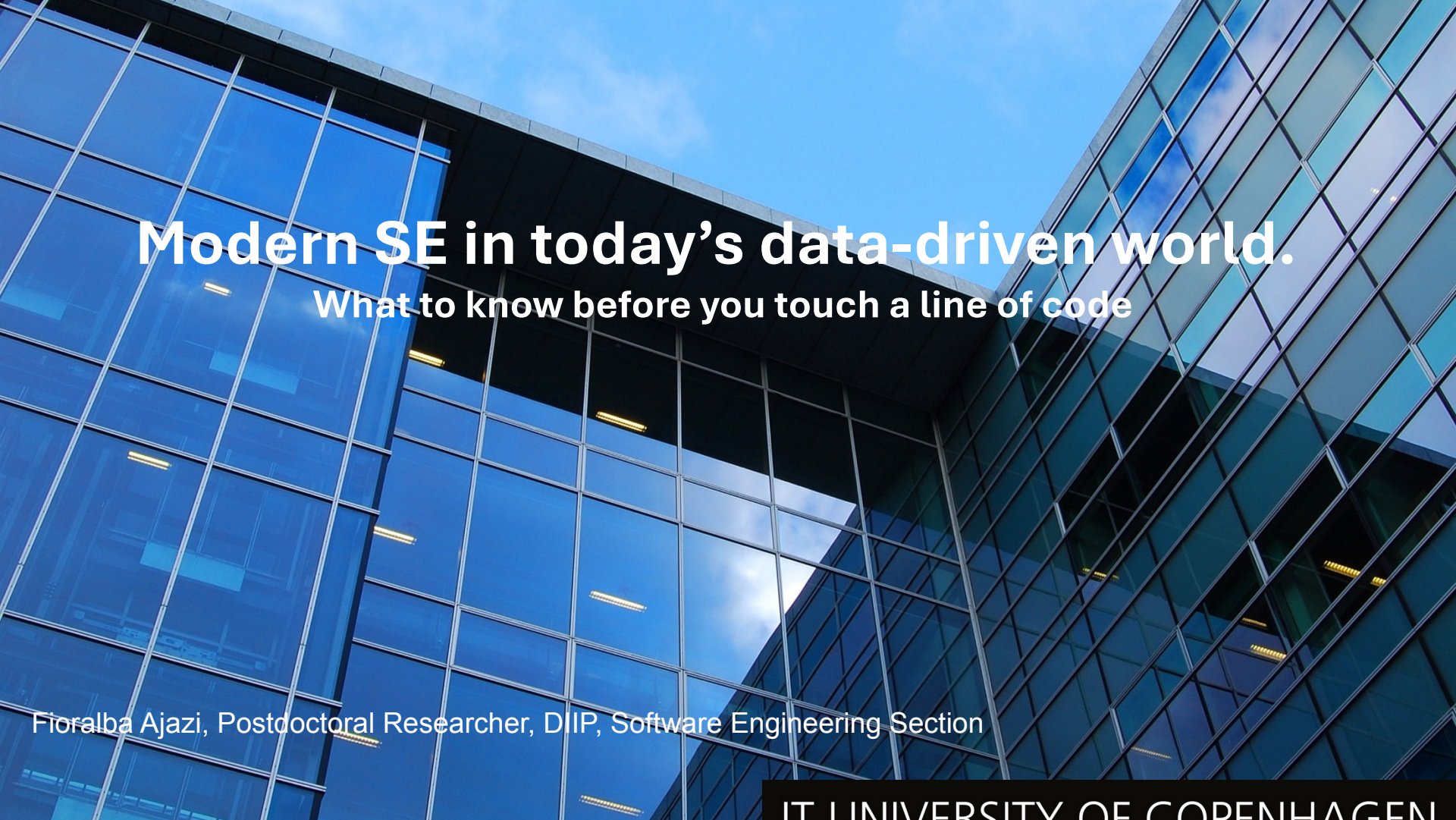


Modern SE in today's data-driven world.

