

ARTIFICIAL INTELLIGENCE & LAW

Ermo Taks

John von Neumann (1903-1957)

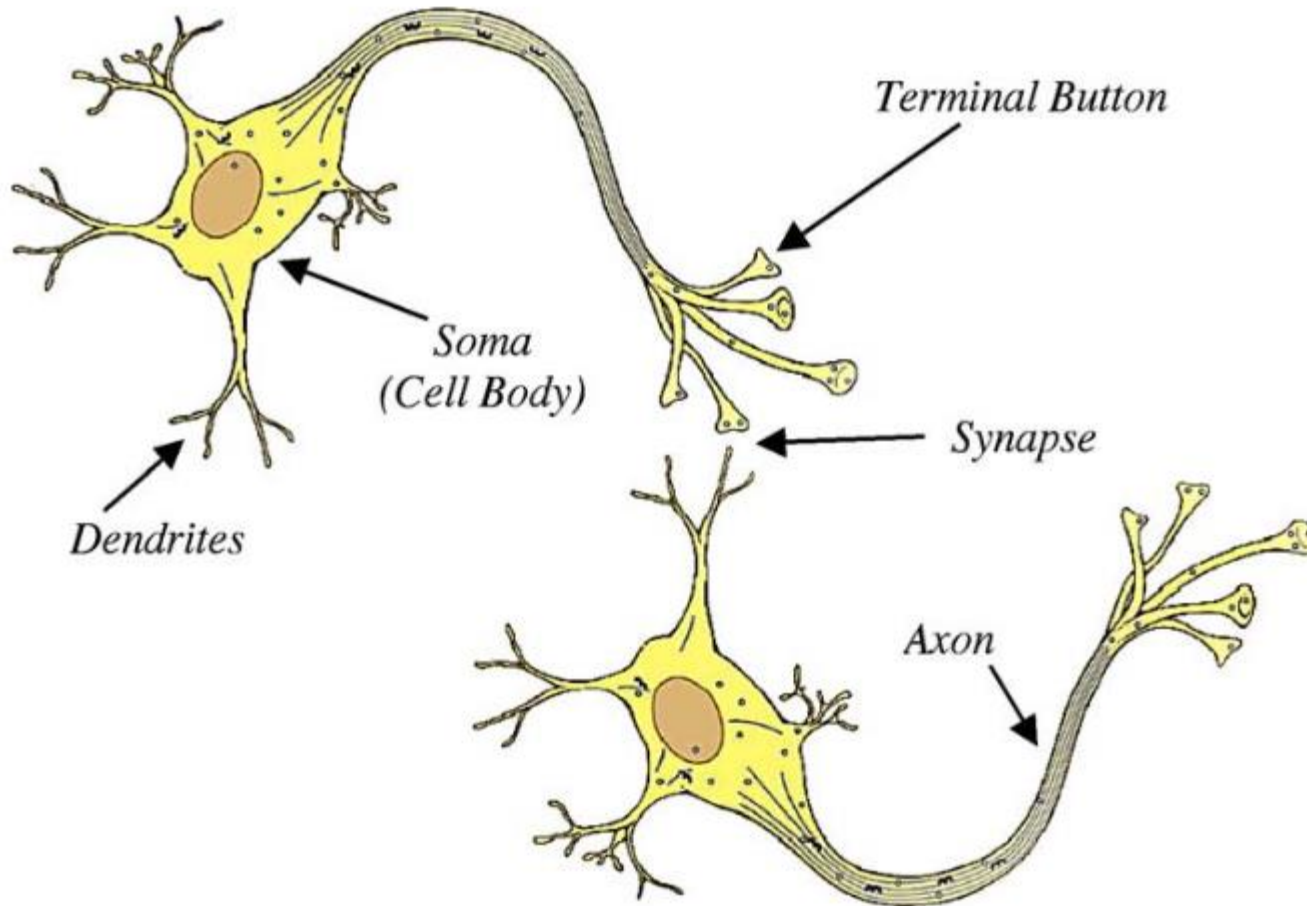
- EDVAC - an early stored-program computer
- von Neumann architecture separates :
 - ▣ (task-specific) stored program
 - ▣ (general-purpose) hardware circuitry,
 - ▣ which can execute (sequentially) the instructions of any program whatsoever
- The commanding importance
 - ▣ it can be used for any purpose whatsoever

