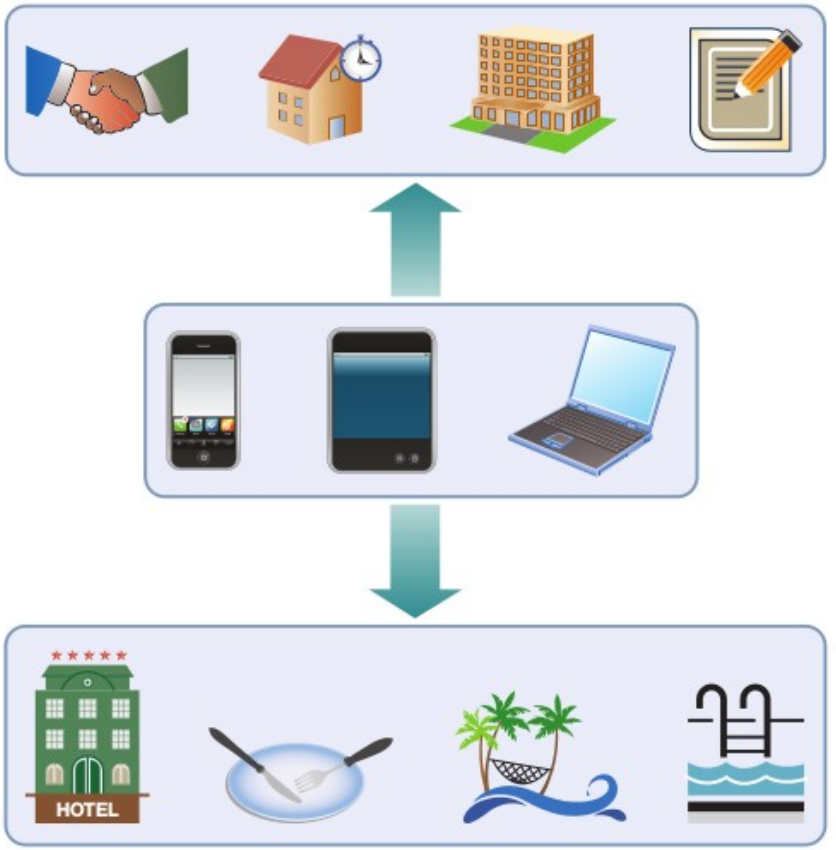
- Demographics changes
- Urbanization
- Shift in economic power
- Resource scarcity
- Climate change

