
What makes software projects successful?
Workshop with
Govt. of Bangladesh Delegation
ECNEC,
24th of July 2018
Magne Jørgensen
IT Management, SimulaMet

Based on:

- Jørgensen, M. (2016). A survey on the characteristics of projects with success in delivering client benefits. *Information and Software Technology*, *78*, 83-94.
- Jørgensen, M., Mohagheghi, P., & Grimstad, S. (2017). Direct and indirect connections between type of contract and software project outcome. *International Journal of Project Management*, *35*(8), 1573-1586.
- Jørgensen, M. (2017, May). Software development contracts: the impact of the provider's risk of financial loss on project success. In *Proceedings of the 10th International Workshop on Cooperative and Human Aspects of Software Engineering* (pp. 30-35). IEEE Press.
- Do Agile Methods Work for Large Software Projects? (2018, April) To be presented at *XP 2018*, Porto, Portugal.
- Huge investements in digitalization. What does it give us in return? Keynote Software 2018 (DnD's annual conference, Oslo, Norway).

What do we (on average) gain from governmental (and other) investment in IT?

You can see the computer age everywhere but in the productivity statistics.

Robert Solow (1987)

This ”productivity paradox” is claimed even today. Is it true?

Information Economics and Policy

Volume 25, Issue 3, September 2013, Pages 109-125

ICT and productivity: conclusions from the empirical literature

M. Cardona [a] ✉, T. Kretschmer [a, b] ✉, T. Strobel [b] ✉

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https://doi.org/10.1016/j.infoecopol.2012.12.002

"… 10% increase in ICT investment leads to a 0.6% increase in growth" (i.e., around half of the current (very low) increase in productivity is due to ICT-investments!)

"… the growth impact of ICT has grown over time."

A high number of studies shows the positive effect

ELSEVIER

Information Economics and Policy

Volume 38, March 2017, Pages 38-54

The productivity paradox: A meta-analysis

Petr Polák ✉

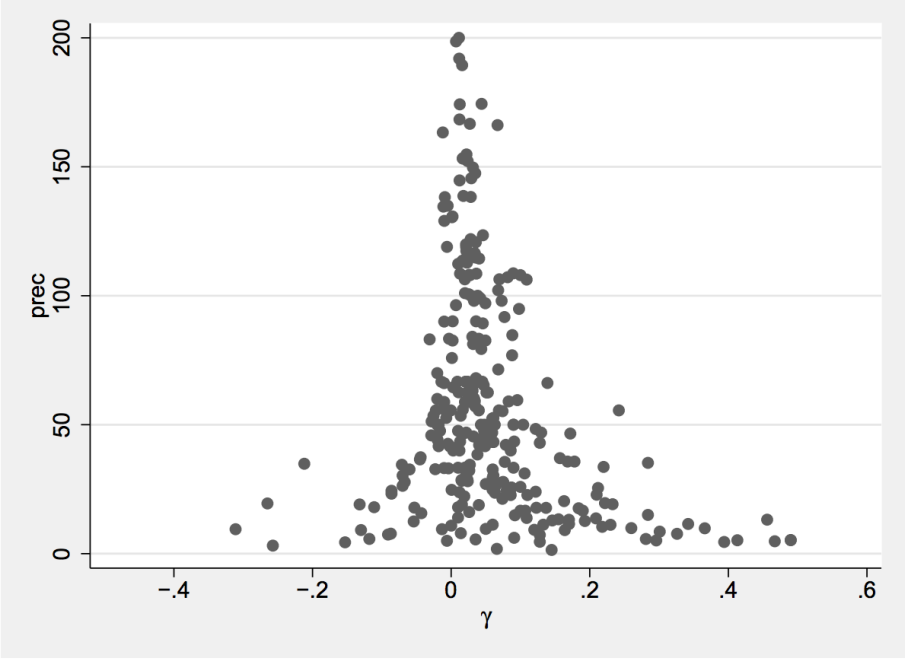


Figure 5: Funnel graph – before 2002

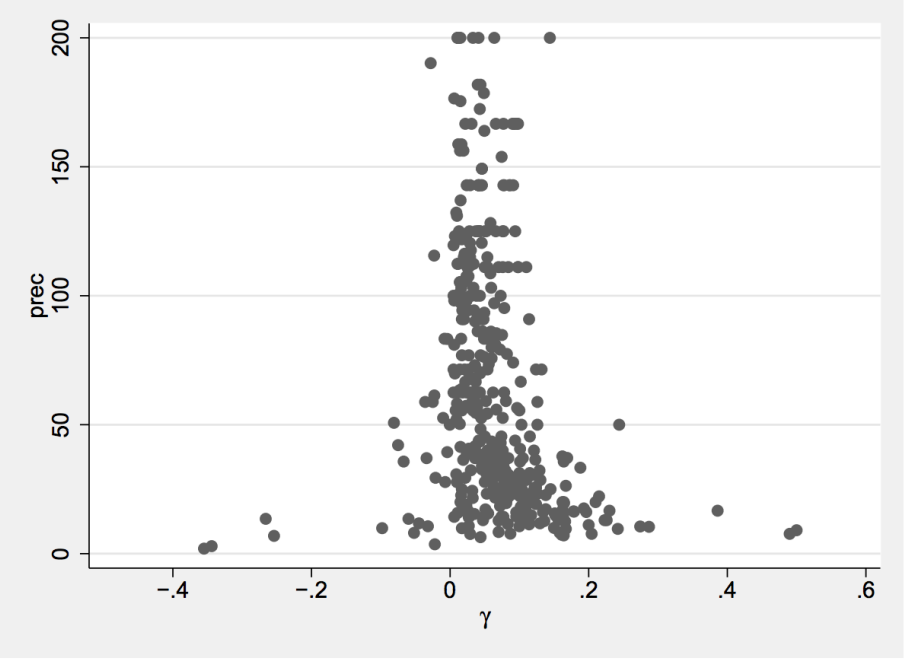


Figure 6: Funnel graph – after 2002

Wealth is correlated with happiness
«World happiness report»