What to know before you touch a line of code

Fioralba Ajazi, Postdoctoral Researcher, DIIP, Software Engineering Section

IT UNIVERSITY OF COPENHAGEN

KNOWING THE SPEAKER

Name: Fioralba Ajazi
Origin: Born in Albania (Kruja), grew up in Italy (Udine), lived between Sweden (Lund) and Switzerland (Lausanne) in the last 13 years. Worked in Denmark for 2.5 years.

Academia:

- PhD in Mathematical Statistics from Lund University
- PhD in Information Systems from the University of Lausanne.
- Postdoc ITU, IT Program Management.
- Thesis in ”Inhomogeneous Random Graphs Applied to Neuronal Networks”.
- Teaching assistant ”Optimization methods for Business and Economy” (UniL, Lausanne).

Business:

- Product Data Analyst (private sector)
- Product Owner BI/Data Scientist (public sector)
- IT Data Delivery Project Manager (private sector)
- Advisor IT Program Management (public sector)

KNOWING THE AUDIENCE

Who among you plans to work in the private sector?

And who in the public sector?

How many would like to stay in Academia?

Who is already very familiar with Develop, Test, Documentation, and Release?

THE IDEAL PROFILE IN ACADEMIA

Science, **T**echnology, **E**ngineering, **M**athematics

STEM world:

Theory → Models → Data → Validation → Documentation → Peer Review

“laboratory paradise”:

Controlled variables, expert supervision, and data truthfulness.

THE ACADEMIC ECOSYSTEM

- Theoretical models
- Evaluation on synthetic vs real data
- Objective and fact-based reviews

Key concepts:

Rigor, reproducibility, and fairness.

The ideal environment is “truth-seeking without conflict of interest.”

WHEN ACADEMIA MEETS REALITY

Academic World Values meet Business World Pressures

Let’s see how theoretical ideals crash into

deadlines, politics, and budgets

ON THE JOB…IT, DIGITAL, BUSINESS

No organigram with operation & ownership

Once in the job…

Technical Debt

Is  a snake?

No Data Contract

NO Documentation

The Random Estimate

NO Governance

"Trust" without knowledge

NO Accountability

NO Traceability

Coffee with LaTeX

CIO/CTO WHO???

I'm not "technical" but I am a good manager

Let's outsource and buy something we don't know

TECHNICAL DEBT & STAKEHOLDER RESISTANCE

“Shipping first time code is like going into debt. A little debt speeds development so long as it is paid back promptly with a rewrite. […] The danger occurs when the debt is not repaid. Every minute spent on not-quite-right code counts as interest on that debt[1]*“.*

…How it looks in your daily work….

Frustrated developer vs happy manager on deadline day.
Misaligned incentives, lack of documentation, poor versioning, and rushed releases.

1. Cunningham, Ward. "The WyCash portfolio management system." ACM Sigplan Oops Messenger 4.2 (1992): 29-30. (link)

STAKEHOLDER RESISTANCE

How organizations ignore or resist rigor:

“We’ve always done it this way”

“It’s not our responsibility”

“It is your job to deliver”

TODAY REALITY CHECK…MONEY

18% of IT projects spend **457%** of the original budget on average

Approximately
one in five IT projects
cost five times the budget
on average.

Table 4. Descriptive Statistics by Public vs. Private Sector

	Estimated cost		Actual cost		Cost overrun	
	Private	Public	Private	Public	Private	Public
Mean	4.0	8.8	12.5	15.7	1.4	2.1
Median	0.4	1.7	0.2	2.2	0.9	1.0
Sd	15.8	18.9	255.7	115.2	8.2	8.9
Min	0.0005	0.001	0.0002	0.001	0.003	0.0014
Max	215.9	593.5	8,676.7	4,376.2	280.4	239.8
N	1,755	2,691	1,156	2,679	1,748	2,759

Notes:
1. statistics shown in this table do not include projects where sector is unknown
2. Estimated and actual costs are shown in USD in millions in 2015 prices. Cost overrun is actual cost divided by estimated cost.

