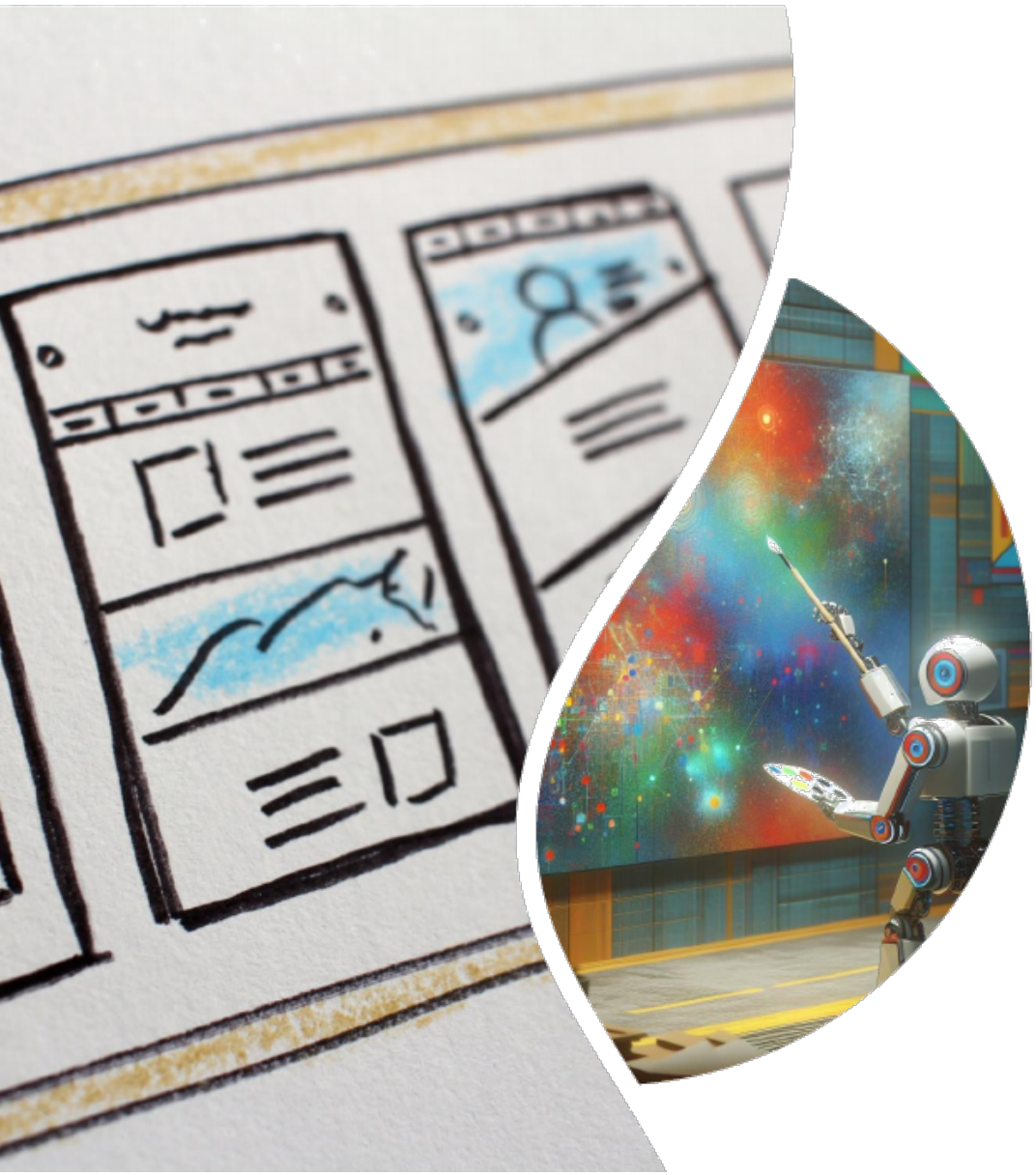


DGIN 5201
Digital Transformation
Lecture 2

Overview of Technical Perspective

Vlado Keselj

Time and date:
14:35–15:35, 11-Jan-2024
Location: LSC C238

Image: DALL-E. Bing Image Creator. Generated by AI

Why do we have two profs?

Dr. Colin Conrad , who focuses on behaviour, users, and information systems innovation.

Dr. Vlado Keselj, who focuses on data mining, NLP, and technical innovation.

To do this well, you need to do both!

(from Colin's slide deck)

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

About the Course

- Digital Transformation with an Innovation Approach
- Designed to be co-taught by an instructor from Management and an instructor from Computer Science
- Overall learning objective:
  Combined learning of business and technical approaches in Digital Transformation and Digital Innovation.

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

Why do we learn Linux?

- Linux, or better to say a Unix-style operating system
- A stable, elegant, well-designed system that survived a test of time
- Windows also has Windows Linux Subsystem
- Mac uses BSD-based Unix-style system
- Others: Android, Chromebook, similar systems
- Cloud solutions use frequently Linux-based containers
- and more...