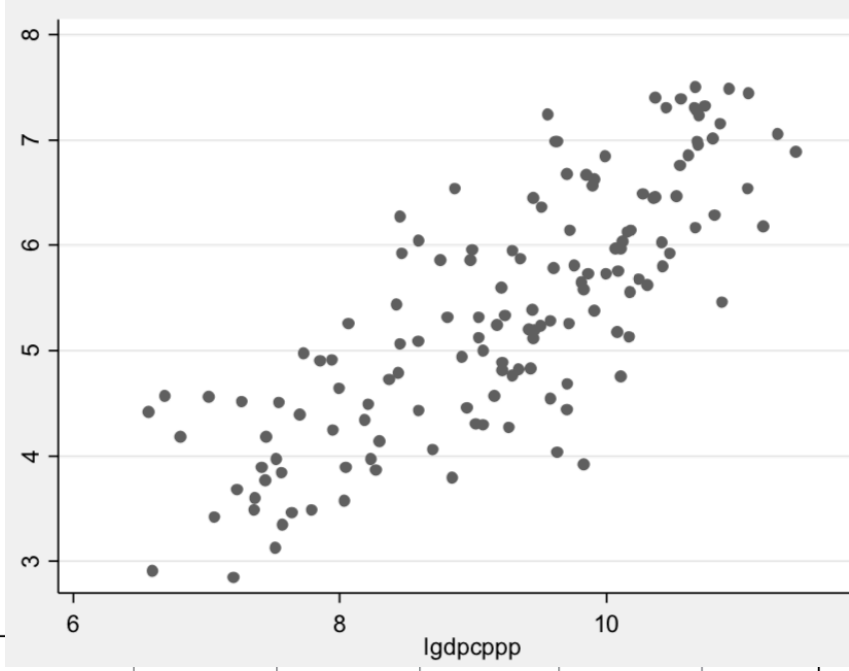
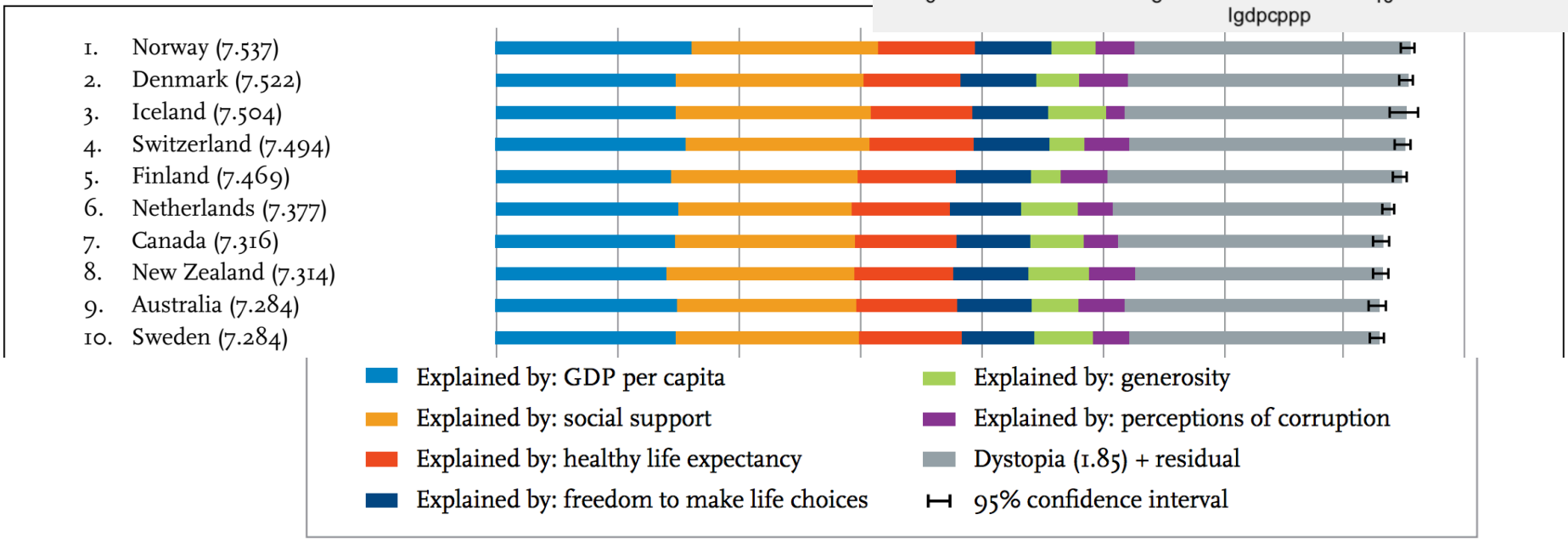


Figure 2.2: Ranking of Happiness 2014-2016 (Part 1)