Five IT Megatrends



Megatrend 1- Mobile

- Real time
- Anywhere
- BYOD

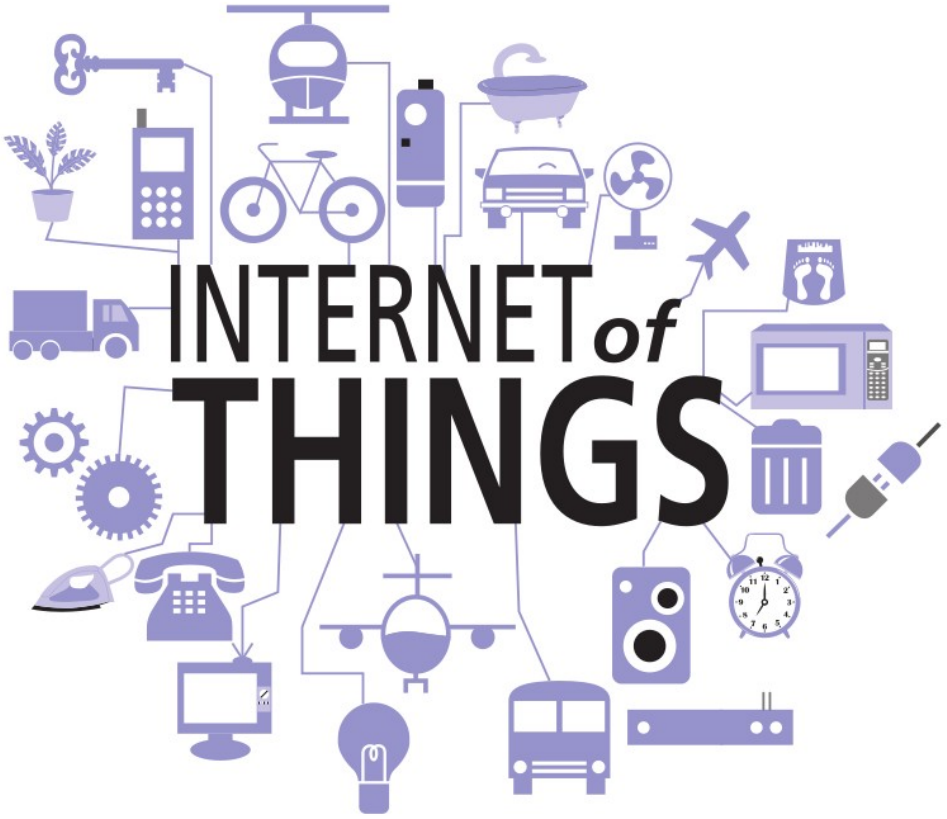


Megatrend 2 - Social Media

- Network effect
- Used as platforms
- Shift in roles

Megatrend 3 - Internet of Things

- Network of physical things
- Sensors
- Smart homes
- Industry IOT IIoT



Megatrend 4 - Cloud Computing

- IaaS
- Paas
- Saas

Megatrend 5 - Big Data

- 24/7 connectivity
- Large and complex data sets
- High volume, variety, velocity

