



Digital

I&E Study Course in 2023-24

1st Session on Sep 21st

Principal Features of the I&E Courses
Olli-Pekka Mutanen

Aalto University

Responsible Teacher: Olli-Pekka Mutanen



CURRENT: Professional career and societal activity

- Digital Operations Research Group, School of Science, Aalto University
- Aalto Ventures Program, co-founder and lecturer
- EIT Master's Programme in ICT Innovation, Coordinator & responsible teacher
- National Growth Forum (Finland), co-founder & member of the steering group 2008-2013
- Industrial activities and lecturing related to technology based growth, ecosystems and business

BACKGROUND: Co-founder and CEO of IT, Media and Software firms (1991-2004)

- *MULTILIZER, Inc. 1998-2004, Co-founder, CEO and Member of the board*
 - The market leader in software globalization technology platform solutions for internationally operating enterprises
 - Product awarded as The Best Globalization Technology of the Year in 2001, 2002 and 2003 in USA
- *HYPERHOUSE Group: 1995-2000, Co-founder, Director of projects*
 - HYPERHOUSE was among the top-three "new media" firms in Finland producing corporate wide multimedia solutions and internet services to the leading enterprises and organizations in Finland
- *INNOVIEW Data Technologies 1991-2000, co-founder, CEO and member of the board*
 - Development of software based technologies and solutions, e.g. image compression and archiving technology solutions, multimedia development tools, POS systems, online based real estate solutions

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Part-time teacher: Dr. Mona Roman



Teacher for the Business Research Methodology in this course.

I am Mona Roman, and I teach this course at EIT Digital in Aalto on top of my full time work as Innovation Director at Metropolia University of Applied Sciences. Previously, I have worked as Postdoctoral Researcher at Aalto University, and as Business Development Manager in TeliaSonera Corporation.

I am Aalto University alumni as I completed my doctoral studies, PhD. (Tech.) and MSc. (Tech.) in Aalto University Department of Industrial Engineering and Management.

My role in the teaching team is to help you learn effective ways to do research that (1) serves practical business research needs and also (2) fulfills basic criteria that are set for scientific research.

Course Schedule 2023-24

LECTURES & SESSIONS

- 10 in-class or virtual sessions between on Thursdays 16:15-18:45 (default: OIH, 2nd floor)
 - **Thu 21.9, Thu 28.9, Thu 5.10, Thu 12.10, Thu 26.10, Thu 2.11, Thu 9.11, Thu 16.11, Thu 23.11 and Thu 7.12**
 - Default type of session is in-class (OIH, 2nd floor), few Teams sessions on separate announcement
 - **No lectures in these dates:** Thu 19.10 (Autumn break) and 1.12 (Slush event)

MID-TERM PRESENTATIONS TO THE COMPANIES

- **Groups present preliminary findings of their research** project to company representatives;
- **Thu 14.12** between appr. **14:00-17:00** (in Teams, not a in-class session)

RESEARCH PROJECT WORK & REPORT WRITING PERIOD (15.12-31.1.2024)

- **No lectures** during this period
- **2 Support sessions/per each team** (beginning and mid of January 24)

Course Concept in Nutshell



1. Course at Glance

- General positioning within the I&E Minor and progression;
- Value of the I&E Study course in detail;
- Course Features;

2. Evaluation Criteria

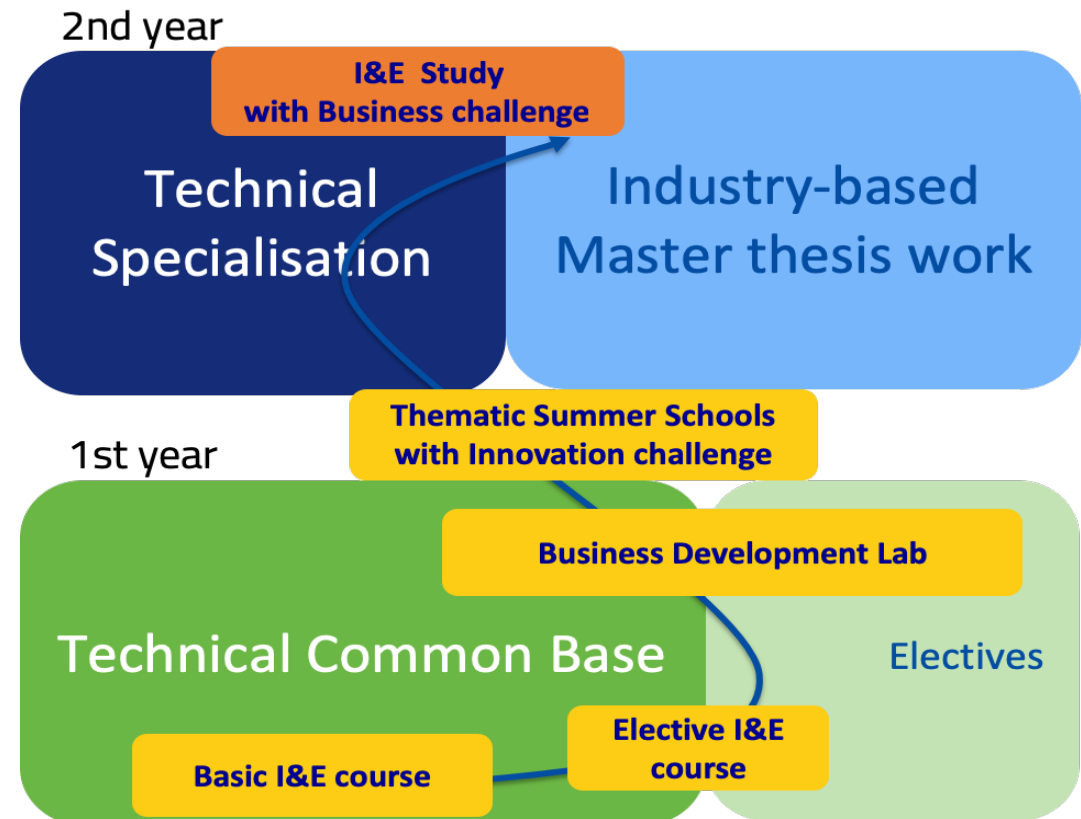
- Final individual assignment report evaluation criteria;
- Group work report evaluation criteria;