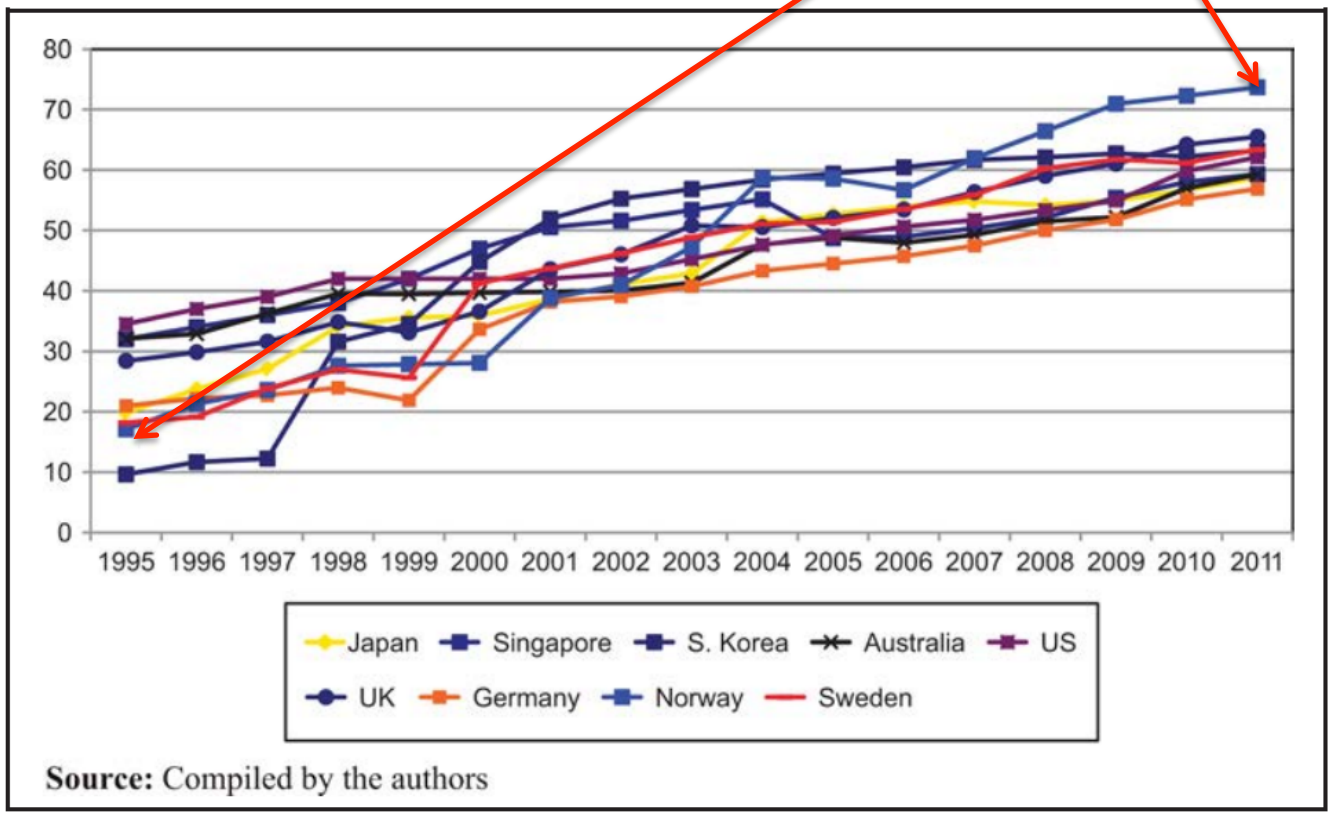


Using a digitization index to measure the economic and social impact of digital agendas

Norway has improved its digitalization much from the 1990s

Raul Katz, Pantelis Koutroumpis and Fernando Martin Callorda

Figure 2 Digitization index for selected industrialized countries (1995-2011)



Source: Compiled by the authors

BUT, there are much wasted and failed ICT investments …

Around 10% of all IT projects are cancelled or completed with little or no client benefits.

About 50% get into substantial problems with either client benefits, technical quality, cost control, time control or development productivity.

Regional differences in failure rate (small projects only)

Table: Client = columns, Provider = rows

Client / Provider	AF	EA	EE	LA	ME	NA	OC	SA	WE	Total
AF (Africa)	14% (92)	22% (289)	26% (137)	19% (105)	23% (195)	16% (3944)	12% (692)	26% (306)	15% (183)	17% (7633)
EA (East Asia)	20% (332)	16% (1660)	19% (856)	15% (662)	18% (970)	12% (27447)	12% (3953)	25% (1416)	15% (10576)	14% (48023)
EE (East Europe)	11% (1285)	14% (5010)	13% (5278)	11% (2618)	14% (4325)	9% (114728)	10% (11473)	18% (4355)	10% (51088)	10% (201565)
LA (Latin America)	12% (127)	16% (523)	14% (540)	11% (985)	15% (493)	10% (17245)	9% (1888)	20% (499)	12% (6369)	11% (28868)
ME (Middle East)	16% (231)	25% (622)	16% (635)	17% (320)	17% (824)	13% (15881)	13% (1973)	26% (792)	15% (6494)	14% (27883)
NA (North America)	19% (2713)	20% (2713)	16% (2143)	20% (1352)	19% (2112)	13% (86346)	15% (8161)	25% (2049)	15% (23947)	14% (130919)
OC (Oceania)	14% (58)	18% (260)	26% (149)	26% (82)	19% (182)	12% (6656)	9% (1474)	24% (205)	15% (2303)	13% (11484)
SA (South Asia)	17% (2614)	23% (7729)	22% (4861)	19% (3599)	20% (5632)	16% (143699)	15% (18958)	24% (10934)	18% (54710)	17% (254075)
WE (Western Europe)	13% (470)	17% (2070)	14% (1779)	14% (960)	15% (1927)	13% (38544)	14% (4250)	23% (1529)	13% (20111)	13% (72297)
Total	16% (5734)	19% (20935)	17% (16393)	16% (10702)	18% (16714)	13% (456106)	13% (52894)	23% (22113)	14% (177852)	

Why don’t we know how to avoid failures and be successful with software development?

