BUSINESS ECOSYSTEMS
No company is an island:
• Every company is active in one or more markets
• Every company fills one or more roles in the business ecosystem of its market

To become a viable business one must find a sustainable spot in one’s business ecosystem
Business Ecosystems

- Industries, & markets
- Supply chains & value chains
- Standards
- Network effects & economies of scale
- Business ecosystem actors
- Regional clusters
Sectors, industries, & markets
Supply chains & value chains
Standards
Network effects & economies of scale
Business ecosystem actors
Regional clusters
"What is it again that you do?

Classifying your venture"
### Primary Sector
- Extracts or harvests products from the earth: production of **raw material and basic foods**.
- Activities: agriculture, mining, forestry, farming, grazing, hunting and gathering, fishing, and quarrying. + the packaging and processing of the raw material associated with this sector
- About 3% of the U.S. labor force is engaged in primary sector activity today, while more than two-thirds of the labor force were primary sector workers in the mid-nineteenth century.

### Secondary Sector
- Manufactures finished goods
- All of **manufacturing, processing, and construction** lies within the secondary sector.
- Activities: metal working and smelting, automobile production, textile production, chemical and engineering industries, aerospace manufacturing, energy utilities, engineering, breweries and bottlers, construction, and shipbuilding.

### Tertiary Sector
- **Service industry**
- Provides services to the general population and to businesses
- Activities: retail and wholesale sales, transportation and distribution, entertainment, restaurants, clerical services, media, tourism, insurance, banking, healthcare, and law.
- In the U.S., more than 80% of the labor force are tertiary workers.

### (Quaternary Sector)
- The quaternary sector consists of intellectual activities. Activities associated with this sector include **government, culture, libraries**, scientific research, education, and information technology.
- Others limit quaternary sector it to **not-for-profit sector**
Distribution of different sectors over time.

Phase I: Traditional civilization
Phase II: Industry
Phase III: Tertiary civilization

Primary sector
Secondary sector
Tertiary sector
- An **industry** is a collection of similar companies or of companies conducting similar activities.
- **Top-down** classification: large sectors, split into smaller subsegments
  - sometimes quite arbitrary
- Newcomers to economics can use it to grasp the scope of business activities
- **Industry Classification (benchmark)**
  - 10 industries
  - 20 supersectors
  - 41 sectors
  - 114 subsectors
Semenya underwent tests conducted by a panel of medical experts after winning last summer's world female 800 meters gold medal in Berlin.

Tests show that Caster Semenya is a woman ...and a man!

The 18-year-old South African champ has no womb or ovaries and her testosterone levels are more than three times higher than those of a normal female, according to reports.

The tests after Semenya's 800-meter victory in the World Championships, determined she's a hermaphrodite - having both male and female organs.

Sources: The Telegraph, 2010; Daily News, 2009
ABOUT MARKETS

- Markets are those meeting places where products and services are traded. They are the interfaces between customers and suppliers.

- Its definition is grounded from bottom-up
  - Consumers, suppliers (+ consultants and trade show organizers) drive the definition of markets
  - Gradual and ad-hoc classifications, overlaps, no top-down classification of markets
  - Are there trade fairs, conferences, consultants, magazines? Then there is a market
  - Partly driven by marketing strategies of suppliers and industry specialists
"Ohh.! So you're the one who,

took all our jobs."
... markets merge
  - PDA+GSM+iPod+camera+ gaming console = iPhone
  - -> Will these markets disappear as separate entities? On what does it depend?
... markets split
  - 'Computers' -> hardware, operating system, software, storage, peripherals, internet...
... markets (dis-)appear
  - Analog photography
  - the nucleic acid isolation market (see further)
... markets can be encapsulated in others
  - Changes in one overall markets unavoidably impacts encapsulated markets
Several types of links between markets are possible for supplier
  - Same core competencies, same customers
Segments = subsets of a wider market (size)

Niches = smaller and more specialized segment (specialization)

Example LCD screens
- Segments: TVs, PCs, mobiles
- Niches: medical monitors, concert stages
MARKETS

- Horizontal = offering goods and services to **multiple groups of customers with common needs**; generally broad markets
- Vertical = offering goods and services specific to a **group of customers with specialized needs**.
- Succeeding in Vertical Markets requires a **thorough understanding** of the sectors; often seasoned professional are required to succeed.

Examples
- Horizontal
  - Washing powder
  - Cars
  - Search engines
  - Dafalgan
- Vertical
  - Software for film post-production
  - Biotechnology patent lawyers
  - Vision systems for industrial automation
  - Software for cultural centers
  - Navigation equipment for sailing ships
MARKETS

HORIZONTAL & VERTICAL: OPTRIMA CASE

- VUB spin-off
- Core technology: 3D imaging
- Enormous range of application areas
MARKETS

- **Television**
  - DepthSense™ and OptriCam™ enables natural **interface to TVs based on simple gestures**, allowing new and intuitive ways of interacting with your media-centre. A simple hand gesture will change the TV channel, turn up the volume, surf the Internet or flip through the photo or music library.

