INFORMATIEMANAGEMENT 2018-2019 1e semester

H1: Positioneren van informatiesystemen

1. Information systems in business today

Elektronica wordt steeds kleiner en goedkoper. De breedband access wordt ook steeds beter, de snelheid is hoger, streaming is mogelijk, … In Japan zijn er bijvoorbeeld 150 breedbandverbindingen (vb.: 4G met gsm, Telenet thuis) per 100 inwoners. In België is dit iets minder dan 80/100.

Technology drivers

Moore's law and microprocessing power: Moore zei dat het aantal transistoren per 18 maanden zal verdubbelen. De prijs zal ook iedere 18 maanden halveren. Tegenwoordig zegt men dat deze wet niet meer zo sterk zal zijn omdat het op den duur niet meer mogelijk zou zijn. Nanotechnologie maakt zijn intrede en hierdoor kan men nog kleiner en sneller werken.

Law of mass digital storage: Ieder jaar zal de hoeveelheid opgeslagen data verdubbelen. Men moet dit natuurlijk wel nog kunnen verwerken.

Metcalfe's law and network economics: Het aantal knooppunten in een netwerk zorgt ervoor dat de waarde van dit netwerk exponentieel zal toenemen naarmate het aantal knooppunten stijgt. Bv.: Instagram, Facebook, Twitter, netwerken in het algemeen wordt pas echt interessant bij veel connecties.

Consummeration of IT: IT is een soort van commodity geworden

Generation Y: 1980-1999 (millenials). Deze zijn:

-Financially savvy: sparen, pensioen

-Employer loyalty is sterk verminderd

-Men is minder geobsedeerd om te werken

-Quality of life is van groot belang geworden

-Dress more casually (das overbodig)

-Cultureel tolerant en acceptatie gay right

Mobile: "Bring your own device": Vroeger kreeg men vaak een telefoon van het werk. Nu ook nog maar dit brengt natuurlijk ook gevaren mee qua hacking en spionnage. (vb.: in LA formateert men na iedere werkdag de gsm)

Gamification: Het nut van games en het behalen van doelstellingen wordt ingezien.

Digitale platformen: Facebook, YouTube, Twitter, …

Customer experience is van groot belang en informatiesystemen pikken hierop in. (hotels)

Er is een "push" <-> "pull" werking. Er wordt nieuwe technologie afgevuurd op klanten en dan is er vaak de vraag die volgt.

Social business

Baby boomers worden het digitale meer gewoon, millennials komen de arbeidsmarkt binnen, merken verankeren zich sociaal sterk door het publiek bij het bedrijf te betrekken.

Van iedere investering die gedaan wordt gaat 1 van de 3 naar IT.

Some concepts

IS is Information Systems

IT is Information Technology: Hardware en software (machines, gsm, software, windows)

ICT is Information and Communication Technology

MIS is Management Information Systems: Het oude begrip van IS

IT/IS: Men heft het zowel over de technologie als de systemen

IT/IS transformeert bedrijven op alle vlakken. Inkoop, big data, cloud computing, relatie met de klant, online kranten, adverteren, beveiliging en boekhoudregels

2. Productivity paradox

Hoe meer men investeert in IT, hoe minder dit zal opbrengen. Solow: “You can see the computer age everywhere but in the productivity statistics”

IT heeft de productiviteit doen toenemen in de manufacturing en retail maar in sociale sector is dit onzeker

Landbouw, blue collar (arbeiders), white collar (bedienden) nemen toe, In de services is de stijging in productiviteit niet zo zichtbaar.

Productivity

Efficiëntie van een bedrijf meten door input om te zetten naar output

Productivity and IT: Het inflatiecijfer ging naar beneden met 0,5% naar 1%. De productiviteit is ongeveer 1% verhoogd. IT is één van de belangrijkste mogelijkheden die managers hebben om de productiviteit en efficiëntie te verhogen. Ongeveer 30%-50% van alle investeringen in de VS gaan naar IT.

Waarom meet men zo’n beperkte impact door IT?

Productivity paradox

- Het is moeilijk om een getal op de productiviteit te plakken, het is niet kwantificeerbaar.
- Productiviteit zal vaak pas stijgen als er complementaire investeringen gebeuren over het gehele bedrijf heen.
- Het effect van IT is soms pas verder in het hele proces waarneembaar. (vb.: alles labelen pas voordelig als men houdbaarheidsdatum moet bekijken, bankautomaat verbindt de klant aan de bank

IT doesn't matter (Carr, 2003)

Het competitief voordeel dat je hebt na het ontwikkelen van eigen IT is snel weg doordat concurrenten dit gewoonweg overnemen ALS het al voordelig is. Men neemt het over als de IT als effectief bewezen is. Het is gewoonweg een commodity geworden, enkel de prijs is van belang.

ZIE VERDER IN POWERPOINT

Strategic business objectives of IS

1. Operational excellence: Zorgen dat alles intern goed werkt
   Efficiëntie verhogen zodat er meer winst over blijft. Bevoorrading automatisch maken doordat de kassa bijhoudt wat de voorraad is en uit zichzelf dit laat leveren.
2. New products, services and business models
   Het business model beschrijft hoe een bedrijf produceert, aan de man brengt en daar uiteindelijk winst aan maakt. IS/IT kan zeer veel betekenen voor bedrijven. Software is automatisch auteursrechtelijk beschermd. Er is ook wel open-software zoals Linux. (Apple, Android, …)
3. Customer and supplier intimacy
   Een goede ervaring voor klanten zorgt ervoor dat men zal terugkeren.
4. Improved decision making
   Zonder accurate informatie kan men geen goede beslissingen nemen. Men moet dus een dashboard voor zich krijgen waar alles aangegeven wordt en waar er verbetering mogelijk is.
5. Competitive advantage
   Men zal een betere performantie hebben, kostprijs lager voor betere producten, direct kunnen antwoorden naar klanten en leveranciers, …
6. Survival: investeren om te overleven
   Men kan een competitief voordeel hebben maar dit moet ook duurzaam zijn. (Citibank introduceert ATM) Men moet ook aan alle regels kunnen voldoen. (GDPR)

Globalisation opportunities

Flatteners van Friedman:

-Val van de Berlijnse Muur

-Netscape v.s. Microsoft world wide web

-Outsourcing

-Offshoring

-Uploading

-Supply chaining

-Insourcing

-In-forming

-Workflow Software

-The Steroids

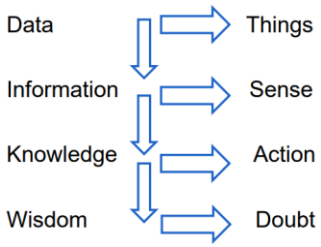
What's new in management information systems?

Technology: mobile digital platform, cloud computing, SaaS, … wordt mogelijk gemaakt door snellere chips en minder stroomverbruik.

Management: Sociaal netwerken met Facebook, LinkedIn, Business Intelligence, Virtual Meetings. Dit wordt mede mogelijk gemaakt door Web 2.0 applicaties.

Organisations: Outsourcing, Telework, Co-creating

Information



Information system

Three activities of IS

Pag 64,65

Input: vangt rauwe data op van de organisatie of van buitenaf op.

Processing: verwerkt de rauwe data naar een betekenisvolle vorm.

Output: draagt de verwerkte informatie over naar mensen of activiteiten die ze gebruiken.

Feedback: de output wordt aan de geschikte medewerkers terugbezorgd zodat het kan helpen bij evalueren of bij het input stage.

Organisational dimension of information systems

Hierarchy of authority, responsibility: senior-, middle-, operational management, knowledge workers, data workers en production or service workers

Separation of business functions: Sales and marketing, human resources, finance and accounting en manufacturing and production

Unique business processes

Unique business culture

Organisational politics

Business Perspective on Information Systems

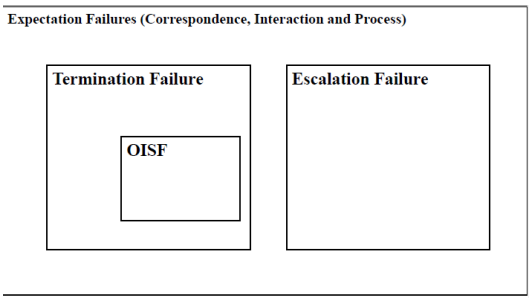
Pg80: Maar 29% van de IT-projecten zal succesvol zijn. Andere projecten komen obstakels tegen en hebben problemen (budgetoverschrijding, te moeilijk om te implementeren).

- Een succesvol IT-systeem is datgene dat aan alle noden voldoet binnen de organisatie en ook aan de noden voldoet voor de belangrijkste stakeholders.
- Een gefaald IT-systeem is datgene dat niet aan de noden voldoet binnen de organisatie en ook niet voldoet voor de belangrijkste stakeholders.

Escalation failure: De problemen zijn al een tijd aan de hand

Termination failure: De problemen zijn van dien aard dat men enkel nog alles kan stopzetten

OISF= An OISF is a failure that occurs during an IS project in an outsourced environment. We focus thereby on project management. Some have already pointed out that outsourcing increases the risks that lead to IS.



Complementary assets

Dit zijn deze grondstoffen of bekwaamheden die het core component van een bedrijf zal versterken. Deze assets worden afgeleid van primary investments. Bedrijven die inzetten op investeringen in technologie én complementary assets zullen een grotere return hebben. (bv.: investeren in technologie en in de mensen zodat de technologie goed kan werken.) Hiervan zijn er 3 groepen:

- Organisational assets: appropriate business model, efficient business processes
- Managerial assets: incentives for management innovation, teamwork and collaborative environments
- Social assets: the internet and telecommunication infrastructure, technology standards

Organizational assets	Supportive organizational culture that values efficiency and effectiveness Appropriate business model Efficient business processes Decentralized authority Distributed decision-making rights Strong IS development team
Managerial assets	Strong senior management support for technology investment and change Incentives for management innovation Teamwork and collaborative work environments Training programs to enhance management decision skills Management culture that values flexibility and knowledge-based decision making.
Social assets	The Internet and telecommunications infrastructure IT-enriched educational programs raising labor force computer literacy Standards (both government and private sector) Laws and regulations creating fair, stable market environments Technology and service firms in adjacent markets to assist implementation

Contemporary approaches to information systems

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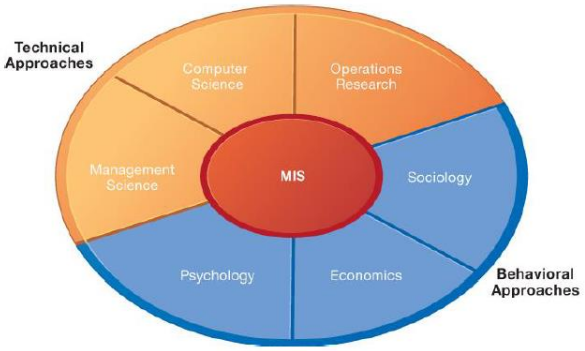


- Technical approach: focussen op de technische kant met wiskundige modellen.
- Behavioral approach: psychologie, economie en sociologie
- Management Information Systems (MIS): combineert verschillende zaken

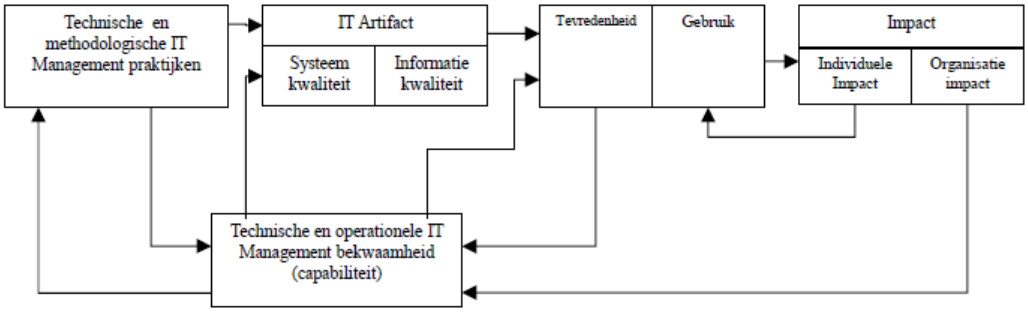
Four main actors:

- Suppliers of hardware and software
- Business firms
- Managers and employees
- Firm's environment (legal, social, cultural context)

Approach of this course: SOCIOTECHNICAL VIEW p90!!!!!: Veel projecten zijn sociotechnisch gericht. De technologie moet stelselmatig toegroeien naar de organisatie tot dat alle complementaire assets zijn aangesproken en de technologie vergroeid is in de organisatie.

IT artifact and its immediate nomological net

P.93 Nomologisch net van variabelen die intergerelateerd zijn met elkaar. Hier zien we de "oertekening" van een netwerk.



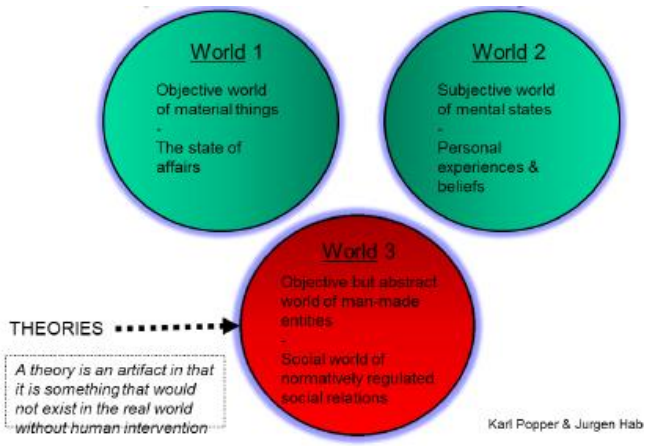
How do we look upon information technology?

1. A tool view
   - IT om werkkrachten te vervangen
   - IT om de productiviteit te verhogen (vb.: door webshop heb je sneller geld in het begin van de maand maar dit voordeel is er maar 1 keer)
   - IT om informatie te werken
   - IT om sociale relaties te bevorderen
2. A proxy view
   - IT as perception: hoe bruikbaar is het?
   - IT as diffusion: hoe diep is de IT doorgedrongen in het bedrijf? Van early adoptors naar majority.
   - IT as capital: wat kost het allemaal, is hier genoeg rendement op?

   Deze views zijn vaak in conflict met elkaar.
3. The computational view
   - IT as algorithm: er zit heel wat IT in een wagen
   - IT as model: een model maken van je IT
4. The nominal view
- IT is niet gewoon een naam maar een feit
5. An ensemble view

IT artefact= The application of IT to enable or support some tasks embedded within a structure that itself is embedded within a context.

A sociotechnical perspective on information systems



Wereld 3 is de basis van een technologisch system. We zullen ons enkel op wereld 3 concentreren.

IT success and failure PPT1 BIS

What makes an IT system a success and what makes it a failure?

A successful IT system: is one that meets the needs (i.e. the goals or strategy) of an organisation within which it is used, as well as relevant needs of other key stakeholders related to, but external from, that organisation

A failed IT system: is one that does not meet the needs of an organisation within which it is used and/or its other key stakeholders.

The sociotechnical nature of IT systems

'**system**' means many different things in different contexts. A short definition of a system: '**a set of components interconnected for a purpose**'

- A system is an assembly of components connected in an **organised** way.
- The **components** are affected by being in the system and are **changed** if they leave it.
- The assembly does something – carries out a task, fulfils a **function**.
- The assembly has been identified by some observer who is **interested** in it.

Systems should be regarded as constructs because the way that the system is understood has been constructed (either consciously or unconsciously) by a particular individual or group who are observing a situation and viewing aspects of it as a system.

The perspective from which the situation is viewed will shape what the viewer identifies as the 'system of interest'

The boundaries of a system

- What is considered to be part of the system?
- What is considered to be outside the system?
- Who is defining the boundaries?
- The purpose system to have
- The time when considering the boundaries.

Zijn er dan geen echte systemen in de wereld? We maken een bepaald model van realiteit op een bepaald moment (wereld 2).

Sociotechnical systems thinking

The social and the technical aspects of a system are inextricably linked

IT systems are **sociotechnical** – they cannot be understood without a sense of the relationship between the **social aspects** (organisational and people) and the **technical aspects** (hardware and software) of the system.

Understanding the **complex** way in which people at work **co-operate** and use tools and technology to get their **collective** work done

A successful system is one that can adapt to the turbulence of the outside world and it is the **people** in their work roles who do most of the adapting.

Components of an iT system

P12 pptbis

- The **technology** of the system
- The **organisation** where the system is used and developed. The success of a system in use depends a lot upon how well it fits with the need of this organisation, and the way it is organised.
- The **people** involved in the system: technical staff (such as developers, maintainers and support staff); end users; managers; training staff; and many other groups.

What is a successful system?

Het is een system dat bereikt waarvoor:

1) <u>Het bereikt waarvoor het bedoeld was:</u>
   This implies that the **requirements** for the system were identified **accurately** and translated into stated and agreed **objectives** before the system was developed and that it is possible to **measure performance** of the system against these objectives to check if they have been met.
2) <u>Het operationeel was op het moment en aan de kost zoals gepland:</u>
   Here it is assumed that there was an **agreed** and **approved development plan** that included **timescales** and **costs** and that performance against this plan can be measured. It also assumes that it is clear what '**operational**' means and it is possible to be certain when it has been achieved.
   Opm.: Er is een verschil tussen het succes van een system en het succes van het project dat het systeem maakte.

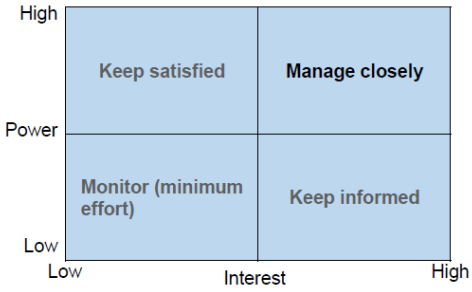
3) <u>Het projectteam en de gebruikers zijn tevreden met het resultaat:</u>
   Wie gebruikt het systeem? Wat zeggen de stakeholders erover?
4) <u>Na verloop van tijd blijft men tevreden van het systeem.</u>
   Het systeem werkt naar behoren, de stakeholders blijven tevreden.

Stakeholders in systems success

People who have a vested interest in a situation

Any group or individual who can affect or is affected by the achievement of the organization's objectives'

- Identify stakeholders:
  Who might want it to succeed and who might want it to fail? Who has the power to cause the project to succeed or to fail? Who controls or provides the resources and facilities that will be needed? Who are the key suppliers you will need to buy from? Who has the special skills needed to make it succeed? Who are the positive and negative opinion leaders? Who exercises influence over other stakeholders? Who are the less obvious stakeholders you have not considered yet?
- Understand key stakeholders:
  Primary stakeholders: people who will actually use the system – the end-users.
  Secondary stakeholders: people who do not directly use the system but receive output from it or provide input to it (for example, someone who receives a report produced by the system).
  Tertiary stakeholders: people who do not fall into either of the first two categories but who are directly affected by the success or failure of the system (for example, a director whose profits increase or decrease depending on the success of the system).
  Facilitating stakeholders: people who are involved in the design, development and maintenance of the system.
- Prioritise stakeholders:
  Power versus interest



Results of a stakeholder analysis (E.G.)

Stakeholder	Their goals	Past reactions	Reactions expected	Impact on stakeholder: negative/ positive	Possible future reactions	Ideas to ensure support
Production managers	Keep production on schedule	Sceptical of benefits of change, worried about problems with new systems	Likely to be furious if things go wrong at changeover	Could be negative if things go wrong; should be very positive if things work well	Could refuse to switch to new system if they remain sceptical of success	Keep them abreast with progress; involve them in trial runs and testing of new system
Production operatives	Remain in paid employment	Contact unions if the change is likely to have a detrimental effect on their jobs	Likely to be obstructive if the change is seen as negative	Should be positive if the new system improves productivity and brings in more customers (and jobs)	Could refuse to operate the new system if they feel watched or their jobs are threatened	Explain benefits of the new system; offer bonuses for increased productivity

H2: Werken met informatiesystemen

Business processes and information systems

Business processes

IM-2-

Het effect van informatietechnologie in business processen zal op 2 manieren effect hebben:

- Efficiëntie verhogen van bestaande processen door automatiseren
- Mogelijk maken dat er volledig nieuwe processen gemaakt worden die het bedrijf kunnen omvormen.

Er zijn 3 niveaus van informatiesystemen die verschillende delen van de organisatie serveren.

- Operational-level systems: ondersteunen operationele managers, houden de elementaire activiteiten en transacties bij
- Management-level systems: geven steun aan de monitoring, controlling, decision-making en administratieve activiteiten
- Strategic-level systems: helpen senior management om strategische problemen op te lossen.

Types of business information systems

1) Manufacturing and production
2) Sales and marketing
3) Finance and accounting
4) Human resources

Transaction processing systems (TPS): Systemen die dagelijks routinetransacties beheren zoals verkooporders, payroll, shipping, … Managers gaan deze systemen gebruiken om te monitoren en de status te checken. Het gaat ook gestructureerde beslissingen mogelijk maken (niet veel nadenken, weinig mensen moeten consulteren om tot een beslissing te komen)

Het systeem van boekhouden is zeer gestructureerd en alle soorten bedrijven hebben dezelfde wijze van werken. Het vocabularium is ook algemeen gekend. Boekhoudsystemen zijn dus ideaal om te automatiseren. Nu blijkt toch dat boekhouden het knooppunt wordt van allerlei systemen in een bedrijf.

Customer relationship management systems (CRM):

Geven informatie om alle business processen te coördineren die te maken hebben met consumenten in verkopen, marketing en service om zo inkomen te optimaliseren, klanttevredenheid te bevorderen en het houden van klanten.

Integreren van consumenten gerelateerde processen en consolideren van informatie van verschillende kanalen.

A Payrol TPS: Men gebruikt een databank waar de werknemers inzitten om daar uiteindelijk een loonstaat van te maken en naar de nodige andere schakels door te sturen. (overheid, accounting, …) Loonadministratie is operationeel, personeelsbeheer is eerder tactisch operationeel (HRM-achtig). Tegenwoordig wordt dit vaker door een sociaal secretariaat gedaan.

Supply chain management systems

Het managet de relatie tussen de leveranciers en het bedrijf, deelt informatie over bestellingen, productie, voorraad (MRP= Management resource planning). De bedoeling is om de goede hoeveelheid producten naar de bestemming te brengen in zo weinig mogelijk tijd en aan een zo laag mogelijke kost.

