

# The digital firm

## Lecturers

Nicolas VAN ZEEBROECK (Coordinator) and Vincent LION

## Course mnemonic

GEST-S482

## ECTS credits

5 credits

## Language(s) of instruction

English

## Course period

First term

## Campus

Solbosch

## Course content

Over the past five years, the increase in market capitalization of the five largest digital companies (the GAFAM) has exceeded the total market value of the largest global CPG and retail firms. In 2020, the total turnover of these 5 companies alone more than doubled the total GDP of Belgium. Facebook generates 140 times more income per employee than Walmart. Clearly, digital businesses run on a very different type of software. Digital technology and business are now so deeply interwoven, that it no longer makes sense to talk about one without talking about the other. Yet few business leaders are IT-savvy and few IT experts fully grasp the strategic and organizational impact of technology. This course aims at bridging this gap. More specifically, its core objective is to provide an overview of information systems (IS) and digital technologies (Digital), and their impact on the organization and strategy of firms and institutions. It is therefore meant to provide an introduction to the role of CIOs (Chief Information Officer) and CDOs (Chief Digital Officer), enriched with practical exercises ("Hands-On Digital") to understand and experience digital technology from the inside.

The first part of the course, "Digital Technology and the Organization", is structured around the notion of an operational model of the firm's activities, which is defined by its core processes. These processes are characterized by their degree of standardization and integration, which determine the extent to which workflows need to be harmonized and codified (process standardization) and data needs to be shared (process integration). This leads us to base the course on data modelling (Entity-Relationship Diagrams or ERD) on the one hand, and process modelling (Business Process Modeling and Notation or BPMN) on the other. Information Systems are technologies supporting the standardization, integration, and automation of business processes, thereby implementing and crystallizing the operational model of the firm. One chapter will review the main families of Information Systems and their functional scope. Given how IS and organizational processes are interwoven, deploying and exploiting IS requires strong change management.

In business terms, one would say that information systems require strong complementary investments in organisational capital. One chapter of this first part will uncover why and how to deal with such change. Once implemented, Information Systems generate or capture data, which can inform management and strategy, a field called Business Analytics that will be introduced in the last chapter of Part I.

The second part of the course, "Digital Technology Management" looks at digital infrastructure. Information Systems (and digital technologies more broadly) run on a given infrastructure, which falls under the responsibility of the CIO. This infrastructure includes networks, servers, desktops and mobile devices, but also external resources (e.g. Cloud services) and security. It will lead to questions about IS Architecture and design choices. We will finally cover the roles of the CIO more broadly and specific challenges in IT and IS Management, with an emphasis on new challenges in highly digitized environments, such as business continuity planning, data governance, cyber criminality, and privacy.

The third part of the course, "Digital Technology and Strategy" will explore the impact of digitalization on firm competitiveness. It will examine the main categories of digitally-enabled business models: digital distribution channels (e-commerce and mobile commerce), data-driven strategies, and platforms, ecosystems and crowdsourcing (e.g. P2P and open source models). This part will focus on how incumbent firms may respond to digital disruption. The course will conclude with a discussion of the social and environmental impacts of digitalization.

## THEORY

The theory is organized in three main parts. **PART I: DIGITAL TECHNOLOGY AND THE ORGANISATION**

- > Business processes and operational models
- > Data modeling and management
- > Process modeling, digitization and automation
- > Typology of information systems
- > IS Implementation and organizational adaptation
- > Data analytics technology (SQL, ETL, DWH, OLAP, BI)
- > Data analytics implementation

### **PART II: DIGITAL TECHNOLOGY MANAGEMENT**

- > Building blocks of a digital infrastructure
- > Elements of digital architecture
- > CIO Challenges: managing IT for business resilience

### **PART III: DIGITAL TECHNOLOGY AND STRATEGY**

- > Digital distribution: e- and m- commerce
- > Data-driven strategies
- > Platforms and ecosystems
- > Digital transformation

- › Social and environmental impacts of digitalization

## HANDS-ON DIGITAL EXERCISES

The "hands-on digital" exercises will be structured around a project, to be performed in groups. The project will cover the main following elements, which will be introduced gradually throughout the practice sessions. **STEP 0: WARMING UP**

- › Form Groups of 4-5 students
- › Identify a SME for which you will develop a "Strategic Digital Transformation" plan