- **Gaming**
  - **You are the controller**

- **Automobile**
  - Optra’s DepthSense™ and OptriCam™ systems provide reliable 3D data for autonomously guided vehicles, with improved obstacle identification and avoidance, **service robots in industrial and in assembly**, quality control monitoring, material handling and automation.

- **Health-Lifestyle**
  - New applications that can help elderly people or less valid patients home, in hospitals or in care centers benefit from “gaming alike rehabilitation and revalidation programs”.

- **Automation**
  - Optra’s DepthSense™ and OptriCam™ systems provide reliable 3D data for autonomously guided vehicles, with improved obstacle identification and avoidance, **service robots in industrial and in assembly**, quality control monitoring, material handling and automation.

- **Security**
  - By using the OptriCam™ 3D Time-of-Flight camera a reliable set of depth data becomes available. This increases the robustness and flexibility of many surveillance, inspection, and logistics systems: camera based factory automation, person-counting applications at airports, elevator and door/gate security detection systems.

- **The engineers know nothing of these (end) user markets...**

[Image of depth sensor and camera symbols]
OPTRIMA CASE

- The automated milking market.
  - Selling “2757 Industrial Machinery”
  - To “3573 Farming & Fishing”
OPTRIMA CASE

Markets

- The automated milking market.
  - Selling “2757 Industrial Machinery”
  - To “3573 Farming & Fishing”
- Magnitude comparison
B2B & B2C

- B2B = Business-to-Business
- B2C = Business-to-Consumer
- "B2B market far larger than B2C market"
  - Several layers and dimensions of B2B behind each consumer product (see supply chain)

- Most companies are business to business
- Comparing B2B and B2C: two main differences with implications on marketing strategies and tactics
  1. Market structure, segmentation and demand
  2. Decision making process
B2B & B2C: STRUCTURE & DEMAND

- Fewer, larger customers
- Scale and **strategic importance** of contract for all parties
- **Interdependence** between buyer and seller
- **Long term relationship**
  - Close interaction: joint problem analysis, developments; operational integration...
  - Risk of overdependence!
- Often geographic **clustering** of certain activities
- **Derived demand**

- **Market size determined by end-user market**
- **Fluctuation of demand**
  - Especially for investment goods: close link to economic situation
- **International scope of sales**
  - Most B2B companies act on international scale
  - US (America), Europe (EMEA), Asia: often different markets, market leaders
- **It's a small world...**
  - Each market segment is a village
  - Importance of reputation
  - High customer satisfaction required
- tot hier sessie 1 deel 1
BUSINESS MANAGEMENT AND ENTREPRENEURSHIP STARTER SEMINARS 2020-21

CHAPTER 1: BUSINESS ECOSYSTEMS PART 2

Marc Goldchstein
B2B = Business-to-Business
B2C = Business-to-Consumer

`B2B market far larger` than B2C market
- Several layers and dimensions of B2B behind each consumer product (see supply chain)

- Most companies are business to business

Comparing B2B and B2C: two main differences with implications on marketing strategies and tactics
1. Market structure and demand, segmentation
2. Decision making process
MARKETS

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**B2B & B2C: MARKET SEGMENTATION**

### In B2C
- Psychological, demographical, sociological criteria...

### Example of B2C segmentation criteria
- Demographic segmentation
  - age, gender, education, religion, occupation, income and marital status
- Geographic segmentation
- Behavioral segmentation
  - brand loyalty, awareness, knowledge, social media interaction and purchasing patterns
- Psychographic segmentation
  - personality, lifestyle, values and social class

### In B2B
- More ‘sober’ criteria
- Can be linked to clear, concrete, understandable performance criteria

- More **professional** attitude
  - Business buying process of is one of the most **rational** processes!
  - Major impact on marketing!

- More **complex**, **more people involved**

- Decision process takes **longer**

- More **formalized**
  - Product specifications
  - Services, support, maintenance, insurances,
  - Contracts!

- Role of the **industrial buyer**

- Decision making process **flavored by national cultures**

The Decision making Unit

- Not necessarily a formal group
- Range of participants
  - **Users**: often initiate the process, can be anybody in organization
  - **Influencers**: often technical department, staff
  - **Buyers**: in larger organizations: dedicated department
  - **Decision makers**: depends on importance of decision
  - **Gate keepers**: protect decision makers from unwarranted influence of sellers

- -> Multi-level sales!
Especially in B2B clear, rational reasons determine if products are bought
• B2C adds other types of arguments
• but rational reasons remain applicable

It is essential that the entrepreneur knows explicitly why a certain customer should buy from him
• He must therefore fully understand the logic of the customer

Entrepreneurs must consider things from the perspective of their customer

Tools to formalize this:
• performance criteria (see later)
• value proposition (see later)
Sectors, industries, & markets
Supply chains & value chains
Standards
Network effects & economies of scale
Business ecosystem actors
Regional clusters
Cattle
• Cattle feed

Leather
• Skins
• Chemicals
• Equipment
• Housing, energy, telecom...

Shoes
• Leather
• Heels
• Laces
• Housing, energy, telecom...

Wholesale
• Shoes
• Storage
• Distribution
• Housing, energy, telecom...

Retail
• Shoes
• Store interior
• Housing, energy, telecom...

Consumer
• Shoes
A supply chain is a network between a company and its suppliers to produce and distribute a specific product to the final buyer.