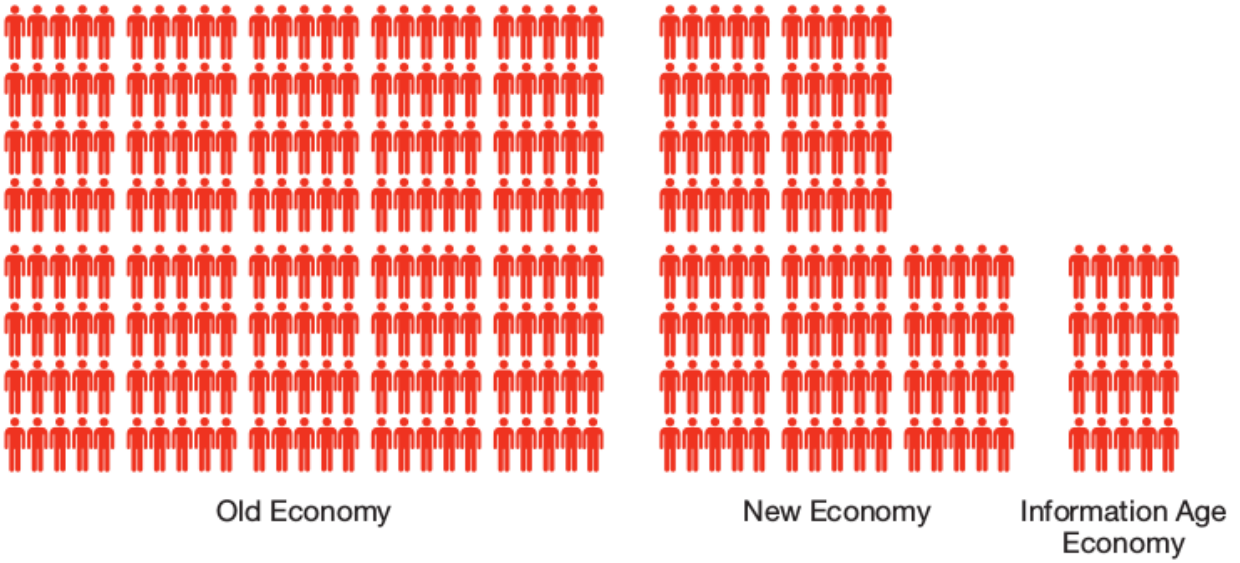


FIGURE 1.11

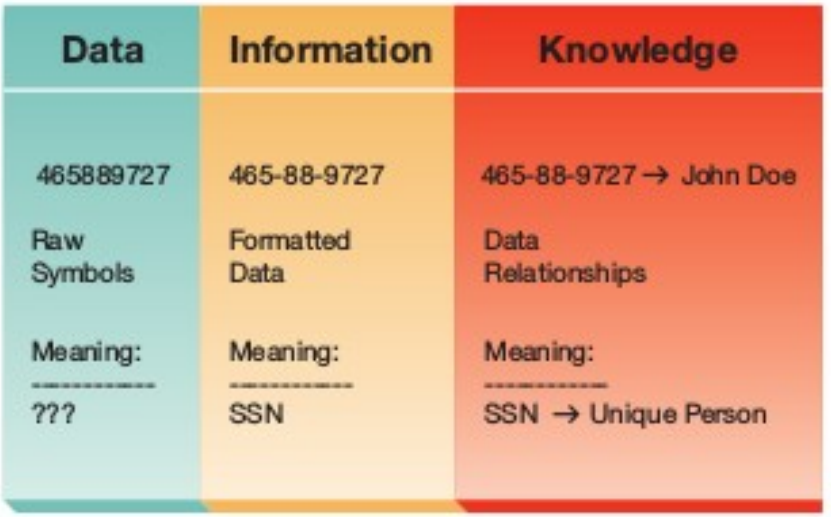
Companies in the Information Age economy are creating value not from people but from data.

Information Systems

FIGURE 1.12

An information system is the combination of people and information technology that create, collect, process, store, and distribute useful data.

Data, Information, Knowledge



Best Jobs in America (2015)

TABLE 1.1 Best Jobs in America (2015)

Rank	Career	Job Growth (10-year forecast)	Median Pay (in US$)
1	Software architect	23%	124,000
2	Video game designer	19%	79,900
3	Landman	13%	103,000
4	Patent agent	13%	126,000
5	Hospital administrator	23%	114,000
6	Continuous improvement manager	12%	96,600
7	Clinical nurse specialist	19%	89,300
8	Database developer	23%	88,200
9	Information assurance analyst	37%	96,400
10	Yoga instructor	13%	62,400

Source: Based on 100 Best Jobs in America, published by CNN Money, © 2016.

TABLE 1.2 Some IS Management Job Titles and Brief Job Descriptions

IS Activity	Job Title	Job Description	Salary Range, in US$, in Percentiles (25%–75%)
Develop	Systems analyst	Analyze business requirements and select information systems that meet those needs	63,000–80,000
	Software developer	Code, test, debug, and install programs	71,000–91,000
	Software architect	Create customized software for large corporations	98,000–130,000
	IT consultant	Provide IT knowledge to external clients	57,000–93,000
	Database developer	Develop, modernize, and streamline databases	57,000–68,000
Maintain	IT auditor	Audit information systems and operating procedures for compliance with internal and external standards	64,000–83,000
	Database administrator	Manage database and database management software use	75,000–99,000
	Webmaster	Manage a firm's website	59,000–80,000
Manage	IT manager	Manage existing information systems	95,000–126,000
	IS security manager	Manage security measures and disaster recovery	102,000–125,000
	Information assurance analyst	Ensure availability and security of information stored on networks and in the cloud	60,000–93,000
	E-commerce manager	Manage development, maintenance, and strategy related to e-commerce systems	97,000–126,000
	Chief information officer (CIO)	Highest-ranking IS manager; oversee strategic planning and IS use throughout the firm	213,000–316,000
	Chief digital officer (CDO)	Executive focused on converting traditional "analog" businesses to digital; oversee operations in rapidly changing digital sectors like mobile apps and social media	150,000–200,000
Study	University professor	Teach undergraduate and graduate students; study the use of information systems in organizations and society	70,000–180,000
	Government scientist	Perform research and development of information systems for homeland security, intelligence, and other related applications	60,000–200,000

Source: Based on http://www.salary.com, http://www.payscale.com.