Examples for AI from nature

- Is machine evolution possible
 - ▣ Evolution- the change in heritable phenotype traits of biological populations over successive generations
 - ▣ Secret Life of Chaos, BBS

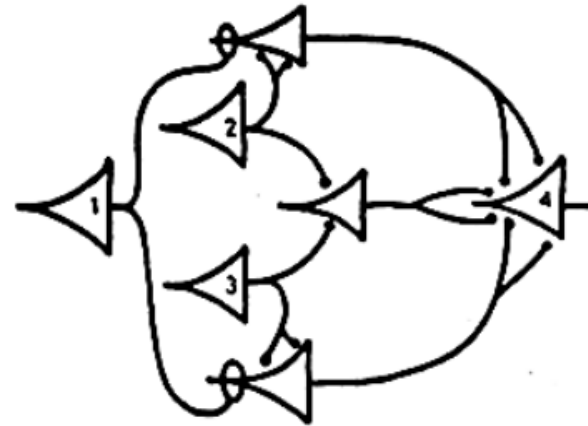


Inputs from Neurology



Neural networks -> machine learning

- The interconnection pattern between different layers of neurons
- The learning process for updating the weights of the interconnections
- The activation function that converts a neuron's weighted input to its output activation.



Artificial neural networks applications

- System identification and control (vehicle control, process control, natural resources management),
- quantum chemistry,
- game-playing and decision making (backgammon, chess, poker),
- pattern recognition (radar systems, face identification, object recognition and more),
- sequence recognition (gesture, speech, handwritten text recognition),
- medical diagnosis,
- financial applications (automated trading systems),
- data mining (or knowledge discovery in databases, "KDD"),
- visualization and e-mail spam filtering.

R. N. Friedberg & IBM colleagues

1958

- the program of a stored-program computer be
 - ▣ gradually improved by a learning procedure
 - ▣ tries many programs and
 - ▣ chooses ... the one most often associated with a successful result

Can machine think?

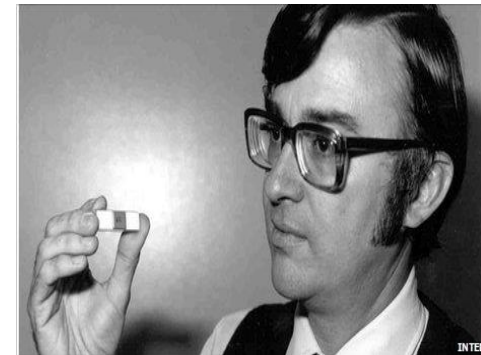
- Turing machine-human question-answer test:
 - ▣ man and a woman go into separate rooms and guests try to tell them apart by writing a series of questions and reading the typewritten answers sent back
 - ▣ man and the woman aim to convince the guests that they are the other.
 - ▣ What will happen when a machine takes the part of A in this game?

NB! Cheating is possible!

- Joseph Weizenbaum's patently unintelligent conversational program, 1966
 - ELIZA
 - <http://www.chayden.net/eliza/Eliza.html>
 - [Cleverbot](#)

Computer development

- Decades from the 1950s to 1970s are deemed as the era for
 - ▣ organizational mainframe and
 - ▣ Minicomputers
- Data communication technology linked the computers together, but the mainframe was always the master in an unquestioned master/slave relationship
- first microprocessor was invented by M. E. Hoff, Jr. in 1971 at Intel



History

- First online computer systems were developed in 1960's
 - ▣ Defense Department Advanced Research Projects Agency Network(ARPANET)
 - ▣ First idea J. C. R. Licklider of Bolt, Beranek and Newman (BBN), in April 1963, in work „Intergalactic Computer Network“
 - “imagined as an electronic commons open to all, ‘the main and essential medium of informational interaction for governments, institutions, corporations, and individuals.’”
 - ▣ Project taken over by Defense Department's Information Processing Techniques Office (IPTO)
 - original mandate to computerize military command and control systems.
 - developed one of the first wide area computer networks (WAN) for the cross country radar defense system,
 - and build a survivable electronic network to interconnect the key DoD sites.