This network includes different activities, people, entities, information, and resources.

The supply chain also represents the steps it takes to get the product or service from its original state to the customer.

Investopedia
About Supply Chains

- Many steps are taken before an end user need is fulfilled
- Your contribution is only a small part of the whole picture
- Do you see the whole picture?
- Supply chains: ‘the sequence of events’ in this industry/market
  - How step by step the product is built and marketed
  - Value increases as value is added by players
- Can be extraordinarily complex or very straightforward
- Different roles are possible, choice impacts many aspects
  - Competitive position
  - Capital needs
  - Minimum size
  - Scalability
- Supply chains are crucial to understand what it exactly is that you do as a company

Supply Chain

- Materials
- Components
- Subsystems
- Systems
- Marketing
- Distribution
**Drugs development phases**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Duration</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research</td>
<td>3-5y</td>
<td>Identify targets and compounds</td>
</tr>
<tr>
<td>Preclinical</td>
<td>1-2y</td>
<td>Test candidate drugs in lab and animals for toxicity, side-effects and therapeutic value</td>
</tr>
<tr>
<td>Phase I</td>
<td>1-2y</td>
<td>Test safety in healthy volunteers (20-200 candidates)</td>
</tr>
<tr>
<td>Phase II</td>
<td>1-2y</td>
<td>Test efficiency in targeted (200 - 300 patients) disease</td>
</tr>
<tr>
<td>Phase III</td>
<td>2-3y</td>
<td>Confirm efficacy in large patient sample (300-3000 patients)</td>
</tr>
<tr>
<td>Pre-registration</td>
<td>1-2y</td>
<td>FDA/EMA review: safety, quality and efficacy</td>
</tr>
<tr>
<td>Launch</td>
<td></td>
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</tbody>
</table>

**Milestones**

- **Entry into humans**
- **MA application**
Bekaert: steel wire transformation and coatings
SUPPLY CHAIN

E-INK SUPPLY CHAIN
- MIT media lab 1997
- Ink-based display system
  - Bullets of ink on (potentially flexible) substrate
  - Magnetized in black or white
  - Energy consumption only when changing images, so very long battery life
- But...
  - No color
  - Long image switching time (no video)
E-INK SUPPLY CHAIN: STEP 1 – INTELLECTUAL PROPERTY

- Inventions...
  - In this case: MIT Media lab, Prof Joe Jacobson

- ... lead to patents!
  - Owner can forbid others to copy
  - IP is often first step in technology value chains
  - In many cases owners simply license technology to others, who exploit the idea

- Beyond patents...
  - Engineering specs, so other parties can implement
  - Fully operational!
**Producing charged ink**

- Two contrasting liquid polymers are loaded into separate containers which have attached atomizing nozzles. One of the nozzles has a positively charged potential while the other has a negative potential. Pressure is then used to force the inks through the nozzles causing them to break into tiny particles and also acquire the opposing charges.

- After the larger particles are formed, the materials are allowed to cool which causes them to solidify. This results in a small two-toned solid particle which has a positive and negative side.

**Encapsulating ink**

- The particles are moved into a tank which contains a liquid solution of monomer in a silicone oil. The particles are mixed thoroughly so they are evenly dispersed. This solution is combined with an aqueous phase which creates an emulsion. An emulsion is a semi-stable mixture of oil and water. The electronic ink particles remain in the silicone oil which is surround by water.

- A cross-linking agent is added to the solution which causes the monomer to react with itself. This produces tiny spheres which contain some silicone oil and the electronic ink particles.

- After the reactions are complete, the electronic ink articles are stored in a liquid solvent until they can be applied. Depending on the final product, this application process can involve spreading the liquid ink on specialized paper, fabric, or other kinds of fibers.
E-INK SUPPLY CHAIN: STEP 2 – THE MATERIAL

- Cut to right size
- Add display driver electronics
- Laminate
E-INK SUPPLY CHAIN: STEP 3 – THE DEVICE

- Device
- Operating system
2005: Philips exits display module segment and sells facilities to Prime View
2009: Prime View buys E-Ink
2010: Prime View changes name to E-ink Holdings

For every 100 paperback books sold, Amazon has sold 115 Kindle books since the beginning of the year, the company said. This milestone has come even sooner than we expected.
SOLAR CELL’S SUPPLY CHAIN: PART 1 - THE MATERIALS

- **Base material**
  - Quartz (sio2) is the basic raw material of si
  - Quartz can be found in rocks/stones and in (quartz) sand
  - Quartz is in abundant supply on earth
  - Si: 2nd most common chemical element on earth (after oxygen)

- **Wafer making process**
  - Purified si
    - Quartz sand is reduced to metallurgical si
    - Subsequently it is purified to at least 99.9999999% pure si (named poly-silicon)
  - Ingot
    - The pure si is melted & crystallized in large blocks (ingot)
  - Wafer
    - Ingots are sliced into smaller blocks
    - These smaller blocks are at their turn sliced into thin slices (wafers): very thin slices of si (currently, a wafer has a thickness of 180-200 μm & surface of 15.6 x 15.6 cm)
  - Wafers are the raw material for production of solar cells (supplied to photovoltech, by f.E. LDK solar)
SUPPLY CHAIN