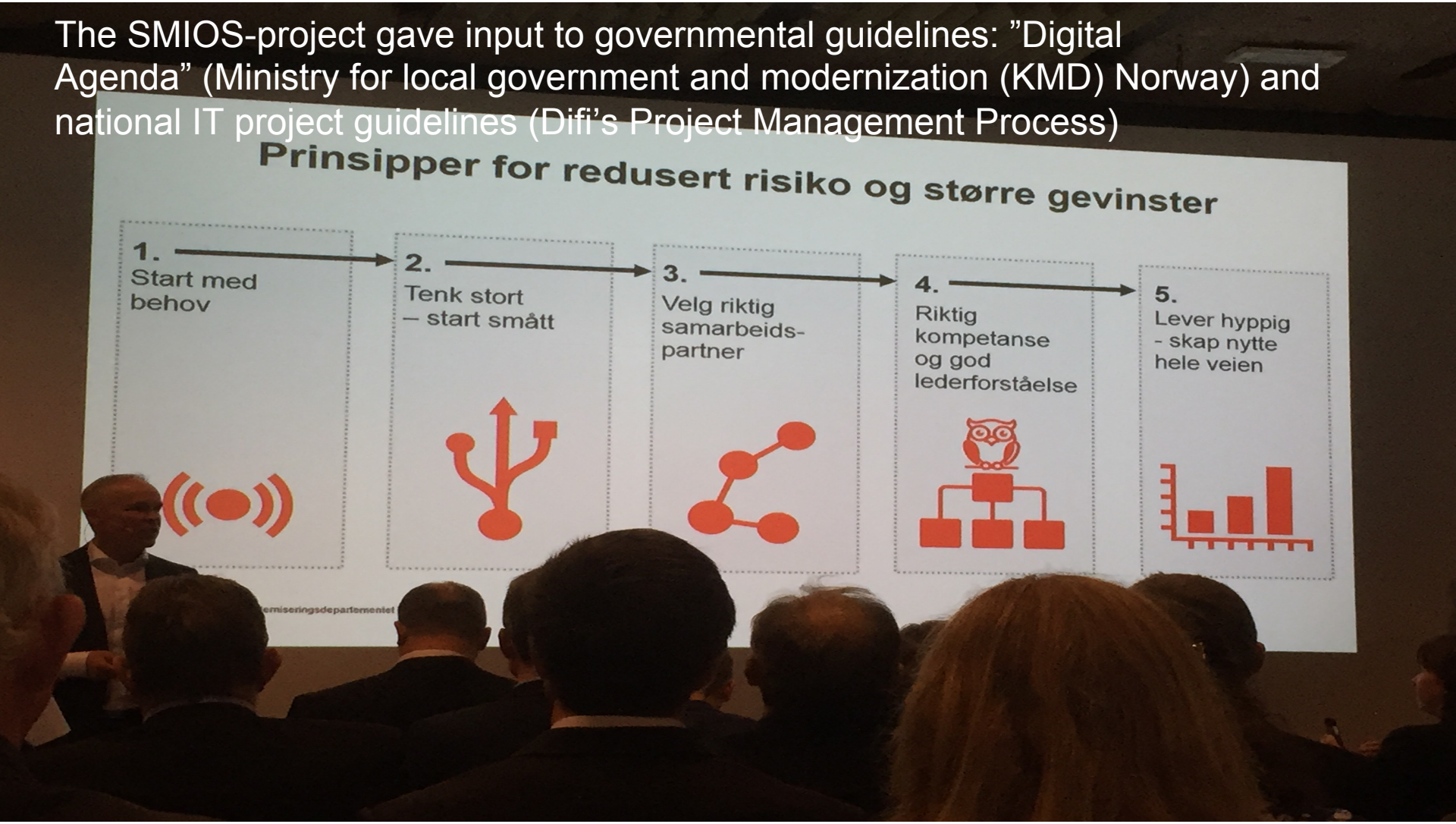
The truth is that ...

- The high complexity and innovativeness of product, process and people organization means that we can hardly expect to succeed all the time
- Much of what happens is outside of the control of the project
- Connections are context dependent and hard to identify and understand
- There is a network of connections and we're inherently poor at identifying and understanding indirect relationships
- The relationships are probabilistic and we're inherently poor at understand non-deterministic relationships

... we'll probably never understand fully what it takes to succeed

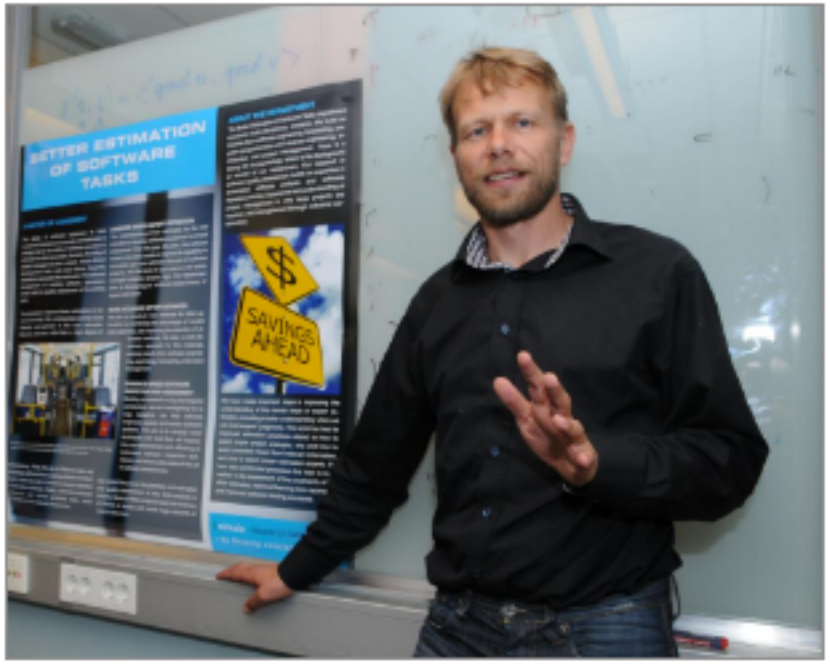
It’s hard to know much about how to succeed, but not impossible:
Results from the SMIOS-project

The SMIOS-project gave input to governmental guidelines: ”Digital Agenda” (Ministry for local government and modernization (KMD) Norway) and national IT project guidelines (Difi’s Project Management Process)



Computerworld

2004: Public sector much worse software project performance than the private sector



