Faculty of Computer Science, Dalhousie University *8-Jan-2026*

DGIN 5201 — Digital Transformation

Lecture 1: Course Introduction (CS part)

Location: McCain 2170 Instructor: Vlado Keselj and FE Bordeleau
Time: 10:05–11:25

1 Course Introduction

Course Information

- Course: DGIN 5201 Digital Transformation
- Lectures: Tue/Thu 10:05–11:25,
  McCain Arts&SS 2170
- Instructors: Dr. Vlado Keselj and Dr. FE Bordeleau
- Lab: Mon 11:25–12:25 Mona Campbell 1201
- TAs: Kya Masoumi-Ravandi
- Web: `https://tr.cs.dal.ca/dgin5201`
- Brightspace: `https://dal.brightspace.com/d2l/home/414860`

Digital Transformation – One View

- Digital Transformation:
  - innovation based on digital technologies, and
  - adoption of digital technologies

  to fundamentally improve an organization's processes
- This is a **key skill**:
  - Businesses disrupt business models with digital tech
  - Health systems radically improve process efficiency
  - Data-driven decisions are adopted to improve decision making

  This intensive course incorporates both hands-on and theory to help prepare you for the workforce.

Why do we have two profs?

- Digital Transformation course is the core, or "heart" of the MDI program
- Includes essential synergy of two academic traditions: Computer Science and Business
- The course it taught by two professors from the two traditions, each following principles and approaches typical in their areas
- This term the course instructors are:

Dr. Vlado Keselj Computer Science approach	and	Dr. FE Bordeleau Management approach

Learning Outcomes

- Overall learning objective:
  Combined learning of business and technical approaches to Digital Transformation and Digital Innovation
- Learning outcomes:

1. Digital disruption

2. User experience

3. Front end tech

4. Data & backend

5. Entrepreneurship

6. Prototyping

7. Emerging tech

Delivery

- This is an in-person class. The course works better in-person.
- Networking is important. Working in a "random" team is a learning objective.
- Labs may not be used each week, always available for team work
- Content is on Brightspace and Course Web Site
- We will use: Email, Teams, Gitlab as well
- Best effort will be put to have lectures recorded, but no guarantees!

List of Topics

- Course introduction (Lec 1, w1)
- Disruptive Innovation and Business Strategy (Lec 2–6, w1–3)
- Rapid Prototyping (Lec 7–11, w4–6)
- Emerging Technologies and Project (Lec 12–24, w7–12)
  - Emerging Technologies (business and CS)
  - Team Project Work and check-ins

Course Calendar Overview

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2026    Mo Tu We Th Fr Sa Su
Jan              7  8  9 10 11 (w1) Intro
        12 13 14 15 16 17 18 (w2) Disruptive Innovation
        19 20 21 22 23 24 25 (w3) A1
Feb     26 27 28 29 30 31  1 (w4) Rapid Prototyping
         2  3  4  5  6  7  8 (w5) A2
         9 10 11 12 13 14 15 (w6)
        16 17 18 19 20 21 22 (study break)
Mar     23 24 25 26 27 28  1  (w7) Project Specification
         2  3  4  5  6  7  8  (w8) Emerging topic
         9 10 11 12 13 14 15  (w9) Early Prototype
        16 17 18 19 20 21 22 (w10) Emerging topic
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        23 24 25 26 27 28 29 (w11) Emerging topic
Apr     30 31  1  2  3  4  5 (w12) Demo & Presentation
         6  7  8  9                Report and code
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Evaluation

- 40% — Individual Assignments (A1 + A2)
- 10% — Seminar Reports
  - on emerging technologies, individual
- 50% — Final project, Group Work
  - project specification 5%
  - early prototype 5%
  - presentation and demo 20%
  - report and code 15%
  - peer evaluation 5%