Another look at Syllabus

- Syllabus, Evaluation schema, etc.
- Look at the public web site: https://vlado.ca/dgin5201

Evaluation

- 30% — Individual Assignments
- 20% — Seminar Reports
  - on Emerging Technologies, Individual
- 50% — Final project, Group Work
  - 5% + 5% + 10% + 25% + 5%

Course Calendar Overview

2024	Mo	Tu	We	Th	Fr	Sa	Su		
Jan	.8	9	10	11	12	13	14	(w1)	Intro
	15	16	17	18	19	20	21	(w2)	Disruptive Innovation
	22	23	24	25	26	27	28	(w3)	
Feb	29	30	31	1	*2	3	4	(w4)	Rapid Prototyping
	5	6	7	8	9	10	11	(w5)	
	12	13	14	15	16	17	18	(w6)	
	*19	20	21	22	23	24	25	(study break)	
Mar	26	27	28	29	1	2	3	(w7)	Emerging: Blockchain
	4	5	6	7	8	9	10	(w8)	Emerging: Gen AI+BA
	11	12	13	14	15	16	17	(w9)	Emerging: AI+DeepL
	18	19	20	21	22	23	24	(w10)	Emerging: BioM+BCI
	25	26	27	28	29	30	31	(w11)	Reserved (Guest?)
Apr	1	2	3	4	5	6	7	(w12)	Final Presentations
	8	.9	10	11	12	13	14		Report and code

Deliverables and Project Calendar Overview

2024	Mo	Tu	We	Th	Fr	Sa	Su		
Jan	.8	9	10	11	12	13	14	(w1)	Intro
	15	16	17	18	19	20	21	(w2)	Disruptive Innovation
	22	23	24	25	26	27	28	(w3)	
Feb	29	30	31	1	*2	3	4	(w4)	Rapid Prototyping
	5<	6	7	8	9	10	11	(w5)	A1 due
	12	13	14	15	16	17	18	(w6)	
	*19	20	21	22	23	24	25	(study break)	
Mar	26<	27	28	29p	1	2	3	(w7)	A2 due, prj.spec.
	4<	5	6	7	8	9	10	(w8)	Seminar report 1
	11<	12	13	14p	15	16	17	(w9)	Sem.rep. 2, prj.early.proto.
	18<	19	20	21	22	23	24	(w10)	Seminar report 3
	25<	26	27	28p	29	30	31	(w11)	Seminar report 4, prj.demo
Apr	1	2	3	4	5	6	7	(w12)	Final Presentations
	8	.9	10p	11	12	13	14		Report and code

Digital Transformation

- Definition given in the last class:
  "**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

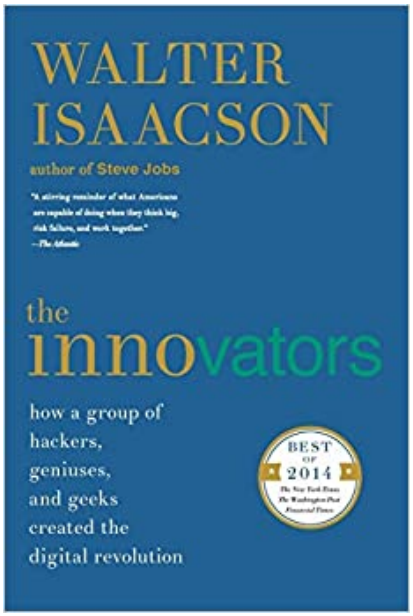
- A quote by John Ralston Saul:

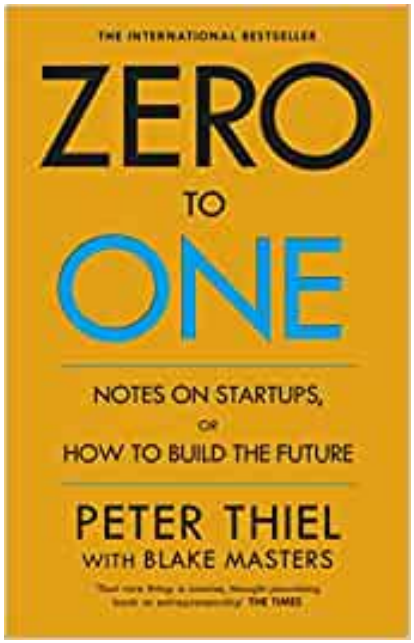
  "The effect of new technology has been to draw even senior managers into minutiae. People paid to think and lead now spend much of their time typing and responding to or sending an endless stream of unnecessary messages, simply because communications technology invades every second and every corner of 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

Three References in Digital Innovation





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

Three 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

Rapid Prototyping (starting Jan 30)

- Tentative plan:
- Tuesday class used to cover concepts and theory
- Thursday 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.