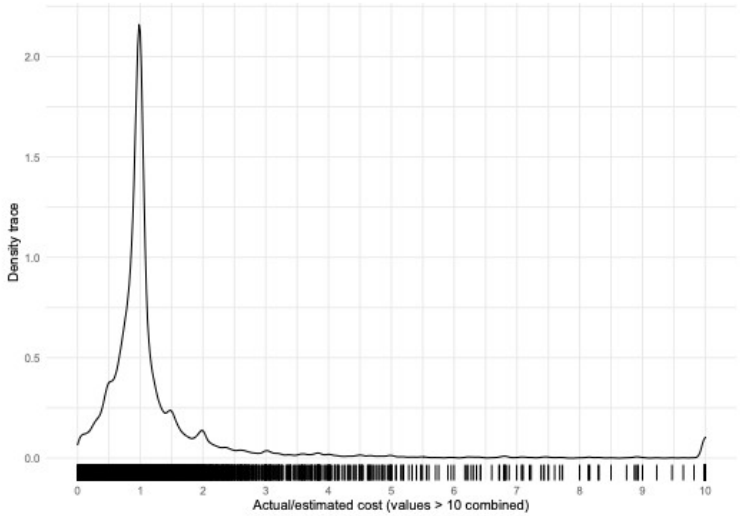


Figure 1. Probability Distribution of Cost Overruns (actual cost divided by estimated cost) for 4,677 IT Projects. Values over 10 are combined, which explains the bump at the far right of the curve.

From:
[1] The Empirical Reality of IT Project Cost Overruns:
Discovering A Power - Law Distribution
Bent Flyvbjerg, Alexander Budzier, Jong Seok Lee, Mark Keil, Daniel Lunn, and Dirk W. Bester, 2022

WHAT TO KNOW… BEFORE A LINE OF CODE…

“Causes and mechanisms behind past information technology (IT) project failures can be
used for systematic risk mitigation in new IT projects.”

From:
[2] Mitigating risk of failure in information technology projects: causes and mechanisms. J. Schmidt Project Leadership and Society, 4:100097, 2023

Table 4
IT project failure factors and causes in the literature.

Failure Factor (F1 - 12)	Cause of Failure (CF1 – CF33)
1. Objectives	1. Unrealistic objectives 2. Unclear objectives 3. Changing objectives
2. Senior Management	4. Lack of management involvement 5. Lack of management commitment 6. Lack of management support
3. Planning	7. Unrealistic planning 8. Underestimation 9. Schedule pressure
4. Requirements	10. Unclear requirements 11. Requirement changes
5. Project Execution and Control	12. Inadequate project execution and control 13. Inadequate change management 14. Inappropriate method
6. Technology	15. Immature technology 16. Technology new to the organisation 17. Too much customisation
7. Software Development Method	18. Inadequate system engineering 19. Excessive scale and complexity 20. Method and process
8. User Involvement	21. Lack of user input and user involvement 22. Lack of user training 23. Failure to manage user expectations
9. Staff	24. Lack of skills and experience 25. Insufficient staff 26. Unmotivated staff
10. Contractors	27. Poor performance 28. Underestimation by contractors and consultants 29. Lack of experience in contractor management
11. Risk Management	30. Inadequate analysis and management of risk
12. Other	31. External changes 32. Organisational complexity 33. Lack of trouble-shooting capability

WHAT TO KNOW BEFORE A LINE OF CODE…

Our daily actions have an ethical dimension that characterizes development and has consequences.

Be aware of **ethical blindness**[2] and **willing ignorance**[3]**!**

Knowledge on “**how to do it right”** and **“how to recognize when it is done wrong”.**

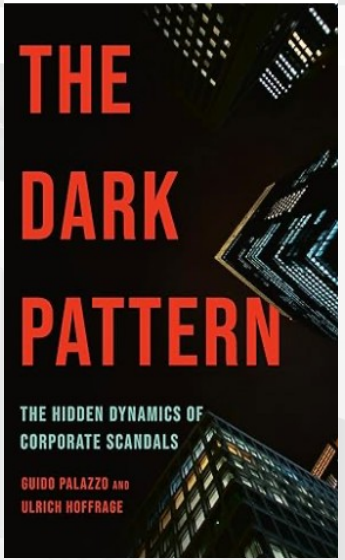
These are the first steps towards **preventive measures**.