3. Distributed I&E Course Model (since 2018):

- Description of the of the distributed course model;
- Basic information on the two (2) distributed courses in 2023;
- Application and selection process for distributed courses;

1.1 General positioning within the I&E Minor and progression

- The I&E Minor offers a progression towards more and more:
 - **Technology intensive** I&E (Digitalization);
 - Application to **EIT Digital innovation areas**
 - Application to **real challenges**;
 - **Autonomy** by student teams (advice and mentoring available, though);
 - **Impact!** (to businesses, EIT community, society, planet, students,...);



1.2 Cornerstones (value) of the course



- A. Interaction with a real-life Company:** your goal is to tackle a company business challenge, make recommendations, and do your best having an impact! This is neither an internship, nor a pre-recruitment.
- B. Robust Business Analysis:** improving analytical skills on economic and social matters; how to handle a business analysis and make recommendations to case-providers, using qualitative and/or quantitative research methods and reflecting upon the conditions for sound analysis.
- C. Tech-based Innovation:** you will learn to employ analytical tools to assess the impact of a technology at a macro (industry, sector) or micro level (business, market), analyse the current trends in an industry and, based on this, to predict the impact of a technology in the near future (5-10 years-time) as well as how the development of new technology influence an industry.

1.3 Online Work (Individual assignment)



- As part of the EIT Digital **Master School's I&E Minor**, the **I&E Study Project** course counts for **6 ECTS** distributed among **Online work part (2 ECTS)** and **Group work part (4 ECTS)**. It is the last I&E course in the EIT Digital I&E Minor and the only one during the Master School Exit year.
- **The online work includes three (3) online modules:**
 - 1) Assessing the impact of technology (Individual Assignment);
 - 2) Business Research Methodology (supports the theory lectures);
 - 3) How to make a Market Entry / grow on a new market (supports the group work).

In the **Individual Assignment** - assessed by the Teacher(s) - you analyse and report briefly the current and future business potential of a chosen technology. The *default for the technology choice is the one in the company case of your group work* (in special cases it can be another one based on your interest, but need to have a separate acceptance for it).

Online Module @EIT Digital Online Education Platform: I&E Study Project Aalto 2023



EIT Digital's Online Education Platform



- Log in to the online platform at:
<https://ieonline.eitdigital.eu>
- Use your existing account (email);
- You will be enrolled to the course:
“I&E Study Project Aalto 2023”
<https://ieonline.eitdigital.eu/course/view.php?id=477>
(if needed, use ‘Search’ to find it);
- In case of platform related problems, feel free to contact: anna.Kurmaeva@aalto.fi (Cc: OP)

- ▶ General
- ▶ Refresh knowledge: Theory and models
- ▶ Impact of Technology
- ▶ Business research methodology
- ▶ How to make a market entry / grow on a new market
- ▶ Assignments
- ▶ Guidelines
- ▶ Business Cases

Course Platform: TEAMS

Please Note: After receiving email from us, make sure you have access to TEAMS platform and your group channel there!

In case of platform related problems, contact:
anna.Kurmaeva@aalto.fi
(Cc: olli-pekka.Mutanen@aalto.fi)



Teams environment

The screenshot shows a Microsoft Teams interface. On the left is a navigation pane with icons for Activity, Chat, Teams, Assignments, Calendar, Calls, Files, and Help. The main area displays a channel named 'IE Study Project Aalto 2021' with a header 'Welcome to IE Study Project Aalto 2021' and the instruction 'Choose where you want to start'. Two buttons are visible: 'Upload Class Materials' (with a book and scissors icon) and 'Set up Class Notebook' (with a notebook icon). Below these is a message from Heiskala Mikko, dated Tuesday 15.53, with the text: 'Welcome to the I&E Study Project Aalto space! We will host our live sessions and their recordings here. Groups will have their own private channels for teamwork and mentoring by staff. Live sessions will be held in their separate channel to allow this General channel to remain uncluttered for course communication.' A 'See more' link and a 'Reply' button are also present. At the bottom, there is a 'New conversation' button. The top of the window shows a search bar and the user's profile 'Aalto University'.