Middleware zal de verschillende systemen langs bedrijfskant en leverancierskant samenbrengen

Manufacturing Resource Planning (MRP)

Discreet (lopende band) Continu (nooit productie stilleggen) semi-continu (textielbedrijven gaan ook vaak continu tewerk maar zullen af en toe wel stoppen)

Make-to-stock, make-to-order (product wordt direct na bestelling gemaakt), build-to-assembly (eerder werken in loten), make-to-assembly (onderdelen worden samen gezet zoals bij autoproductie)

Bill of material (BOM): Een stuklijst is een lijst van stukken (onderdelen) die verwerkt zijn in een product. Bureaustoel als voorbeeld

Bill of labour (BOL): Het aantal uren nodig om een werk te doen.

Material resource planning (MRP): Doorsluizen van aankoop naar verkoop. Hiervoor zal het BOM gebruiken. Het product wordt in onderdelen uiteen gehaald en deze worden dan en masse aangekocht bij de leverancier.

Vaak wordt bij MRP een prognose gemaakt om zo op langere termijn aankopen te kunnen doen van onderdelen. In het masterplan (maandbasis) wordt nagegaan hoe men alles kan financieren. Productieplan (week)

Management Information Systems

Dit zijn echt systemen om het management informatie te geven. De systemen halen data uit de TPS en zetten deze zo vlug mogelijk om naar informatie. Ze geven antwoord op routinevragen met vooraf gedefinieerde procedures. Analytisch zijn deze niet sterk. De data wordt wel niet rechtstreeks uit de TPS omdat deze continu data verwerkt maar de data wordt uit een “warehouse” gehaald.

Decision support systems

Deze zijn voor het middelmanagement. Ze helpen om niet-alledaagse beslissingen te nemen (Wat is de impact van een bepaalde gebeurtenis? Zou voorraad groter moeten zijn?). Het gebruikt vaak externe informatie maar ook informatie van TPS en MIS.

Model driven DSS: Voyage-estimating systems, een model beslist over de kortste, meest efficiëntste weg

Data driven DSS: Intrawest’s marketing analysis systems

Executive support systems

Deze zijn om senior management bij te staan. Wordt gebruikt om niet-alledaagse beslissingen gemakkelijker te maken. Het toont ook externe gebeurtenissen (nieuwe wetten, belastingen) en het van ook informatie samen uit de MIS en DSS. Vb.: ESS dat minuut-tot-minuut overzicht geeft van de financiële informatie van het bedrijf.

De 3 verschillende systemen. Deze kunnen wel in elkaar overlopen en zijn dus niet strikt gebonden aan hun categorie:

- Transaction processing systems: ondersteunen van werknemers op het operationele niveau
- Management information systems and decision support systems: managers ondersteunen
- Executive support systems: ondersteunen van de executives.

Relationship of systems to one another

Om order processing, SCM-systems, payroll system goed te laten werken, zijn er verschillende soorten systemen nodig om dit allemaal goed te laten verlopen.

Enterprise Resource Planning (ERP)

Deze bundelt de soorten systemen samen. vb.: SAP, Oracle Het wordt ook soms digitaal beton genoemd. Bedrijven moeten zich aanpassen aan het systeem en niet andersom. De flexibiliteit valt dus deels weg.

Enterprise Applications

Systemen om het bedrijf binnen elkaar te linken. Het gaat over de functionele gebieden, voert business processen uit over de firma heen, integreert alle niveaus van management. Er zijn 4 grote toepassingen:

Systems that span the enterprise

Enterprise systems

- Verzamelt data van verschillende functies en winkels van de firma en bundelt dit in één centrale datafile. Het lost ook problemen van gefragmenteerde data, overbodige data, foute data op.
- Het coördineert de dagelijkse activiteiten, heeft een efficiënt antwoord op bestellingen (productie, voorraad) en het geeft waardevolle informatie om beslissingen van het management te verbeteren

Supply chain management systems

- Het managet de relaties met de leveranciers en deelt informatie over alles met de benodigdheden voor de productie.
- De bedoeling is om de juiste hoeveelheid producten op de bestemming te krijgen in zo weinig mogelijk tijd en aan een zo laag mogelijke kost.

Customer relationship management systems

- Het geeft informatie om de business processen te coördineren dat met klanten te maken heeft (sales, marketing, customer service)
- De bedoeling is om de meest winstgevende klanten te identificeren, aantrekken en behouden.

Knowledge management systems:

- Support processes for acquiring, creating, storing, distributing, applying, integrating knowledge.
- Collect internal knowledge and link to external knowledge.
- Include enterprise-wide systems for: Managing documents, graphics and other digital knowledge objects and directories of employees with expertise

Intranets

- Internal networks built with same tools and standards as Internet.
- Used for internal distribution of information to employees.
- Typically utilize private portal providing single point of access to several systems.
- May connect to company's transaction systems

Extranets:

- Intranets extended to authorized users outside the company.
- Expedite flow of information between firm and its suppliers and customers.
- Can be used to allow different firms to collaborate on product design, marketing, and production

E-business (Electronic business):

- Use of digital technology and Internet to execute major business processes in the enterprise.
- Includes **e-commerce** (electronic commerce): Buying and selling of goods over internet

E-government:

- The application of Internet and networking technologies to digitally enable government and public-sector agencies' relationships with citizens, businesses, and other arms of government.
- Vb.: Tax-on-web, documenten downloaden van de gemeente

Systems for collaboration and teamwork

Collaboration:

- Short-lived or long-term
- Informal or formal (teams)

Growing importance of collaboration:

- Changing nature of work
- Growth of professional work—"interaction jobs"
- Changing organization of the firm
- Changing scope of the firm
- Emphasis on innovation
- Changing culture of work

Social business

Gebruik maken van netwerkplatformen, intern en extern. Werknemers, klanten en leveranciers worden betrokken met als doel om interacties te verdiepen en informatie te kunnen delen. Hiervoor is wel transparante informatie nodig.

SOCIAL BUSINESS APPLICATION	DESCRIPTION
Social networks	Connect through personal and business profiles
Crowdsourcing	Harness collective knowledge to generate new ideas and solutions
Shared workspaces	Coordinate projects and tasks; co-create content
Blogs and wikis	Publish and rapidly access knowledge; discuss opinions and experiences
Social commerce	Share opinions about purchasing or purchase on social platforms
File sharing	Upload, share, and comment on photos, videos, audio, text documents
Social marketing	Use social media to interact with customers; derive customer insights
Communities	Discuss topics in open forums; share expertise

Business benefits of collaboration and teamwork

- Investments in collaboration technology can bring organisational improvements, returning high ROI.
- Benefits: productivity, quality, innovation, customer service, financial performance

BENEFIT	RATIONALE
Productivity	People interacting and working together can capture expert knowledge and solve problems more rapidly than the same number of people working in isolation from one another. There will be fewer errors.
Quality	People working collaboratively can communicate errors and corrective actions faster than if they work in isolation. Collaborative and social technologies help reduce time delays in design and production.
Innovation	People working collaboratively can come up with more innovative ideas for products, services, and administration than the same number working in isolation from one another. Advantages to diversity and the "wisdom of crowds."
Customer service	People working together using collaboration and social tools can solve customer complaints and issues faster and more effectively than if they were working in isolation from one another.
Financial performance (profitability, sales, and sales growth)	As a result of all of the above, collaborative firms have superior sales, sales growth, and financial performance.

SOCIAL SOFTWARE CAPABILITY	DESCRIPTION
Profiles	Ability to set up member profiles describing who individuals are, educational background, interests. Includes work-related associations and expertise (skills, projects, teams).
Content sharing	Share, store, and manage content including documents, presentations, images, and videos.
Feeds and notifications	Real-time information streams, status updates, and announcements from designated individuals and groups.
Groups and team workspaces	Establish groups to share information, collaborate on documents, and work on projects with the ability to set up private and public groups and to archive conversations to preserve team knowledge.
Tagging and social bookmarking	Indicate preferences for specific pieces of content, similar to the Facebook Like button. Tagging lets people add keywords to identify content they like.
Permissions and privacy	Ability to make sure private information stays within the right circles, as determined by the nature of relationships. In enterprise social networks, there is a need to establish who in the company has permission to see what information.

Building a collaborative culture and business processes

"Command and control" organizations

- No value placed on teamwork or lower-level participation in decisions

Collaborative business culture

- Senior managers rely on teams of employees.
- Policies, products, designs, processes, and systems rely on teams.
- The managers purpose is to build teams.

Tools for collaborating and teamwork

- E-mail and instant messaging
- Wikis
- Virtual worlds
- Collaboration and social business platforms
    - Virtual meeting systems (telepresence)
    - Google Apps/Google sites
    - Cyberlockers
    - Microsoft SharePoint
    - Lotus Notes
    - Enterprise social networking tools

Enterprise social networking software capabilities P66 (slide 73)

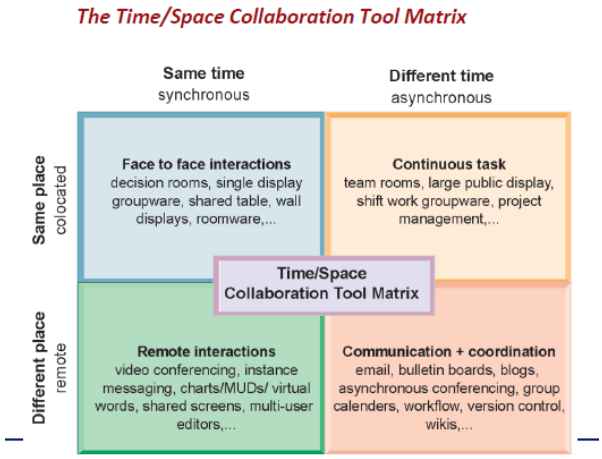
- Profiles
- Content sharing
- Feeds and notifications
- Groups and team workspaces
- Tagging and social bookmarking
- Permissions and privacy

Two dimensions of collaboration technologies:

- Space (or location)—remote or co-located
- Time—synchronous or asynchronous

Six steps in evaluating software tools:

1. What are your firm's collaboration challenges?
2. What kinds of solutions are available?
3. Analyze available products'cost and benefits.
4. Evaluate security risks.
5. Consult users for implementation and training issues.
6. Evaluate product vendors.



Information systems department

- Formal organizational unit responsible for information technology services
- Often headed by chief information officer (CIO). Other senior positions include chief security officer (CSO), chief knowledge officer (CKO), chief privacy officer (CPO)
- Programmers
- Systems analysts
- Information systems managers

IT governance

Since late 1990s, lack of a clear understanding of the term, Influences the benefits generated by IT investments, link with corporate governance (Sarbanes-Oxley), link with strategic IS, A lot of methodologies from and for practitioners

Corporate Governance (degelijk bestuur): a responsibility delegated by shareholders and shared by boards and in some measure with managers.

A lot of methodologies focussed on:

- structures (e.g. ISACA)
- control frameworks (e.g. COBIT)
- processes (e.g. BPM)

IT Governance is the strategic alignment of IT with the business such that maximum business value is achieved through the development and maintenance of effective IT control and accountability, performance management and risk management.

Een wat praktischere definitie: to direct IT endeavors, to ensure ITs performance meets the following objectives:

- For IT to be aligned with the enterprise and realize the promised benefits.
- For IT to enable the enterprise by exploiting opportunities and maximizing benefits.
- For IT resources to be used responsibly.
- For IT related risks to be managed appropriately

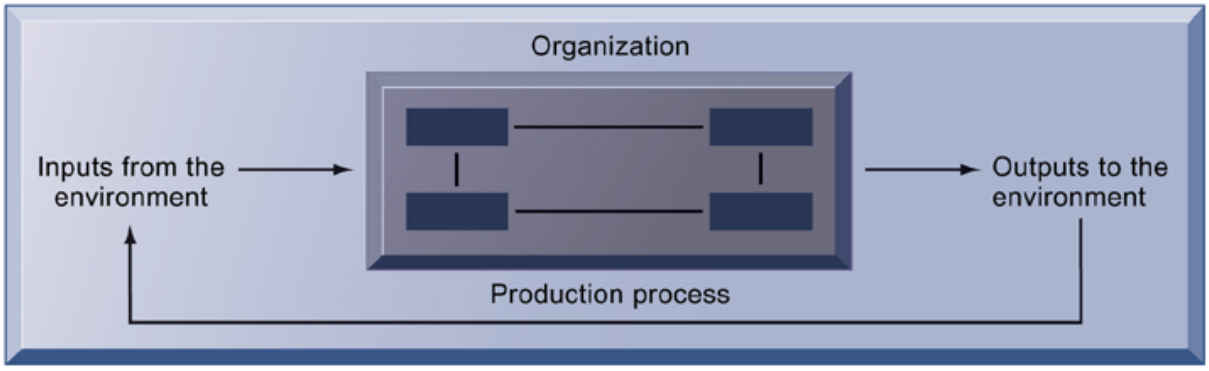
H3: Informatiesystemen: organisaties en strategie

IM-3-

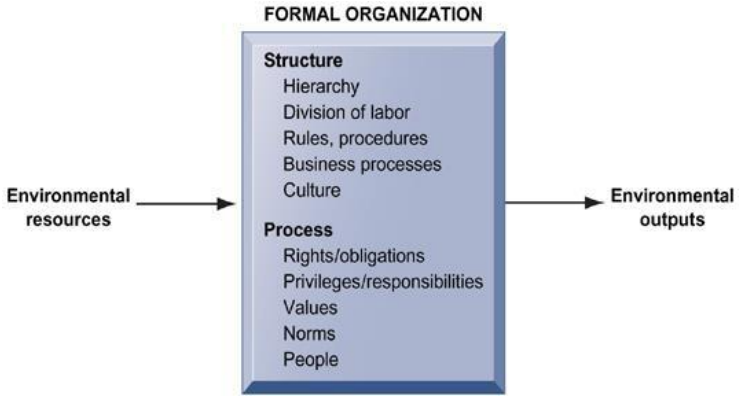
Relaties beïnvloed door de organisatie: Structure, Business processes, Politics (binnen de organisatie zelf), Culture, Environment, Management decisions

Wat is een organisatie?

Technische definitie: Stable, formal social structure that takes resources from environment and processes them to produce outputs. A formal legal entity with internal rules and procedures, as well as a social structure.



Behavioral definitie: A collection of rights, privileges, obligations, and responsibilities that is delicately balanced over a period of time through conflict and conflict resolution. (dit is het belangrijkste, wordt het meeste research over gedaan)



Features of organisations

Iedere modern organisatie heeft ongeveer dezelfde karaktertrekken:

- Hiërarchische structuur
- Verantwoordelijkheid, autoriteit in beslissingsnemen
- Principes van efficiëntie
- Routine in het proces, cultuur, …

Routines and business processes

- Routines zijn precieze regels, procedures en “practices” die gemaakt worden om alle soorten situaties aan te kunnen.
- Business processes: een collectie van routines
- Business firm: een collectie van business processes

Organisational politics

- Divergent viewpoints lead to political struggle, competition and conflict.
- Political resistance greatly hampers organizational change.
- Dominant coalition (D. Buyens, Vlerick)

Organisational culture

Encompasses set of assumptions that define goal and product

- What products the organization should produce
- How and where it should be produced
- For whom the products should be produced

May be powerful unifying force as well as restraint on change

Organisational environments

- Organizations and environments have a reciprocal relationship
- Organizations are open to, and dependent on, the social and physical environment
- Organizations can influence their environments
- Environments generally change faster than organizations (e.g. Belgian Postal Services)
- Information systems can be instrument of environmental scanning, act as a lens

Environments and organisations have a reciprocal relationship: Wat van buitenaf naar de organisatie wordt gebracht, zal normaal gezien niet volledig overgenomen worden. Een organisatie zal zijn eigen versie ervan implementeren.

Disruptive technologies

Technology that brings about sweeping change to businesses, industries, markets

Examples: personal computers, word processing software, the Internet, …

First movers and fast followers

- First movers – inventors of disruptive technologies
- Fast followers – firms with the size and resources to capitalize on that technology

Disruptieve innovaties

Tushmanand Anderson (1986) proposed that the differences in the innovative capacities of firms could be explained by whether an innovation enhancedor destroyedthe competencies of established companies.

The move to micro-computing, challenged rather than supported the competency of companies like IBM, which focused on producing smaller numbers of very large computers and providing ongoing services to larger corporate customers. These were not the competencies required in the production of large numbers of lower value computers, effectively as commodities. Instead new entrants moved into the personal computer market and came to dominate it.

the example of the Digital Equipment Corporation (DEC). DEC was the leading maker of minicomputers during the 1960s and 1970s but missed out on the growth of personal computers during the 1980s. This was not because of the technology –DEC's engineers had no problems with designing PCs –but rather because it missed out on the opportunity as a result of its business model. In the early 1980s, the company believed it could make 40% gross margin on PCs that would sell for $2,000. The problem was that proposals to develop PCs were competing for resources inside the company with proposals to make more powerful $500,000 minicomputers with a gross margin of 60%. Additionally, its existing customers for large computers were not the same customers as the likely customers for PCs, so making PCs would have brought the additional risks and costs associated with entering new markets. Given DEC's internal logic, it is unsurprising that they did not focus resources on developing the PC.

Although we might argue that wireless telephony is a disruptive technology in relation to fixed-line telephony, major US fixed line companies like Verizon and SBC responded to the potential threat by simply buying up wireless operators. The wireless customers and profit models fitted with the fixed line operators' existing business model, rather than disrupting them. For Christensen, then, it is not the technology that is disruptive, but the technology in relation to an incumbent's business model. Consequently, he no longer talks of 'disruptive technology' but of 'disruptive innovation' that threatens a firm's business model, and by contrast of 'sustaining innovation' that consolidates its position (Christensen and Overdorf, 2000). This is an argument that we would suggest anyone involved with innovation should keep firmly in mind.

Organisatie structuur

Pg. 19 Five basic kinds of structure:

- Entrepreneurial: Small start-up business (kmo)
- Machine bureaucracy: Midsize manufacturing firm
- Divisionalised bureaucracy: Fortune 500 firms
- Professional bureaucracy: Law firms, schoolsystems, hospitals
- Adhocracy: Consulting firms (bedrijven die opgericht worden voor een specifiek project)

TABLE 3-2 *Organizational Structures*

Organizational Type	Description	Examples
Entrepreneurial structure	Young, small firm in a fast-changing environment. It has a simple structure and is managed by an entrepreneur serving as its single chief executive officer.	Small start-up business
Machine bureaucracy	Large bureaucracy existing in a slowly changing environment, producing standard products. It is dominated by a centralized management team and centralized decision making.	Midsize manufacturing firm
Divisionalized bureaucracy	Combination of multiple machine bureaucracies, each producing a different product or service, all topped by one central headquarters.	Fortune 500 firms, such as General Motors
Professional bureaucracy	Knowledge-based organization where goods and services depend on the expertise and knowledge of professionals. Dominated by department heads with weak centralized authority.	Law firms, school systems, hospitals
Adhocracy	Task force organization that must respond to rapidly changing environments. Consists of large groups of specialists organized into short-lived multidisciplinary teams and has weak central management.	Consulting firms, such as the Rand Corporation

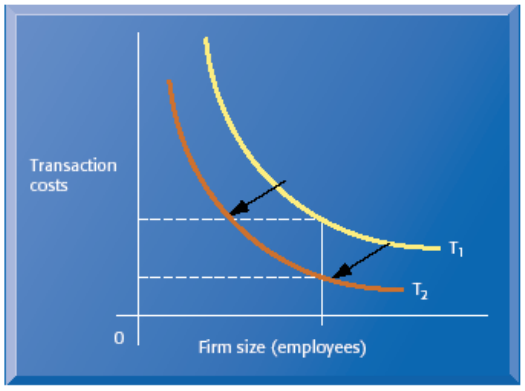
Bijna alles (99%) is entrepreneurial. Andere organisatiekenmerken zijn “goals, leadership styles, tasks and surrounding environments”

Economic impacts

- IT verandert de relatieve kosten van kapitaal en de kost van informatie
- Informatiesysteem technologie is een factor van productie zoals arbeid en kapitaal
- IT affects the cost and quality of information and changes economics of information. Het helpt om bedrijven te verkleinen want het reduceert de transactiekosten (kost om in de markt te participeren) Outsourcing speelt hier ook belang bij.

Transaction cost theory

- Firms seek to economize on transaction costs (the costs of participating in markets).
- Vertical integration, hiring more employees, buying suppliers and distributors.
- IT lowers market transaction costs for firm, making it worthwhile for firms to transact with other firms rather than grow the number of employees.



Transactional capability

Transactionele bekwaamheid is defined as a repertoire of abilities, processes, experiences, skills, knowledge and routines that the firm uses to **minimise** its transaction costs

De transactionele bekwaamheid heeft twee dimensies:

- Klantgericht
- Supplygericht

Agency theory

Het zijn contracten waar de belangen tegengesteld zijn (WG wil dat WN zoveel mogelijk werkt, WN wil zoveel mogelijk verdienen). Agency kosten = managementkosten. Dit zijn kosten die nodig zijn om te managen en te controleren. Deze kosten stijgen naarmate het bedrijf groeit. IT kan agency kosten verminderen waardoor firma's kunnen groeien zonder extra kosten van controle of extra werknemers.

- Principal= bepaalt het werk (risicoavers)
- Agent= voert het werk uit (risiconeutraal)
  Deze twee gaan een contract aan

- Er is een rationeel gedrag en verwachtingen van beide partijen (bounded rationality)
- Self-intrest van beide partijen (dit is wel een doelconflict tussen de partijen)
- Het resultaat heeft effecten op de principal's winst en succes.
- Een deel van het resultaat is door externe zaken bepaald. Vaak zal men risiconeutraal handelen.
- De agent heeft zeer sterke, vaak betere kennis van het onderwerp, de principal heeft te weinig tijd en misschien niet altijd de beste kennis van het exacte onderwerp.

Hoe groter het bedrijf, hoe meer agency kosten er zullen zijn.

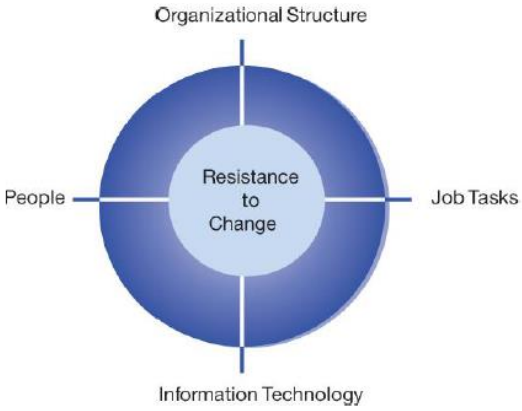
Organisational and behavioral impacts

IT maakt organisaties "platter": beslissingsnemen wordt naar lagere niveaus geduwd. Hierdoor zijn er minder managers nodig (IT zorgt ervoor dat men sneller kan beslissen en vergroot de span of control)

Postindustriële organisaties: organisaties worden "platter" want in postindustriële gemeenschappen hangt autoriteit meer en meer af van kennis en kunnen en niet van formele posities.