IT Core Competencies

TABLE 1.3 IS Professional Core Competencies

Domain	Description
Technical Knowledge and Skills	
Hardware	Hardware platforms, infrastructure, cloud computing, virtualization, peripherals, mobile devices
Software	Operating systems, application software, mobile apps
Networking	Network administration, cabling and network interface cards, wireless, Internet, security
Business Knowledge and Skills	
Business integration, industry	Business processes, functional areas of businesses and their integration, industry characteristics
Managing people and projects	Planning, organizing, leading, controlling, managing people and projects
Social	Interpersonal, group dynamics, political
Communication	Verbal, written, and technological communication and presentation
Systems Knowledge and Skills	
Systems integration	Connectivity, compatibility, integrating subsystems and systems
Development methodologies	Steps in systems analysis and design, systems development life cycle, alternative development methodologies
Critical thinking	Challenging one's and others' assumptions and ideas
Problem solving	Information gathering and synthesis, problem identification, solution formulation, comparison, choice

Good IS Personnel

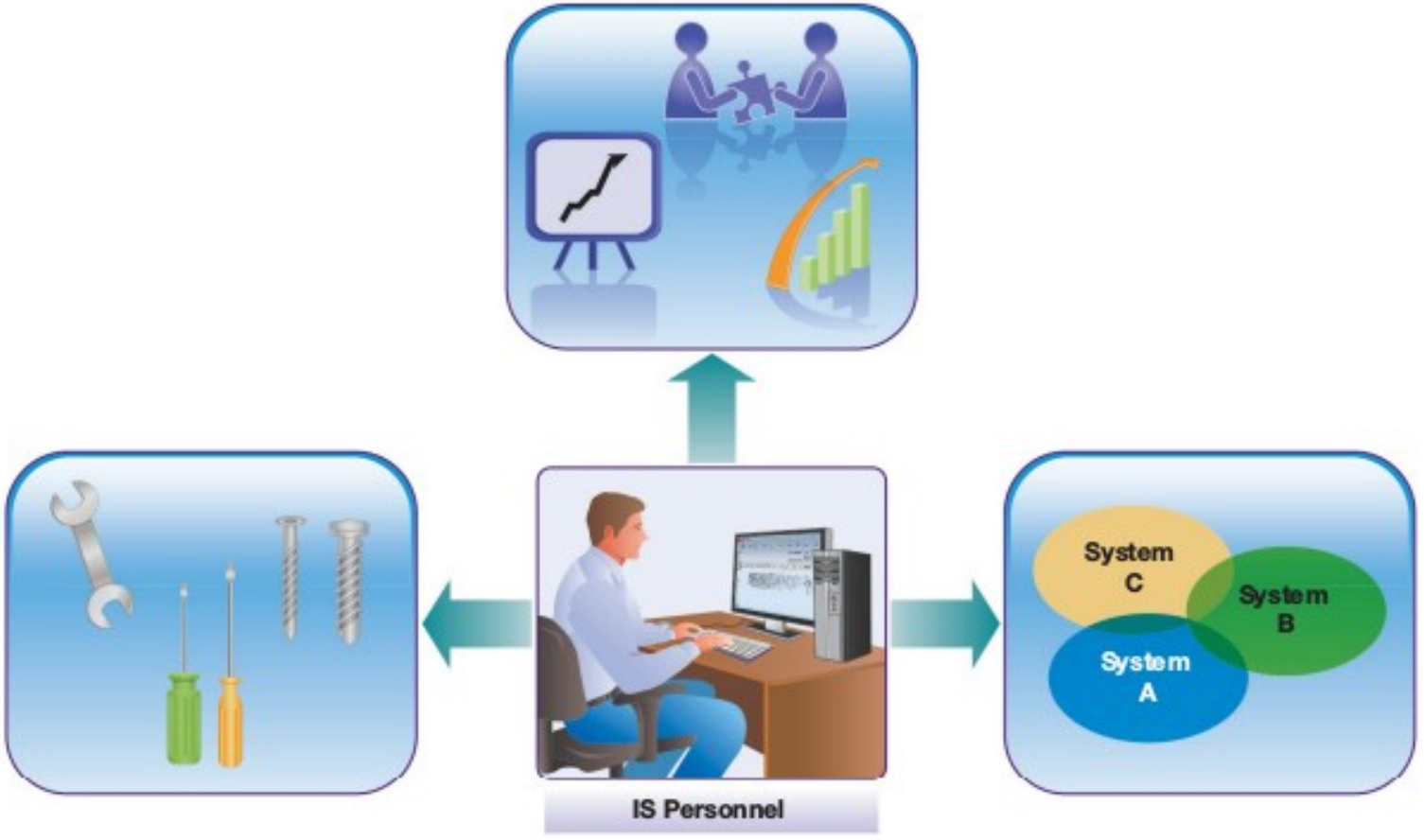


FIGURE 1.14

Good IS personnel possess valuable, integrated knowledge and skills in three areas—technical, business, and systems.