Academic Integrity Policy

- Please read the given handout (also available at the course web site)
- Suspected cases of plagiarism are referred to Academic Integrity Officers, and may lead to serious consequences
- Plagiarism is defined as "the presentation of the work of another author in such a way as to give one's reader reason to think it to be one's own"
- Fully reference sources in your assignments and reports
- Write in your own words
- You can look at other code, but do not cut-and-paste!
- Discussing assignments verbally is likely not an issue, but do not discuss it in writing or typing

Dalhousie Culture of Respect

- We believe that inclusiveness is fundamental to education and learning.
- Every person has a right to be respected and safe.
- Misogyny and disrespectful behaviour on campus, wider community, and social media is not acceptable. We stand for equality and hold ourselves to a higher standard.
- Take an active role:
  - Be ready: do not remain silent
  - Identify the behaviour, avoid labeling or name-calling
  - Appeal to principles, particularly with friends, co-workers or similar
  - Set limits
  - Find an ally and be an ally, lead by example
  - Be vigilant

Business and CS Part

- Two approaches:
  1. Business Approach
  2. Computer Science Approach

Overview of Technical Part

- Implementing a solution: Rapid prototyping
- Review of programming and Web fundamentals
- Hands-on exercises in fundamental technology
- Elements of building a three-tier system
- Techniques for rapid prototype building
- Applied in the course project

About CS Instructor

- Dr. Vlado Keselj (pron.: Vlado Ke-sh-el)
- E: vlado@cs.dal.ca
- W: vlado.ca
- Director of the MDI program
- Professor in Computer Science
- BCS, Master's, and PhD in CS
- Research: NLP, ML, AI, Data Mining, Innovation

Digital Transformation

- One business-oriented definition:
  "**Digital Transformation:** The adoption of digital technologies that fundamentally improve an organization's processes."
- **Digital Innovation:**
  - Sometimes defined as identical to Digital Transformation; or
  - A continuous activity of finding opportunities for leveraging digital technology
- For **successful** Digital Transformation:
  - We need to understand the problem (need, "pain"), and
  - We need to understand the technology that we can use

Digital Transformation: Good, Bad, and Ugly

- DT: "The Good, the Bad, and the Ugly"
  - a handy expression from the 1966 Sergio Leone's movie
- Good: efficiency, flexiblity
  - easier communication, collaboration
  - Goal: increase it
- Bad: risks of data, money, and time loss
  - data breaches, cyber scam
  - Goal: eliminate it
- Ugly: not actually efficient
  - increased complexity and loss of time and effort
  - Goal: decrease it

Digital Transformation: the "Ugly" side

- A quote by John Ralston Saul:

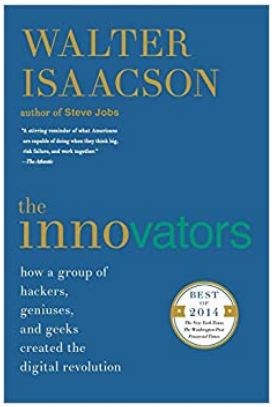
  "The effect of new technology has been to draw even senior managers into minutiae. People paid to think and lead now spend much of their time typing and responding to or sending an endless stream of unnecessary

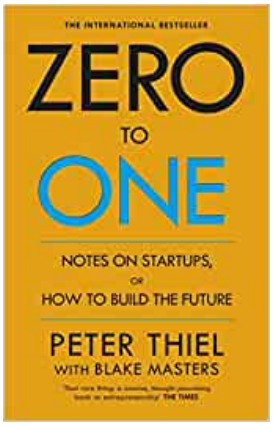
messages, simply because communications technology invades every second and every corner of their lives. This bureaucratization of both the leadership and the creative process makes thought seem irresponsible and clear action seem unprofessional. It provides a sensation of activity while creating a broader sense of powerlessness. This is what used to be called **being nibbled to death by ducks.**"

Fundamentals of Digital Innovation

- A historical look at digital innovation
- Computer Science elements of digital innovation

Some References in Digital Innovation





- Walter Isaacson: The Innovators
- Peter Thiel with Blake Masters: Zero to One
- Yevgeniy Brikman: hello, startup

Some References in Digital Innovation

- Walter Isaacson: The Innovators
  - How a group of hackers, geniuses, and geeks created the digital revolution
- Peter Thiel with Blake Masters: Zero to One
  - Notes on startups, or how to build the future
- Yevgeniy Brikman: hello, startup
  - A programmer's guide to building products, technologies, and teams

The Innovators by Walter Isaacson present a history of digital innovation, explaining in depth the key moments in this amazing development.