Organisational resistance to change

- Information systems become bound up in organizational politics because they influence access to a key resource – information.
- Information systems potentially change an organization's structure, culture, politics, and work.
- Most common reason for failure of large projects is due to organizational and political resistance to change.



The internet and organisations

The Internet increases the accessibility, storage, and distribution of information and knowledge for organizations

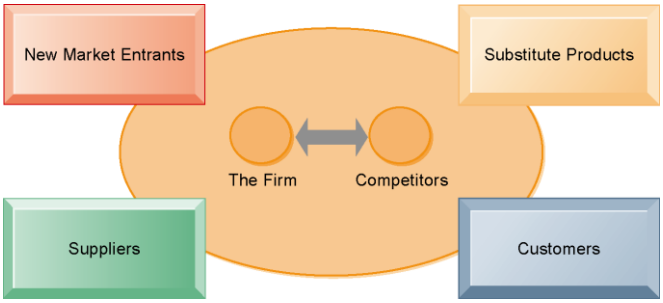
The Internet can greatly lower transaction and agency costs. Example: Large firm delivers internal manuals to employees via corporate Web site, saving millions of dollars in distribution costs

Central organisational factors to consider when planning a new system: environment, structure, culture and politics, type of organisations and style of leadership, main interest groups affected by system; attitudes of end users, tasks, decisions and business processes that the system will assist.

Strategy

Why do some firms become leaders within their industry?

Michael Porter's competitive forces model



Hoe de strategische visie van een organisatie eruitziet. Waarin een algemeen overzicht wordt gegeven van de firma, concurrenten en het "milieu".

Five competitive forces shape fate of firm:

- Traditional competitors
  All firms share market space with competitors who are continuously devising new products, services, efficiencies, switching costs
- New market entrants
  Some industries have high barriers to entry, e.g. computer chip business
  New companies have new equipment, younger workers, but little brand recognition
- Substitute products and services
  Substitutes customers might use if your prices become too high, e.g. iTunes substitutes for CDs
- Customers
  Can customers easily switch to competitor's products? Can they force businesses to compete on price alone in transparent marketplace?
- Suppliers
  Market power of suppliers when firm cannot raise prices as fast as suppliers

Kracht 1: De kracht van de leveranciers

- Single sourcing: afhankelijk zijn van één leverancier
- Merken – dealers: personenwagens, PC's (A-merken)

Kracht 2: De kracht van de klanten

- Neerwaartse prijsspiraal door kortingen
- Prijstransparantie door internet te raadplegen
- Mobiliteit (Europese grenzen / internet) vb.: Auchan, boekenwinkels, Amazon, …

Kracht 3: De bedreiging van nieuwe concurrenten

- Andere inzichten/ aanpak voorbeeld: Hans Anders Opticiens
- Prijzenoorlog voorbeeld: gsm-operatoren: Proximus/ Mobistar/ Base
- Marktaandeel moet verdeeld worden
- Te lage instapdrempel voorbeeld: IT-markt

Kracht 4: De bedreiging van substituut producten

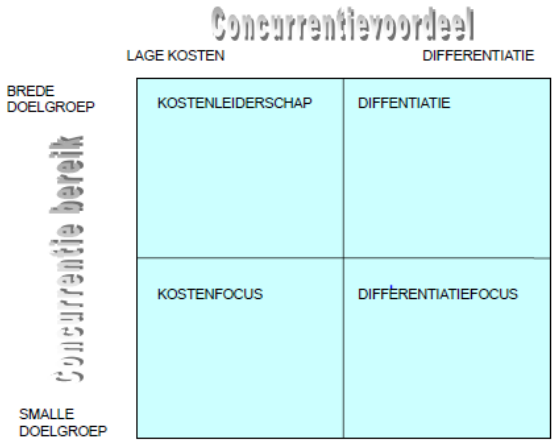
- Wijzigende gewoonten/ markten voorbeeld: Serrebouwers glazen serre t.o.v. plastiek serre
- Nieuwe technologieën voorbeeld: Bekaert Zwevegem: nieuwe materialen voor GSM's, autobanden

Kracht 5: De rivaliteit tussen de bestaande concurrenten

- Prijzenoorlog: kan plotseling opsteken vb.: tapijtenindustrie
- Zie case Hershey's: strijd voor een plaats op de rekken: productie viel stil voor 14 dagen, rekken werden gevuld met producten van concurrentie

Vier generische strategieën om met competitieve krachten om te gaan, mogelijk gemaakt door IT:

- Low-cost leadership
  Producten en services aanbieden aan een lagere prijs dan de concurrenten terwijl de kwaliteit en niveau van service wel nog hooggehouden wordt. Vb.: Wal-Mart, Dell, Ryanair
- Product differentiation
  Nieuwe producten of services die mogelijk gemaakt worden, veranderen van customer convenience en experience vb.: Google, Apple iPhone
- Focus on market niche
  Informatiesystemen gebruiken om met een gefocuste strategie op een bepaalde niche in te spelen vb.: Hilton Hotels
- Strengthen customer and supplier intimacy
  Informatiesystemen gebruiken om sterke banden en loyaliteit te hebben met klanten en leveranciers. Ook verhogen door de kost om te veranderen van afnemer. Vb.: Chrysler, Amazon



De impact van het internet op competitief voordeel

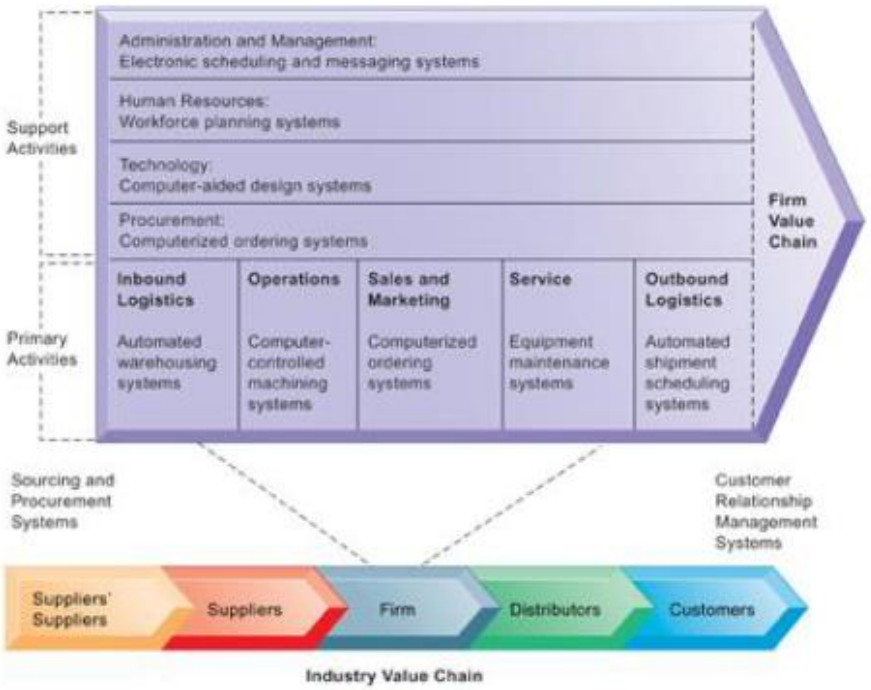
- Transformation, destruction, threat to some industries E.g. travel agency, printed encyclopedia, newspaper
- Competitive forces still at work, but rivalry more intense
- Universal standards allow new rivals, entrants to market
- New opportunities for building brands and loyal customer bases

Smart products and the internet of things (IoT)

- Growing use of Internet-connected sensors in products
- Smart products
- Fitness equipment, health trackers
- Expand product differentiation opportunities
- **Raise switching costs**
- Increasing rivalry between competitors
- Inhibit new entrants
- May decrease power of suppliers

Business value chain model

- Views firm as series of activities that add value to products or services.
- Highlights activities where competitive strategies can best be applied Primary activities vs. support activities.
- At each stage, determine how information systems can improve operational efficiency and improve customer and supplier intimacy.
- Utilise benchmarking, industry best practices



The value chain model

Er wordt telkens meer waarde gecreëerd wanneer men van links in het model naar de rechter kant gaat.

-PRIMAIRE ACTIVITEITEN-

Inkomende logistiek:

Dit zijn activiteiten die verband houden met het ontvangen, opslaan en verspreiden van 'inputs' voor het product. Dit is bijvoorbeeld de receptie en opslag van grond-en hulpstoffen, de voorraad, de transportdiensten, de retourafdeling, …

Productie:

Dit is de transformatie van inputs (grond-en hulpstoffen) tot afgewerkte producten. Dit kunnen diverse bewerkingen zijn zoals: verpakking, assemblage, fabricage, montage, onderhoud van machines, testen, …

Verkoop en marketing

Zijn het aan te man brengen van afgewerkte producten. Dit gaat van eigenlijke verkoop (direct of indirect), reclame, promotie, kanaalselectie, prijssetting, klantenrelaties, …

Service:

De activiteiten die verband houden met het leveren van service om de waarde van het product te verhogen of te handhaven. Voorbeelden: installatie, hersteldienst, levering van onderdelen, tuning, ….

Uitgaande logistiek:

Dit zijn activiteiten ie verband houden met het verzamelen en opslaan van het product en de fysieke distributie ervan naar de klanten (kopers). Voorbeelden zijn: opslaan en verzenden van afgewerkte producten, transport van leveringen, expeditie, leveringsadministratie, …

-ONDERSTEUNENDE ACTIVITEITEN-

Administratie en management

Deze vormen de organisatorische infrastructuur van de onderneming. Het zijn activiteiten zoals algemeen management, boekhouding, financiële beheer, kwaliteitsmanagement… Deze activiteit noemt men heel vaak de overhead van een bedrijf. Toch kan hier concurrerend gewerkt worden. We kunnen hierbij denken aan de vele CEO's (bv. De managers van het jaar -Trends) die door zowel overheid als privaatbedrijven aan getrokken worden.

Personeelszaken:

Dit zijn activiteiten die betrekking hebben op het werven, rekruteren, huren, trainen en verlonen van alle soorten werknemers.

Technologie:

Elke activiteit in een bedrijf heeft technologie nodig. Dit kan kennis (knowhow) zijn, maar ook methodes en procedures. Vb.: .net of JAVA, chemie, metallurgie, elektronica, mechanica, pneumatica, farmacie, …

Acquisitie of verwerving:

Dit zijn alle activiteiten die ondersteunend zijn ter verwerving of inkopen van de inputs van de waardeketen. Het zijn niet de inputszelf! Het voorbeeld bij uitstek is de aankoopafdeling.

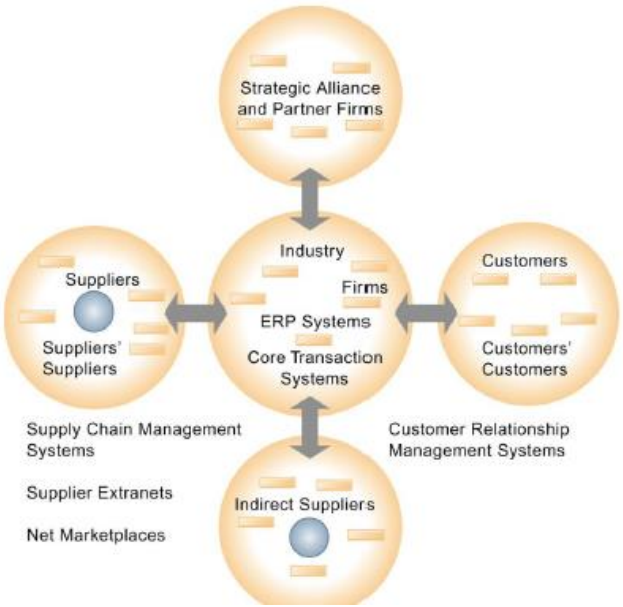
Extending the value chain: the value web

- Firm's value chain is linked to value chains of suppliers, distributors, customers
- Industry value chain
- Value web

Collection of independent firms using highly synchronized IT to coordinate value chains to produce product or service collectively.

More customer driven, less linear operation than traditional value chain.

The value web



Informatiesystemen kunnen de algemene performantie van businessunits verhogen door synergiën en kerncompetenties te promoten.

Synergieën

- When output of some units used as inputs to others, or organizations pool markets and expertise.
- Example: merger of Bank of NY and JPMorgan Chase
- Purchase of YouTube by Google

Kerncompetenties

- Activity for which firm is world-class leader
- Relies on knowledge, experience, and sharing this across business units
- Example: Procter & Gamble's intranet and directory of subject matter experts

The resource-based view (RBV) of organisations

Resource-based view van organisaties zegt dat de essentie van competitie -en dus de basis van succes van een bedrijf- zich centreert rond de grondstoffen (bekwaamheden) en niet de goederen en service.

Thus RBV research and theorising seeks to analyse the **relationship** between **organisations** and **innovation** by focusing on the resources and capabilities organisations possess and questions whether it is the level of resources or the deployment of such resources that leads to **differences in firm performance**

Capabilities: defined as the ability to deploy resources effectively so that inputs can be transformed into desirable outcomes. Capabilities may be at the root of why two firms that have similar resources, obtain drastically different levels of performance.'

A capability is fundamentally an 'ability' to do something: 'deploy resources effectively'.

Core and strategic capabilities

The RBV has proven to be an instructive theoretical framework for explicating how sources of competitive advantage (e.g. resources, assets, and capabilities) lead to marketplace positional advantage (e.g. innovation and marketing differentiation or cost leadership).

technological capabilities consist of combinations of **organisational** and **technical** components

Question(s): Innovation as a source of competitive advantage is achieved when organisations possess or develop their technological capabilities but:

- Why is it that some organisations that invest in this capability are not innovative?
- Or, why do other organisations who invest far less enjoy innovative performance?

Answer: innovation capability

The innovation capability is understood as both the technological learning process from the firm translated into technology development and operations capabilities, as well as the managerial and transactional routines represented by the management and transaction capabilities.

The integration between these four capabilities effectively promotes innovation which creates competitive advantages.

Innovation capability

- Operations capabilities
- Management capabilities
- Transaction capabilities
- Innovation capabilities

All firms have all four capabilities, but that 'to be innovative **at least one** of the firm's capabilities must be predominant'.

A capability is the capacity to utilise resources to perform a task or an activity, against the opposition of circumstances. Capabilities flow from the astute (geslepen) handling and orchestration of resources.

Capability comprises four dimensions

1) Skills and knowledge

- Public/scientific
- Industry-specific
- Firm-specific: least codified and transferable

- Employees hold the knowledge and skills that underpin a capability
- Capability is not based only on generally understood scientific or technological principles, or industry consultants.
- The major, yet most difficult to imitate, dimensions are the skills and knowledge that develop within an organisation.

2) Physical technical systems

- Most tangible part of a capability (e.g. machines, databases and software acquired or developed over time)
- Does not disappear once an organisation's employees leave a building
- Many industrial processes may have their specifications clearly described within patent specifications, although in the public domain their use is restricted.

3) Managerial systems

- Channelling the management of knowledge
- Recruitment, education, training and incentive practices can all influence a capability.

4) Values and norms

- The legitimacy of potential new product developments is often validated by the overarching values of the organisation.
- Values and norms within an organisation will often influence the type of knowledge and, hence, the capabilities seen as important to an organisation e.g. Microsoft, Apple, Google, Wikipedia

Resources, competences and capabilities

'core capability' or 'core competence'

Competences that define a firm's fundamental business as core. Core competences must accordingly be derived by looking across the range of a firm's (and its competitors) products and services. The value of core competences can be enhanced by combination with the appropriate complementary assets.

Complementary assets are those resources or capabilities that enhance **a core competence** in some way. They may already be available within the organisation, or they may need to be acquired. This may mean licensing a technology, building alliances, or buying out other organisations.

Recognising a core competence/ capability:

- Does the competence provide access to a wide variety of markets?
- Does the competence make a significant contribution to the perceived customer benefits of the end products?
- Is the competence difficult to imitate?

The four characteristics that are commonly accepted as defining a strategic resource are:

- Value
- Rarity
- Inimitability
- Non-substitutability

(commonly referred to as the VRIN criteria).

Network-based strategies

- Take advantage of firm's abilities to network with each other
- Include use of: network economics, virtual company model, business ecosystems

Network economics

Traditional economics: Law of diminishing returns

- The more any given resource is applied to production, the lower the marginal gain in output, until a point is reached where the additional inputs produce no additional outputs

Network economics:

- Marginal cost of adding new participant almost zero, with much greater marginal gain
- Value of community grows with size
- Value of software grows as installed customer base grows

Virtual company strategy

Virtual company uses networks to ally with other companies to create and distribute products without being limited by traditional organizational boundaries or physical locations

E.g. Li & Fung manages production, shipment of garments for major fashion companies, outsourcing all work to over 7,500 suppliers

Business ecosystems

- Industry sets of firms providing related services and products: Microsoft platform used by thousands of firms for their own products, Wal-Mart's order entry and inventory management system
- Individual firms can consider how IT will enable them to become profitable niche players in larger ecosystems

-**Keystone firms**: Dominate ecosystem and create platform used by other firms

-**Niche firms**: Rely on platform developed by keystone firm

Challenges posed by strategic information systems

Sustaining competitive advantage:

- Because competitors can retaliate and copy strategic systems, competitive advantage is not always sustainable; systems may become tools for survival

Performing strategic systems analysis

- What is structure of industry?
- What are value chains for this firm?

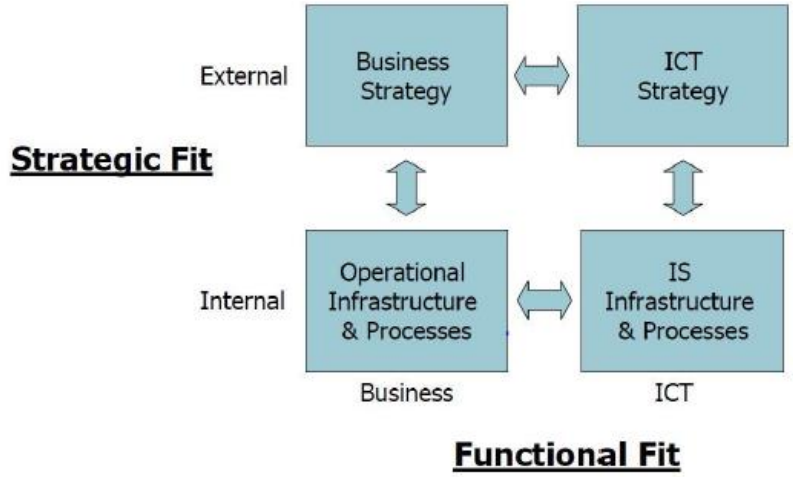
Managing strategic transitions

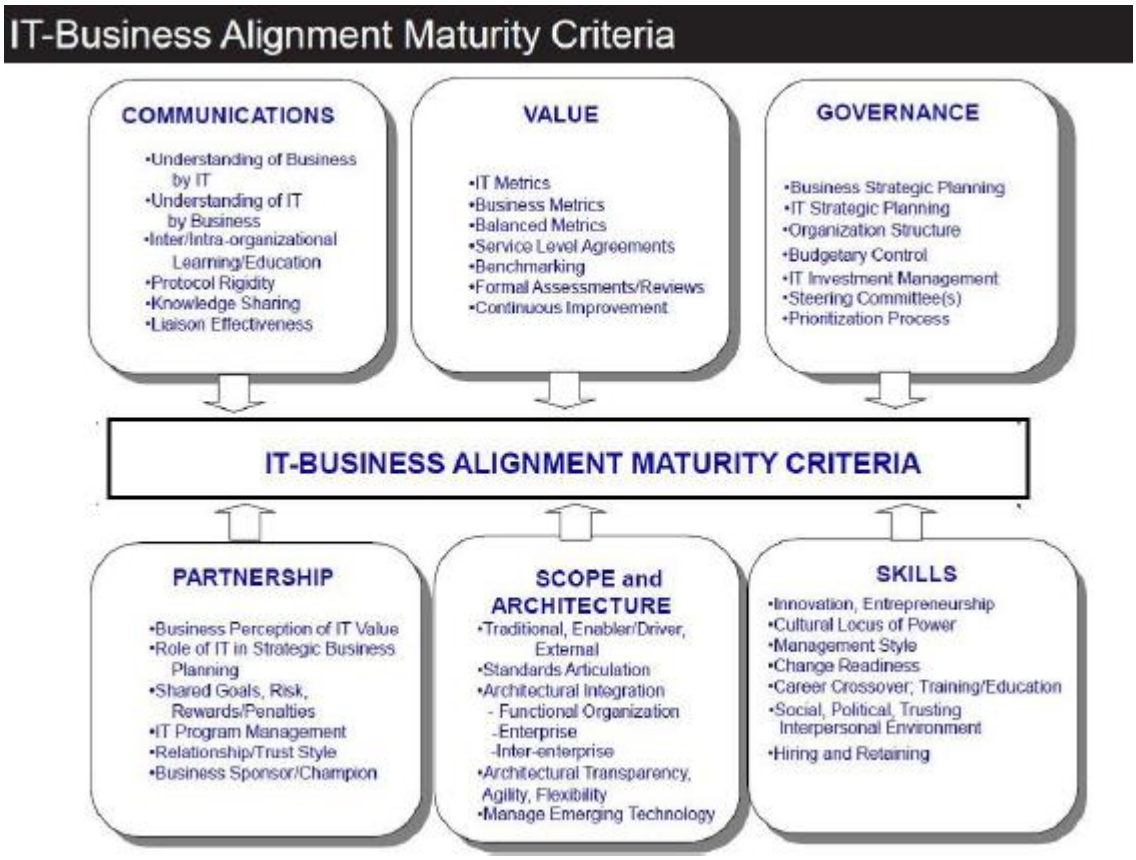
- Adopting strategic systems requires changes in business goals, relationships with customers and suppliers, and business processes

IT business alignment

Since late 70ties, paper 'Strategic Alignment: Leveraging information technology for transforming organizations', Henderson, J.C., Venkatraman, N. IBM Systems Journal. Top issue in IT and business.

Defined as: "the degree to which the information technology mission, objectives, and plans support and are supported by the business mission, objectives, and plans"





Communications: measures the effectiveness of the exchange of ideas, knowledge and information between IT and business organisations, enabling both to clearly understand the company's strategies, plans, business and IT environments, risks, priorities and how to achieve them.

Value: uses balanced measurements to demonstrate the contributions of information technology and the IT organisation to the business in terms that both the business and IT understand and accept. (Balanced measurement includes metrics for assessing both IT and the business. The metric should be easy to understand, derived jointly by IT and business stakeholders and prescribe a clear direction for improvement.)