Hot Skills (Near Future)

TABLE 1.4 Hot Skills for the Next Decade

Domain	Hot Skills
Business	Business–IT alignment; business analysis; enterprise solutions; business process modeling; project management; third-party provider management; enterprise-oriented social media
Technology infrastructure and services	Virtualization; cloud computing/infrastructure as a service; cloud integration; serverless computing; systems analysis and design; network design; systems auditing; wireless; telecommunications/VoIP (Voice over Internet Protocol); database administration; data centers
Security	IT security planning and management; BYOD; governance, risk, and compliance; cybersecurity
Applications	Customer-facing application development; mobile app development; web development; open source; portal technologies; cloud computing; user experience; legacy systems integration; interface design; content management systems
Internet	Social media; customer-facing web applications; mobile apps; search engine optimization; artificial intelligence; web mining; Internet of Things
Business analytics/ data science	Business intelligence; advanced analytics; data warehousing; data mining; unstructured data analysis; Big Data

Source: Based on Broom (2016), Florentine (2015), Pratt (2015), Leung (2009).

TABLE 1.5 Categories of Information Systems Used in Organizations

Category of System	Purpose	Sample Application(s)
Transaction processing system	Process day-to-day business event data at the operational level of the organization	Grocery store checkout cash register with connection to network, student registration system
Management information system	Produce detailed information to help manage a firm or part of a firm	Inventory management and planning system, student enrollment management
Decision support system	Provide analysis tools and access to databases in order to support quantitative decision making	Product demand forecasting system, loan and investment analysis
Intelligent system	Emulate or enhance human capabilities	Automated system for analyzing bank loan applications, self-driving car
Business intelligence system	Analyze Big Data to better understand various aspects of a business	Online analytical processing (OLAP) system
Office automation system (personal productivity software)	Support a wide range of predefined day-to-day work activities of individuals and small groups	Word processor, spreadsheet, presentation software, e-mail client
Collaboration system	Enable people to communicate, collaborate, and coordinate with each other	E-mail system with automated, shared calendar
Knowledge management system	Enable the generation, storage, sharing, and management of knowledge assets	Knowledge portal for finding answers to common questions
Social software	Facilitate collaboration and knowledge sharing	Social network, connecting colleagues and friends
Geographic information system	Create, store, analyze, and manage geographically referenced data	Site selection for new shopping mall
Functional area information system	Support the activities within a specific functional area of the firm	Planning system for personnel training and work assignments
Customer relationship management system	Support interaction between the firm and its customers	Sales force automation, lead generation
Enterprise resource planning system	Support and integrate all facets of the business, including planning, manufacturing, sales, marketing, and so on	Financial, operations, and human resource management
Supply chain management system	Support the coordination of suppliers, product or service production, and distribution	Procurement planning
Electronic commerce system	Enable customers to buy goods and services from a firm's website	Amazon.com, eBay.com, Nordstrom.com
Mobile app	Perform a particular, well-defined function, typically on a mobile device	Instagram, Snapchat, WhatsApp, Facebook app