### **STEP 1: Industry Strategic Drivers** *Analyse the industry and its main digital strategic drivers*

- › Porter 6 forces
- › Extended Value chains

### **STEP 2: Company Challenges** *Present the company and its specific challenges related to digitalization*

- › Products / Services
- › Delivery systems

### **STEP 3: Business And Digital Architecture** *Propose an adapted business architecture and the related technological architecture*

- › Business Model
- › Key value chains - Key Processes – Key data
- › Key software components – Key infrastructure components

### **STEP 4 : Deployment** *Expose the mains steps for the deployment of the key architecture components*

- › Program and project approach - Milestone planning
- › Key partners

### **STEP 5 : Data Analytics** *Discuss how the data will be used to improve the performance of the organization*

- › Dashboards
- › Data Acquisition
- › Data Presentation

### **STEP 6 : Digital Governance** *Present how you will structure the management of the Digital function*

- › Business & IT

### **STEP 7: Competitive advantage**

## Objectives (and/or specific learning outcomes)

The main objective of the course is to develop the familiarity of business students with IS and digital technology in order to (1) critically assess IT investments and management, (2) understand and anticipate how information technology relates with firm organization and strategy, (3) critically assess IS/Digital priorities in a given context, and (4) perceive IT as a personal productivity tool in their future career (thereby being able to

produce code to automate or simplify their own job tasks) and also as an "industrial" tool, much like a business a production chain. One needs to be able to identify how value is created through business processes, what type of automation and other benefits digitization of processes can bring, how technology enables entirely new approaches and strategies, and how to deal with social and environmental impacts.

More specifically, at the end of the course students should be able to :

- › identify and model business processes
- › model relational enterprise data
- › recognize and criticize the scope of typical IS applications
- › produce simple code in Python to automate a simple business task
- › analyze business data with SQL and Python
- › identify key IT implementation challenges
- › identify and describe high-level building blocks of information systems and infrastructure
- › describe and criticize high-level IT architectures
- › recognize and evaluate IT risks and priorities
- › anticipate and leverage the impact of digitization on businesses
- › describe the logic of typical digital business models

## Pre-requisites and co-requisites

### Required knowledge and skills

- › General understanding of computer science and microcomputers
- › Basic coding / programming, ideally with some experience in Python
- › Basic knowledge of relational databases models (Entity-Relationship Diagrams) and SQL
- › Basic concepts of business and corporate strategy
- › Basic concepts of social psychology and change management
- › Financial methods for project valuation (NPV, IRR, etc.)

## Teaching method and learning activities

The course is mostly organized as an inverted class one, which means that sessions require reading and preparation ahead of the sessions, both for exercises and theory sessions.

- › Theory:
  - › Readings and Video Capsules/Podcasts (Microsoft Stream / OneDrive)
  - › In-class interactive lectures (mostly offline, potentially online) ==> **Every Thursday 10am-12pm (starting Sept 22, 2022)**
  - › Interactive discussions (e.g. Case study discussion), potentially in small breakout groups

- > Guest lectures (extra sessions potentially added for these)
- > Hands-On Digital (exercises and project):
  - > Video Capsules/Podcasts (Microsoft Stream / OneDrive) ==> **Tuesdays 4pm-6pm on Teams, starting Sept 21, 2020**
  - > Live tutoring sessions (mostly offline, potentially online)
  - > Contribution to a class Wiki
  - > Group project with milestones

## Contribution to the teaching profile

This course contributes to the development of the following skills :

- > Adopt a professional and pragmatic stance to work effectively under pressure.
- > Critically analyse situations based on a scientific managerial approach to develop innovative ideas.
- > Devise strategies by developing innovative approaches and practical solutions to drive progress.
- > Manage resources, tasks and input of stakeholders to achieve goals.