History

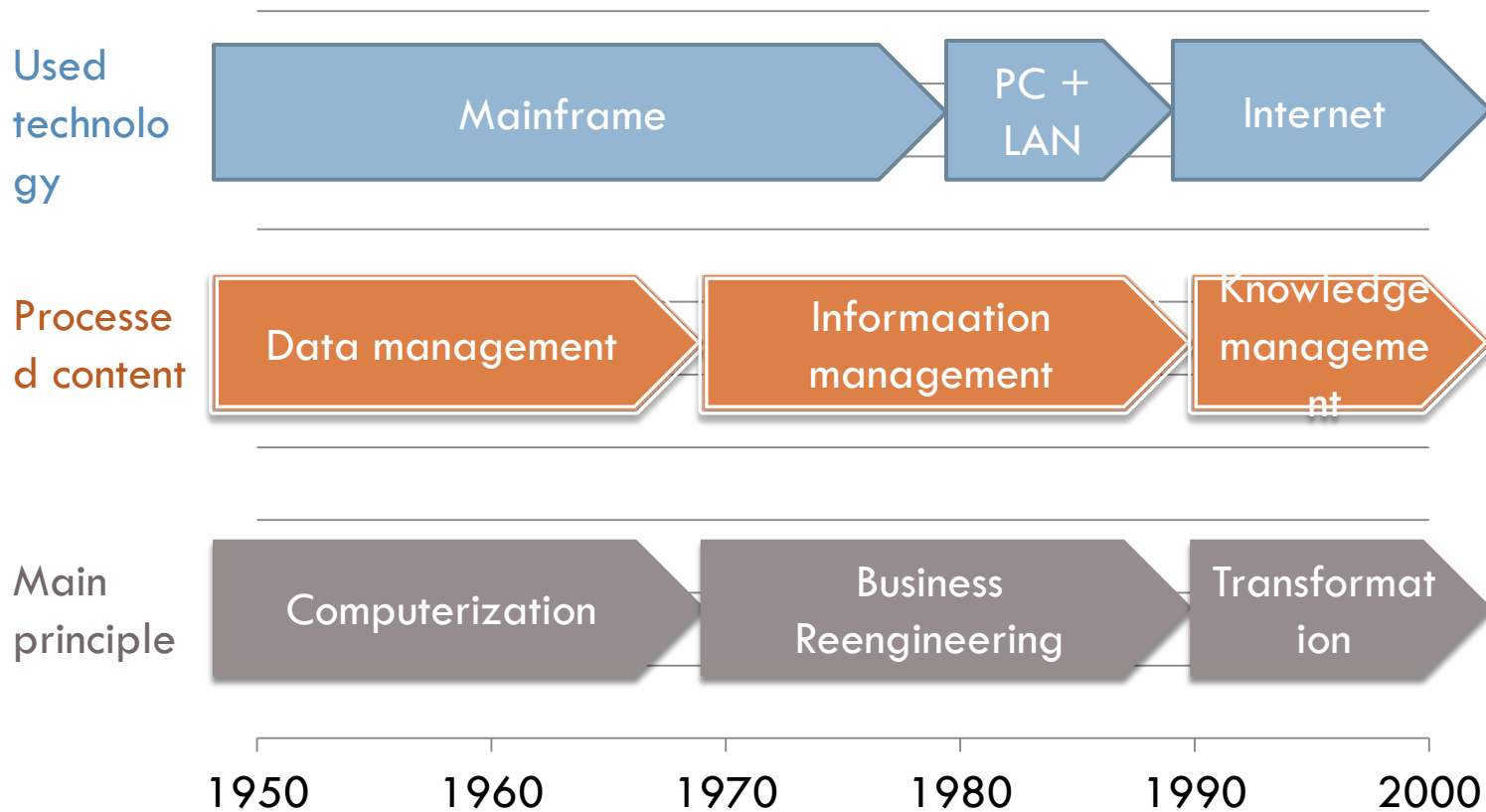
- The first personal computer, “the Altair”, was developed in 1975
- The first personal computer with keyboard and Cathode-Ray Tube display in 1977 by Radio Shack
- IBM announced the IBM Personal Computer in 1981
 - ▣ It offered 16 kilobytes of user memory (expandable to 256 kilobytes),
 - ▣ one or two floppy disks and
 - ▣ an optional colour monitor.