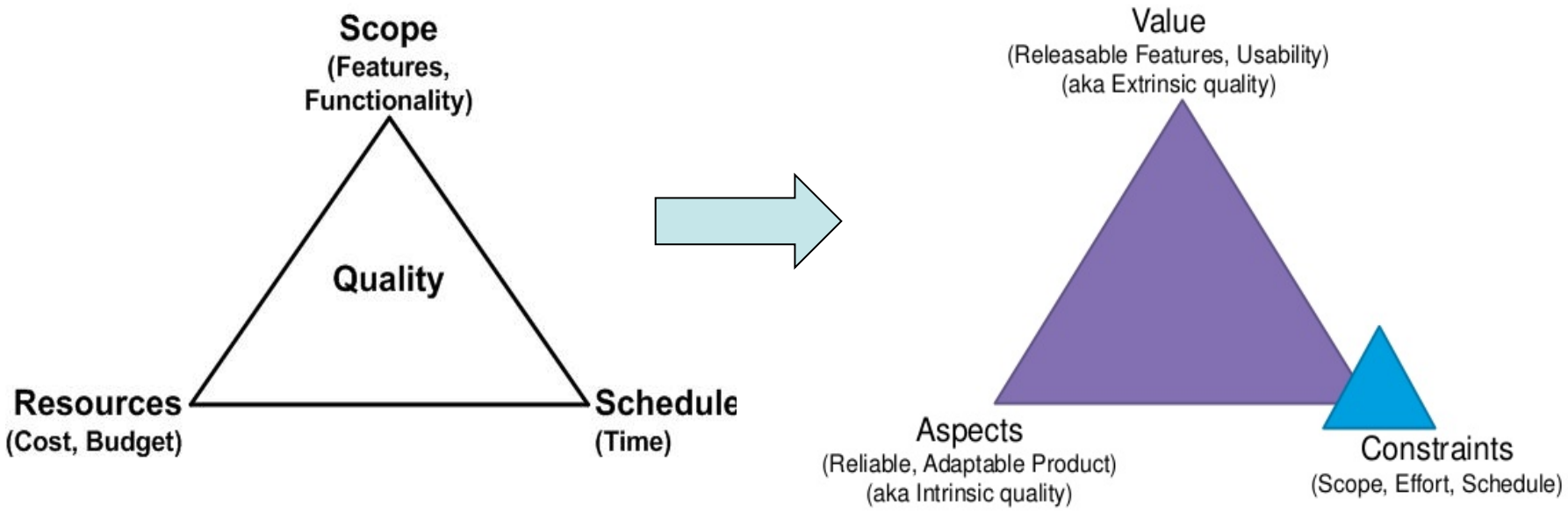
- Offentlig sektor har blitt flinkere

Det sier professor Magne Jørgensen. Men virksomheter sliter fortsatt med gevinstene på sikt

2015: About the same software project success reate in public and private sector.

What does it mean to succeed and to fail with software development?

Software project success



We defined success as a combination of a set of criteria, subjectively judged by the client and project manager:

- Client benefits delivered
- Cost control
- Time control
- Development efficiency
- Software properties (technical quality)

Our definition of success and failure of software project

Scale (values for each success criterion):

- Very successful
- Successful
- Acceptable
- Problematic
- Very problematic

Project outcome (for the project as whole):

- **Successful**: Acceptable or better on all five criteria (benefits, cost, time, quality, efficiency)
- **Problematic**: Problematic or worse on at least one criteria
- **Failure**: Cancelled, or delivering no or very little client benefits

Our studies (2015-2017):

- Nine surveys, with 50-200 participants each, representing around 1000 Norwegian software projects in the public and the private sector.
- In-depth, interview-based examination (case studies) of 35 software projects in the public sector of Norway
- Analysis of a data set consisting of more than 400.000 small, international IT-projects/tasks

Success and failure rates found in our studies

All studies gave similar results:

- Around 50-60% successful projects
- Around 30-40% problematic (but not failed) projects
- Around 10% failed projects

Like other studies, we have insufficient control of the representativeness of the samples and with definitions and measures of success. Other contexts, measures and data collection methods, may give other success and failure rates.

More interesting (and more robust results):

How are things connected?

Question 1: Does the software development method matter?
(Does it help to work agile?)