1, Business Research online module

The online material discusses the basics of the following topics:

1. Introduction
2. The nature of business research
3. Typical research designs in business research
4. Developing the research question
5. Collecting evidence, doing field research, and analysis in case research
6. Reporting research



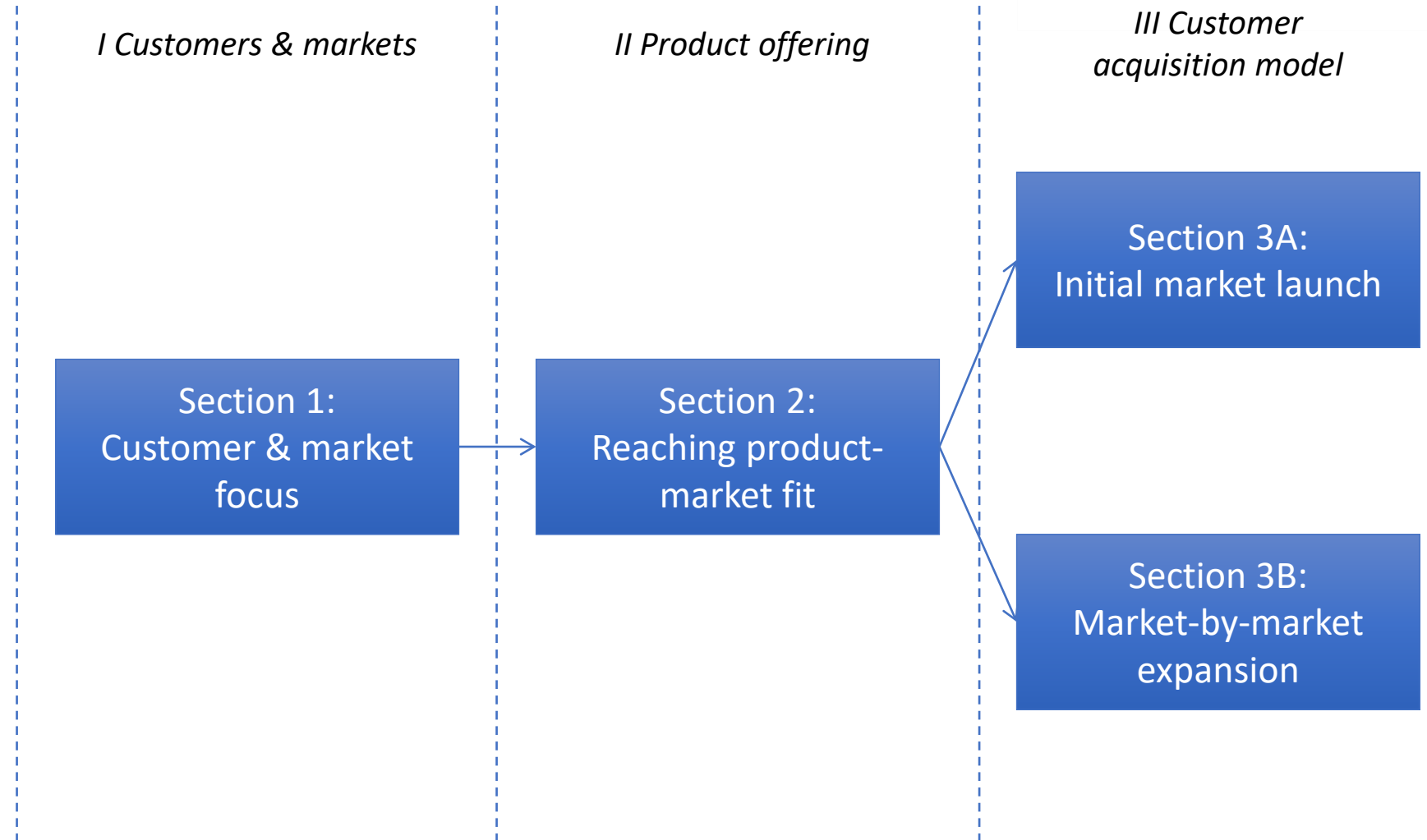
2. Go-to-Market Module

Modules A & B are partially combined



Path A: Go-to-market,
Initial market entry

Path B: Go-to-market,
International scale-up



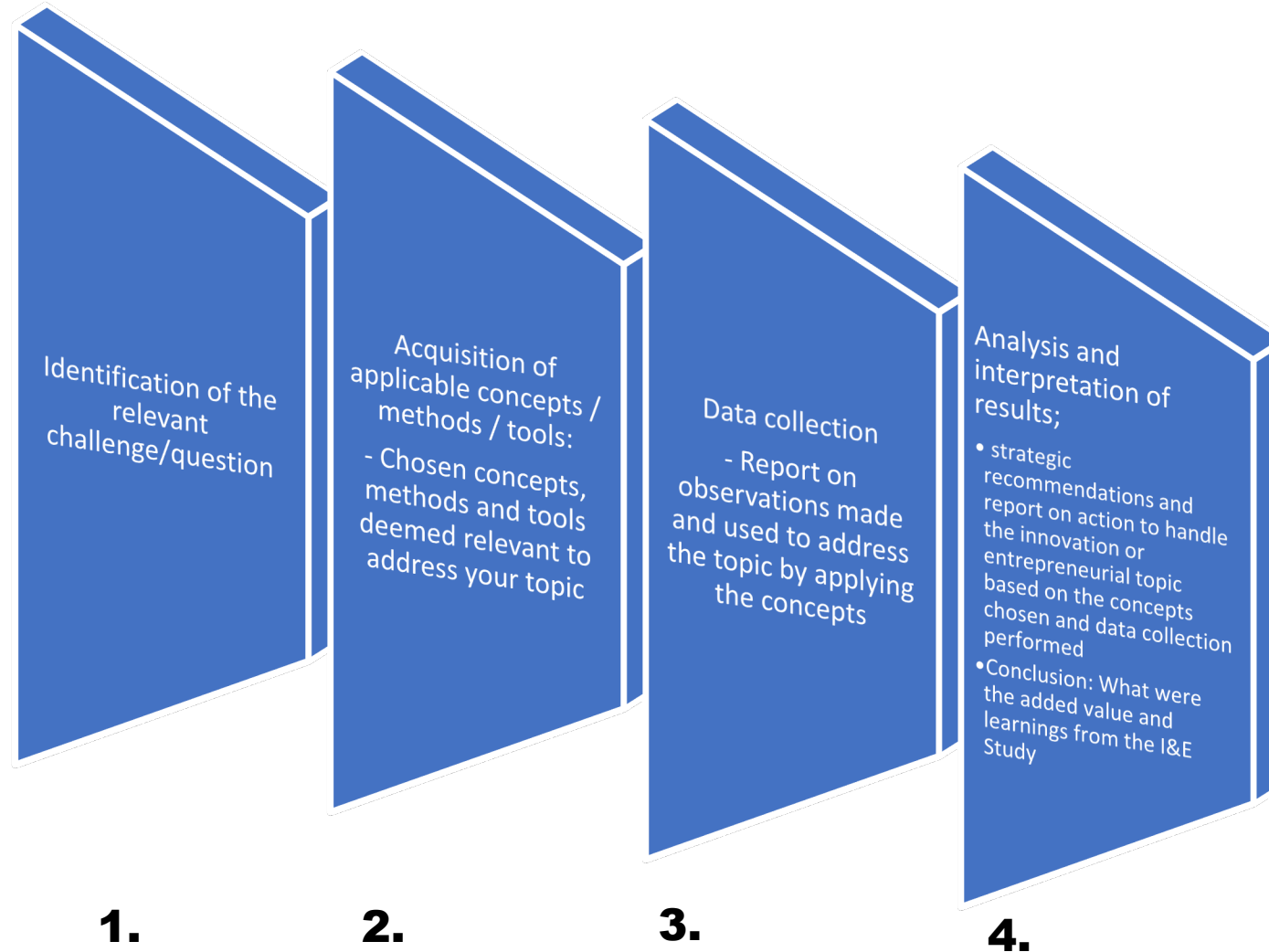
1.3 Course Project (Group assignment)



- **In the Course project (Group Assignment)** students work in teams of ~5 people to prepare a group-report to address a business challenge based on a case offered by a company and the team-dynamics related to that process. We expect you to apply a robust business analysis methodology consisting in:
 - a) Framing the business challenge** with you (relevant challenge and research problem) ;
 - b) Choosing appropriate concepts, methods** and (business) **analysis “tools”**;
 - c) Collecting (real-life) data**;
 - d) Interpreting, critically discussing, making recommendations and reporting**;
- **Templates** for *Individual Assignment* and *Group Project reports* are to made available to you by the teachers;



”Four (4) steps” of the Business Analysis



2. Course Evaluation Criteria



The final grade is based for **65% on the group work** and **35% on online work**.

- **Online work grade** is based on the *Final Individual Assignment* (teacher evaluation). The evaluation criteria of *Final Individual Assignment* report seek to assess students' ability to 'explain' and/or 'apply' the concepts and models contained in the online modules, in the selected technology
- **Group work** The assessment is based on *a written group report*. Beyond company recommendations and potential solutions, the report includes a description of the challenges faced by students, the decision-making points and the ways they addressed them. It also describes the team organization and the specific contributions of the team members. The report should be 10 to 15 pages long plus annexes.