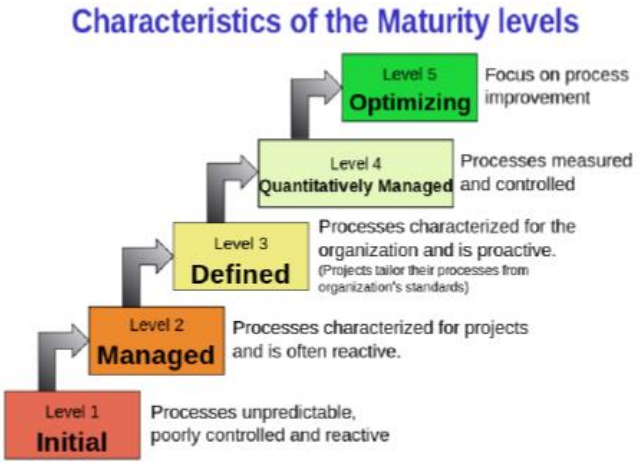
Governance: defines who has the authority to make IT decisions and what processes IT and business managers use at strategic, tactical and operational levels to set IT priorities to allocate IT resources.

Partnership: gauges the relationship between a business and IT organisation, including IT's role in defining the business's strategies, the degree of trust between the two organisations and how each perceives the other's contribution.

Scope and Architecture: measures IT's provision of a flexible infrastructure, its evaluation and application of emerging technologies, its enabling of driving business process changes and its delivery of valuable customised solutions to internal business units and external customers or partners.

Skills: measures human resources practices, such as hiring, retention, training, performance feedback, encouraging innovation and career opportunities and developing the organisation's readiness for change, capability for learning and ability to leverage new ideas.

IT business alignment maturity model



slide 100

Level 1: Initial or AD-HOC processes

- Organizations have poor communications between IT and the business and also a poor understanding of the value or contribution the other provides.
- Relationships tend to be formal and rigid and the metrics are usually technical rather than business oriented.
- Service level agreements tend to be sporadic.
- IT planning or business planning is ad hoc.
- IT is viewed as cost centre (a cost of business).
- The two parties have minimal trust and partnership.
- IT projects rarely have business sponsors or champions
- Little to no career crossovers.
- Applications focus on operational systems with no integration among them.
- No aligned IT-Business strategy

Level 2: Committed processes

- Organization have begun enhancing their IT-business relationship
- Alignment tend to focus on functions or departments or geographical locations
- Business and IT have limited understanding of each other' responsibilities and roles
- IT metrics and service levels are technical and cost-oriented and not linked to business metrics
- Few continuous improvement programs exist
- Management interaction between IT and the business tend to be transaction-based rather than partnership-based
- IT spending relates to basic operations
- Business sponsorship of IT projects is limited
- At the function level, there is some career crossover between the business and IT
- IT management considers technical skills the most important for IT

Level 3: Established, focused processes

- IT assets become more integrated enterprise-wide.
- Senior and mid-level IT management understand the business, and the business's understanding of IT is emerging.

- SLAs begin to emerge across the enterprise; although the results are not always shared or acted upon.
- Strategic planning tends to be done at the business unit level, although some inter-organizational planning has begun.
- IT is increasingly viewed by the business as an asset, but project prioritization still usually responds to "the loudest voice"
- Formal IT steering committees emerge and meet regularly.
- IT spending tends to be controlled by budgets, and IT is still seen as a cost centre but awareness of IT's "investment potential" is emerging.
- The business is more tolerant of risk and is willing to share some risk with IT
- At the function level the business sponsors IT projects and career crossovers
- Both business and technical skills are important to business and IT managers
- Technology standards and architecture have emerged at both the enterprise level and with key external partners.

Level 4: Improved, managed processes

- Organizations manage the processes they need for strategic alignment within the enterprise.
- The gap between IT understanding the business and the business understanding IT has closed.
- Effective decision making, and IT provides services that reinforce the concept of IT as a value centre
- Leverage of IT assets enterprise-wide and focus is on applications that enhance business processes for sustainable competitive advantage.
- SLAs are enterprise-wide
- Benchmarking is a routine practice.
- Strategic business and IT planning processes are managed across the enterprise.
- Formal IT steering committees meet regularly and are effective at the strategic, tactical, and operational levels
- The business views IT a valued service provider and as an enabler (or driver) of change
- The business shares risks and rewards with IT by providing effective sponsorship and championing all IT projects.
- Career crossovers between business and IT occur across functions
- Business and technical skills are recognized as very important to the business and IT.

Level 5: Optimised processes

- Organizations have optimized strategic IT-business alignment through rigorous governance processes that integrate strategic business planning and IT planning.
- Alignment goes beyond the enterprise by leveraging IT with the company's business partners, customers and clients as well
- IT has extended its reach to encompass the value chains of external customers and suppliers
- Relationships between the business and IT are informal, and knowledge is shared with external partners.
- Business metrics, IT metrics, and SLAs also extend to external partners, and benchmarking is routinely performed with these partners.
- Strategic business and IT planning are integrated across the organisation, as well as outside the organisation

Main observations: Industries vary in their alignment maturity; alignment maturity is rising, and business executives score alignment higher than IT executives.

Alignment and IT organisational structure

Central IT organisation:(2,86): all IT resources report to one unit usually led by a CIO

Decentralized IT organisation:(2,89): Each business unit has its own IT organisation

Federated IT organisation: (3,31) Some parts of IT are centralized (e.g. IT infrastructure, standards, …) and parts are decentralized (e.g. application resources specific in the business units)

There is a link between Alignment and firm performance. Higher levels of IT-business alignment.

H4: Ethische en sociale aspecten van informatiesystemen

Ethische aspecten

IM-4-

What ethical, social and political issues are raised by information systems?

Recent cases of failed ethical judgment in business:

- General Motors, Barclay's Bank, GlaxoSmithKline, Takata Corporation, United Airlines, Boeing, Facebook; …
- In many, information systems used to bury decisions from public scrutiny

Ethics: principles of right and wrong that individuals, acting as free moral agents, use to make choices to guide their behaviours.

Information systems raise new ethical questions because they create opportunities for:

- Intense social change, threatening existing distributions of power, money, rights, and obligations
- New kinds of crime

A model for thinking about ethical, social and political issues

Society as a calm pond

IT as rock dropped in pond, creating ripples of new situations not covered by old rules

Social and political institutions cannot respond overnight to these ripples—it may take years to develop etiquette, expectations, laws (e.g. privacy, cybersquatting, high frequency trading…)

Requires understanding of ethics to make choices in legally grey areas

Five moral dimensions of the information age

- Information rights and obligations
- Property rights and obligations
- Accountability and control
- System quality
- Quality of life

Key technology trends that raise ethical issues

- Computing power doubles every 18 months: More organisations depend on computing systems for critical operations and become more vulnerable to system failures.
- Data storage costs rapidly decline: Organisations can easily maintain detailed databases on individuals. There are no limits on the data collected about you.
- Data analysis advances: Companies can analyse vast quantities of data gathered on individuals to develop detailed profiles of individual behaviour. Large-scale population surveillance is enabled.
- Networking advances: The cost of moving data and making it accessible from anywhere falls exponentially. Access to data becomes more difficult to control.
- Mobile device growth impact: Individual cell phones may be traced without user consent or knowledge. The always-on device becomes a tether.

Advances in data analysis techniques

Profiling: combining data from multiple sources to create dossiers of detailed information on individuals.

Nonobvious relationship awareness (NORA): combining data from multiple sources to find obscure hidden connections that might help identify criminals or terrorists

Basic concepts: responsibility, accountability and liability

Responsibility: accepting the potential costs, duties, and obligations for decisions

Accountability: mechanisms for identifying responsible parties

Liability: permits individuals (and firms) to recover damages done to them

Due process: laws are well-known and understood, with an ability to appeal to higher authorities

Ethical analysis

Five-step process for ethical analysis

1. Identify and clearly describe the facts.
2. Define the conflict or dilemma and identify the higher-order values involved.
3. Identify the stakeholders.
4. Identify the options that you can reasonably take.
5. Identify the potential consequences of your options.

Candidate ethical principles

Golden Rule: do unto others as you would have them do unto you.

Immanuel Kant's Categorical Imperative: if an action is not right for everyone to take, it is not right for anyone.

Descartes' Rule of Change: if an action cannot be taken repeatedly, it is not right to take at all.

Slippery slope rule: is a consequentialist logical device in which a party asserts that a relatively small first step leads to a chain of related events culminating in some significant (usually negative) effect.

Utilitarian Principle: take the action that achieves the higher or greater value.

Risk Aversion Principle: Take the action that produces the least harm or potential cost.

Ethical "No Free Lunch" Rule: Assume that virtually all tangible and intangible objects are owned by someone unless there is a specific declaration otherwise.

Professional codes of conduct

Promulgated by associations of professionals

American Medical Association (AMA), American Bar Association (ABA), Association for Computing Machinery (ACM)

Promises by professions to regulate themselves in the general interest of society

Privacy

Information rights: privacy and freedom in the internet age

Privacy:

- Claim of individuals to be left alone, free from surveillance or interference from other individuals, organizations, or state; claim to be able to control information about yourself
- Claims to privacy are also involved at the workplace

In the United States, privacy protected by:

- First Amendment (freedom of speech and association)
- Fourth Amendment (unreasonable search and seizure)
- Additional federal statues (e.g., Privacy Act of 1974)

European directive on data protection

- Use of data requires informed consent of customer
- EU member nations cannot transfer personal data to countries without similar privacy protection
- Stricter enforcements under consideration: right of access, right to be forgotten
- Safe harbour framework (EU–US Privacy Shield)

General data protection regulation (GDPR)

- Algemene Verordening Gegevensbescherming (AVG)
- Regulation of the European Union (2016/679/EU)
- Applies directly to everyone/everyorgin Europe
- And beyond, to orgs providing services/collecting data for Europeans
- Replaces Data Protection Directive (1995/46/EC)
- In force from 25thMay 2018

Internet challenges to privacy

Cookies

- Identify browser and track visits to site
- Super cookies (Flash cookies)

Web beacons (web bugs)

- Tiny graphics embedded in e-mails and web pages
- Monitor who is reading e-mail message or visiting site

Spyware

- Surreptitiously installed on user's computer
- May transmit user's keystrokes or display unwanted ads

Google services and behavioural targeting

The United States allows businesses to gather transaction information and use this for other marketing purposes.

Opt-out vs. opt-in model: kiezen of een site je online activiteit mag gebruiken.

Online industry promotes self-regulation over privacy legislation.

- Complex/ambiguous privacy statements
- Opt-out models selected over opt-in
- Online "seals" of privacy principles

Technical solutions

Solutions include:

- E-mail encryption
- Anonymity tools
- Anti-spyware tools

Overall, technical solutions have failed to protect users from being tracked from one site to another

Browser features: "Private"browsing, "Do not track"options

Intellectual property

Real property (onroerende goederen): land, trees, buildings, ...

Personal property (roerende goederen): Cars, bank accounts, jewellery, pets, patents, ...

Intellectual property: Any tangible asset that consists of human knowledge and ideas such as software, data, novels, sound recordings, design

Three main ways that intellectual property is protected:

- Trade secret: intellectual work or product belonging to business, not in the public domain
- Copyright: statutory grant protecting intellectual property from being copied for the life of the author, plus 70 years
- Patents: grants creator of invention an exclusive monopoly on ideas behind invention for 20 years

Copyrights

protects tangible or fixed expression of an idea but not the idea itself, is automatically assigned when created, may need to be registered in some countries

Exists when:

- Proposed work is original (not necessarily new)
- Creator has put original idea in concrete form
- e.g. literary works, musical works, dramatic works, pantomimes and choreographic works, pictorial, graphic, and sculptural works, motion pictures and other audio-visual works, sound recordings, architectural works, software-related works.

copyright owner has these exclusive rights, protected against infringement:

- reproduction right
- modification right
- distribution right
- public-performance right
- public-display right

Open source software, “GPL”, “BSD”, …

Open source software is de verzamelnaam voor alle soorten software die ter beschikking wordt gesteld onder een open source licentie, die minstens voorziet dat de broncode vrij ter beschikking is.

Voorbeelden:

- Linux besturingssysteem
- Firefox webbrowser
- Apache webserver.

De bescherming van computerprogramma’s door het auteursrecht laat de rechthebbende personen of ondernemingen toe om de voorwaarden voor commercialisering, zoals prijs en gebruiksbeperkingen, te bepalen.

De aan de gebruikers gegeven toestemmingen, alsook hun beperkingen en voorwaarden worden beschreven in een “licentie”.

Over het algemeen zijn de licenties bij computerprogramma’s zeer restrictief: zo kan de licentie bijvoorbeeld verbieden om het programma te kopiëren, te verspreiden of aan te passen, het toegelaten gebruik beperken tot privédoeleinden en/of de installatie van het programma slechts toestaan op één computer, enz.

Ook open source software is auteursrechtelijk beschermd. Maar de licenties die ermee gepaard gaan geven veel meer rechten aan de gebruikers. Toch kennen ook deze licenties belangrijke gebruiksvoorwaarden. Men kan dus niet eender wat doen met open source software.

De open source licenties onderscheiden zich van klassieke licenties in de zin dat ze tamelijk veel rechten geven aan de gebruiker van de software:

- Het recht om het programma zonder beperkingen te gebruiken
- Het recht om reproducties te maken
- Het recht kopieën weg te geven of te verkopen
- Het recht om het computerprogramma te wijzigen, enz.

Let op, dikwijls gaan deze, weliswaar ruime rechten, toch nog gepaard met een aantal voorwaarden zoals, de verplichting om de naam van de auteurs te vermelden of een kopie van de broncode mee te geven. Er bestaan heel veel verschillende open source licenties die steeds andere rechten en voorwaarden stipuleren. Het is dus van belang een licentie goed te lezen.

In tegenstelling tot klassieke computerprogramma's, kan software die wordt verspreid onder een open source software als basis dienen voor het ontwikkelen van andere programma's. U mag immers de open source software verbeteren of aanpassen en deze nadien in gewijzigde versie verspreiden. (Op het Internet zijn zelfs bibliotheken met functiecodes onder open source licenties beschikbaar waaruit een programmeur onderdelen kan overnemen of waarnaar hij kan 'linken' bij het schrijven van zijn computerprogramma's). Men hoeft deze stukken programmeercode dus niet steeds te herschrijven.

Er zijn talrijke types open software licenties in omloop en de voorwaarden ervan kunnen onderling wel verschillen (m.b.t. toegang tot de broncode, vermelding van de auteurs, vermelding van de wijzigingen, …). Een vaak voorkomende strikte voorwaarde is de "copyleft" clausule, die bijvoorbeeld is opgenomen in de GNU-GPL (General Public License). Deze bepaalt dat een computerprogramma, waarin software-elementen zijn opgenomen die onder de GPL-licentie vallen, ook zelf onder die licentie verspreid moet worden.

GNU is an operating system that is free software—that is, it respects users' freedom. The GNU operating system consists of GNU packages (programs specifically released by the GNU Project) as well as free software released by third parties. The development of GNU made it possible to use a computer without software that would trample your freedom.

Vrije software gaat over vrijheid, niet prijs. Vrije software betekent dat gebruikers van het programma de vier basisvrijheden hebben:

- De vrijheid om het programma te gebruiken zoals jij wilt, voor ieder doel.
- De vrijheid om te kijken hoe het programma werkt en aan te passen aan je behoeften. Hiervoor is toegang tot de broncode nodig.
- De vrijheid om kopieën te verspreiden zodat je anderen kan helpen.
- De vrijheid om het programma te verbeteren en die te verspreiden, zodat de hele gemeenschap profiteert. Hiervoor heb je toegang tot de broncode nodig.

GNU = GNU is not Unix (Operating System)

GPL = General Public License

BSD = Berkeley Software Distribution (Operating System)

Patents

grant a property right to the inventor to exclude others from making, using, offering for sale, or selling the invention

Types:

- utility -any new and useful process, machine, article of manufacture, or composition of matter
- design -new, original, and ornamental design for an article of manufacture
- plant -discovers and asexually reproduces any distinct and new variety of plant e.g. RSA public-key cryptosystem patent (1982-2000)

Trademarks

a word, name, symbol, or device

- used in trade with goods
- indicate source of goods
- to distinguish them from goods of others

trademark rights may be used to:

- prevent others from using a confusingly similar mark
- but not to prevent others from making the same goods or from selling the same goods or services under a clearly different mark

Challenges to intellectual property rights

Digital media different from physical media

- Ease of replication
- Ease of transmission (networks, Internet)
- Ease of alteration
- Compactness
- Difficulties in establishing uniqueness

BSA (Business Software Alliance): 39% software piracy (2015)

Computer-related liability problems

If software fails, who is responsible?

- If seen as part of a machine that injures or harms, software producer and operator may be liable.
- If seen as similar to a book, difficult to hold author/publisher responsible.
- If seen as a service? Would this be similar to telephone systems not being liable for transmitted messages?

For almost all IT disputes, courts will call for an EO (Expert Opinion). This expert will give -under oath- an advice (not a judgement), mostly in a written report that will be used as testimony.

System quality: data quality and system errors

What is an acceptable, technologically feasible level of system quality?

- Flawless software is economically unfeasible

Three principal sources of poor system performance

- Software bugs, errors
- Hardware or facility failures
- Poor input data quality (most common source of business system failure)

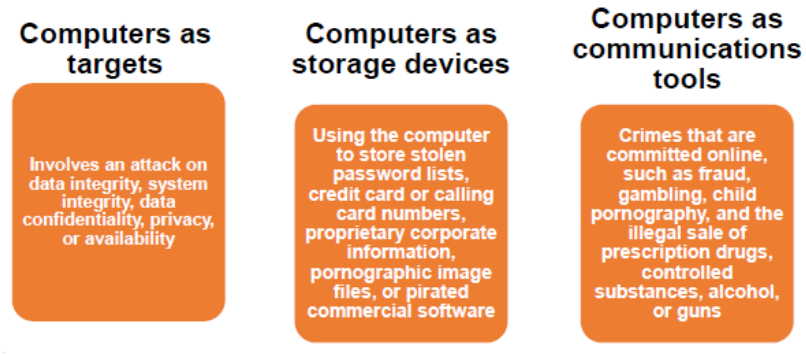
Computer crime

"criminal activity in which computers or computer networks are a tool, a target, or a place of criminal activity" (US Dep. of Justice)

The U.S. Department of Justice categorizes computer crime based on the role that the computer plays in the criminal activity:

Impact on reputation, morale and continuity due to importance of trust

Financial losses can be direct or indirect (phishing announcements)



Cybercrime and computer crime

Law enforcement agencies

Sophisticated technologies needed	Lack of knowledge and experience of investigators
Global nature of cyber crime	Lack of international cooperation
Legal framework	Cybercriminals
Young and very computer-savvy	Wide range of behavioural characteristics
Cybercrime victims	

Law enforcement challenges

The deterrent effect of law enforcement on computer and network attacks correlates with the success rate of criminal arrest and prosecution.

Law enforcement agency difficulties:

- Lack of investigators knowledgeable and experienced in dealing with this kind of crime
- Required technology may be beyond their budget
- The global nature of cybercrime
- Lack of collaboration and cooperation with remote law enforcement agencies
- Convention on Cybercrime introduces a common terminology for crimes and a framework for harmonizing laws globally

Verdere info in het hoofdstuk door prof. Lemaire

Working with law enforcement

Executive management and security administrators need to look upon law enforcement as a resource and tool

Management needs to:

- Understand the criminal investigation process
- Understand the inputs that investigators need
- Understand the ways in which the victim can contribute positively to the investigation

H5: Business Intelligence en databanken

IM-5-

File organisation terms and concepts

Database: Group of related files

File: Group of records of same type

Record: Group of related fields

Field: Group of characters as word(s) or number(s)

Entity: Person, place, thing on which we store information

Attribute: Each characteristic, or quality, describing entity

Problems with the traditional file environment

- Files maintained separately by different departments
- Data redundancy: Dezelfde data komt meerdere keren voor
- Data inconsistency: Data stemt niet met elkaar overeen
- Lack of flexibility
- Poor security
- Lack of data sharing and availability
- Program-data dependence:

Program-data independence refers to the capability of leaving data intact and accessible regardless of modifications to the database that contains the data. Independence allows database administrators to retool a database to meet an enterprise's new information needs without worrying that the people who need the data for research, reports and making informed decisions will suddenly be unable to access it. Metadata provides database administrators with information about the database management system, or DBMS, itself, helping them maintain data integrity and track database performance. (Techwalla)

Database schemata are blueprints for databases, articulating how data is stored within a DBMS and describing the relationships between a database's tables. A physical schema explains how data is stored within a computer, describing the actual hardware used as storage for the digital data. A database's logical schema describes how the data is organized within the database, providing details such as which tables are used for specific data and what values are used as primary keys to establish relationships between tables. (Techwalla)

Relational DBMS

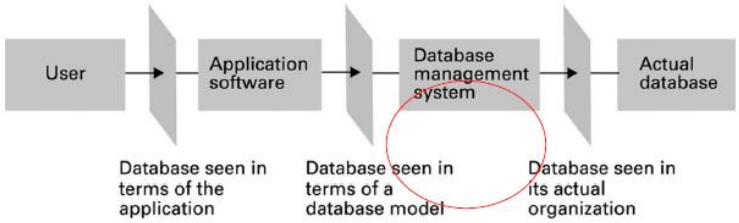
Represent data as two-dimensional tables

Each table contains data on entity and attributes

Table: grid of columns and rows

- Rows(tuples): Records for different entities
- Fields(columns): Represents attribute for entity
- Key field: Field used to uniquely identify each record
- Primary key: Field in table used for key fields
- Foreign key: Primary key used in second table as look-up field to identify records from original table

Databasemanagementsystemen (DBMS)



Operations of a relational DBMS

Three basic operations used to develop useful sets of data

SELECT: creates subset of data of all records that meet stated criteria

JOIN: combines relational tables to provide user with more information than available in individual tables

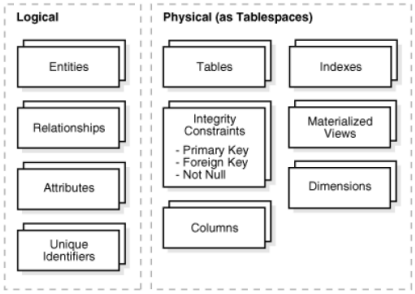
PROJECT: creates subset of columns in table, creating tables with only the information specified

Capabilities of database management systems

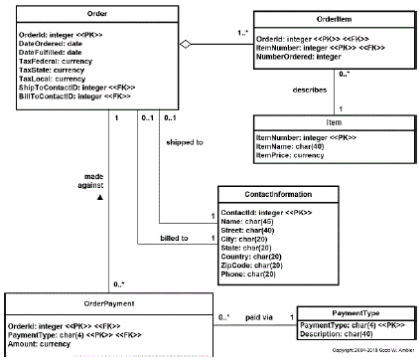
- Data definition capability
- Data dictionary
- Querying and reporting
- Data manipulation language: Structured Query Language (SQL)
- Many DBMS have report generation capabilities for creating polished reports (Microsoft Access)

Designing databases

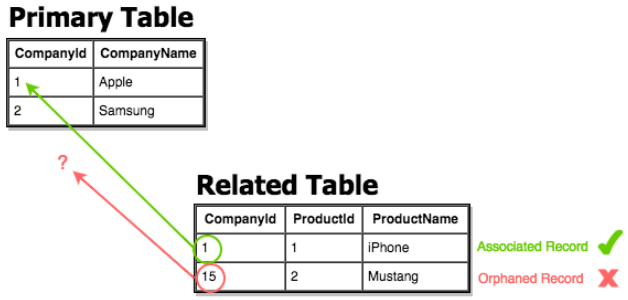
Conceptual design vs. physical design



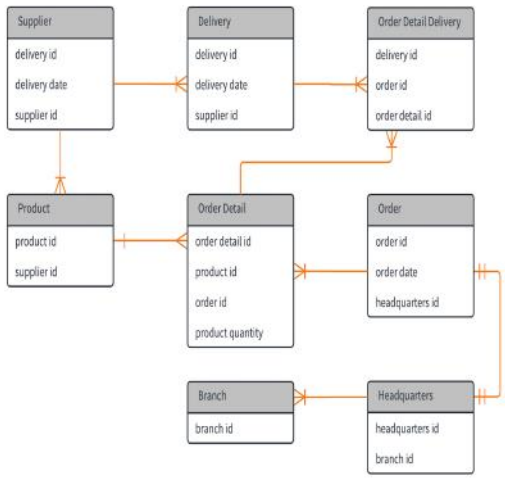
Normalization: Streamlining complex groupings of data to minimize redundant data elements and awkward many-to-many relationships



Referential integrity: rules used by RDBMS to ensure relationships between tables remain consistent



Entity-relationship diagram: a correct data model is essential for a system serving the business well



Relationele bewerkingen

Select: kiezen van rijen uit een tabel

Project: kiezen van kolommen uit een tabel

Join: Combineren van twee tabel tot één tabel

Structured Query Language (SQL)

Bewerkingen op tupels (rijen): insert, update, delete, select

The challenge of big data

80% of world's information is unstructured

Unstructured information is growing 15 times faster than structured information

Big data is information that cannot be processed or analysed using traditional processes or tools, is in a semi-structured or unstructured format, not known if it is worth keeping

The volumes are too great for typical DBMS so big data requires new tools and technologies to manage and analyse so more patterns, relationships and anomalies can be revealed.