Dual Nature of Information Systems

IS Ethics

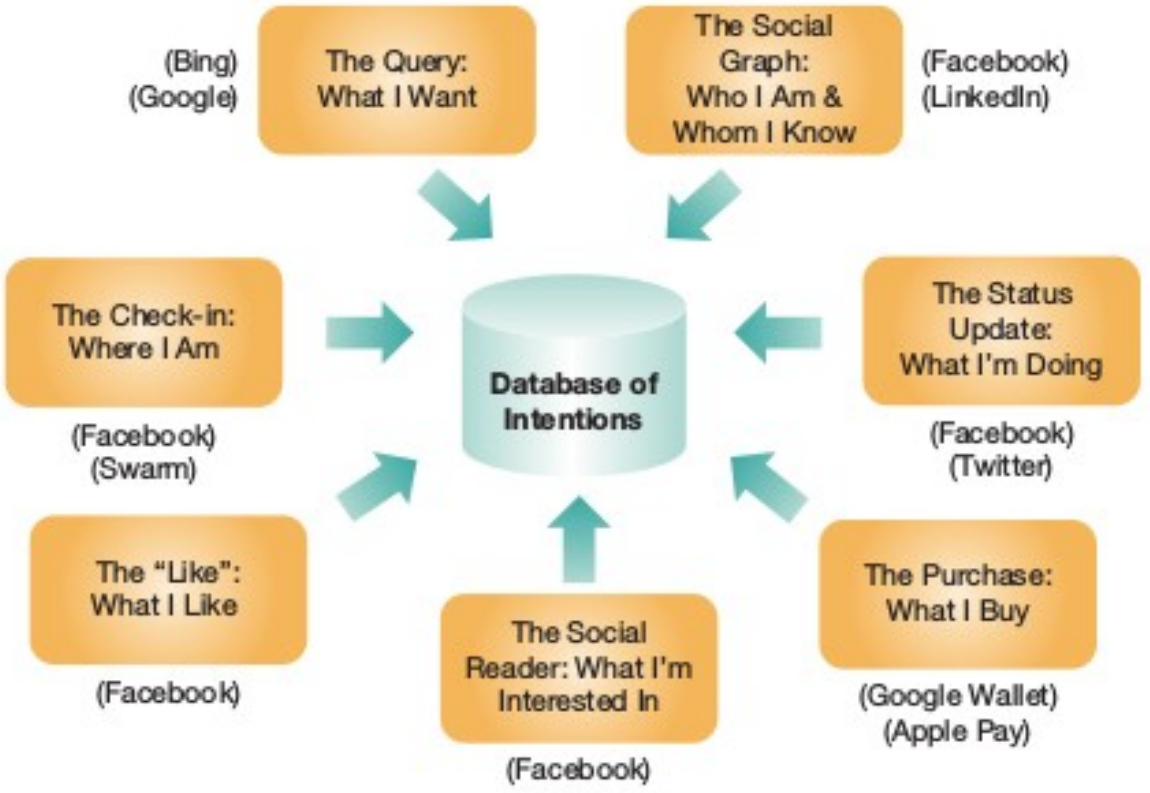
- Information privacy
- Intellectual Property
- The Need for a Code of Ethical Conduct

Information Privacy

FIGURE 1.19

The database of intentions.

Source: Based on *The Database of Intentions is Far Larger than/Thought* by John Battelle, published by John Battelle.