History

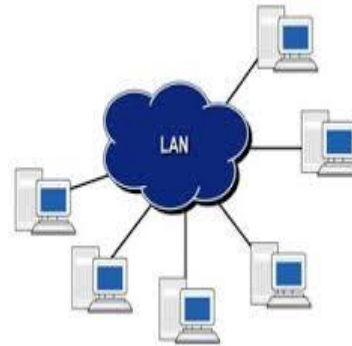
- Datapoint introduced the ARC system in 1977,
 - ▣ the first commercially available Local Area Network (LAN).
- There were three architectural components to the ARC:
 - ▣ file processors,
 - ▣ application processors, and
 - ▣ hubs, all connected with a coaxial cable.
- In its simplest form, a network computing system consists of computers connected to each other and to users via a network.
- 1980s-the end of the first (traditional) era of computer systems and the beginning of the second (micro-based PC and LAN)

Evolution of using computers



Used technology

- IT history can be divided into three eras
 - Mainframe;
 - PC (personal computer) plus LAN (local area network);
 - Internet computing.



Evolution of data management

- Computers originally for scientific calculations
- Now
 - ▣ used to store, process and retrieve
 - ▣ enormous quantities of information
 - ▣ for an incredible variety of purposes
- Computer can be used as
 - ▣ tools for communications
 - ▣ as audio and video players and so forth

Data Management

- All the efforts for data computing
 - ▣ first census data processing system in the USA in 1951
 - ▣ the first computer payroll system, deployed in the USA in 1954
- Batch processing - execution of a series of programs on a computer without manual intervention.
- Soon real-time and/or on-time data processing was introduced
- the main content processed and managed by computers
 - data

Information Management

- Software development focused on
 - ▣ data
 - ▣ information management
- used to support
 - ▣ administration and management of an organization
 - ▣ decision-making
- Emerge of management information systems (MIS) and decision-making support systems (DSS)
- main content processed and managed by computers had shifted to information

Knowledge Management

- The content has been shifted from data/information to knowledge.
- there are more than 10 billion web pages existing on the Internet
 - ▣ increase by about 2 million pages a day
- information explosion on the Internet is a serious challenge to humankind
- Main question:
 - ▣ how to make
 - ▣ adequate use of the information
 - ▣ available on the Internet
- so that the information
 - ▣ can be transformed to
 - ▣ organizational and/or personal knowledge
 - ▣ which brings value and benefit to all?

Evolution of the e-Government

- Guiding principles in the use of information technology ha changed
- Changes are crucial for the governments.
- It can help to formulate
 - ▣ visions for e-government
 - ▣ work out government policies and strategies
 - ▣ for its development.

Computerization

- various efforts to computerize business processes
- involved using computers to
 - ▣ automate or aid business activities
 - ▣ wherever computers could play a role
 - ▣ for the sake of efficiency and productivity
- most popular term was “*computerization*”
 - ▣ just computerizing existing business processes as much as possible

Business Process Reengineering

- Distributed processing and network computing introduced advances made people to
 - ▣ rethink the guiding principles
 - ▣ of computer applications
 - ▣ in an organization
- Often providing to
 - ▣ new ways of doing business,
 - ▣ sometimes completely transforming a business process.

Business Process Reengineering

- Focus shifted from the
 - ▣ acquisition of computer equipment and implementation of systems to optimal exploitation by means of adjustments
 - ▣ to procedures, organization and staff utilization.
- Shift also in emphasis
 - ▣ from efficiency
 - ▣ and productivity gains by automating routine tasks,
 - ▣ to achievement of effectiveness expressed in terms of applying new solutions to traditional tasks and providing solutions to new tasks.
- Shift from
 - ▣ computerizing existing business processes of organizations
 - ▣ to redesigning business processes and/or reengineering organizations
 - ▣ to take full advantage of and to maximize the benefit from information technology

Business Process Reengineering

- main efforts include:
 - ▣ Eliminating layers of traditional management;
 - ▣ Compressing job categories;
 - ▣ Creating work teams;
 - ▣ Training employees in multilevel skills;
 - ▣ Shortening and simplifying various business processes; and
 - ▣ Streamlining administration.
- success of business process re-engineering
 - ▣ greatly streamlined the organizational structure,
 - ▣ improved management,
 - ▣ raised effectiveness and efficiency, and
 - ▣ boosted productivity.