Non-relational databases and databases in the cloud

Non-relational databases: “NoSQL”

- More flexible data model
- Data sets stored across distributed machines
- Easier to scale
- Handle large volumes of unstructured and structured data
- Databases in the cloud
- Appeal to start-ups, smaller businesses
- Amazon Relational Database Service, Microsoft SQL Azure
- Private clouds

Business analytics

Enterprise Data vs Big Data

3V+1 (velocity, variety, volume) + Value

Skills and experience to know which piece of the (big) data puzzle can be applied to answer business questions

Business Analytics Architects

Operational reporting

- Transactional data (Enterprise data)
- Data warehouses
- Business Intelligence
- Based on relational databases (SQL)
- Business Analytics focus on structured data

Challenges: inconsistent data, lacking analytical capabilities in ERP application and business analytic skills are needed due to complexity

Business intelligence infrastructure

Array of tools for obtaining information from separate systems and from big data

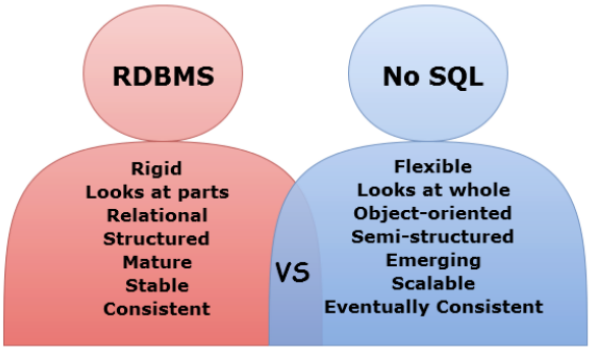
Data warehouse

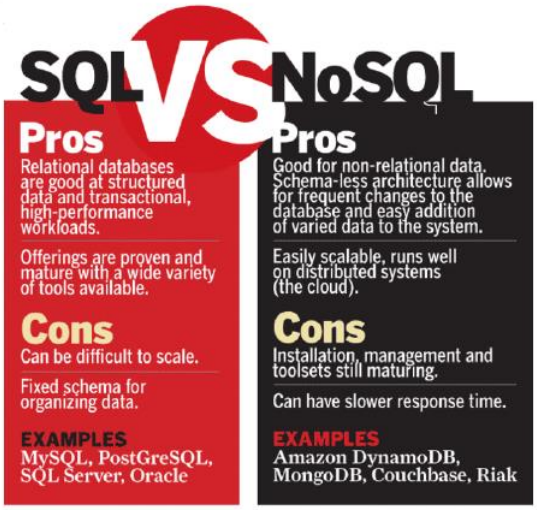
- Stores current and historical data from many core operational transaction systems
- Consolidates and standardizes information for use across enterprise, but data cannot be altered
- Provides analysis and reporting tools

Data marts: subset of data warehouse, typically focus on single subject or line of business

Hadoop: Enables distributed parallel processing of big data across inexpensive computers

Key services: hadoop Distributed File System (HDFS): data storage, MapReduce: breaks data into clusters for work, Hbase: NoSQL database





In-memory computing

- Used in big data analysis
- Uses computers main memory (RAM) for data storage to avoid delays in retrieving data from disk storage
- Can reduce hours/days of processing to seconds
- Requires optimised hardware

Analytic platforms: High-speed platforms using both relational and non-relational tools optimized for large datasets.

Analytical tools: relationships, patterns, trends

Tools for consolidating, analysing, and providing access to vast amounts of data to help users make better business decisions

- Multidimensional data analysis (OLAP)
  OLAP enables rapid, online answers to ad hoc queries
  OLAP supports multidimensional data analysis because:
    - It views data using multiple dimensions
    - Each aspect of information (product, pricing, cost, region, time period) is different dimension
    - Example: How many washers sold in the East in June compared with other regions?
- Data mining
  Finds hidden patterns, relationships in datasets such as customer buying patterns
  Infers rules to predict future behaviour
  Types of information obtainable from data mining:
    - Associations
    - Sequences
    - Classification
    - Clustering
    - Forecasting
- Text mining
- Web mining

Databases and the web

Many companies use the web to make some internal databases available to customers or partners

Typical configuration includes:

- Web server
- Application server/middleware/CGI scripts
- Database server (hosting DBMS)

Advantages of using the web for database access:

- Ease of use of browser software
- Web interface requires few or no changes to database
- Inexpensive to add web interface to system

Establishing an information policy

Firm's rules, procedures, roles for sharing, managing, standardizing data

Data administration: establishes policies and procedures to manage data

Data governance: deals with policies and processes for managing availability, usability, integrity, and security of data, especially regarding government regulations

Database administration: creates and maintains the database

Ensuring data quality

More than 25 percent of critical data in Fortune 1000 company databases are inaccurate or incomplete

Before new database is in place, a firm must:

- Identify and correct faulty data
- Establish better routines for editing data once database in operation

Data quality audit

Data cleansing

Why database security?

- Large volumes of data
- Vital to the operation of the organisation
- Security not well covered by OS-security
- OS security is only on file level (read/write entire files)
- OS security offers no access control over a wide range of commands (select, insert, update, delete, …)

Inference

The process of performing authorized queries and deducing unauthorized information from the legitimate responses received.

How?

Combination of several data items is more sensitive than the individual items or a combination of data items can be used to infer data of a higher sensitivity

H10: Building information systems

IM-10-2e deel les 30/11/2018, 14/12/2018

Systems development and organisational change

IT-enabled organisational change

Automation

- Increases efficiency
- Replaces manual tasks

Rationalization of procedures

- Streamlines standard operating procedures
- Often found in programs for making continuous quality improvements
  Total quality management (TQM), Six sigma, KAIZEN

Business process redesign (ook wel BPM Business Process Management)

- Analyse, simplify, and redesign business processes
- Reorganize workflow, combine steps, eliminate repetition

Paradigm shifts

- Rethink nature of business
- Define new business model
- Change nature of organization
- Example: automobile industry (dealers vs online buying), Apple heeft bij zijn computers de iPhone, iPad toegevoegd. Microsoft heeft meer ingezet op “de cloud”
- Why? stay competitive - global economic pressures

Business process redesign BPR

Business process management (BPM)

- Is the art and science of analysing every task in a business and helping firms continually optimize them.
- Includes work flow management, business process modelling, quality management, change management, and standardizing processes throughout the organization.
- The business doesn’t have to accomplish this with the idea that every process should be automated even though many can. The business simply has to continually look for better methods of performing the work.

BPR faalt 70% van de tijd. Dit komt door het tekort aan planning, onmogendheid om de enorme, complexe manier volledig te snappen en het feit dat BPR vaak veel meer tijd in beslag neemt dan verwacht.

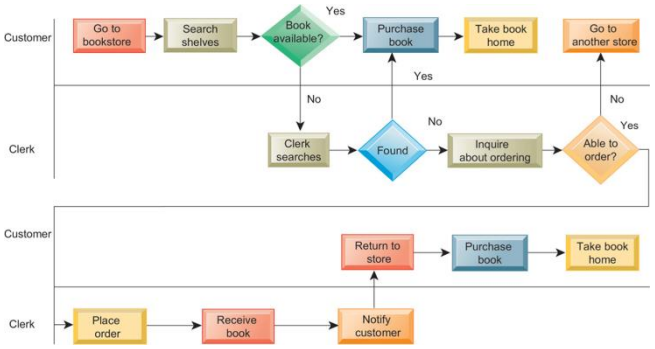
Business process management (BPM)

- Variety of tools, methodologies to analyse, design, optimize processes
- Used by firms to manage business process redesign

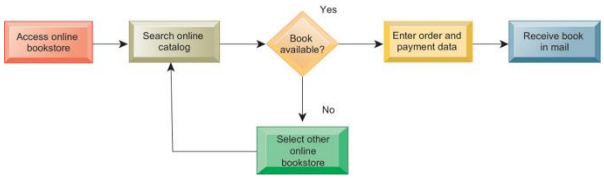
Steps in BPM

1) Identify processes for change (not the IS)
2) Analyse existing processes
3) Design the new process
4) Implement the new process
5) Continuous measurement

AS-IS Business Process for Purchasing a Book from a Physical Bookstore



Redesigned process for purchasing a book online



Tools for Business Process Management

- Identify and document existing processes

  Identify inefficiencies

- Create models of improved processes
- Capture and enforce business rules for performing, automating processes
- Integrate existing systems to support process improvements
- Verify that new processes have improved
- Measure impact of process changes on key business performance indicators

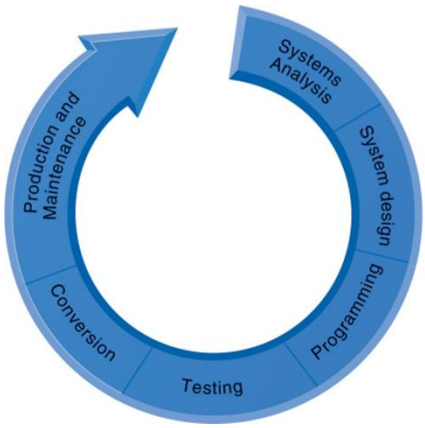
The tools for BPM generally fall into one of three categories:

- Documenting and monitoring business processes to help identify inefficiencies and identifying trouble spots
- Automating some parts of a business process and enforcing business rules
- Integrating existing systems to support process improvements

What are the core activities in the systems development process?

Systems development

Activities that go into producing an information system solution to an organizational problem or opportunity



- Systems analysis
- Systems design
- Programming
- Testing
- Conversion
- Production and maintenance

Systems analysis

Analysis of problem to be solved by new system

- Defining the problem
- Identifying causes
- Specifying solutions
- Identifying information requirements
- Feasibility study = haalbaarheidsstudie
- Systems proposal report
- Information requirements
  Faulty requirements analysis is a leading cause of systems failure and high systems development costs

Systems design

Describes system specifications that will deliver functions identified during systems analysis

Should address all managerial, organizational, and technological components of system solution

Role of end users

- User information requirements drive system building
- Users must have sufficient control over design process to ensure system reflects their business priorities and information needs
- Insufficient user involvement in design effort is major cause of system failure

System design specifications

Category	Specifications
Output	Medium, Content, Timing
Input	Origins, Flow, Data entry
User Interface	Simplicity, Efficiency, Logic, Feedback, Errors
Database Design	Logical data model, Volume and speed requirements, File organization and design, Record specifications
Processing	Computations, Program modules, Required reports, Timing of outputs
Manual Procedures	What activities, Who performs them, When, How, Where
Controls	Input controls (characters, limit, reasonableness), Processing controls (consistency, record counts), Output controls (totals, samples of output), Procedural controls (passwords, special forms)

Category	Specifications
Security	Access controls, Catastrophe plans, Audit trails
Documentation	Operations documentation, Systems documents, User documentation
Conversion	Transfer files, Initiate new procedures, Select testing method Cut over to new system
Training	Select training techniques, Develop training modules, Identify training facilities
Organizational Changes	Task redesign, Job redesign, Process design, Organization structure design, Reporting relationships

Completing the systems development process

Programming

- System specifications from design stage are translated into software program code

Testing: dit wordt vaak te weinig gedaan

- Ensures system produces right results
- Unit testing: Tests each program in system separately
- System testing: Test functioning of system as a whole
- Acceptance testing: Makes sure system is ready to be used in production setting
- Test plan: All preparations for series of tests

Conversion

- Process of changing from old system to new system
- Four main strategies:
    1. Parallel strategy: wordt niet vaak gedaan
    2. Direct cutover: dit wordt vaker gebruikt “big bang”. Vrijdagavond stopt het werk, maandagochtend start iedereen op het nieuwe systeem. Dit is niet zonder gevaar want alles moet volledig op een korte periode overgeplaatst worden naar het nieuwe systeem.
    3. Pilot study: men zal eerst een klein departement laten overschakelen op een nieuw systeem om dit uit te testen. Bv.: Sommige vakken zijn op Ufora, de rest nog op Minerva.
    4. Phased approach: men zal in fasen overschakelen naar het nieuwe systeem. Bv.: het uitrollen van het moderne mailsysteem aan de universiteit faculteit per faculteit.
- Requires end-user training
- Finalisation of detailed documentation showing how system works from technical and end-user standpoint.

Production and maintenance

- System reviewed to determine if revisions needed
- May include post-implementation audit document
- Maintenance: Changes in hardware, software, documentation, or procedures to a production system to correct errors, meet new requirements, or improve processing efficiency
    1) 20% debugging, emergency work
    2) 20% changes to hardware, software, data, reporting
    3) 60% of work: user enhancements, improving documentation, recoding for greater processing efficiency

Systems development

CORE ACTIVITY	CORE ACTIVITY
Systems analysis	Identify problem(s), Specify solutions, Establish information requirements
Systems design	Create design specifications
Programming	Translate design specifications into program code
Testing	Perform unit testing, Perform systems testing, Perform acceptance testing
Conversion	Plan conversion, Prepare documentation, Train users and technical staff
Production and maintenance	Operate the system, Evaluate the system, Modify the system

What are the principal methodologies for modelling and designing systems?

Structured methodologies

- Structured: Techniques are step-by-step, progressive
- Process-Oriented: Focusing on modelling processes or actions that manipulate data
- Separate data from processes
- Data flow diagram (DFD)

    Represents system's component processes and flow of data between them.
    Logical graphic model of information flow.

Data dictionary: defines contents of data flows and data stores

Process specifications: describe transformation occurring within lowest level of data flow diagrams

Structure chart: top-down chart, showing each level of design, relationship to other levels, and place in overall design structure

Object-oriented development

Object

- Basic unit of systems analysis and design
- Combines data and the processes that operate on those data
- Data in object can be accessed only by operations associated with that object

Object-oriented modelling

- Based on concepts of class and inheritance
- Objects belong to a certain class and have features of that class
- May inherit structures and behaviours of a more general, ancestor class

More iterative and incremental than traditional structured development

- Systems analysis: Interactions between system and users analyzed to identify objects
- Design phase: Describes how objects will behave and interact; grouped into classes, subclasses, and hierarchies
- Implementation: Some classes may be reused from existing library of classes, others created or inherited

Objects are reusable: object-oriented development can potentially reduce time and cost of development

Computer-aided software engineering (case)

Software tools to automate development and reduce repetitive work, including:

- Graphics facilities for producing charts and diagrams
- Screen and report generators, reporting facilities
- Analysis and checking tools
- Data dictionaries
- Code and documentation generators

Support iterative design by automating revisions and changes and providing prototyping facilities

Require organisational discipline to be used effectively.

What are alternative methods for building information systems? Les 14/12/18

Traditional systems life cycle

System Analysis → System Design → Programming → Testing → Conversion → Production and Maintenance

Dit is het klassieke "Waterval model"

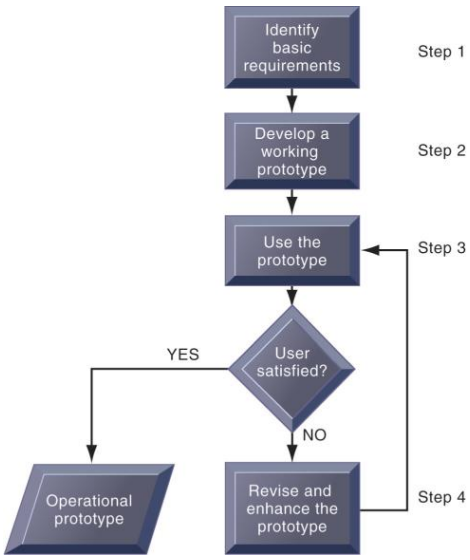
Prototyping

Building experimental system rapidly and inexpensively for end users to evaluate.

Prototype: Working but preliminary version of information system, approved prototype serves as template for final system

Steps in prototyping: Deze zijn dezelfde als in het klassieke watervalsysteem.

- Identify user requirements
- Develop initial prototype
- Use prototype
- Revise and enhance prototype



Advantages of prototyping:

- Useful if some uncertainty in requirements or design solutions
- Often used for end-user interface design
- More likely to fulfil end-user requirements

Disadvantages:

- May gloss over essential steps
- May not accommodate large quantities of data or large number of users
- May not undergo full testing or documentation

End-user development

Allows end-users to develop simple information systems with little or no help from technical specialists and reduces time and steps required to produce finished application. Vb.: tegenwoordig worden meer en meer apps gemaakt

Tools include

- User friendly query languages and reporting
- PC software tools

Advantages:

- More rapid completion of projects
- High level of user involvement and satisfaction

Disadvantages:

- Not designed for processing-intensive applications
- Inadequate management and control, testing, documentation
- Loss of control over data

Managing end-user development

- Require cost-justification of end-user system projects
- Establish hardware, software and quality standards

Application software packages and cloud software services

Application software packages and cloud software services

- Save time and money
- Many packages offer customization features

Evaluation criteria for systems analysis include:

- Functions provided, flexibility, user friendliness, required resources, database requirements, installation and maintenance efforts, documentation, vendor quality, and cost

Request for Proposal (RFP)

- Detailed list of questions submitted to packaged-software vendors
- Used to evaluate alternative software packages

Outsourcing

Several types

Cloud and SaaS providers: subscribing companies use software and computer hardware provided by vendors

External vendors

- Hired to design, create software
- Domestic outsourcing: driven by firm's need for additional skills, resources, assets
- Offshore outsourcing: driven by cost-savings (India, Pakistan)

Advantages: allows organization flexibility in IT needs

Disadvantages:

- Hidden costs, for example:

  Identifiëeren en selecteren van een verkoper (vb.: poetswerk uitbesteden)

  Transitioning to vendor

- Opening up proprietary business processes to third party

Rapid Application Development (RAD), Agile development and DevOps

Rapid application development (RAD): process of creating workable systems in a very short period of time.

Joint application design (JAD): used to accelerate generation of information requirements and to develop initial systems design

Agile development: focuses on rapid delivery of working software by breaking large project into several small subprojects

DevOps: builds on Agile development principles as an organizational strategy

Component-based development and web services

Component-based development

- Groups of objects that provide software for common functions (e.g., online ordering) and can be combined to create large-scale business applications

Web services

- Reusable software components that use XML and open Internet standards (platform independent)
- Enable applications to communicate with no custom programming required to share data and services
- Can engage other web services for more complex transactions

Rapid software development

Rapid development and delivery is now often the most important requirement for software systems

- Businesses operate in a fast –changing requirement and it is practically impossible to produce a set of stable software requirements
- Software must evolve quickly to reflect changing business needs.

“scrum” is hier een voorbeeld van. Dit is een framework om op een flexibele manier producten te maken in korte periodes (1-4 weken)

Rapid software development

- Specification, design and implementation are inter-leaved
- System is developed as a series of versions with stakeholders involved in version evaluation
- User interfaces are often developed using an IDE and graphical toolset.

Agile methods

1980s and 1990s view on software engineering:

- Careful project planning
- Formalized quality assurance
- CASE-tools (analysis and design)

Good for large and long-lived software systems (Aerospace, Government)

Examples: control systems for modern aircrafts

Dissatisfaction with the overheads involved in software design methods of the 1980s and 1990s led to the creation of agile methods.

These methods:

- Focus on the code rather than the design
- Are based on an iterative approach to software development
- Are intended to deliver working software quickly and evolve this quickly to meet changing requirements.

The aim of agile methods is to reduce overheads in the software process (e.g. by limiting documentation) and to be able to respond quickly to changing requirements without excessive rework.

The principles of agile methods

Principle	Description
Customer involvement	Customers should be closely involved throughout the development process. Their role is provide and prioritize new system requirements and to evaluate the iterations of the system.
Incremental delivery	The software is developed in increments with the customer specifying the requirements to be included in each increment.
People not process	The skills of the development team should be recognized and exploited. Team members should be left to develop their own ways of working without prescriptive processes.
Embrace change	Expect the system requirements to change and so design the system to accommodate these changes.
Maintain simplicity	Focus on simplicity in both the software being developed and in the development process. Wherever possible, actively work to eliminate complexity from the system.