SOLAR CELL’S SUPPLY CHAIN: PART 2 - MANUFACTURE

- Unpacking & optical control
  - Incoming si wafers are unpacked
  - Automated camera inspection performs optical quality control

- Iso-texturisation
  - During this process, saw damage, caused during sawing of the wafers by the supplier, is being etched away in an acid
  - Construction of microscopically small bumps (otherwise too much reflection)

- Diffusion
  - In oven, at temp of ± 850°C, phosphor is being defunded. This causes the solar cell to convert sunlight into electricity

- Removal of oxidation layer
  - A 2nd acid removes the oxidation layer that arises during diffusion

- Anti-reflection coating
  - To minimize the reflection of sunlight at the surface of the solar cell, an anti-reflection coating is deposited on the surface of the cell
  - This gives the typical deep blue color to the solar cell

- Silk-screening of the electrical contacts
  - Fully automatic silkscreen line, applies the contact pattern, which is made of silver paste, on the front side of the solar cell

- Firing
  - In oven, the silver on the front side will penetrate the anti-reflection coating, making a good electrical contact

- Laser insulation
  - A laser cuts a narrow groove at the periphery of the solar cells through which front & back side of the cells become electrically isolated from each other

- Measurement
  - Solar simulator generates a standardized amount of light so that the yield/efficiency of the solar cells can be measured
  - Then the cells are being sorted into different power categories, in foam boxes
  - Low power cells are still sold, but at a lower price, because the cells are far too precious to throw away (4 € for the base wafer, 9 € for solar cell)

- Packing and sending
  - Finished solar cells are packed and shipped to customers worldwide
### Solar Cell’s Supply Chain: Part 3 & 4

- **Resulting product of step 2: a solar cell**
  - @ photovoltech: 15.6 x 15.6 cm cells

- **Solar panel**
  - Various solar cells are serially connected by soldering
  - Assembled solar cells are laminated in special plastic films behind a glass plate to form a solar panel
  - This solar panel is to be seen on the roofs
  - Provides mechanical stability and lifetime of at least 25 years because the metallic contacts of the solar cells are shielded from the humidity of the air

- **PV system**
  - Can be grid-connected as well as autonomous
  - Grid-connected system consists of a series of solar panels, which by means of an inverter convert DC into AC, which is then injected into the grid
  - Autonomous system consists of solar panels, which charge a battery by means of a charge controller
Quartz → Silicon wafers → Solar cells → Solar panels → Installation
Cost breakdown of the module...

And of the whole product...

Flowback of added value...
The activities that a specific firm performs are part of the added value produced from a raw material to its ultimate consumption. Along the supply chain, many different firms or businesses have their own activities. Thus, each firm has its own internal value chain.

J. McGee
2014
Most organizations, engage in many activities to **create value**. Value is the amount that buyers are willing to pay for product/service that a firm provides.

Porter’s value chain (1985); McGee (2014)

Organised like a production line, headings differ according to nature of operations.
VALUE CHAIN

PRIMARY ACTIVITIES

- **Inbound logistics**
  - Activities associated with receiving, storing, and disseminating rights to the product, such as material handling, warehousing, stock management, and so on.

- **Operations**
  - All of the activities required to transform inputs into outputs and the critical functions which add value, such as machining, packaging, assembly, service, testing, and so on.

- **Outbound logistics**
  - All of the activities required to collect, store, and physically distribute the output. This activity can prove to be extremely important both in generating value and in improving differentiation, as in many industries control over distribution strategies is proving to be a major source of competitive advantage – especially as it is realized that up to 50% of the value created in many industry chains occurs close to the ultimate buyer.

- **Marketing and sales**
  - Activities associated with informing potential buyers about the firm’s products and services, and inducing them to do so by personal selling, advertising and promotion, and so on.

- **Service**
  - The means of enhancing the physical product features through after-sales service, installation, repair, and so on.
VALUE CHAIN

- Procurement
  - This concerns the acquisition of inputs or resources. Although, technically this is the responsibility of the purchasing department, almost everyone in the firm is responsible for purchasing something. While the cost of procurement itself is relatively low, the impact can be very high.

- Human resource management
  - This consists of all activities involved in recruiting, hiring and training, developing, rewarding, and sanctioning the people in the organization.

- Technology development
  - This is concerned with the equipment, hardware, software, technical skills, and so on, used by the firm in transforming inputs to outputs. Some such skills can be classified as scientific, while others – such as food preparation in a restaurant – are "artistic." Such skills are not always recognized. They may also support limited activities of the business, such as accounting, order procurement, and so on, and in this sense may be likened to the value added component of the experience effect.

- Firm infrastructure
  - This consists of the many activities, including general management, planning, finance, legal, external affairs, and so on, which support the operational aspect of the value chain. This maybe self-contained in the case of an undiversified firm or divided between the parent and the firm’s constituent business units.
The last steps towards the customer are integral part of the supply chain.