N.B. *Detailed tables of criteria for Online Work grade and Group Work Grade are provided in the following slides.*

2.1 Individual Assignment - Evaluation criteria



Concept	Indicative list of criteria	Weight
Technology Analysis	<ul style="list-style-type: none"> Is the technology appropriately described considering its innovation component? Is offered a wider perspective of the selected technology and strengths/weaknesses? 	10%
USP of selected technology	<ul style="list-style-type: none"> Is offered a comparison with competitive technologies? Concepts are described in correct business-related terms? 	15%
Entry barriers	<ul style="list-style-type: none"> Does the report provide an analysis of the entry barriers in the market? Are they technological, business or end-users related? 	15%
Future developments of this technology	<ul style="list-style-type: none"> Is the future technology potential appropriately described? Are the business roles which this technology may generate adequately provided? 	15%
Early Adopters of this technology	<ul style="list-style-type: none"> Is the impact of technology assessed and explained? Is the concept of crossing the chasm applied in the provided strategy? 	15%
Conclusion	<ul style="list-style-type: none"> Significance of the results in analyzing the technology impact and the added value of through original contribution. Relevance of the reflection on the acquired concepts of the online modules and the applicability in report. 	20%
General	<ul style="list-style-type: none"> Report is written in proper English? A novice in the technical field can read report? Quality of professional writing is sufficient? 	10%
TOTAL		100%

2.2 Group Project report - Evaluation criteria



Business analysis step	Indicative list of criteria	Weight
Step1: Challenge identification	<ul style="list-style-type: none"> • Report describes the larger innovation or entrepreneurial context using relevant concepts and terminology? • Report identifies relevant and significant Innovation or Entrepreneurial challenge/question and expresses them clearly? 	10%
Step2: Knowledge (tools) acquisition	<ul style="list-style-type: none"> • Report gives sufficient arguments to what degree chosen concepts /methods/ tools are important, relevant and/or applicable – or not – to the study context? • Concepts are described in correct business-related terms? 	20%
Step3: Data collection	<ul style="list-style-type: none"> • Data are correctly defined? • Collected data are relevant to address the topics and apply the concepts/methods/tools? 	20%
Step4: Analysis and interpretation	<ul style="list-style-type: none"> • Analysis, interpretation of results, strategic recommendations are correctly expressed are well grounded in / justified by the concepts chosen and data collection performed? 	20%
Conclusion	<ul style="list-style-type: none"> • Significance of the results and added value of the contribution? • Relevance of the decision-making process and decisions to address the challenge • Relevance of the reflection on the concepts applicability 	20%
General	<ul style="list-style-type: none"> • Report is written in proper English? • A novice in the technical field can read report? • Quality of professional writing is sufficient? 	10%
TOTAL		100%

3.1 Distributed Course Model for 2022-23 (by EIT Digital University partners)



- **Two (2) parallel course editions**, each led by one university: **Aalto U**, and **UP Madrid**;
- Teaching and course project mentoring is done by the course owner university.
- *Learning goals are the same across courses, but course contents and emphasis differ a bit.*
 - **Madrid**: Less business research theory lectures, emphasis mostly in group work;
 - **Aalto**: More business research related lectures (helping in thesis work later), similar group work;
- The biz cases in the course project are different one (chosen by the course owner university).
- In the course project you will be teamed with either Aalto or Madrid students:
 1. **Madrid-led course**: Madrid (10) & Aalto (max. 4) students = **~14 students / 3 teams**
 2. **Aalto-led course**: Aalto (38 – max. 4) students = **min 30 students / 6-7 teams**

Distributed Course Model



- **Team-work skills:** strong requirement from our industrial partners;
- Working in a multi-cultural, multi-disciplinary, multi-national and now in a **multi-location team;**

*“To succeed in the global economy today, **more and more companies are relying on a geographically dispersed workforce.** They build teams that offer the best functional expertise from around the world, combined with deep, local knowledge of the most promising markets. They **draw on the benefits of international diversity, bringing together people from many cultures** with varied work experiences and different perspectives on strategic and organizational challenges. All this **helps multinational companies compete in the current business environment.**”*

<https://hbr.org/2015/10/global-teams-that-work>

Distributed Course Model - Why multi-location group work?



- ***The prevalence of virtual workers*** – employees whose primary work location is their home or other non-traditional location – has increased 39% over the last two years
- ***Managers can take advantage of this organizational structure by assembling employees from different locations*** in such networks to create a team that can optimally integrate the different pools of expertise to perform a particular task
- ***Using virtual teams can improve employee productivity***; some organizations have seen gains of up to 43%
- ***On average, organizations can save between \$5,000 and \$8,000 per employee on real estate costs alone.***
- ***Virtual work has quickly become a key differentiator in attracting and retaining key employees.***
- ***Increases in employee retention can range between 10% and 50%***
- ***A virtual work arrangement allows organizations to significantly increase their recruiting base, as recruiters do not have to be constrained to a specific geographical area***

https://www.aon.com/attachments/virtual_worker_whitepaper.pdf

<https://sloanreview.mit.edu/article/how-to-manage-virtual-teams/>

Comparison between Distributed I&E Study Courses 2022-23



1. Aalto led course 22-23: Aalto students (Only)

- Period: 21.9. – 31.1.2023
- Lectures: On Thu 4 pm – 6 pm (max 6:45). Both online (theory sessions) and onsite (lectures & workshops);
- Midterm (company) presentations: mid of Dec (14.12.2023);
- DL for the individual assignment: mid of Dec, 14.12.2023;
- DL for the group assignment: By the end of January, 2023;