Zero to One by Peter Thiel is not only business but also a philosophical work on creating startups that build the future.

Hello, startup by Yevgeniy Brikman is a more technical tutorial on building products, technologies and teams in the startup environment.

Rapid Prototyping / Implementing a Solution

- Tentative plan:
- One class used to cover concepts and theory

- Next class to go over hands-on exercises
- Exercises aimed at `timberlea` server
- Use your CSID and password
- Use of web site: https://web.cs.dal.ca/~*YourCSID*

Some Items to Check Early

- Check your CSID and password, helpful site: `https://csid.cs.dal.ca/`
- Helpful if you have experience in `ssh` login to `timberlea.cs.dal.ca`
- Mac or Linux: `ssh` can be used from terminal
- Windows: PuTTY can be used
- PuTTY can be installed from `https://www.putty.org/`

Some Key Moments in Digital Revolution

- Ada Lovelace, Charles Babbage, around 1843
- Building a Computer, 1937–1945
- Discovery of Transistor, 1947
- Microprocessor (Intel 4004), 1971
- The Internet, 1973
- The Personal Computer (Altair 8800), 1974
- The Web and Online access, 1991

Technical Foundations

- Two main foundations of Digital Innovation:
  - Computer as a general computing and information processing device
  - Internet as a general communication infrastructure
- Computer as foundation
  - File system, processes, users
  - Operating system, shell (bash)
  - Programs, utilities, commands, applications
- Internet and communication

The Evolution of the Internet: 1961–The present

- Early Innovation Phase, 1961–1974
  - Creation of fundamental building blocks
  - 1973–74: TCP/IP
- Institutionalization Phase, 1975–1994
  - Large institutions provide funding and legitimization
  - 1986, beside ARPANET, NSFNET began (civilian Internet)
- Commercialization Phase, 1995–present
  - Private corporations take over, expand Internet backbone and local service

More Detailed History of Internet and Web

Early Innovation Phase
1961 — Leonard Kleinrock (MIT) publishes a paper on packet switching networks.
1971 — E-mail is invented by Ray Tomlinson (BBN). Larry Roberts writes the first e-mail utility program.

1973 — Bob Metcalfe (XeroxPark Labs) invents Ethernet and local area networks; client/server computing invented
1974 — "Open architecture" networking and TCP/IP concepts presented in a paper by Vint Cerf (Stanford) and Bob Kahn (BBN).
1980 — TCP/IP officially adopted by DoD; Personal computers invented

Institutionalization Phase

1984 — DNS (Domain Name System) was introduced.
1989 — Tim Berners-Lee (CERN, Switzerland) proposes World Wide Web (HTML and HTTP).
1990 — Internet becomes available to wider public, ARPANET transforms to NSFNET.
1993 — Mosaic, the first graphical Web browser implemented by Mark Andreesen and others (National Center for Supercomputing at the University of Illinois).

Commercialization Phase

1995 — Commercial Internet born: commercialization of the US backbone, Network Solutions takes over domain registration.
1995 — Amazon founded by Jeff Bezos; AuctionWeb (eBay) by Pierre Omidyar.
1998 — Google founded by Larry Page and Sergey Brin.
2004 — Facebook founded by Mark Zuckerberg, Eduardo Severin, Dustin Moskovitz, and Chris Hughes.
2009 — Internet-enabled smartphones become a major extension.

Conclusion

- This was an overview of the Technical (CS) Part
- After the first lecture, we will start with the first Business unit:
  Disrupting Innovation and Business Strategy