Distribution and marketing are a substantial challenges, especially in consumer markets
  - Brand name value, existing retail network
  - Internet is a game-changer: see Amazon, Netflix, Facebook, Google

In business markets approaches vary strongly
  - Internet, regional offices, distributors, specialized partners,…
IT’S THE OVERALL CUSTOMER EXPERIENCE THAT COUNTS:

- Complementary products and services needed to provide a full solution to end-user
  - E-book reader and e-books
  - HD-DVD TV’s/players and HD programs & DVD’s
  - OS and Software
  - Game console & games
- Consultancy, support, training, maintenance, developer community...
- Customization, adaption to local language
- Your offering may depend on complementary technologies (e.g. digital photography and data storage, internet, printers...)

THE WHOLE PRODUCT
Use Case

- A use case is a software and system engineering term that describes how a user uses a system to accomplish a particular goal.
- (www.techopedia.com)

For airplane maintenance

- ‘He pulls out his e-book’.
- ‘Which contains all the documentation for the Boeing 737 e’
- ‘All automatically downloaded each night’
- ‘There is a hyperlink in the text’.
- ‘To a knowledge base where actual experiences are tracked’
- ‘Clicking on it’
Apple strategy: maintain tight control over hardware, software and the services they access

- First Mac only opened with special screwdriver, no expansion slots

Unsuccessful strategy for 30 years

- Apple could not beat the power of modularity and scale
- Intel / Microsoft windows / PC manufacturers / software / add-ons

Dow Jones Apple vs. Microsoft, Dell, Intel (1984-1997)
this integral control has become a major asset in recent times

- iPod, iPhone, iPad
  - designing and manufacturing devices
  - operating systems
  - application software
  - developer tools, relations
  - internet application
  - content provision
  - marketing, brand name
  - ‘vertical integration’

- it is the right approach for the digital entertainment age
  - Jobs wants to make complex devices like computers and smartphones into truly mass-product products
  - for that he needs to control all aspects of the customer experience

- ‘Apple is the only company that controls the whole widget. It turns out that this is Apple’s greatest strategic advantage’
Apple, the sequel... (1998 – 2012)
Developing Games for Xbox

Developer Program

Microsoft has a number of programs and initiatives available for developers who wish to develop content around Xbox LIVE gamercards, Xbox LIVE Arcade games, Xbox 360 retail titles, games for PCs, games for Windows Phone, and more.
Based on G. Hawawini et al. (2004) and D. Jones (2014)
INTEGRAL VS. MODULAR PRODUCT

SUPPLY & VALUE CHAIN DIMENSIONS

Product architecture
SUPPLY & VALUE CHAIN DIMENSIONS
SUPPLY & VALUE CHAIN DIMENSIONS

SUPPLY CHAINS CAN COLLIDE
SUPPLY CHAINS CAN COLLIDE

SUPPLY & VALUE CHAIN DIMENSIONS

- What changes...
  - Distribution
  - Printing, post-press
  - Prepress

- What remains (+/-) the same...
  - Layout
  - Content creation
  - Brand owner

- The new supply chain
  - Reader device
  - Telecom network
  - Online store
  - Prepare for posting

- The real questions for newspaper publishers: will they still make money?
  - At what price can they sell a digital newspaper?
  - What commission will they need to give for ‘distribution’, and to who?

- One of the biggest battles on e-books / e-newspapers (and music, video, television) are the relations between content owners/publishers and device/service suppliers...
  - Who owns the billing system, commissions
## Supply & Value Chain Dimensions

<table>
<thead>
<tr>
<th>Stage</th>
<th>Time Frame</th>
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<tbody>
<tr>
<td>Research</td>
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## Relevance of Time Dimension

- Research: 3-5 years
- Preclinical: 1-2 years
- Phase I: 1-2 years
- Phase II: 1-2 years
- Phase III: 2-3 years
- Pre-registration: 1-2 years
SUPPLY CHAINS: OPTRIMA CASE

- VUB spin-off
- Core technology: 3D imaging
- Enormous range of application areas
The Optrima supply chain 1.0.

Sensors

DepthSense™ is a proprietary and patented, native CMOS imager technology providing robust operation in a wide variety of environments, state-of-the-art sensitivity and depth resolution, and optimal system performance. Optrima 3D Imaging Time-of-Flight CMOS sensors provide a direct way for acquiring 3D information of objects enabling new applications such as gesture recognition.

Modules

Camera Modules are low-cost, real-time 3D components designed for further integration into your products. Reference designs are available for implementation guidance. Please request more information for OEM agreements at info@optrima.com.

Cameras

OptriCam™ is a family of 3D Time-of-Flight Camera Systems based on DepthSense™ Sensor and technologies. 3D Cameras are used in a variety of applications from Consumer electronics.
The Optrima supply chain 1.0.
What is next in Optrima’s supply chain?
The need for gesture recognition.
Merging with SoftKinetic

- SoftKinetic: iisu™ (Interface-is-U)
  - Strong middleware
  - Known in the market
- Optrima
  - Strong 3D camera technology
- Together → unique position with whole stack
- Branding
  - KISS (Keep it Stupid Simple)
    → SoftKinetic will do!
SUPPLY CHAINS: OPTRIMA CASE

Merging with Softkinetic.