Common belief (amongst agile people): Yes

Our studies: Yes, agile helps, but …

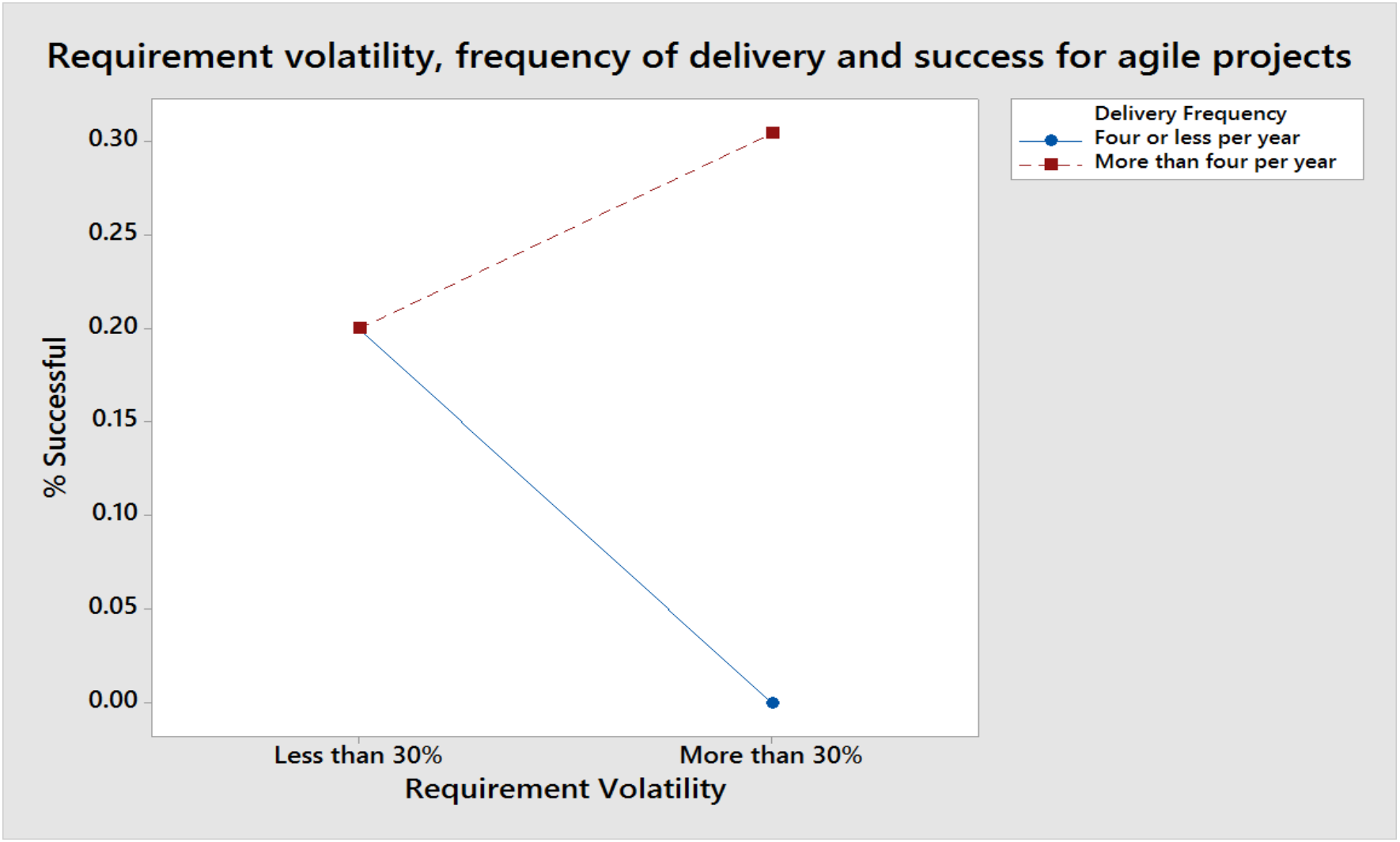
The numbers show the increase (in percent points) in proportion of successful projects

	Agile	Frequent delivery to production	Flexible scope
Client benefits	16%	22%	29%
Technical quality	21%	6%	32%
Budget control	2%	22%	29%
Time control	8%	11%	24%
Efficiency	11%	5%	24%

… only when including frequent delivery to production and flexible scope. Agile projects not including these practices were LESS successful than non-agile projects!

Similar results in our follow-up surveys and studies

Agile is not agile (requirement change and type of agile development)



Question 2: Are larger (and presumably more complex) projects less successful?

Common belief: Yes

Our (initial) result: No

Large projects not less successful than smaller ones (similar finding in all studies)

Criterion	< 1 mill Euro	1-10 mill Euro	> 10 mill Euro
Client benefits	31%	47%	35%
Tech. quality	24%	28%	25%
Budget control	24%	47%	47%
Time control	29%	35%	35%
Efficiency	24%	12%	24%

The numbers (percentages) represent the proportion of projects assessed to be successful or very successful with respect to a success criterion.

But, the first results hid that we only had studied completed projects

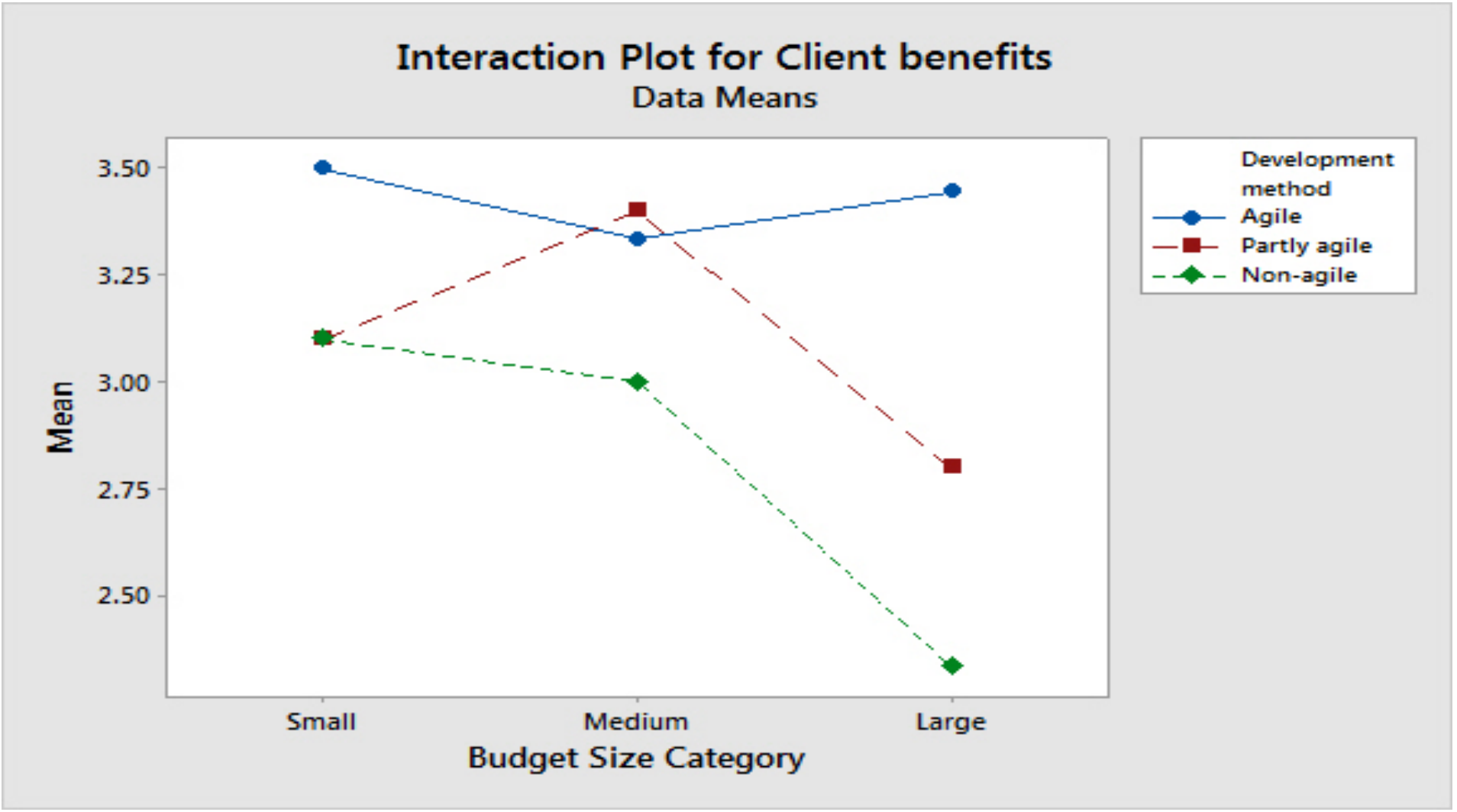
Adding non-completed projects in follow-up studies gave that the largest projects (> 10 mill Euro) were strongly over-represented in the group of failed projects (2-3 times more frequent).