Agile method applicability

Product development where a software company is developing a small or medium-sized product for sale.

Custom system development within an organization, where there is a clear commitment from the customer to become involved in the development process and where there are not a lot of external rules and regulations that affect the software.

Because of their focus on small, tightly-integrated teams, there are problems in scaling agile methods to large systems.

Problems with agile methods

- It can be difficult to keep the interest of customers who are involved in the process.
- Team members may be unsuited to the intense involvement that characterizes agile methods.
- Prioritizing changes can be difficult where there are multiple stakeholders.
- Maintaining simplicity requires extra work.
- Contracts may be a problem as with other approaches to iterative development.

Agile methods and software maintenance

Most organizations spend more on maintaining existing software than they do on new software development.

So, if agile methods are to be successful, they have to support maintenance as well as original development.

Two key issues:

- Are systems that are developed using an agile approach maintainable, given the emphasis in the development process of minimizing formal documentation?
- Can agile methods be used effectively for evolving a system in response to customer change requests?

Problems may arise if original development team cannot be maintained.

Mobile application development

Mobile websites

Mobile web apps

Native apps

Special requirements for mobile platform

- Smaller screens, keyboards, multitouch gestures, saving resources (memory, processing)

Responsive web design

- Websites programmed so that layouts change automatically according to user's computing device

H11: Managing projects

IM-11-

Objectives:

- Evaluate models for understanding the business value of IS
- Analyse the principal causes of IS failures
- Assess the change management requirements for building successful systems

Understanding the business value of IT

Different ways for producing value:

- Improvement in (new) business processes to increase firm efficiency
- Operational Excellence
- Improvements in management decision making (speed and accuracy)
- Competitive Advantage
- Survival

Additional IS value from:

- Strengthening firm strategically (ties to partners, customers, increasing flexibility, etc.) e.g. Dell Computers, Wal-Mart not an immediate ROI but a long-term ROI! first mover – fast follower
- Enabling future implementation of new technologies (option value) by creating possibilities to launch new products, implement new technologies

IS value

- Cannot always be captured by the company !
- Some or all the benefits go directly to the customer e.g. low prices, more reliable services (ATM machine at Ring Shopping Center in Kuurne Belgium)
- Essential from a management point of view: Return on invested Capital

Traditional capital budgeting models

Capital Budgeting: Process of analysing and selecting various proposals for capital expenditures
Capital expenditures:

- Expand production to meet anticipated demand
- Modernize production equipment to reduce costs
- Can be noneconomic, e.g. installing pollution control equipment, compliance with government regulations (SOX)

→IS are considered long-term capital investment projects

Six capital budgeting models for evaluating capital projects:

1) The payback method
2) The accounting rate of return on investment (ROI)
3) The net present value
4) The cost-benefit ratio
5) The profitability index
6) The internal rate of return (IRR)

Traditional capital budgeting models rely on measures of cash flows (in and out the firm) generated by the capital projects. Assume that all relevant alternatives have been examined. All costs and benefits can be expressed in monetary units. → Can everything be expressed in monetary units?

Total cost of ownership (TCO) = the actual cost of owning technology resources including the original cost of acquiring and installing hardware and software, as well as ongoing administration costs for hardware and software upgrades, maintenance, technical support, training, utility and real estate costs for running and housing the technology.

Limitations of financial models for IT investments

- Do not express the risks and uncertainty of their own costs and benefits estimates
- Costs and benefits do not occur in the same time frame.
- Cost tend to be up-front and tangible
- Benefits tend to be back loaded and intangible
- Inflation may affect costs and benefits differently.
- Intangible benefits are difficult to quantify.
- Technology can change during the building of a project
- Bias to transactional and clerical IT systems because of more measurable tangible benefits than MIS, DDS and EIS.
- Assessing of individual IT projects
- Not adequately addressing investments in IT infrastructure, new business models and enterprise-wide capabilities

The payback method

Measures the time required to pay back the initial investment of a project.

(Original Investment/Annual net cash inflow) = Number of years to pay back

Het wordt gebruikt als een initiële screening methode en het is goed voor high-riskprojecten om het bruikbaar leven ervan te bepalen. Als nadelen: negeert de tijdswaarde van geld, negeert de hoeveelheid cashflow na de terugbetalingsperiode, negeert de restwaarde, negeert de winstgevendheid van de investering.

Return on investment (ROI)

(Total benefits – Total cost – Depreciation) / Useful life = net benefit

Net benefit / Total initial investment = ROI

Net present value

The value in current dollars of a payment or stream of payments to be received in the future. Amount of money an investment is worth, considering its cost, earnings, and the time value of money

Cost-benefit ratio

Wordt gebruikt om verschillende projecten te rangschikken en te vergelijken. Hiervoor kunnen discounted cash flows gebruikt worden.

Total benefits / Total costs = cost-benefit ratio

Profitability Index

Present value of cash inflows / Investment = Profitability index

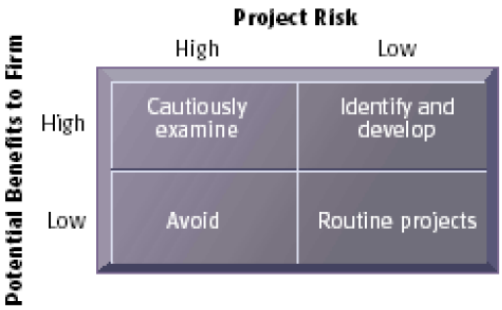
Internal rate of return

Rate of return or profit that an investment is expected to earn, considering the time value of money. The discount (interest) rate that will equate the present value of the project's future cash flows to the initial cost of the project. Value of R (discount rate) is such that Present Value –Initial Cost = 0

Alternative methods for evaluating IS investments

1) Portfolio Analysis

- An overall understanding of where the firm is making IT investments
- Based on inventory of all IS projects and assets, including infrastructure, outsourcing contracts and licenses
- Assigns risk and benefit profiles to IS investments



4 verschillende stadia

- Ad hoc (4,5%), stage zero: Ongecoördineerde beslissingen in IT zoals verschillende software pakketten van verschillende verkopers voor hetzelfde business proces. Vb.: complexe telecom infrastructuur
- Defined (24,5%), stage one: IT-projecten identificeren o.b.v. kosten en voordelen, centrale IT-project database, central budgetoverzicht, central project management office, kennis van financial metrics. GEEN consistentie binnen de gehele organisatie, geen links binnen de budgetteringscyclus, geen feedback loops
- Managed (54%), stage two: Standardised ITPM process, use of financial metrics, yearly reviews of IT spending with strategy, benchmarking GEEN ongoing reviews, niet alle projecten zijn gebonden aan ROI.
- Synchronised (17%), stage three: Alignment investment portfolio with business strategy, measuring a project's value through its life cycle, weed out underperforming initiatives, measuring Option value (use of BSC for IT), assessing the individual project risks and the portfolio risks, project risks: delays, cost overruns, end-user acceptance, ... portfolio risks: innovation: current and future!

Findings from research:

- There is only a statistical significant link between return-on asset (ROA) and a synchronized ITPM process. (ROA = Net Income / Total Assets)
- There is no link between the defined and managed ITPM processes and ROA!

Conclusion: simply defining and managing the ITPM process is not enough to improve performance.

2) Scoring Models

- A quick and compelling method for arriving at a decision on alternative systems.
- The most important outcome of a scoring model is not the score but agreement on the criteria used to judge a system.
- Best practice is to cycle through the scoring model several times, changing the criteria and weights, to see how sensitive the outcome is to reasonable changes in criteria.

Voorbeeld van een scoring model: Parker & Benson.

- Compare and prioritise IT projects (software, development)
- Disadvantage: not so good for IT Infrastructure projects

Slide 53-73 uit ppt4 bekijken, conclusive: Parker & Benson worden gebruikt om IS projecten te rangschikken en projecten moeten goed afgebakend zijn.

3) Balanced Scoreboard for IT

Performance Management System, evaluation of a firm should not be restricted to a traditional financial evaluation. Other measures are: customer satisfaction, internal processes, ability to innovate.

4 perspectieven:

USER ORIENTATION	BUSINESS CONTRIBUTION
How do users view the IT department? **Mission** To be the preferred supplier of IS **Objectives** -Preferred supplier of applications -Preferred supplier of operations vs. proposer of best solutions, from whatever source -Partnership with users -User satisfaction	How does management view the IT department? **Mission** To obtain a reasonable business contribution from IT investments **Objectives** -Control of IT expenses -Business value of IT projects -Provision of new business capabilities
OPERATIONAL EXCELLENCE	**FUTURE ORIENTATION**
How effective and efficient are the IT processes? **Mission** To deliver effective and efficient IT applications and services **Objectives** -Efficient and effective developments -Efficient and effective operations	How well is IT Positioned to meet future needs? **Mission** To develop opportunities to answer future challenges **Objectives** -Training and education of IT staff -Expertise of IT staff -Research into emerging technologies -Age of application portfolio

Key Goal Indicators: describes the outcome of the process, i.e. measurable after the fact; a measure of "what"; may describe the impact of not reaching the process goal, is an indicator of the success of the process and its business contribution.

- Are a measure of "how well" the process is performing
- Predict the probability of success or failure
- Focus on the process and learning dimensions of the balanced scorecard
- Are expressed in precise measurable terms
- Should help in improving the IT process

4) Real Options Pricing Models

- Uses the financial concept of options valuation
- An option is the right, but not obligation, to act at a future date.
- Like real options, which confers the right, but not the obligation, to obtain the benefits associated with some physical asset.

Technology positioning investment is an initial expenditure on IT creates the right, but not the obligation, to obtain the benefits associated with further development and deployment of the technology.

A company that defer the initial expenditure on IT does not have the same claim on future benefits.

Asymetric exposure to "gains" versus "losses":

- Full exposure of the potential of the technology if future events prove favourable t deployment.
- Limit losses to just the positioning investment if future events prove unfavourable.

Change management in IS success and failure

Every IT investment leads to costs of organizational change

Organizational change:

- Transformation of how individuals and groups perform and interact
- New distribution of power and authority
- Resistance and opposition

An IS failure is an outcome of a human process

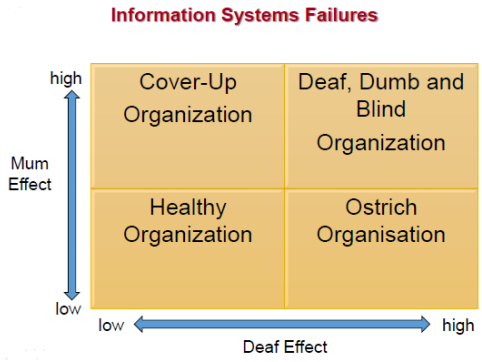
Expectation failure = the inability of an IS to meet a specific stakeholder group's expectation (K. Lyytinen& R. Hirschheim, 1987)

Stakeholders: any group of people who share a pool of values that define what the desirable features of an IS are and how they should be obtained

- Correspondence Failure
- Process Failure
- Interaction Failure

Termination Failure = when all stakeholders have left all support for the system (C. Sauer, 1993)

IS project abandonment is defined as a phenomenon that concerned with the anticipated failure of the project prior to its full implementation. (M. Keil, K. Ewusi-Mensah, 2003)



Information systems problem areas

- Design: System design may fail to capture essential business requirements or improve organizational performance. Information may not be timely: Information may be in a format that is difficult to understand or have a poor user interface.
- Data: The data in the system may have a high level of inaccuracy or inconsistency, may be inaccessible or incomplete.
- Cost: Some systems operate quite smoothly, but their costs to implement and run on a production basis may be way over budget.
- Operations: The system does not run well or breaks down and information is not provided in a timely and efficient manner. System response time is too long. Operation problems can be attributed to technical features, but most from organisational factors.

Change management and the concept of implementation

Implementation: All organizational activities working toward the adoption, management, and routinisation of a new system change agent. The system analyst is the change agent!

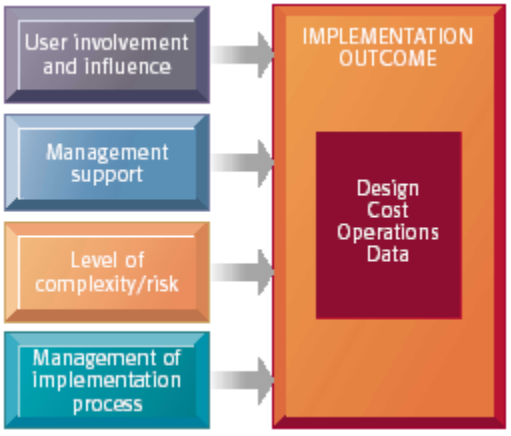
The systems analyst who develops technical solutions and redefines the configurations, interactions, job activities, and power relationships of various organizational groups

Acts as catalyst for the entire change process and is responsible for ensuring that all parties involved accept the changes created by a new system.

Causes of implementation success and failure

User Involvement and Influence:

- If users are heavily involved in systems design, they have more opportunities to mold the system according to their priorities and business requirements and control the outcome.
- Involved users are more likely to react positively to the completed system.



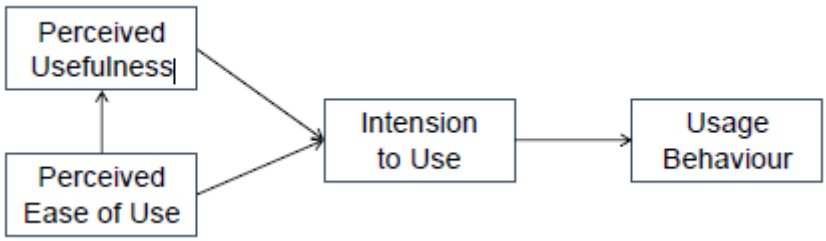
User-Designer Communications Gap:

- Users can have limited understanding of other issues and solutions.

User Concerns	Designer Concerns
Will the system deliver the information I need for my work?	How much disk storage space will the master file consume?
How quickly can I access the data?	How many lines of program code will it take to perform this function?
How easily can I retrieve the data?	How can we cut down on CPU time when we run the system?
How much clerical support will I need to enter data into the system?	What is the most efficient way of storing these data?
How will the operation of the system fit into my daily business schedule?	What database management system should we use?

User Involvement and Influence:

- Technological Acceptance Model (TAM) (F.Davis)



Management Support and Commitment:

- Commitment of management to an IS project usually results in a more positive perception and acceptance by users and the technical services staff.
- Management backing also ensures that a systems project receives sufficient funding and resources to be successful
- All the changes in work habits and procedures and any organizational realignment associated with a new system depend on management backing

Level of Complexity and Risk:

- The level of project risk is influenced by: project size, project structure, level of technical expertise of the information systems team

Outsourced information IS failure

Principal-agent theory:

Deze theorie is eerder toepasbaar bij kmo's. Hoe kleiner het bedrijf, hoe moeilijker men het soms heeft met IT-projecten.

- Principal = de klant; deze bepaalt wat het werk is, heeft iemand nodig met meer kennis.
- Agent= contractor: ISV (Independent Software Vendor) or ERP Implementor / undertakes the work. Deze nemen het werk aan en hebben dus ook meer kennis dan de klant. Hier kan soms misbruik gemaakt worden van de situatie (vb.: als iemand een tweedehandsauto koopt, weet de garagist alles wat aan de auto verkeerd is, de klant niet)

Tegenstellingen tussen de twee partijen:

- Rational behaviour & expectations for both parties (bounded rationality)
- Self-interest of parties (goal conflict between parties)
- Outcome has effects on the Principal's profit and success
- Outcome is only partly a function of behaviours of Agent (risk aversion / risk neutral)

Agent has discretionary freedom due to asymmetric information

- ex ante = uncertainties for Principal (Adverse Selection)
- ex post = disadvantages for Principal (Moral Hazard)

Om deze asymmetrische informatie tegen te gaan, wordt de agent genoeg betaald. Ook dit is natuurlijk niet een volledige garantie op succes.

Principal-Agent theory for IT and SMEs?

- SME-Principal is less knowledgeable on IT than ISV-Agent
- SME-Principal is confronted with high monitoring costs
- SME-Principal is limited in his ability to monitor and judge the contractor's input and output. De klant heeft minder kennis van de zaak. Dit maakt het dan natuurlijk moeilijker om te controleren of alles goed is gegaan.
- Missing metrics and measures for programmer's productivity and outcome

Some examples from real life cases:

- Hidden characteristics: skills to develop & modify screens in an ERP package
- Hidden intention: Agent wants to use the custom-made software for the purpose of developing a software package. Agent is working on two parallel projects
- Hidden action: Agent is correcting software errors during billable hours, Agent is playing computer games during work hours.

<u>Principal-agent theory</u>

1) Situatie van volledige publieke informatie. De klant heeft de mogelijkheden en kennis om de agent te controleren. Hierdoor zal de agent meer geneigd zijn om in het voordeel van de klant te handelen.

→Best solution: Behaviour-based contract reward is outcome independent!

2) Situation of incomplete information (information asymmetry)

When the contract between the P and A is outcome based, then A is more likely to behave in the interests of the principal.

→Second best solution: Outcome-based contract: reward is outcome dependent (de klant betaalt pas na een bepaalde tijd als alles in orde is)

<u>The market for lemons</u>: de markt degenereert. Als kopers geen onderscheid zien tussen goede en slechte waren, zijn ze slechts bereid om een gemiddelde prijs te betalen. Verkopers van goede waren zullen geen goede prijs meer krijgen en de markt verlaten. Na een tijd zal de markt dus enkel nog uit slechte waren bestaan.

Prospect theory (Kahneman & Tversky): deze theorie stelt dat de voorkeur van beslissingen bij onzekerheid afhankelijk is van de omstandigheden. De inschatting van kansen en risico's zijn niet absoluut, maar relatief ten opzichte van de voorgaande situatie.

Experiment: wanneer je winsten kan kiezen, dan is men risicoavers. Wanneer je verliezen moet kiezen, is men risico zoekend behalve als de kans om te winnen of verliezen klein is.

A person is risk averse for gains and is risk seeking for losses (reflectivity principle)

This is also known as the certainty effect

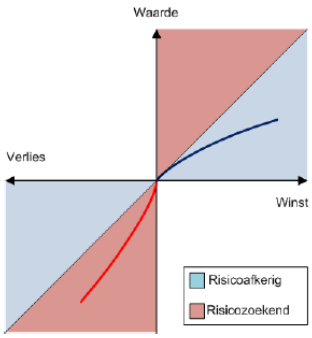
People favour risk aversion in the domain of gains and risk seeking in the domain of losses

Prospect Theory *(Kahneman & Tversky)*

The value function

A person is risk averse for gains (concave function)

A person is risk seeking for losses (convex function)



H12: Enterprise Architecture

IM-12-

What is an enterprise?

Any organisation (company, charity, government, department, agency, …). VZW's horen hier niet bij volgens prof. Devos

A collaborative collection of sub-organisations with a shared set of objectives.

What is architecture?

- The complex or carefully designed structure of something.
- A description of the structure (components) and behavior (processes) of a system.
- The activity required to produce such a description.

What is enterprise architecture?

It is an ontology which provides a structured way of viewing and defining enterprises.

Ontology: The part of philosophy that studies what it means to exist. OR A formal representation of the knowledge by a set of concepts within a domain and the relationships between those concepts. Het is parate kennis van specifiekere termen die men heeft over een onderwerp.

Documentation: describing the structure and behaviour of an enterprise (including its information systems)

A process for describing an enterprise (including its information systems) then planning and governing changes to improve the integrity and flexibility of the enterprise.

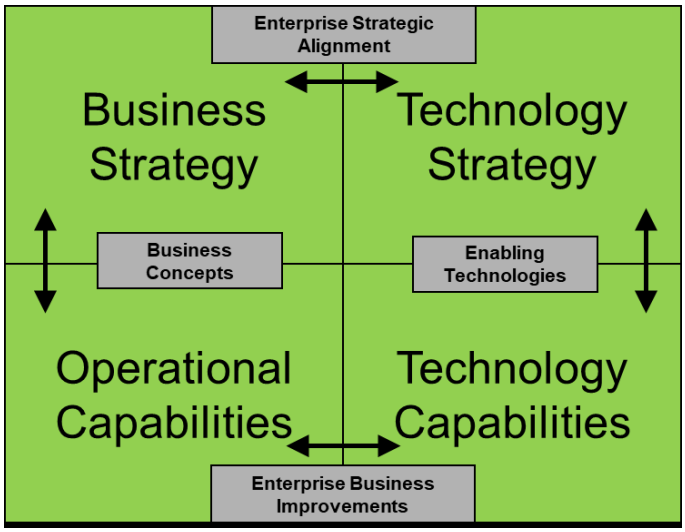
- Set of models and documents
- Graphical and textual artefacts
- Diagrams and symbols
- Definitions and descriptions
- Describes multiple architecture domains
- Describes many stakeholder views
- Defines relationships between them

Why enterprise architecture?

Twenty years ago, a new field was born that soon came to be known as enterprise architecture. The field began to address two problems:

- System complexity – Organisations were spending more and more money building IT systems
- Poor business alignment- Organisations were finding it more and more difficult to keep those increasingly expensive IT systems aligned with business need.

Alle verschillende bekwaamheden moeten op elkaar afgestemd zijn om goed te kunnen functioneren en dit is wat enterprise architecture wil bekomen.



- Enhance the relationships between IT and the business
- Reinforce IT understanding of the business strategy
- Create a process for continuous IT/business alignment.
- Enhance IT agility to support business changes
- Create business value from IT

Frameworks for enterprise architecture

Why do this at the ENTERPRISE level?

- To overcome religious wars concerning technology choices within projects.
- To provide consistent and disciplined use of technology.
- To reduce stovepipe solutions & reduce integration complexity

Common understanding of certain terms is necessary, so people can understand each other.