Tokyo, Japan - Sony Corporation is announcing that it has completed the acquisition of Softkinetic Systems S.A., after reaching an agreement with the company and its major shareholders. With this acquisition, Softkinetic - which possesses time-of-flight ("ToF") range image sensor technology, as well as related systems and software - has become a wholly-owned subsidiary of Sony.

Sony will focus on combining Softkinetic's ToF range image sensor technology expertise with its own technologies with the aim of developing the next generation of range image sensors and solutions, not only in the field of imaging, but for broader sensing-related applications as well.
SUPPLY CHAIN DIMENSIONS

SUPPLY CHAINS: Optrima Case

Softkinetic... Sony Depthsensing Solution
Opportunities for using 3D sensing technology are limited only by imagination. We provide the essential building blocks of this innovative technology: time-of-flight Depthsense® sensors used in cameras and modules, and advanced Depthsense® software libraries. We enable innovative businesses to bring depth-sensing solutions to market and make them part of everyday life.

Horizontal vs. Vertical markets...
BUSINESS ECOSYSTEMS

Sectors, industries, & markets
Supply chains & value chains

**Standards**
Network effects & economies of scale
Business ecosystem actors
Regional clusters
1,00,000, 00, 00, 000

Total Business crosses
Rs. One Lakh Crore

Thank you,
each one of our 15 million customers.
"A standard is (a limited set of) common way(s) to do something or to approach/solve a problem."
STANDARDS

- A common way of doing something
  - Can be achieved
    - bottom-up or top-down
    - unanimously or not
  - It assures not everybody does it his/her own way

- Standards can be...
  - Part of society, very formal and entrenched
    - driving on right hand side, GSM, internet...
  - Purely technical
    - form factors for screws
  - Very long lasting or very transient
    - QWERTY/AZERTY
  - Governed
    - Europe= GSM standard, US: competing technologies

- Standards are a key dynamic in business ecosystems:
  - The advent of a standard is part of the maturation process of an industry (see Industry Life Cycles)
  - Standards often generate their own ecosystems and vice-versa
  - Two or more competing standards...
  - Standards can create opportunities for niche players
  - Standards are reviewed and updated on a regular basis.
WHY STANDARDS?

- Standards **facilitate**
  - Manufacturers know what is expected from them
    - To build a GSM telephone
    - To use the electricity grid
    - To write software for the internet
  - Ease of communication between actors
    - “5 liters of paint, RAL 1003”
  - Compatibility between users
    - PDF

- **Society and economy** needs standards
  - Allows products and people to work together and be interchangeable
  - Provide assurance that a product delivers a certain performance
  - Provide the tools (symbols, terminology) for designers, manufacturers and users to communicate.
STANDARDS

1. Official, public standards
2. De-facto standards
3. Dominant designs
4. Parallel standards
5. Quality standards
WHO SETS STANDARDS?

1. Legislator, government agencies, military

2. National, regional, international, and sectoral standardization bodies
   - International Organization for Standardization (ISO)
   - European Telecommunications Standards Institute
   - International Telecommunication Union
   - World Wide Web Consortium
   - Universal Postal Union
   - American Petroleum Institute
   - DIN, ASA...

3. Sometimes standards emanate from groups of companies
   - USB: Compaq, DEC, IBM, Intel, Microsoft, NEC and Nortel.
   - Audio CD: Philips + Sony

4. Vast battles of influence and market share (especially in emerging industries) can introduce standards
   - Usually connected to de facto standards
   - Microsoft Windows vs. Apple Macintosh
- Electric power
  - DC (edison) vs AC (westinghouse)

- Roads
  - Width, side of the road, signage

- Color television
  - Mechanical (CBS) vs electronic (RCA)

- Air travel
  - Door on front left, jetways/airbridges, taxi ways

- Video cassettes
  - Betamax (sony) vs VHS (matsushita+)

- Cellphones
  - Several co-existing standards
  - TDMA (ericsson/AT&T) vs CDMA (qualcomm) vs GSM (EU) vs PHS

- Personal computers
  - Microsoft windows vs mac OS

- 56k modems
  - K56flex (rockwell/lucent) vs x2 (US robotics/3com) vs v.90

- Smartphones
  - Iphone, windows, google
MY EXPERIENCE WITH STANDARDS

STANDARDS

- ‘Quadtree compression’ vs. CCITT Group IV
  - Invented @ VUB for SoftCore
  - Format to compress scanned pages
  - Arguably better technology
    - Faster compression, better visualization
  - versus the absolute standard
    - The way fax machines compress images
    - Software libraries available at low cost
- And that for a key element in the perception of customers: long term accessibility of documents...
  - What if SoftCore goes bankrupt? Will I be able to view my documents?
- Lots of efforts to convince users, implicit ‘negative point’
- Finally we dropped the technology

Mobitex vs GSM SMS

- Better technology
  - Packed switched
  - Much more reliable
    - In theory: depends on coverage!
- Standard: GSM
  - At that time coming up at full speed
  - Massive investments
    - Main partners of RAM redirect funds to GSM
- Volume volume volume!
  - Try to order 10,000 modems with a manufacturer if GSM operators order 10 million...
  - Impossible to match coverage
- Downward spiral
  - Mobitex networks close...
  - Customers loose confidence
  - Best employees leave
- Only alternative: survive in niche market
 CONTROL VS. INFORMATION

Is the standard public?