2. Madrid (led) course: Madrid & (a few) Aalto students

- Period: 21.9.2022 – appr. 15.1.2023;
- Sessions: Tuesdays mornings (10-13 hours/CET)
- 5 meetings with companies, weeks 43 (case presentation by companies), 45, 47, 49 (3 three follow-up sessions), 51 (final presentation by students to companies)
- Last year (2022) Deadlines were the following:
 - Midterm company presentations: Week 50, Dec, 2022;
 - DL for the individual assignment: Oct, 2022 (tentative date 18.10);
 - DL for the group assignment: By the 2nd week of January, 2022;

3.3 Application & Selection Process



PRINCIPLES:

1. By Default, you're (already) in the Aalto Edition course and if that's your will, nothing need to be done!
2. IF you are interested to take part of the Madrid Edition course, email to me (olli-pekka.mutanen@aalto.fi) **by Tuesday 26.9.** about your interest – this is not any guarantee of a decision yet, but our 1st phase query to see if there are interested ones!

We will make decision on the transferring students **earliest on Wednesday 27.9, until that you still can decide differently without justifying it.**

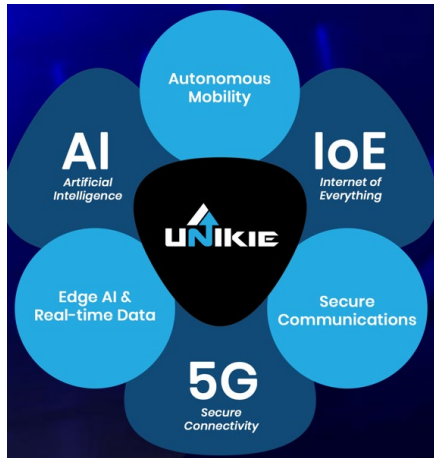
Getting Organized with Cases

I&E Study Aalto **LAST YEAR**

2022-23



1 - Unikie (Aalto)



Keywords: Internet of Everything, Smart machines and spaces, real time decision making

Business Context:

- Technology for secure realtime processes and consulting for related demand.
- We bind together three global macro trends – **IoE, 5G and AI.**
- We enable the use of **continuous situational awareness** for autonomous mobility, **augmented operational assistance**, and process management.

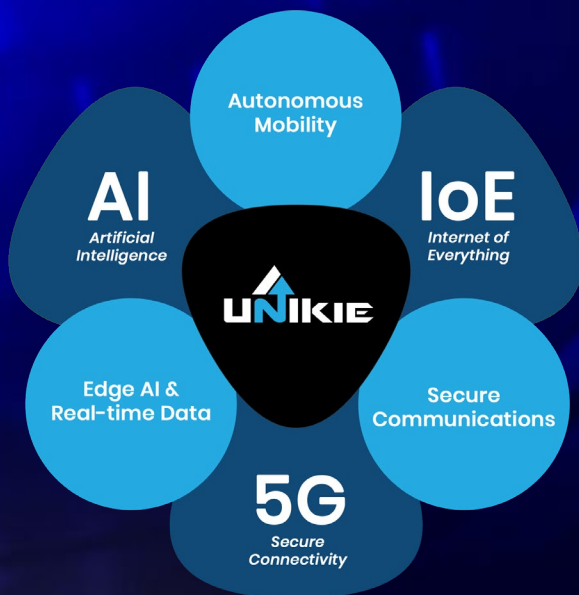
Technologies involved:

- Autonomous processes, sensor fusion, hardening and virtualization of devices & systems

Business Challenge:

- Market focus selection and timing (Unikie's positioning in "Smart space")
- Utilization of our references and reference designs to meet the potential market
- Selecting customers on the markets, Understanding where to play and against whom

WE ARE UNIKIE



Technology for secure realtime processes and consulting for related demand.

We bind together three global macro trends – IoE, 5G and AI.

We enable the use of **continuous situational awareness** for autonomous mobility, **augmented operational assistance**, and process management.

GOALS 2024

REVENUE 100+ M€

1000+ EMPLOYEES

CASE TOPICS

- **SMART SPACE – WHAT WOULD BE THE BEST PRODUCT MARKET FIT FOR A TECH COMPANY**

45 M€

REVENUE (2021)

+150%

EMPLOYEE GROWTH (2021)

180+

CLIENTS GLOBALLY

60+

EMPLOYEE NET PROMOTOR SCORE



Finland (HQ), USA,
Germany, Sweden,
Poland, Estonia,
France

2 – Viimatech, Option A (Aalto)



Keywords: IoT, data-analytics, Energy saving, Predictive maintenance

Business Context:

- An unique method to monitor and optimize pumps in water utilities and industry. (Predictive analysis and energy optimization). The analysis is made from motor current data. This enables easy installation and affordable prize.

Could this technology be used to optimize energy consumption and maintenance in private and/or public swimming pools?