## References, bibliography and recommended reading

The course uses no specific textbook but the following references are recommended as supporting documentation and/or for a deeper understanding:

- > Westerman, Bonnet and McAfee, *Leading Digital: Turning Technology into Business Transformation*, Harvard Business Press, 2014.
- > Austin, R., R. Nolan and S. O'Donnell, *The Adventures of an IT Leader*, Harvard Business Press, 2009.
- > Laudon, C. and J. Laudon, *Management Information Systems, Managing the Digital Firm* (16th edition), Pearson, 2018.
- > Ross, J.W., Weill, P. and Robertson, D.C., *Enterprise Architecture as Strategy: Creating a Foundation for Business Execution*, Harvard Business School Press, 2006
- > Davenport, T. and J. Harris, "Competing on Analytics: The New Science of Winning", Harvard Business School Press, 2006.
- > Darnton, G., *Business Process Analysis: including Architecture, Engineering, Management, and Maturity, Requirements Analytics*, 2012
- > Downey, A. D. (2015), "Think Python", 2nd edition, Green Tea Press. <https://greenteapress.com/wp/think-python-2e/>
- > Sweigart A. (2020), "Automate the boring stuff using Python", 2nd edition, No Starch Press. <https://automatetheboringstuff.com/>

## Course notes

Université virtuelle and Podcast

## Other information

### Place(s) of teaching

Solbosch

## Contact(s)

Prof. in charge of the course and main instructor

- > Vincent Lion
  - > [vincent.lion@ulb.be](mailto:vincent.lion@ulb.be)
  - > Expert in Strategic Digital Transformation
  - > Founder, VLC - Management & IT Advisors
  - > Co-Founder, Internal Consulting Services
- > Nicolas van Zeebroeck
  - > [Nicolas.van.Zeebroeck@ulb.be](mailto:Nicolas.van.Zeebroeck@ulb.be)
  - > <http://www.vanzeebroeck.net/>
  - > R42.5.205

Author of the main contents of the "Hands-on Digital" Part

- > Charles HOFFREUMON
  - > <http://homepages.ulb.ac.be/~choffre>

Lecturers of the "Hands-on Digital" Part for this academic year

- > Valentin Dirken (coordinator)
  - > IT Architect, ULB
  - > Expert in IT Architecture
  - > <https://www.valentindirken.com/>
- > Christophe Castan
  - > Co-Founder, Penbox
  - > Expert in AI
  - > <https://www.linkedin.com/in/castanchristophe/>
- > Michaël Dawant
  - > Co-Founder, Vespucci Analytics
  - > Expert in Analytics and UX/UI
  - > <https://www.linkedin.com/in/micha%C3%ABl-dawant-a84814151/>
- > Gaël Rabier
  - > Founder, Niboo
  - > Expert in ERP Systems and Odoo
  - > <https://www.linkedin.com/in/gaelrabier/>

## Evaluation method(s)

written examination, Group work, Personal work and Other

### Evaluation method(s) (additional information)

The course involves active participation, both in the theory and exercise sessions. The theory part of the course will be evaluated through class participation and an exam. The practical part (hands-on digital) will be evaluated during exercise sessions (at specific milestones), as well as through the group project, and through personal contributions to the class wiki.

## Determination of the mark (including the weighting of partial marks)

### CORE COMPONENTS

The course grade is distributed as follows:

- Multiple Choice exam (theory): 10 points
- Hands-on digital project : 10 points
  - The individual hands-on digital project grade is made of the group grade and the individual contribution to the project.

### GENERAL RULES

Please review the following rules carefully:

- Note that assignments (e.g. projects and milestones) will be associated with formal requirements and a strict deadline. Failure to comply with the formal requirements and/or with the deadline will lead to a null grade for that assignment.
- Note as well that plagiarism is a very serious offense and will be punished severely. If you submit a piece of work that contains plagiarized passages, you risk receiving a null grade for the entire piece of work.
- The course forms an integral whole and active components (exercises, assignments, etc.) may change from one year to the next. As a result, partial grades are carried over from first to second sitting (session) but normally not from one year to the next.
- Note also that the 10 points coming from "active" components of the class (participation, assignments, etc.)

are final and offer no possibility for a second sitting. These components of the course are set in January and will be carried over to September in case of a second sitting. With other words, there is no second chance for this part of the course.

- The project grade will be taken into account if and only if the individual grade for the exercises is at least 1 out of 2. Should the individual exercises grade be lower than 1/2, the group grade will count as 0/3.
- Any form of cheating will lead to a null grade at least for the focal component of the course.

## Main language(s) of evaluation

English

## Programmes

### Programmes proposing this course at the Solvay Brussels School of Economics and Management

MA-INGE | **Master in Business engineering** | finalité Professional/unit 1

### Programmes proposing this course at the faculty of Sciences

MA-SECU | **Master in cybersecurity** | finalité Erasmus Mundus joint master in Cybersecurity (CYBERUS)/unit 2