STANDARDS
Adobe twice decided to make architectural information openly available
  • Postscript
  • PDF

In both cases they became dominant designs
It is quite the inverse of protection of intellectual property!
They succeeded because no major competitor arose to grab market share
Adobe is generally respected as serious business partner

“PDF is now a formal open standard known as ISO 32000, maintained by the international organization for standardization”
STANDARDS

WHICH PRODUCTS ARE LEAST STANDARDIZED?

Standards at the expense of performance optimization, uniqueness, personality...
How Standards Proliferate:

(See: A/C chargers, character encodings, instant messaging, etc.)

Situation:
There are 14 competing standards.

14?! Ridiculous!
We need to develop one universal standard that covers everyone's use cases.

Yeah!

Soon:

Situation:
There are 15 competing standards.
STANDARDS AND NETWORK EFFECTS

WHAT TRIGGERS STANDARDS BATTLES, AND WHAT ARE THE OUTCOMES?

- Are two (or more) businesses or business ecosystems vying for dominance?
- How important are network effects?

- Tipping
  - “fight to death”
- Truce
  - Convergence
  - Comprise
- Two (or more)
  - No tipping
  - Duopoly or oligopoly
Sectors, industries, & markets
Supply chains & value chains
Standards
Network effects & economies of scale
Business ecosystem actors
Regional clusters
Products with network effects.

Value to user

Actual (or anticipated) number of users

Conventional products

Products with network effects
NETWORK EFFECTS

DIRECT NETWORK EFFECTS

CUSTOMER

facebook

skype

ebay

VUB VRIJE UNIVERSITEIT BRUSSEL

ABCDEF

HIJKLMNOP

QRSTUVWXYZ

- I derive value from others using the product
- Metcalfe's law
  - The value of a network goes up as the square of the number of users
    - 10 users => $100; 100 users => $10.000
  - Value of product increases with (anticipated) number of users
- Apply to technologies where interaction or compatibility are important
  - Communication: phones, e-mail, internet, PDF, Facebook
- Network Effects and monopolies and standards
  - Strong network effects lead to monopolies (facebook, MS office) or standards (phones, fax, email, www...)
  - Central argumentation by Bell Telephone to receiving monopoly on US telephone services. In 1908 there were over 4000 local and regional telephone exchanges.
Nobody beats network effects...

Example: Google Plus

- Facebook: 50%
- Twitter: 24%
- Pinterest: 16%
- LinkedIn: 5%
- Google+: 3%
- Anders: 2%
Do products with negative (direct) network effects exist?
**Network Effects**

**Negative (Direct) Network Effects**

- The \(n+1\) person decreases the value of a network if additional resources are not provided.
- Usually related to:
  - Limits to resources
  - Limits to capacity
  - The connection that overloads the freeway, competition for bandwidth
  - Status goods
NETWORK EFFECTS

- Indirect, lagged effects
- Supply of complementary goods and services (by third parties and by company) develops only if there is sufficient installed base
- Complementary products
  - Software for OS
  - Games for console
  - VHS movies
- Critical mass, economies of scale
  - Local service offering, 24h support, language support...
- Apply more often than direct effects, but are less severe
Network Effects

- Economic platforms having two distinct user groups that provide each other with network benefits.
  - Credit cards (cardholders and merchants)
  - Operating systems (end-users and developers)
  - Travel reservation services (travelers and airlines)
  - Yellow pages (advertisers and consumers)
  - Video game consoles (gamers and game developers)
  - eBay

- Particularly useful for analyzing the chicken-and-egg problem of standards battles,
  - See competition between VHS and Beta.

- Useful in explaining many free pricing or "freemium" strategies where one user group gets free use of the platform in order to attract the other user group.
  - Connected to business model (see later)
Switching Costs are the costs associated to a switch. These can be orders of magnitude larger than costs of a new product.

The resilience of a standard depends a/o on the Switching Costs.

- Google search to Bing; Ford to Volkswagen: no switching cost
- The total cost of installing an ERP system is up to eleven times greater than the purchase price of the software
  - infrastructure upgrades, consultants, retraining programs...
- Change side of the road on which you’re driving...

Switching Costs can be so large that switching is virtually unthinkable: ‘lock-in’

Types of lock-in

- Contractual commitment
- Durable equipment and aftermarkets
- Brand-specific training
- Information and databases
- Specialized suppliers
- Search costs
- Loyalty programs
Economies of scale = cost advantages that a business obtains due to expansion.