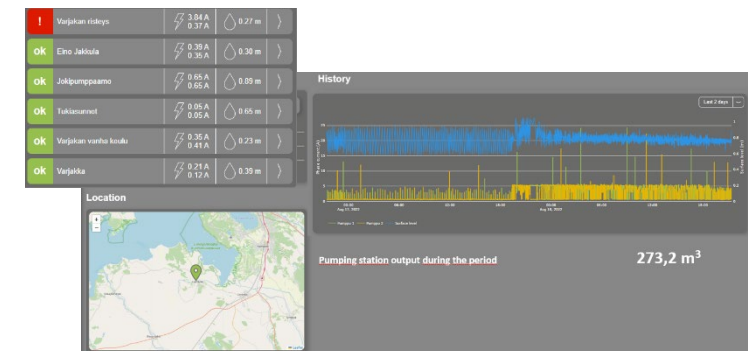
Technologies involved:

- IoT, 5G, Edge- and Cloud computing, Digital Twins

Business Challenge:

The goal of the study is to understand:

1. The feasibility in the swimming pool segment. Need adjustments to the products.
2. The value chains and players in the swimming pool service market (The market can be limited to Europe or students can propose some other areas)
3. The main problems of the end customers and service providers.



2 – Viimatech, Option B



Keywords: IoT, data analytics, Energy saving, Predictive maintenance

Business Context:

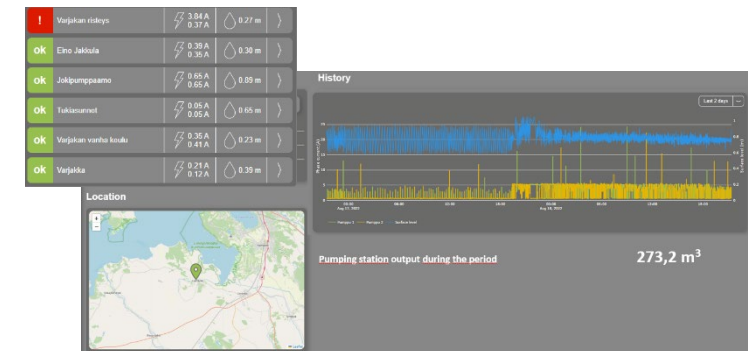
- An unique method to monitor and optimize pumps in water utilities and industry. (Predictive analysis and energy optimization). The analysis is made from motor current data. This enables easy installation and affordable prize.
- Service design is need. Scalable, easy to by, easy to use package of the technology and method is needed.

Technologies involved:

- IoT, 5G, Edge- and Cloud computing, Digital Twins

Business challenge:

1. Understand the value chains and players in the water distribution in (European) countries
2. Define a scalable service product portfolio to enable a “digital energy audit” for water utilities



3 - MDD IoT (Aalto)



Keywords: data logging, machine learning, predictive maintenance

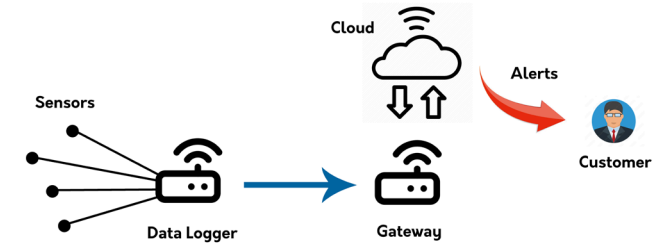
Business Context:

- MDD IOT designs **data acquisition systems for high value assets** such as *aircraft, construction machinery, manufacturing machinery etc.* Data is collected from sensors on the asset and analysed using machine learning that detects early signs of failure. If problems are detected then alert messages are sent via the cloud to the customer so that they can take remedial action before the failure occurs.
- A customer dashboard is used **to show the status of each asset and any fault histories.**

Technologies involved: embedded computing, wireless comms (LoRa, Wifi, satellite), machine learning, cloud computing.

Business Challenge:

- Identify potential **markets** that have costly downtime
- Identify **the most promising applications** where machine learning on the asset could have real benefits for the customer
- **Assess how much downtime** customers have and how much it **costs for them per year**
- Identify **early adopters**
- Ask them what features they would like
- List the **benefits** as stated by that the customers
- Identify **implementation obstacles** that will need to be overcome
- Do a **cost/benefit analysis** that will **convince the customer** that they need the solution
- Determine **the sales price** for the hardware and for the alert messaging service
- Assess **the sales volume** per customer(s)
- Identify **suppliers of hardware and software** that have **products/services that could be used to build a customised solution** for each customer



Helping companies eliminate downtime

4 – AirXYZ, Electric air taxi for ten cities (Aalto)



Keywords: eVTOL, electric aviation, urban air mobility, smart mobility

Business Context

- AirtaXYZ™ develops an intra-urban air taxi. It is a battery electric vertical take-off and landing (eVTOL) aircraft. It can fly like a helicopter, although with less range – and is semi-autonomous (no pilot on board).
- AirtaXYZ™ has about 5-7 mature competitors, with a wide range of business models. Most competitors are in talks to commercial airlines, who have only vague ideas about intra-urban traffic.
- At the same time, existing passenger helicopter operators offer a wide range of airborne services, with a focus on sightseeing flights VIP transport, and airport shuttle/feeding flights. In addition, MaaS companies such as Uber prepare for airborne services, and intend to offer combined car/aircraft rides.
- Geographically, the case context is limited to ten cities, including Rio de Janeiro and Hong Kong. These ten cities are all prone to traffic congestion and have several helicopter operators providing services already.