The enterprise view

An enterprise perspective identifies the big-picture interrelationships & interdependencies to make appropriate optimisation and suboptimisation decisions

- Look at “the whole,” not the parts
- Look beyond narrow and restricted views
- Look for context from the top

The quality of all IT decisions is dependent on the enterprise view

Enterprise architecture (EA) and construction architecture (CA)

- CA shares a common frame of reference (e.g. ‘room’, ‘balcony’, ‘roof’ ….) the relations and functions are also well known (e.g. rooms are connected to other rooms via doors)
- It makes architecture easier

Frameworks for Enterprise Architecture

Graphical representation of the “real world”

Multiple architecture domains

- Data
- Business process
- Technical
- Application
- Organisation

Many stakeholder views

- Management
- Designer
- Builder
- User communities

- Many levels of model: Conceptual → logical → physical
- Many artefacts and relationships
- Supported by descriptive text
- Governed by architecture principles and standards
- Business-centred

ZACHMAN, TOGAF, FEAF, TAFIM, E2AF, …

History of frameworks for Enterprise Architecture

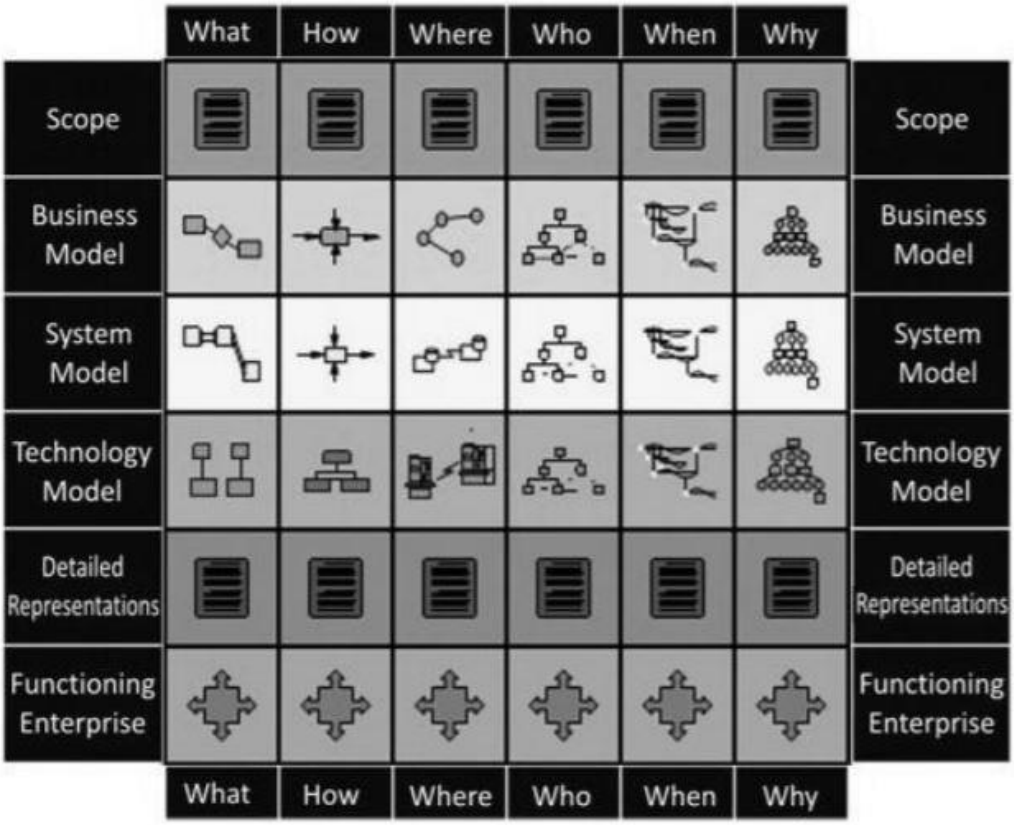
The field now known as enterprise architecture first came about 30 years ago. In 1987, J.A. Zachman wrote an article entitled “A Framework for Information Systems Architecture” in the IBM Systems Journal. Zachman originally described as information systems architectural framework, but it was soon renamed enterprise-architecture framework.

- Applies physics and engineering principles to the enterprise as a whole
- Tool for engineering and manufacturing enterprises

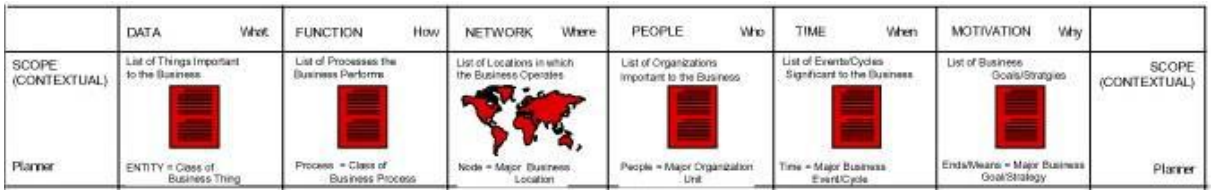
Zachman framework for Enterprise Architecture

It’s a logical structure for classifying and organizing the descriptive representations of an Enterprise that are significant to the management of the Enterprise as well as to the development of the enterprise’s systems.

A logical structure for classifying and organizing the descriptive representations of an enterprise in different dimensions, and each dimension can be perceived in different perspectives 6X6 matrix



Colums – illustrate different descriptions of an enterprise from a certain perspective.



- the what into inventory. This interrogative is about the set of things that the enterprise must manage or track.
- The how into process flows. This interrogative is about how the work and processes are designed and executed within the enterprise;
- The where into distribution networks. This interrogative is about locations and distances;
- The who into responsibility assignments. This interrogative is about roles and responsibilities;
- The when into timing cycles. This interrogative is about changes regarding time. Traditionally, organizations are established in precise geographic location (regarding the where interrogative) and time zone;
- The why into main reasons and motivation intentions. This interrogative is about motivations that drive organizational behaviors, concerns and decision-making.

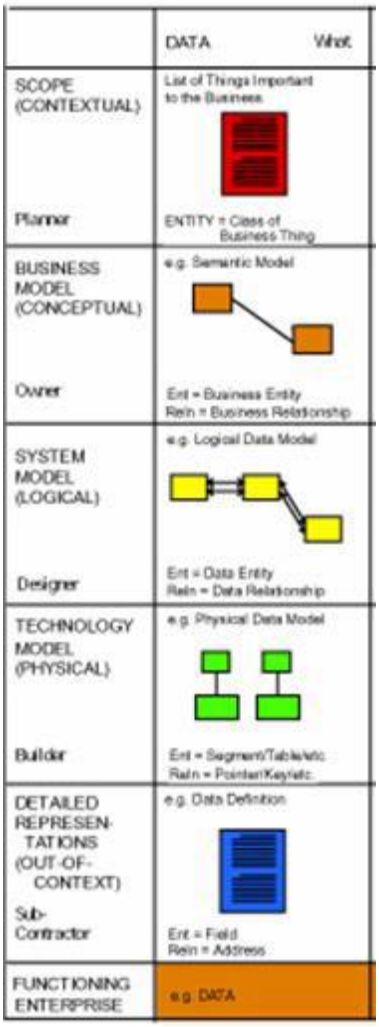
Rows- One aspect of the enterprise from top to the bottom from different perspectives.

The rows represent the transformation of an abstract concept into a concrete (more real) concept through DIFFERENT PERSPECTIVES labelled as

- Scope
- Enterprise
- System (IS Functionality)
- Technology (Physical design)
- Detailed representations
- Functioning enterprise

The rows are the perspectives (stakeholders):

- Executive Perspective (Scope)
- Business Management Perspective (Business Concepts)
- Architect Perspective (System Logic)
- Engineer Perspective (Technology Physics)
- Technician Perspective (Tool Components)
- Enterprise Perspective (Operations Instances)



The cells formed by the intersection between the two axes are the framework classifications

ZF will constitute the total set of descriptive representations that are relevant and important to describe an enterprise in both the management of the company and the development of its information systems

Zachman: the 7 rules

Rule 1 The columns have no order: The columns are interchangeable but cannot be reduced or created

Rule 2 Each column has a simple generic model: Every column can have its own meta-model

Rule 3 The basic model of each column must be unique: The basic model of each column, the relationship objects and the structure of it is unique. Each relationship object is interdependent, but the representation objective is unique.

Rule 4 Each row describes a distinct, unique perspective: Each row describes the view of a particular business group and is unique to it. All rows are usually present in most hierarchical organizations.

Rule 5 Each cell is unique: Example: A2 represents business outputs as they represent what are to be eventually constructed.

Rule 6 The composite or integration of all cell models in one row constitutes a complete model from the perspective of that row: For the same reason as for not adding rows and columns, changing the names may change the fundamental logical structure of the Framework.

Rule 7 The logic is relational between two instances of the same entity.

Zachman row 1

- What = the DATA dimension -What is out of scope
- How = the FUNCTION dimension -List of processes + defining context for processes of other perspectives
- Where= the NETWORK dimension –defining location context
- Who = the PEOPLE dimension –defining the target groups
- When = the TIME dimension -List of events
- Why= the MOTIVATION dimension –List of objectives, strategies, critical success factors

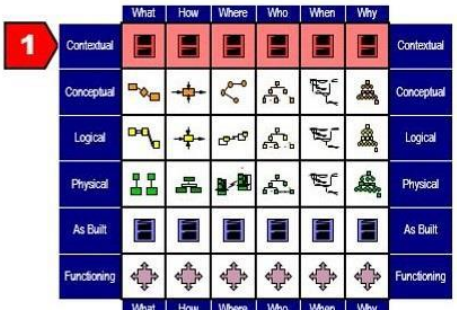
	What	How	Where	Who	When	Why
Scope	Running; Sports; Shoes;	Designing; testing; manufacturing; documenting; selling; distributing; marketing;	Netherlands; China;	Suppliers; Partners; Resellers;	6 months for each new product release;	Entertainment; Wellbeing; Health;

Inside of each of the activities, six sub-activities (representing the six interrogatives for each different perspective) have to be done regarding the fulfilling of the cells of each row, what results in the ZF deliverables

Row 1

- **Motivation/Why**
  Business goals, objectives and performance measures related to each function
- **Function/How**
  High-level business functions
- **Data/What**
  High-level data classes related to each function
- **People/Who**
  Stakeholders related to each function
- **Network/Where**
  locations related to each function
- **Time/When**
  Cycles and events related to each function

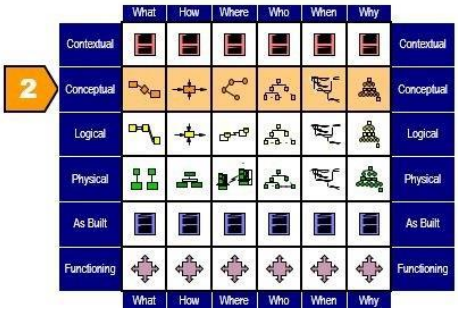
- **External Requirements and Drivers**
- **Business Function Modeling**



Row 2

- **Motivation/Why**
  Policies, procedures and standards for each process
- **Function/How**
  Business processes
- **Data/What**
  Business data
- **People/Who**
  roles and responsibilities in each process
- **Network/Where**
  locations related to each process
- **Time/When**
  Events for each process and sequencing of integration and process improvements

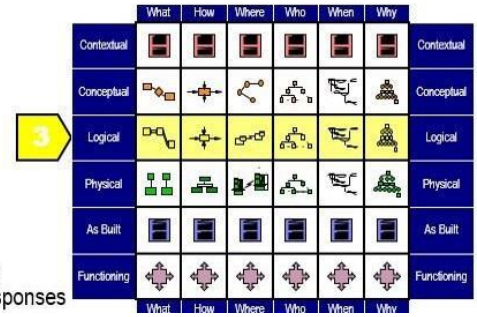
- **Business Process Models**
- **Business Function Allocation**
- **Elimination of Function Overlap and Ambiguity**



Row 3

- **Motivation/Why**
  policies, standards and procedures associated with a business rule model
- **Function/How**
  Logical representation of information systems and their relationships
- **Data/What**
  Logical data models of data and data relationships underlying information
- **People/Who**
  Logical representation of access privileges constrained by roles and responsibilities
- **Network/Where**
  Logical representation of the distributed system architecture for locations
- **Time/When**
  Logical events and their triggered responses constrained by business events and their responses

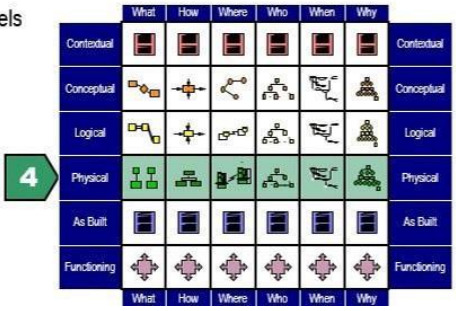
- **Logical Models**
- **Project Management**
- **Requirements Definition**



Row 4

- **Motivation/Why**
  business rules constrained by information systems standards
- **Function/How**
  Specifications of applications that operate on particular technology platforms
- **Data/What**
  Database management system (DBMS) type requirements constrained by logical data models
- **People/Who**
  Specification of access privileges to specific platforms and technologies
- **Network/Where**
  Specification of network devices and their relationships within physical boundaries
- **Time/When**
  Specification of triggers to respond to system events on specific platforms and technologies

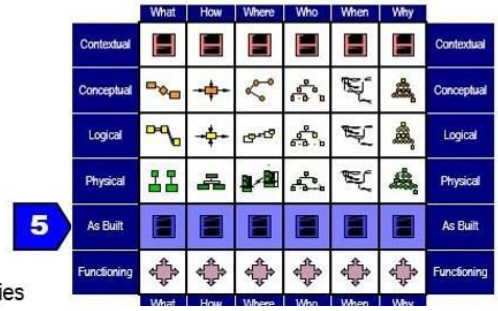
- **Physical Models**
- **Technology Management**
- **Solution Definition and Development**



Row 5

- **Motivation/Why**
  business rules constrained by specific technology standards
- **Function/How**
  Programs coded to operate on specific technology platforms
- **Data/What**
  Data definitions constrained by physical data models
- **People/Who**
  Access privileges coded to control access to specific platforms and technologies
- **Network/Where**
  Network devices configured to conform to node specifications
- **Time/When**
  Timing definitions coded to sequence activities on specific platforms and technologies

- **As Built**
- **Configuration Managemen**
- **Deployment**

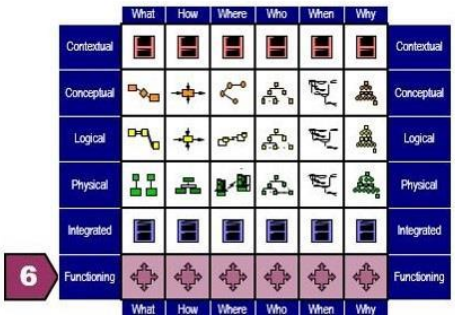


Hier zit de code, programmatie

Row 6

- **Motivation/Why**
  Operating characteristics of specific technologies constrained by standards
- **Function/How**
  Functioning computer instructions
- **Data/What**
  Data values stored in actual databases
- **People/Who**
  personnel and key stakeholders working within their roles and responsibilities
- **Network/Where**
  Sending and receiving messages
- **Time/When**
  Timing definitions operating to sequence activities

- **Functioning Enterprise**
- **Operations Management**
- **Evaluation**



Zachman (summary)

- "Reference model" for architecture frameworks
- Supports all architecture domains (column)
- Supports multiple perspectives (row)
- Supports multiple stakeholder views
- Not prescriptive about multiple modelling methods: Iedereen is nog altijd vrij om als men aan het modelleren is om een eigen systeem te gebruiken.
- Enables use of existing (legacy) models
- Enables re-use of model artefacts
- Enables a common vocabulary for IT and business people

"The system is the enterprise" [q. J Zachman]

H13: Security (Len Lemaire) eindelijk met een goede cursus

Zie vooral de cursus. Hieronder staan de nadrukken die prof. Lemaire legde tijdens de les.

Algemeen

Soorten aanvallers

Hackers: Eerder mensen die ook nog een “goede” bedoeling hebben. Bv.: Apple dat hackers beloont als ze kunnen inbreken in hun systeem en dit uitleggen. Anonymous is op het randje van “goede” bedoelingen

Crackers: De mensen met slechte bedoelingen

Scriptkiddies: Mensen die niets van hacking afweten maar openbare programma’s gebruiken die uit zichzelf lopen.

Interne risico’s

- Nietsvermoedende medewerkers: vb.: usb-sticks op de universiteit, e-mail openen en bestand downloaden.
- Misnoegde werknemers:
- Nieuwgierige medewerkers of snoops: vb.: mensen die toevallig toegang krijgen tot bestanden die ze niet moeten zien. Snoops zijn mensen die gaan zoeken naar specifieke bestanden in opdracht van anderen.
- Subcontractors: Veel bedrijven huren iemand in voor de beveiliging. Deze mensen krijgen vaak toegang tot het volledige bedrijf. Eens het contract beëindigd is, blijft men vaak toegang hebben tot het bedrijf.

Malware

- Virussen: de broncode wordt vermenigvuldigd naar andere computers
- Spyware: probeert in te loggen en iets te doen met die informatie. Vaak gaat dit op zoek naar een bepaalde routine die je hebt voor een paswoord in te geven. (…@... tab-toets …….. enter) Als je dit op een computer kunt krijgen, dan is het gemakkelijk om informatie te stelen.
- Wormen: maken zich een pad door het netwerk
- Trojaanse paarden: een softwarepakket dat iets anders doet dan waarvoor het normaal dient. (shady programma downloaden en tegelijk iets binnenkrijgen)
- Ransomware: dit zal je data versleutelen. Als je betaalt, zal je een code krijgen om je computer weer te ontgrendelen.

Technieken voor een cyberaanval

Vulnerabilities, exploits en backdoors

- Vulnerability: een zwak punt in de computer
- Exploits: een manier om binnen te geraken
- Backdoors: manier waarop je weer opnieuw in het systeem kan binnen geraken. Vaak is dit door programmeurs al erin gemaakt zodat zij snel toegang krijgen. Het wordt gevaarlijk als een hacker die kan vinden.

Bufferoverflow

Een buffer is een reeks gereserveerde geheugenblokken die gebruikt wordt om data vast te houden Bij bufferoverflow zorgt de aanvaller ervoor dat de bufferlimiet van de gegevensopslag wordt overschreden door meer tekens naar de buffer te schrijven dan toegelaten is. Dat heeft tot gevolg dat hij de buffer van het programma kan overschrijven met een eigen code die hem eventueel toegang tot het systeem kan verschaffen, of waardoor hij het systeem kan doen crashen.

Ondoordacht gecodeerde websites

De broncode van de website opvragen en via de structuur een zwak punt achterhalen.

Defacing

Wanneer een organisatie over een website beschikt, kan die kwetsbaar zijn voor ‘defacing’. Defacing houdt in dat men zonder toestemming een website vervangt of verandert. Dit kan onder andere gebeuren door middel van DNS-aanvallen, of Domain Name Service-aanvallen. Je wordt automatisch naar een gelijk-uitziende website gebracht. Daar geef je je wachtwoord in….

Spoofing

- IP-spoofing: Bij IP-spoofing kan de aanvaller pakketten versturen over het netwerk met een vals IP-adres.
- ARP-spoofing: ARP (Address Resolution Protocol; een onderdeel van het TCP/IP-protocol maar werd niet besproken) wordt gebruikt om een IP-adres om te zetten naar een overeenkomstig MAC-adres (of hardware-adres) op ethernet-niveau
- DNS-spoofing: Zie defacing
- E-mail-spoofing: E-mail-spoofing’ is het verzenden van e-mail van een vals e-mailadres. Een variant van e-mail-spoofing zijn ‘phishing-mails’.

Verkennende aanvallen

Sniffers

Scanners

DoS en DDoS

Dos: Denial of Services

DDoS: Distributed Denial of Services

Dos is niet genoeg, DDos wel. Men maakt gebruik van een heel netwerk van pc’s om een systeem te laten crashen. Dit moeten zelfs niet enkel pc’s zijn. Alles wat met het internet verbonden is, kan men hiervoor gebruiken.

Social engeneering

-Niets is zo dom als een mens- L. Lemaire

Mensen kunnen snel gemanipuleerd worden tot het geven van paswoorden of andere gegevens die voor het op het eerste zicht onschuldig lijken.

Man-in-the-middle

Vb.: je gebruikt een VPN, dat is een derde waardoor al je data zal gaan. Deze moet dan nog enkel de versleuteling doorbreken en hij heeft toegang tot alles

Brute force-attacks

Gewoon een programma alle combinaties laten afgaan van een mogelijk wachtwoord.

Netwerkcomponenten onbruikbaar maken

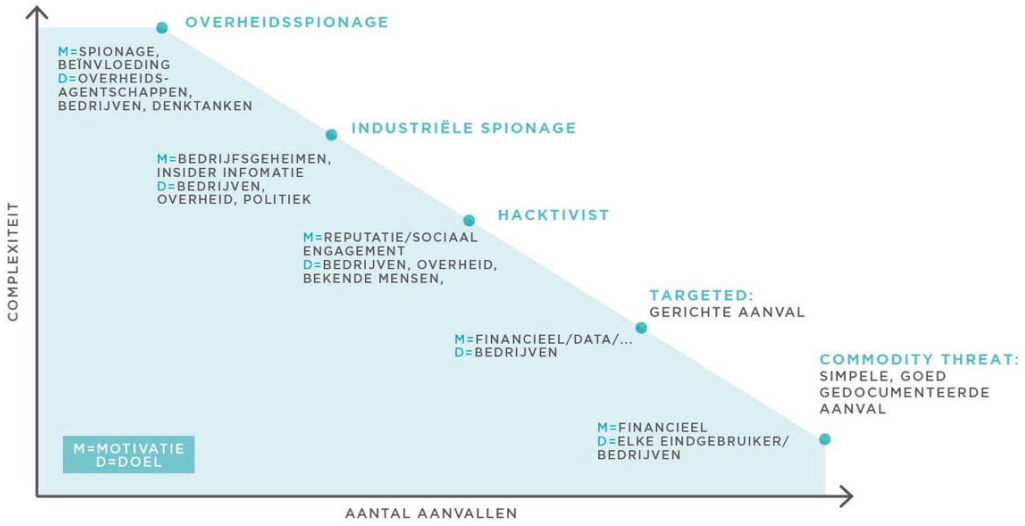
- DoS, DDoS
- Vernietiging of wijziging van een configuratie-informatie
- Fysieke vernieling of wijziging van netwerkcomponenten

Aanvallen op draadloos netwerk

WPA2 wachtwoord is te achterhalen met een programma

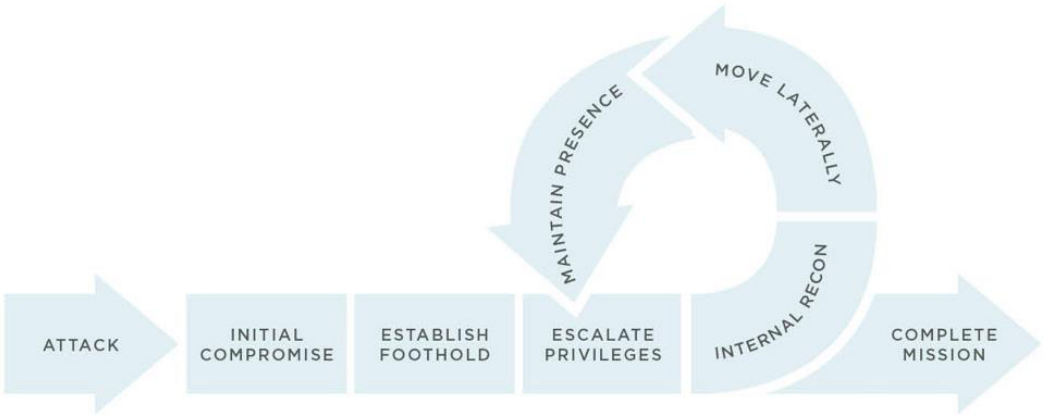
Advanced Persistent Threats (APT)

Door wie, voor wat en van waar



Stuxnet: Virus geschreven door de NSA, verspreid met USB-sticks. Het programma deed niets behalve bij een aantal specifieke Siemens computers (waarvan men de serienummers wist) van kerncentrales in Iran.