[2] The dark pattern: the hidden dynamics of corporate scandals”. G. Palazzo and U. Hoffrage. PublicAffairs, 2025
[3] Digital transformation decoupling: the impact of willful ignorance on public sector digital transformation. J. Crusoe, J. Magnusson, and J. Eklund.Government Information Quarterly, 41(3):101958, 2024

CASE STUDY FROM ”THE DARK PATTERN”

CASE STUDY: “Theranos – The Emperess’s New Clothes”

1. Reading material (30 min):
The dark pattern: the hidden dynamics of corporate scandals.
G. Palazzo and U. Hoffrage. PublicAffairs, 2025.



2. While reviewing the case, consider:

- What actions would you take as an SE?
- At what point would you intervene?
- Who in DK would you contact?

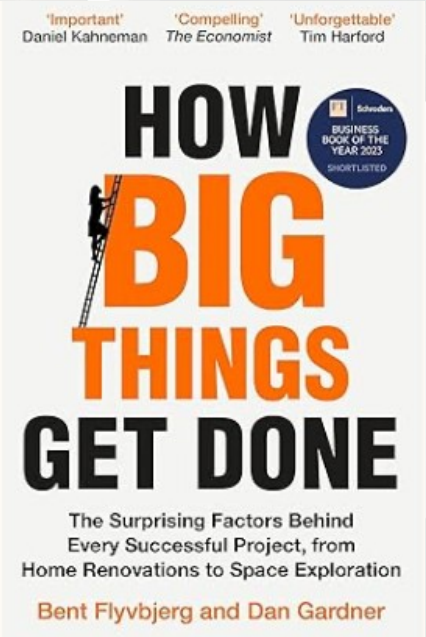
Find the answers before the end of your study program!

WHAT TO KNOW AND WHAT TO DO BEFORE A LINE OF CODE…

Let’s teach to question and study the **entire IT project** through Steps/Protocols:

1. Political scale of your job: how to protect yourself and your work.
2. Planning vs Delivery [5].
3. Maximum Virtual Product (against MVP)[5].
4. Red flags towards uniqueness

(…or be suspicious when you hear ”you will be the first”)[6].



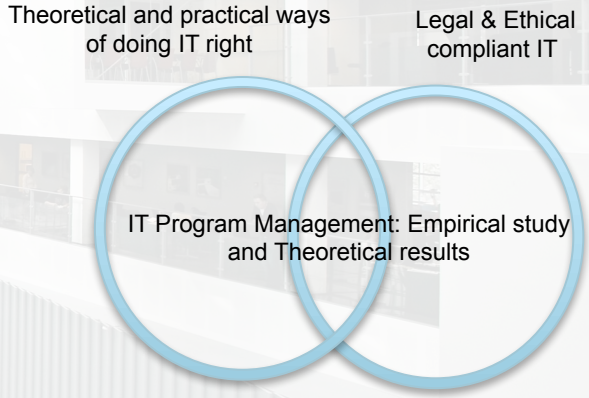
From:

[5] How Big Things Get Done: The Surprising Factors that Determine the Fate of Every Project from Home Renovations to Space Exploration, and Everything in Between
B Flyvbjerg, D Gardner

[6] Uniqueness Bias: Why It Matters, How to Curb It
B Flyvbjerg, A Budzier, MD Christodoulou, M Zottoli

WHAT TO KNOW AND WHAT TO DO BEFORE A LINE OF CODE…

- Information Technology plays a fundamental role in the success of projects across all sectors.
- By integrating IT project management research across all STEM curricula, we can empower today's future SE and researchers to challenge the status quo in the IT & Digital sector (private and public), avoid pitfalls, and improve IT and digital performance.
- Understanding the costs, schedule, benefits, and performance metrics of IT projects is vital for controlling outcomes.
- **Let's learn best practices, right questions, right protocols, "must do", union involvement, juridical accountability and responsibilities.**



Thank you!
You are welcome to ask any questions ☺

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