A rule of thumb (based on offshoring projects) is that ten times larger project size leads to twice the risk of failure.

Also of interest:

- Different reasons for problems for small and large projects.
- Higher risk of failure with larger projects should not be used to divide ”logical connected deliveries” into separate projects.

Agile software projects seem to be less affected by large project size



Question 3: Does contract type matter?

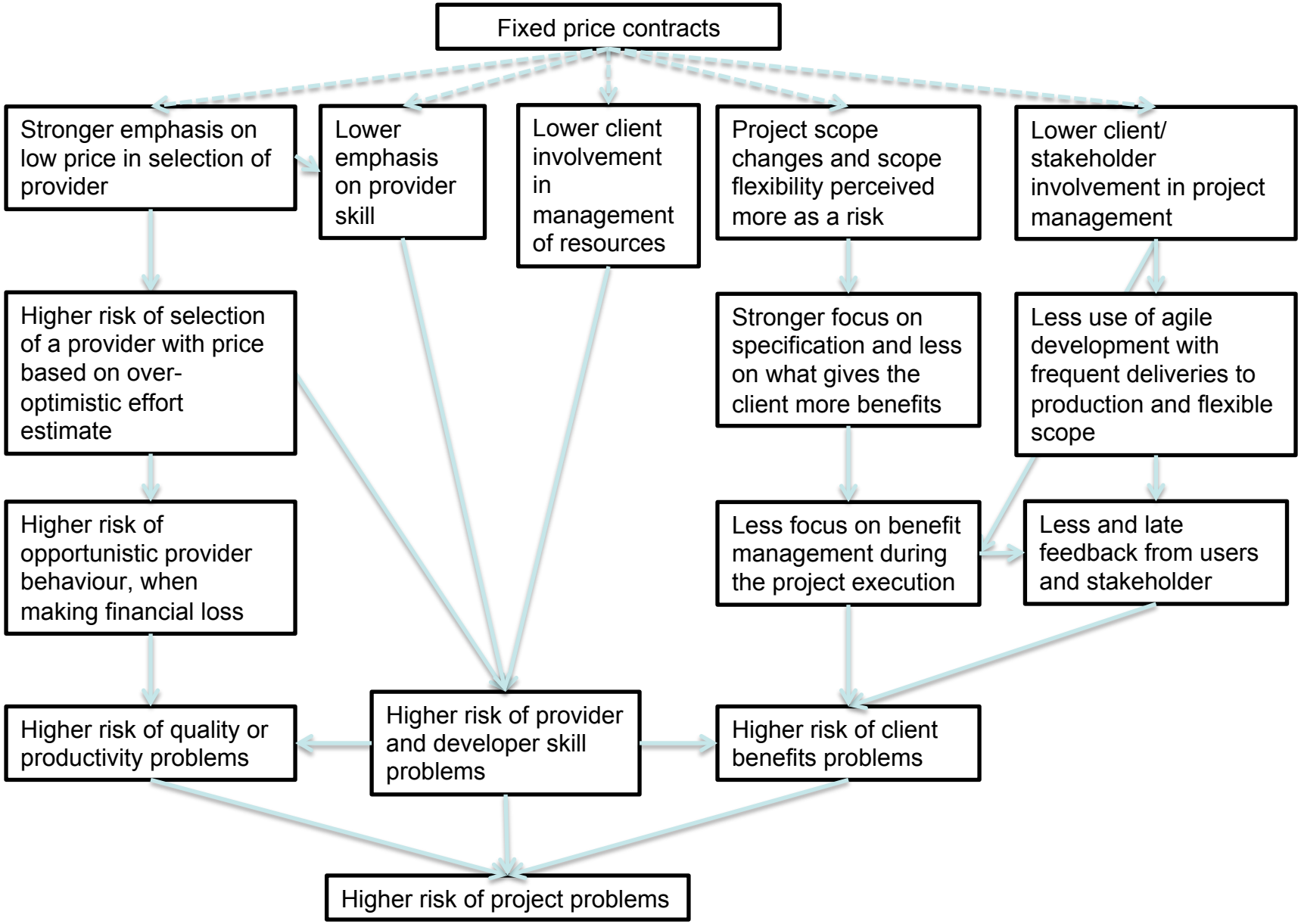
Common belief (amongst clients)**:**
Fixed price contracts is the better (for us)