Transformation

- Internet technologies have caused big leap in use of today's information technology
- people are able to acquire
 - ▣ any information and digitally communicate with
 - ▣ anyone, anywhere and at any time
- Government solutions can now be extended to
 - ▣ reach businesses and citizens
 - ▣ with the help of the Internet
 - ▣ no matter where they are located

Transformation

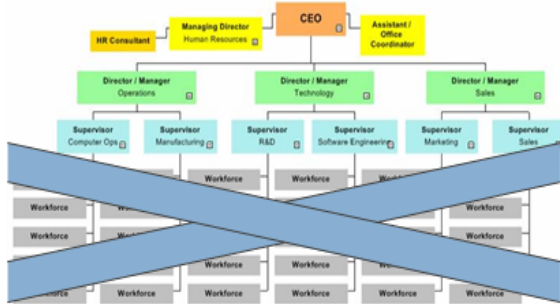
- Internet can help government in
 - ▣ improving its interactions with businesses and citizens,
 - ▣ while providing a sound basis
 - ▣ for establishing a new type of partnership relationship
- government informatization is no longer simply an internal business of government.
- Whenever an IT project is going to be put on the agenda,
 - ▣ government must take its internal demands and the external interactions
 - ▣ with business and citizens as a whole into consideration.

Transformation

- **Governmental systems**
 - ▣ must be planned and designed
 - ▣ under the architecture of the Internet and
 - ▣ under the circumstance of globalization
- **Today's government environment, is totally different from the previous one**
- **Governments are facing a task of transformation.**
- **Government have to**
 - ▣ reinvent the existing modality and organizational structure of government,
 - ▣ which was created for the industrial age and
 - ▣ has existed for about two hundred years.

Service-Oriented Cloud Computing (SOCC)

Top-down hierarchical organization with disconnected silos



Business-Process Orientation



WP3

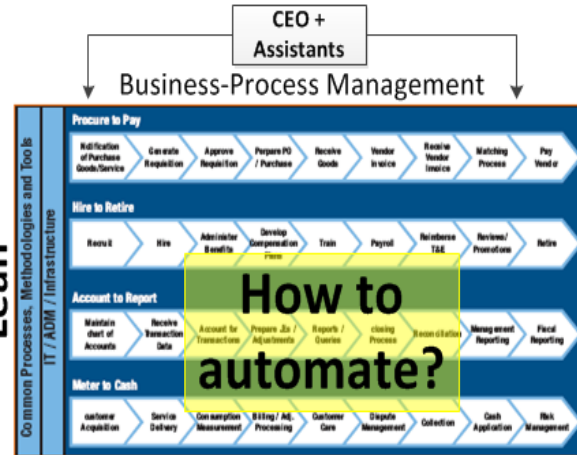
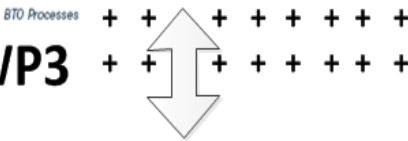
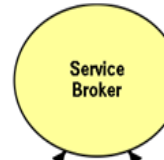


Figure 1 | BTO Processes

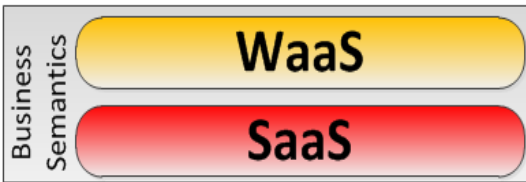
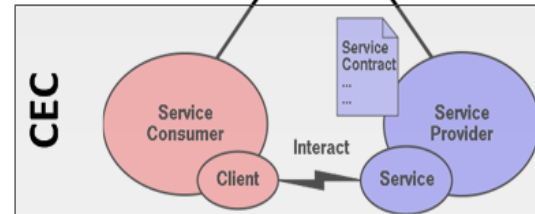
WP3



eService Engineering



WP2



WP1