Factors that cause average cost per unit to fall as the scale of output is increased:

- Operations: The size of a facility and the usage levels of other inputs increase.
- Purchasing: bulk buying of materials through long-term contracts
- Managerial: increasing the specialization of managers
- Financial: obtaining lower-interest charges when borrowing from banks and having access to a greater range of financial instruments
- Marketing: spreading the cost of advertising over a greater range of output in media markets, volume buying
- Technological: taking advantage of returns to scale in the production function.
- Service offering

Related to the learning curve

- Graphical representation of the relationship between the cost and output over a defined period of time (H. Ebbinghaus, 1885)
- New skills or knowledge can be quickly acquired initially, but subsequent learning becomes much slower.
- The slope of the learning curve represents the rate in which learning translates into cost savings for a company.
- The steeper the slope of the learning curve, the higher the cost savings per unit of output.
(DIS) ECONOMIES OF SCALE

THE LEARNING CURVE

Average production cost / unit

Cumulative total output

Learning curve
- **Cost increase / efficiency decrease** due to size
- **Sources of diseconomies of scale** (wikipedia)
  - Cost of communication
  - Duplication of effort
  - Office politics
  - Isolation of decision makers from results of their decisions
  - Slow response time
  - Inertia (unwillingness to change)
  - Cannibalization
  - Large market portfolio
  - Inelasticity of Supply
  - Public and government opposition
Business Ecosystems

- Sectors, industries, & markets
- Supply chains & value chains
- Standards
- Network effects & economies of scale

**Business ecosystem actors**

Regional clusters
A business ecosystem is the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize.

Adner 2017
<table>
<thead>
<tr>
<th>BUSINESS ECOSYSTEM ACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OVERVIEW OF ACTORS</strong></td>
</tr>
<tr>
<td>■ Materials, Components, subsystems</td>
</tr>
<tr>
<td>• ExxonMobil Chemicals, Intel, Softkinetic...</td>
</tr>
<tr>
<td>• Excellence; value proposition; permanent innovation</td>
</tr>
<tr>
<td>• Recurring business;</td>
</tr>
<tr>
<td>• Can be critical cost element</td>
</tr>
<tr>
<td>■ R&amp;D/Design, Manufacturing, Brand name</td>
</tr>
<tr>
<td>• Are the end-user product suppliers</td>
</tr>
<tr>
<td>• Can outsource part of activity</td>
</tr>
<tr>
<td>• Pharma &amp; Biotech, Apple &amp; Foxconn</td>
</tr>
<tr>
<td>■ Investment goods supplier</td>
</tr>
<tr>
<td>• Trinean, BEST sorting, IBM...</td>
</tr>
<tr>
<td>• Integrators: width of expertise</td>
</tr>
<tr>
<td>• Innovation, value proposition, service &amp; support</td>
</tr>
<tr>
<td>• Long sales cycle</td>
</tr>
<tr>
<td>■ Services supplier</td>
</tr>
<tr>
<td>• Banks, shops, consultants, transport...</td>
</tr>
<tr>
<td>• Some services are recurring, others are project-based - impact on sales effort</td>
</tr>
<tr>
<td>• People-related, therefore hard to scale</td>
</tr>
<tr>
<td>• Often low startup costs</td>
</tr>
<tr>
<td>■ Retail channel</td>
</tr>
<tr>
<td>• Final steps to end-user</td>
</tr>
<tr>
<td>• Many ways to fulfill this function</td>
</tr>
<tr>
<td>■ Complementary products suppliers</td>
</tr>
<tr>
<td>• Apple: software/apps, digital content,...</td>
</tr>
<tr>
<td>■ Ecosystem animator</td>
</tr>
<tr>
<td>• Microsoft &amp; Windows community</td>
</tr>
<tr>
<td>■ Regulator</td>
</tr>
<tr>
<td>• Governments, standards bodies</td>
</tr>
<tr>
<td>• Gov't plays variety of roles in ecosystem: lawmaker, policymaker, investor, ...</td>
</tr>
<tr>
<td>■ Staff functions</td>
</tr>
<tr>
<td>• Consultants</td>
</tr>
<tr>
<td>• Trade shows, conferences &amp; seminars...</td>
</tr>
<tr>
<td>• Professional press, journalists, industry experts, opinion leaders</td>
</tr>
<tr>
<td>• Standardisation bodies</td>
</tr>
<tr>
<td>■ Finance</td>
</tr>
<tr>
<td>• Banks, investors, subsidies...</td>
</tr>
</tbody>
</table>
The (often) paramount role of Government.
Governments can play key enabling and/or inhibiting roles in ecosystems

Guarantor/supplier of core societal functions
- Rule of law
- Education
- Financial stability
- Mobility
- Infrastructure
- ...

Regulator
- Genetically modified organisms
- Patent regulation
- Standards
- ...

Initiator
- VIB, IMEC, GIMV
- GSM standard
- Military
- Support for Venture Capital
- Support for Research and Development
- ...

The Belgian situation...
- Flanders
- Brussels
- Wallonia
- Federal
- Europe
Biotech staff functions.
You almost never can provide the whole product on your own
  • There are exceptions...
    – Google, Facebook, eBay... (Don’t underestimate their core assets! (see later))
    – Standard Oil, IBM in the 60’s came very close
  • Full vertical integration = covering the full supply chain
    – From raw material to customer services

Different roles are possible
  • Architect or module in the supply chain or ecosystem? Both can be realistic strategies, much depends on sector. Some examples:
    – Trinean: Full solution for biomedical lab analysis instead of just the reader component (‘it’s better to sell one copy at 100,000 euro than 1,000 at 100’)
    – Intel: component -> subsystem
  • Alternatives must be considered closely
  • We will see later that keeping your options open might be a sensible approach

Role in ecosystem generally impacts many aspects:
  • Competitive position; capital needs; minimum size; scalability...