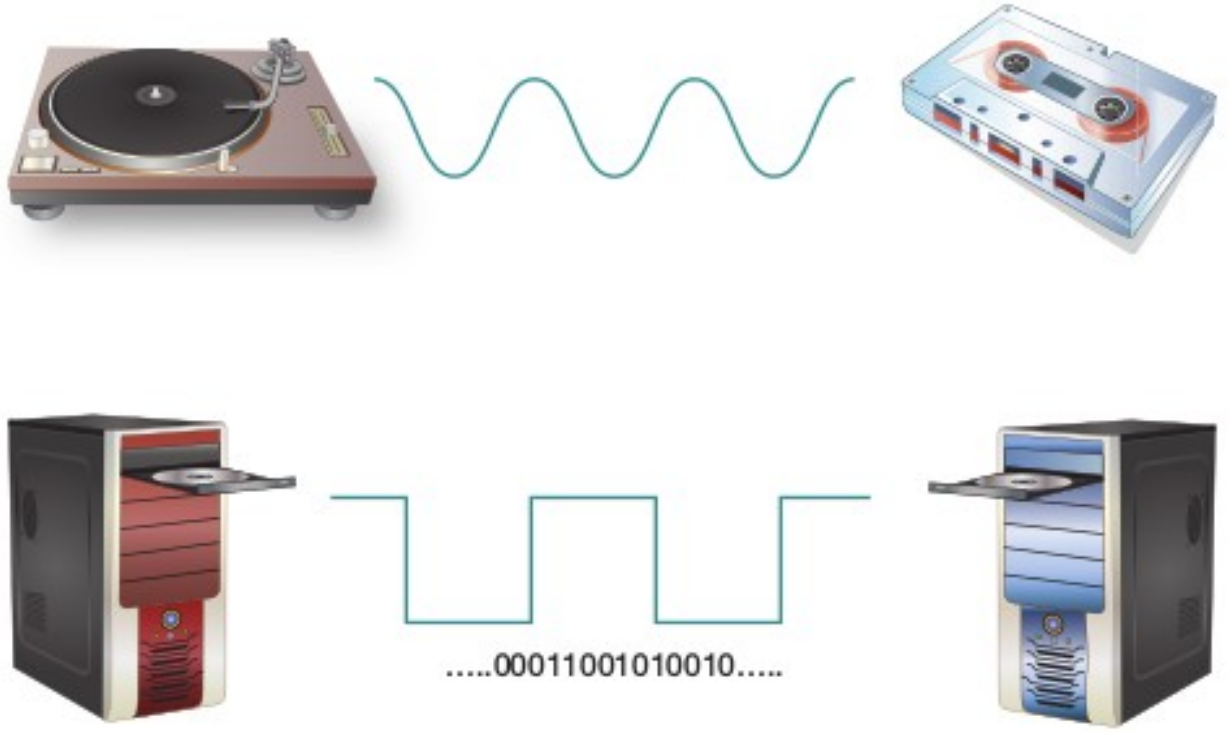


Information Privacy Principles

Intellectual Property

FIGURE 1.21

Digital media allows for lossless duplication.



Responsible Computer Use

- Using a computer to harm others
- Interfering with other people's computer work
- Snooping in other people's files
- Using a computer to steal
- Using a computer to bear false witness
- Copying or using proprietary software without paying for it
- Using other people's computer resources without authorization or compensation
- Appropriating other people's intellectual output

In addition, the guidelines recommend the following:

- Thinking about social consequences of programs you write and systems you design
- Using a computer in ways that show consideration and respect for others

Key Points

- Digital world, societal issues, IT megatrends
- Information system, data, technology, people, and organizational components
- Dual nature of information systems in the success and failure of modern organizations
- Computer ethics and ethical concerns, information privacy, intellectual property

Project: HPC and AI/ML

- Why is this important?
  - **Philosophic** view, Industrial **revolution**
  - **Ethics**, Responsible use of technology
- Technical aspects
  - Do I have understanding and skills for this?
  - What can I **learn**, **apply**, **do** with this?
- Business aspects / Digital transformation
  - HPC/AI/ML and **Digital transformation**
  - **Radical innovation**

References/Acknowledgements

- Information systems today: managing in the digital world by J. Velacich and C. Schneider, 8th ed., Pearson, 2017
- Information technology for managers by G.W. Reynolds, 2nd ed., Cengage Learning, 2015
- Menagement information systems: managing the digital firm by K.C. Laudon and J.P. Laudon, Pearson, 2017
- Information technology for management: advancing sustainable, profitable business growth by E. Turban, L. Volonino, and G. Wood, Wiley, 2013

Riječi

- Transformacija
- Migracija
- Digitalan

Riječi

- Transformacija
  - ženski rod, pretvaranje, preobražavanje, preinačavanje, preobličavanje; preuobličenje, preuobličenost;
- Migracija
  - ženski rod, seoba, seljenje; seoba životinja, npr. ptica selica. (lat.)
  - ženski rod (računarstvo, biznis), prelazak sa jednog načina realizacije nekog poslovnog procesa na drugi, prelazak sa jedne verzije softvera ili hardvera na drugi (ili noviji).
- Digitalan
  - pridev, prstni, koji se tiče prstiju (noge i ruke)
  - pridev (računari), način za predstavljanje stanja objekata pomoću dva različita stanja, kao što su uključeno-isključeno, visoko-nisko ili dobro-loše; svi računari su digitalni pošto sadrže milione prekidača koji mogu biti u uključenom ili isključenom stanju