APT



Technische maatregelen ter beveiliging van netwerken

Preventie

- Toegangscontrole
- Versleuteling
- Firewalls
- Virtual Private Network (VPN)
- Patchen
- Intrusion Prevention Systems (IPS)

Detectie

- Intrusion Detection Systems (IDS)
- Honeypots

Reactie

Preventie

Toegangscontrole

100% veilig systeem zal niet volstaan maar de beste oplossing is om voor ieder account een ander wachtwoord te gebruiken.

Access token: een bepaald voorwerp (vb.: usb-stick) is nodig om de computer te kunnen gebruiken

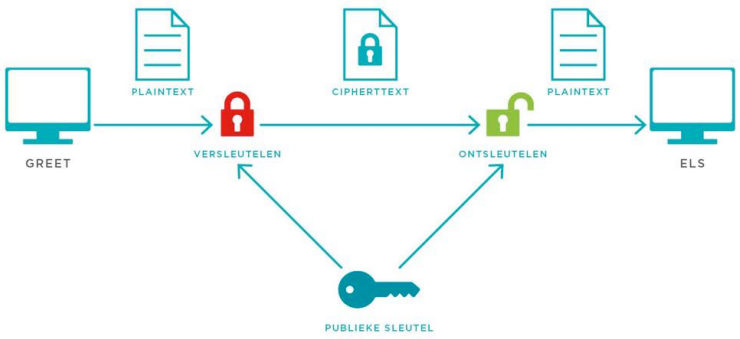
Strong-authentication: vb.: bericht naar je gsm

Biometrie

Versleuteling

Gegevens onleesbaar maken a.d.h.v. een sleutel. Als je dan de sleutel hebt, kan je de gegevens weer leesbaar maken.

Symmetrische encryptie



Greet wil een symmetrisch geëncrypteerd bericht versturen naar Els.

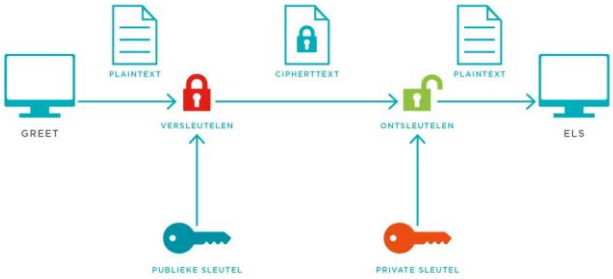
Greet ontvangt de publieke sleutel.

Greet maakt gebruik van de publieke sleutel om de ciphertext op te stellen.

Els ontvangt de publieke sleutel.

Els maakt gebruik van de publieke sleutel om het bericht leesbaar te maken.

Asymmetrische encryptie



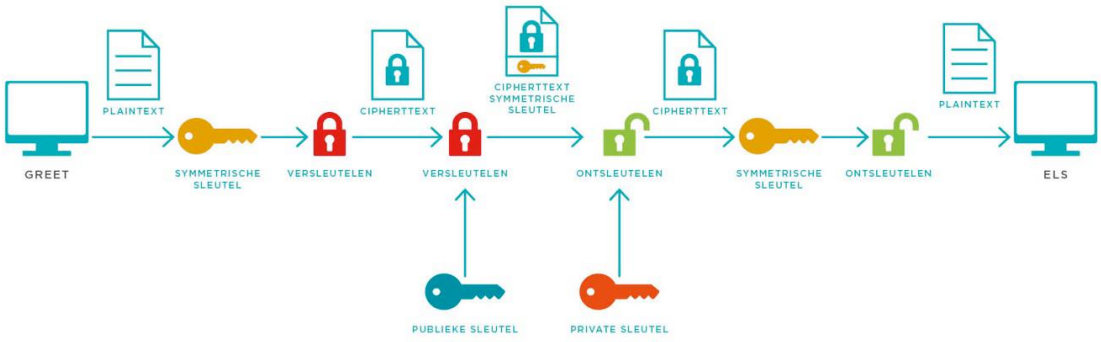
Greet wil een asymmetrisch geëncrypteerd bericht versturen naar Els.

Greet ontvangt de publieke sleutel.

Greet maakt gebruik van de publieke sleutel om de ciphertext op te stellen.

Els maakt gebruik van haar private sleutel om het bericht leesbaar te maken.

Hybride encryptie



- Greet wil een bericht versturen naar Els via hybride encryptie.
- Greet ontvangt de publieke sleutel.
- Greet berekent zelf een symmetrische sleutel.
- Greet stelt de ciphertext op door gebruik te maken van de symmetrische sleutel.
- Greet encrypteert de symmetrische sleutel door gebruik te maken van de publieke sleutel.

- Greet verbergt deze sleutel in de ciphertext.
- Els maakt gebruik van haar private sleutel om de symmetrische sleutel uit de ciphertext te filteren.
- Els maakt gebruik van de symmetrische sleutel om het bericht leesbaar te maken.

Dit is het meest gebruikt. https maakt hiervan gebruik.

Point-to-point encryptie (P2PE)

P2PE is een vorm van versleuteling waarbij geen gebruik wordt gemaakt van een publieke sleutel. Elke sleutel die gebruikt wordt is alleen gekend door het toestel dat de versleuteling uitvoert. Elk interactiepunt ('point of interaction' of POI) is een gecertificeerd toestel en heeft hardwarematig een identificatie die mee een rol speelt bij het berekenen van de gebruikte sleutel.

Vb.: betalen aan een terminal in een winkel

End-to-end encryptie

'End-to-end-versleuteling' is gebaseerd op hetzelfde principe, maar deze keer gaat het niet over punten van vertrouwen, maar over verzender en ontvanger van het bericht. WhatsApp zegt hiervan gebruik te maken. Zij zelf kunnen het bericht dus niet lezen.

Hasing

Een sterk wachtwoord wordt omgezet naar een code. Deze wordt dan gebruikt om in te loggen. Iemand met slechte bedoelingen kan dus niet de directe code zien. De computer controleert enkel of de hash van het opgegeven wachtwoord overeenkomt met de opgeslagen hash.

Firewalls

Dmz

Vpn

Patchen

Een "patch" is een oplossing voor een bug of kwetsbaarheid in een softwareprogramma. Het bevat programmacode die aan het programma wordt toegevoegd en die het gat in de software moet dichten. Gewoon altijd je updates downloaden dus.

Intrusion Prevention Systems (IPS)

Een IPS zal net als een IDS het netwerkverkeer monitoren, en treedt in werking wanneer een potentiële bedreiging wordt opgemerkt. Een IPS zal niet enkel de zwakheid in het systeem detecteren, maar zal eveneens actief voor een oplossing zorgen, gebaseerd op een aantal vooraf gedefinieerde regels, geconfigureerd door de netwerkbeheerder.

Detectie

Intrusion detection systems (IDS)

Het doel van IDS is het ontdekken van onbevoegde gebruikers of indringers wanneer ze ongeautoriseerd toegang hebben verkregen tot het netwerk. De gebruikte methodes bij IDS zijn in hoofdzaak gebaseerd op observatie en analyse van de gebeurtenissen. IDS staat hoofdzakelijk in voor:

- Het verzamelen van informatie over aanvallen op het bedrijfsnetwerk.
- Het gecentraliseerd beheer van de alarmsignalen wanneer een potentiële aanval werd gedetecteerd.
- Het verschaffen van een eerste diagnose over de aard van de aanval zodat men vlug en efficiënt kan reageren.
- Het vertragen of het stoppen van de uitgevoerde aanval.

De detectiemethode die aangewend wordt door een IDS kan onderverdeeld worden in twee categorieën

- Knowledge-based detection systems
- Anomaly detection

Afhankelijk van de functie en plaatsing van het IDS, zijn er drie grote categorieën IDS-implementaties te onderscheiden

- Network-based intrusion detection systems (NIDS)
- Host-based intrusion detection systems (HIDS)
- Hybrid intrusion detection systems (NIDS + HIDS)

Honeypots

Het idee achter een 'honeypot' is dat men een server installeert, die van het bedrijfsnetwerk is geïsoleerd. De honeypot is zo geïnstalleerd dat een aanvaller denkt dat het om een deel van het bedrijfsnetwerk gaat. Wanneer de aanvaller dit opgezette netwerk binnendringt, kan men zijn activiteiten monitoren en zo eventueel gegevens over hem en de aanval verzamelen om de ondernomen aanval te stoppen.

Een honeypot is een relatief simpel concept dat volgende voordelen oplevert:

- Een kleine hoeveelheid data met een hoge waarde
- Nieuwe middelen en technieken
- Een minimum aan benodigde middelen
- Informatie
- Eenvoud

Een honeypot registreert enkel die activiteiten die gelinkt zijn aan de honeypot zelf. Het kan dus geen informatie geven over de aanvallen op andere informatiesystemen of netwerksegmenten. Het kan wel een profiel opstellen van iemand die de honeypot gebruikt. Normaal zou er geen activiteit mogen zijn op deze server. Als er wel activiteit is, weet men dat er een aanval bezig is.

Een honeypot dient dus geloofwaardig te zijn voor een hacker, en dit kan alleen door zich zo te gedragen dat de server actief gebruikt wordt.

Reactie

Elke organisatie dient procedures vast te leggen met scenario's die beschrijven hoe men dient om te gaan met een specifiek incident.

Risk assessment

Een belangrijk onderdeel van beveiliging is "risk assessment". Hoe gaan organisaties om met risico? Zijn er mogelijkheden om risico te meten? Hoe ver moet men gaan om risico's te vermijden?

CIA-TRIAD

Er zijn drie soorten risico's rond data.

- Confidentiality
- Availibility
- Integrity

IT-risico

"The potential that a given threat will exploit vulnerabilities of an asset or group of assets and thereby cause harm to the organization. It is measured in terms of a combination of the probability of an event and its consequence."

ALE

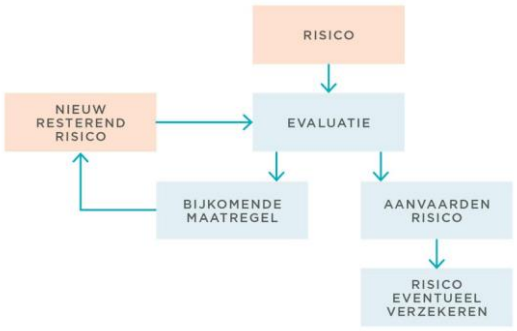
De kost berekenen doe je door te berekenen wat de kans is dat een bepaald event gebeurt en dat af te wegen ten opzichte van de consequenties die gepaard gaan met dergelijk event.

ALE= (kans dat een event voorvalt) X (de kost van een dergelijk event)

Gevolgen risk assesment

Wanneer de kost om een IT-risico weg te werken kleiner is dan ALE men het probleem dient op te lossen.

Wanneer de kost groter is, moet men als bedrijf bereid zijn het risico te lopen of kan men eventueel zoeken naar een verzekering.



Problemen met IT-risico

Het grootste probleem is het juist inschatten van de kans en het juist budgetteren van de kost van een incident. Niet alles is uit te drukken in harde valuta. Denk maar aan imagoschade na een incident.

In het wereldje van netwerkbeveiliging gaat het soms heel snel. Plots ontdekken hackers een bug in software die resulteert in een enorme bedreiging.

Eenvoudige maatregelen

Heel wat cyberincidenten kunnen op eenvoudige wijze voorkomen worden.

- Updates en patches altijd onmiddellijk installeren
- Slecht gebruikersmanagement
- Slechte architectuur van het netwerk
- Geen controle of logfiles
- Slechte gewoonten van gebruikers of systeembeheerders
- Geen sterke authenticatie
- Eenvoudige toegang tot het LAN-netwerk

IT-governance

Bedrijven moeten gedragscodes opstellen die betrekking hebben op beveiliging. Er dient een raamwerk ontworpen te worden dat beschrijft hoe men met beveiliging omgaat en hoe men reageert op incidenten. 'IT-governance' gaat dus eigenlijk over een goed beheer van IT.

Plan: men moet een informatiebeveiligingsraamwerk ontwikkelen

Do: In deze fase gaat men over tot de uitvoering van de afspraken

Check: In deze fase focust men op het monitoren en evalueren van de maatregelen

Act: Dit houdt in dat men continu moet streven naar verbetering

Iso 2700X-normen

Een belangrijke beschrijving van maatregelen, best practices en standaarden rond het ISMS en de beveiliging vind je in de ISO2700X-normen.

Certificaten

Er bestaan allerhande certificaten rond IT-beveiliging. Je hebt certificaten voor beveiligingsspecialisten die aanduiden dat ze geslaagd zijn voor bepaalde examens en effectief aan de slag kunnen als beveiligingsspecialist. Daarnaast zijn er ook certificaten die bepalen of een bedrijf aan bepaalde voorwaarden voldoet. Dergelijke certificaten kunnen vereist zijn om actief te zijn binnen een bepaalde sector (bv.: banken). Maar bedrijven onderling kunnen ook bepaalde certificaten opleggen alvorens toegang te verschaffen tot data of bedrijfssystemen.

Wetgeving rond informatiebeveiliging

General Data Protection Regulation (GDPR)

Een belangrijke wetgeving rond informatiebeveiliging is 'GDPR' (of met de Nederlandse benaming 'AVG', nl. Algemene Verordening voor Gegevensbescherming). Deze Europese wetgeving is van kracht sinds 25 mei 2018 en gaat over:

"De bescherming van natuurlijke personen in verband met de verwerking van persoonsgegevens en betreffende het vrije verkeer van die gegevens".

De belangrijkste principes van GDPR

Bepalingen omtrent verzameling en gebruik van gegevens:

- Transparantie
- Doelbeperking
- Gegevensbeperking
- Bewaarbeperking
- Recht vergeten te worden

Mechanismen die bedrijven verplichten om bepaalde beveiligingsmaatregelen te nemen:

- Integriteit en vertrouwelijkheid
- Verantwoording
- Meldplicht datalekken
- DPO (Data Protection Officer)

Voorbeeldexamen

Vragen met antwoorden van Thibaut Mercier voor taak 860971 (task_log_id 47377381) DEFAULT

1. Strategische business objectieven (vraag verwijderd uit voorbeeldexamen, antwoord p.3)

Tot de strategische business objectieven van informatiesystemen behoren:

A. Operational excellence, competitef voordeel, en gebruik van nieuwe technologie
B. Operational excellence, competitief voordeel en overleven
C. Operational excellence, competitief voordeel en innovatie
D. Operational excellence, competitieft voordeel en supply chain management

2. Nieuw in hedendaagse informatiesystemen

Wat is er nieuw in een hedendaags informatiesysteem? (vraag verwijderd, antwoord p.4)

A. Toegenomen productiviteit, cloud computing, en sociale netwerken
B. Toegenomen productiviteit, big data en sociale netwerken
C. Cloud computing, sociale netwerken en ERP-systemen
D. Cloud computing, SaaS en sociale netwerken

3. Succesvol informatiesysteem (vraag verwijderd, antwoord p.5)

Een succesvol informatiesysteem is

A. Een systeem dat op tijd en binnen budget is afgewerkt
B. Een systeem waarvan alle behoeften zijn gedekt alsook deze van de belangrijkste stakeholders
C. Een systeem waarvan alle behoeften zijn gedekt alsook deze van de meest betrokken stakeholders
D. Een systeem waarvan alle behoeften zijn gedekt alsook deze van alle stakeholders.

4. Wet van Moore

De wet van Moore:

A. Beschrijft het vermogen van computerchips
B. Beschrijft de toename van computerkracht per eenheid van oppervlakte
C. Bepaalt de toename van de grootte van databanken op het internet
D. Bepaalt de evolutie van de groei van computernetwerken

5. Complementaire assets

Complementary assets zijn

A. Die resources of capabilities die een kerncompetentie versterken.
B. Die resources of capabilities die buiten de organisatie moeten gezocht worden.
C. Die resources of capabilities die moeten extern aangeleerd worden.
D. Die resources of capabilities die uit het informatiesysteem komen

6. Productiviteitsparadox

De Productiviteitsparadox leert ons dat:

A. Er helemaal geen verband is tussen IT-falingen en productiviteit
B. IT geen productiviteit vertoont
C. Productiviteit bij IT anders moet gemeten worden
D. IT en productiviteit niet samengaan

7. Tool view

De tool view op informatietechnologie bekijkt deze onder meer als

A. Een algoritme
B. Een structuur
C. Een instrument ter verbetering van de productiviteit
D. Kapitaal

8. TPS

TPS (Transaction Processing Systems) systemen horen bij de:

A. De operational systems
B. De executive systems
C. De management information systems
D. De knowledge management systems

9. Investeren in IT (vraag verwijderd, antwoord p.5 denk ik maar de vraag is zeer vaag)

Investeren in informatietechnologie is geen garantie voor het bekomen van goede 'returns', Wat is er supplementair nodig?

A. Implementatie van het juiste businessmodel
B. Aangepast personeel
C. Een goed management
D. Opleiding

10. Stakeholdersanalyse

Een stakeholders analyse bestaat uit:

A. Identificeren, begrijpen en prioriteren.
B. Identificeren, analyseren en prioriteren
C. Identificeren, classeren en prioriteren
D. Prioriteren, analytiseren en classeren

11. IT en business processen

IT verbetert de business processen op 2 wijzen:

A. 1) verhogen van de efficiëntie van bestaande business processen 2) toelaten van nieuwe business processen die capabel zijn de organisatie te veranderen
B. 1) verhogen van de efficiëntie van bestaande business processen 2) weglaten van bestaande business processsen
C. 1) de bestaande business processen zo veel mogelijk gerust laten 2) weglaten van bestaande business processsen
D. 1) toelaten van nieuwe business processen die capabel zijn de organisatie te veranderen 2) overtollige business processen schrappen

12. CRM-systemen

CRM systemen

A. Bieden informatie om alle business processen te coördineren met betrekking tot de klanten
B. Bieden informatie om alle business processen te coördineren met betrekking tot de klanten en leveranciers

13. Transactie- en agencykosten

Transactiekosten en agencykosten kunnen door informatietechnologie

A. Beiden verlaagd worden
B. Verlaagd worden maar slechts één van beide
C. Verlaagd worden mits inzet van 'complimentary assets'
D. Verlaagd worden mits het voeren van een kostenleiderschap strategie

14. Informaticamislukkingen

De meest voorkomende reden van informaticamislukkingen is

A. De organisatorische en politieke weerstand tegen verandering
B. Verouderde software
C. Onvoldoende computerkracht
D. Een niet aangepaste organisatiecultuur

15. Nieuw informatiesysteem

Centrale organisatorische factoren die in overweging moeten genomen worden wanneer een nieuwe informatiesysteem gepland wordt zijn:

A. Cultuur en politiek
B. Transactiekosten en agencykosten
C. Transactiekosten en hierarchie
D. Agency kosten en hierarchie

16. Impact van het internet

De impact van het Internet op een competief voordeel is:

A. Druk op alle vijf de strategische krachten
B. Druk op strategische kracht van nieuwe toetreders en de onderhandelingskracht van de leveranciers
C. Druk op strategische kracht van nieuwe toetreders en onderhandelingskracht van de klanten
D. Druk op strategische kracht van nieuwe toetreders en onderhandelingskracht van de klanten en leveranciers

17. IoT

Het IoT heeft volgende effecten:

A. Verhogen van de switching kosten
B. Verlagen van de onderlinge rivaliteit
C. Verhogen van de switching kosten en verlagen van de onderlinge rivaliteit
D. Verlagen van de switching kosten

18. business value chain

De business value chain bepaalt hoe informatiesystemen

A. Operational efficiency en customer en supplier intimacy kunnen verbeteren
B. Onderlinge rivaliteit en operational efficiency kunnen verbeteren
C. Business processen en customer en supplier intimacy kunnen verbeteren
D. Productie van substituut producten en operational efficiency kunnen verbeteren

19. Value web

De value web is:

A. Een collectie van onafhankelijke bedrijven die gebruik maken van geadvanceerde IT, om hun value chains te coördineren en gezamenlijk te produceren
B. Een value chain waarbij de invloed van het Internet is toegevoegd
C. Een collectie van onafhankelijke bedrijven die gebruik maken van geadvanceerde IT, om hun onderlinge rivaliteit in kaart te brengen
D. Een collectie van onafhankelijke bedrijven die gebruik maken van webtechnologie

20. RBV

De RBV gaat ervan uit dat de basis van competitie

A. Gebaseerd is op de resources van een bedrijf en niet op producten en diensten
B. Gebaseerd is op de effcientie van de informatiesysstemen van een bedrijf
C. Gebaseerd is op de value chain van een bedrijf
D. Gebaseerd is op het IoT

21. Capability

Een capability heeft de volgende dimensies

A. Skills en knowledge, physical technical systems, managerial systems en values en norms
B. Skills en knowledge, physical technical systems, managerial systems en informatiesystemen
C. Skills en knowledge, physical technical systems, managerial systems en value chains
D. Skills en knowledge, physical technical systems, managerial systems en competitieve krachten

22. Core competence

Wat is een core competentie?

A. Competentie die de fundamentele kern van een bedrijf definieert
B. Competentie die onmisbaar is bij informatiseren
C. Competentie die hoort bij de informatiesystemen
D. Competentie naast andere competenties staat

23. IT-Business Alignment

Tot de IT-Business Alignment Maturity criteria horen onder meer:

A. Communications, Value, Governance, en Skills.
B. Partnership, Value, Scope & Architecture en Place
C. Partnership, Skills, Value, Management
D. Communications, Value, Place en Governance

24. Generieke strategieën (Porter)

De generieke strategieën van M. Porter die beinvloedt worden door IT zijn:

A. Low-cost leadership, Product differentiation, focus on market niche en Strengthen customer and supplier intimacy.
B. Low-cost leadership, Product differentiation, focus on market niche en competitive survival
C. Low-cost leadership, Product differentiation, focus on market niche en Focus on disruptive innovations
D. Low-cost leadership, Product differentiation, focus on market niche en competitive survival en Focus on BPM

1B	9A	17A
2D	10A	18A
3D	11A	19A
4B	12A	20A
5A	13A	21A
6C	14A	22A
7C	15A	23A
8A	16A	24A