Technologies involved: Semi Autonomous Systems (Semi-AUS)

Business Challenge

- Investigate existing and predict future business models for air taxis. This includes current business models for passenger helicopter operators. Those business models do not need to be “complete”, though the value offered needs to be clearly identified.
- Discover overarching business aspects (e.g., value offered, partnerships, target markets etc.) which are valid throughout all the ten cities and can be adopted for the AirtaXYZ™ (customers’) business model.
- Take the benefits of eVTOLs into account. They fly free of emissions, are much more silent, simpler in maintenance, and likely less expensive to operate than helicopters.



5 – MilliScan, Market entry plan

Keywords: Market entry, deep technology, Terahertz imaging, Millimeter-wave imaging, security sector

Business context: MilliScan is a Research-to-business project where we aim commercialize a novel Terahertz or millimeter-wave imaging solution.

We are developing a new revolutionizing imaging technology for security sector. With our technology security operators can spot hidden objects through clothes without harmful radiation or invading people's privacy.

Technologies involved: Millimeter-wave imaging, neural network, Terahertz imaging

Business challenge: We are interested in forming a market entry plan for our technology and future product. Market entry plan includes at least the following:

- Analyzing different customer segments and recommendation of the first segments
 - Business environments
 - Competitive analysis
 - SWOT
- Analysis and recommendation of the first geographical areas
- Sales and marketing strategy

In best case the student group would contact and interview different customer segments and understand their business environments (sales cycles, purchasing power etc.) and whether our technology can provide value to them.



6 - Xenia Reply - Offering citizens innovative telemedicine

Keywords: business model, innovation, telemedicine

Business Context:

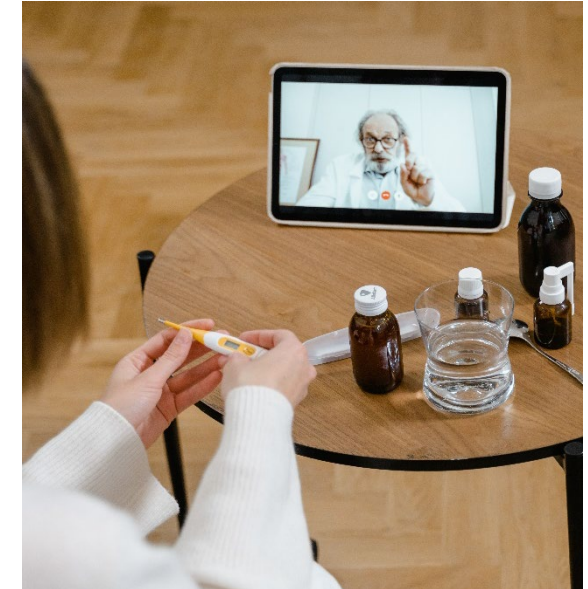
- Using technology to deliver care at a distance represents a valid help to overcome nowadays healthcare challenges
- Several applications of telemedicine exist ranging from supporting doctors through tele-consulting to providing continuity of care through tele-monitoring at patients' home
- Health problems are very often linked to bad nutrition and drinking behaviour, the potential of monitoring these habits to tailor the treatment is huge
- There are already many telemedicine platforms on the market, competition is based on functionalities offered, after-sales support, quality, and personalization of services

Technologies involved:

- IoT, AI, mobile technology stack

Business Challenge:

- Design innovative services to address care related to food and beverage behaviour. Provide a business case with market, financial and feasibility analysis of the solution
- Propose a versatile business model for a telemedicine platform suitable to target services designed for B2C and B2B commercialization and adjustable according to client size or number of features involved
- Provide solutions to monitor the success of the business model and strategies to market new features of the telemedicine platform



3.1 Organization of Course Guidelines



Guidelines' Table of content:

1. Introduction (T)	2
2. Introduction (S)	2
a. Course purpose in a nutshell	2
b. General positioning within the I&E Minor and progression	3
c. Value elements, in detail	3
3. Learning objectives (S&T)	3
a. Specific intended learning outcomes (ILOs)	3
b. EIT Overarching Learning Outcomes (OLOs)	4
4. Pedagogical methods (S&T)	4
Online work	4
Group work	4
5. Assessment and grading (S&T)	5
a) Online work evaluation criteria	5
b. Group assignment	6
6. Timing of the I&E Study (S&T)	6

Homework for the Thu 28.9 session

Before the next lecture, watch the following videos @ EIT Digital Online of the **Business Research Methodology**:

- Sub-module 1: Introduction / **1.1 Introduction**, and **1.2 Studying tips**;
- Sub-Module 2: Understanding BR / **2.1 Business, research and business research**, and **2.2 Structuring the research argument**



Digital
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**Thank you for attention –
Let's see next time on Sep
28th (in OIH 2nd floor)!**