Our finding: Time & material type of contracts much better for both the client and the provider

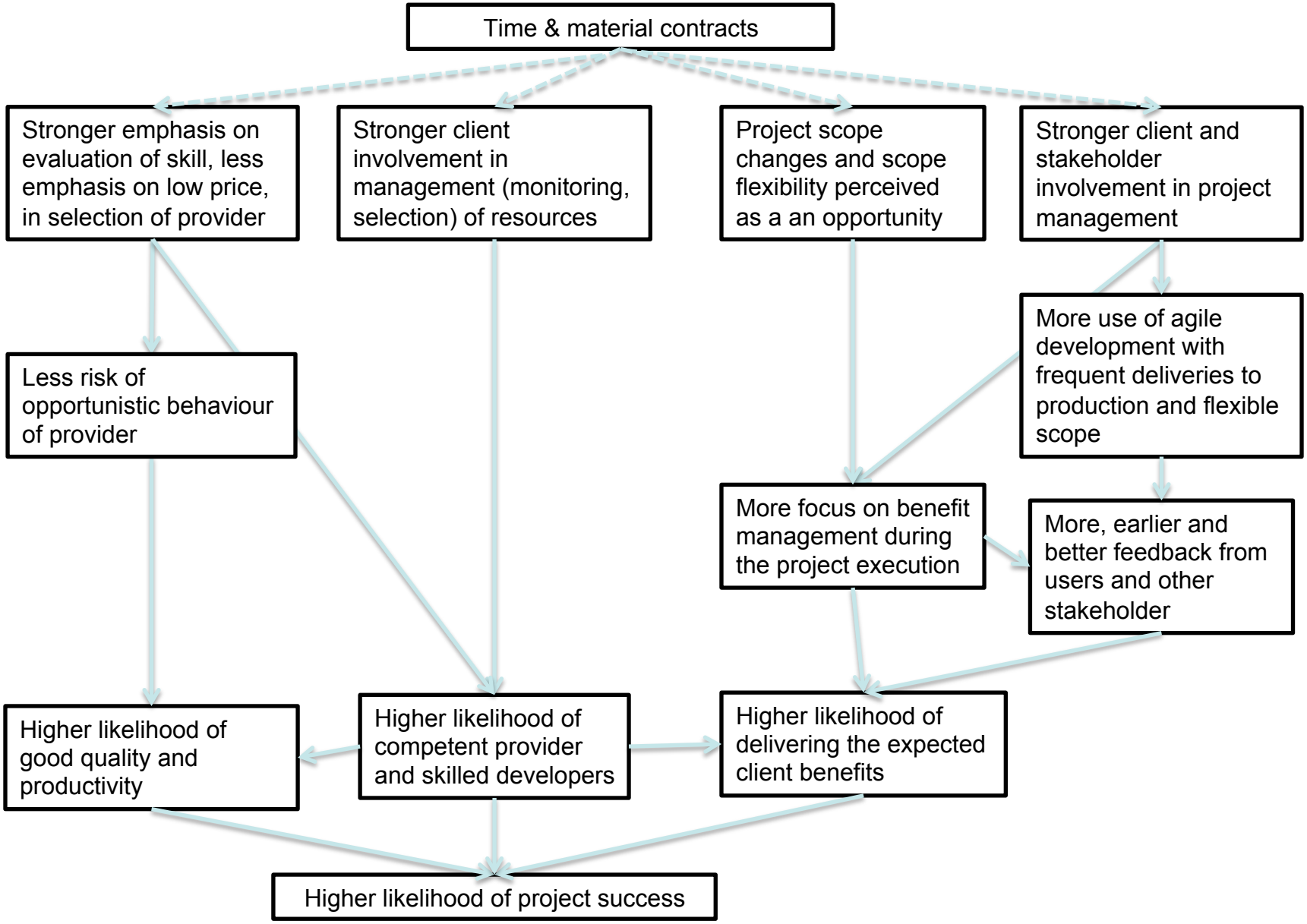
First study: Extremely negative results for Fixed price contracts.

	Fixed price	**Time & Material**
Client benefits	**0% (success rate)**	**59%**
Technical quality	22%	24%
Budget control	33%	31%
Time control	11%	29%
Efficiency	0%	19%

Failure pattern (Fixed price behaviour)



Success pattern (Time and materials behavior)



Question 4: Does it help with “benefits management”?

Common belief: Yes

Our finding: Not all benefit management practices led to much improvements

Survey 1:

Benefit management practices	Proportion	Increase in success rate (wrt benefits)
Cost-benefit analysis (up front)	47%	6%
Benefit responsible appointed	57%	22%
Plan for benefit management	33%	31%
Benefit management during proj. execution	53%	34%
Evaluation of benefit during/after proj. exec.	31%	19%

Survey 2 (in-depth study):

Benefit management practices	Present	Not present/don't know
Cost-benefit analysis (up front)	31% with problems	22% with problems
Benefit responsible appointed	28% with problemer	29% with problems
Plan for benefit management	29% with problems	28% with problems
Benefit management during proj. execution	20% with problems	35% with problems

Characteristics of the successful project

Success pattern

- Good control of ambition level. Avoiding ”too much” at the same time and good at saying ”no” to adding complexity.
- Use of contracts that avoid ”fixed price”-behavior.
- Client with competence to select and manage competent providers and individual resources (not so much focus on low price)
  - Selection of resources from more than one provider
- Flexibility in scope (not only ”must have”-functionality)
- Client is (as a minimum) strongly involved in the planning and execution of benefits management.
- Use of agile development with frequent deliveries to production (or at least with proper testing/feedback from real users)
- Early start of involvement of stakeholders (especially the users) and planning and preparing for deployment.

Digitalization Council 2015 - …

An initiative to avoid governmental IT project failures and increase the investment benefits

How to help IT projects succeed

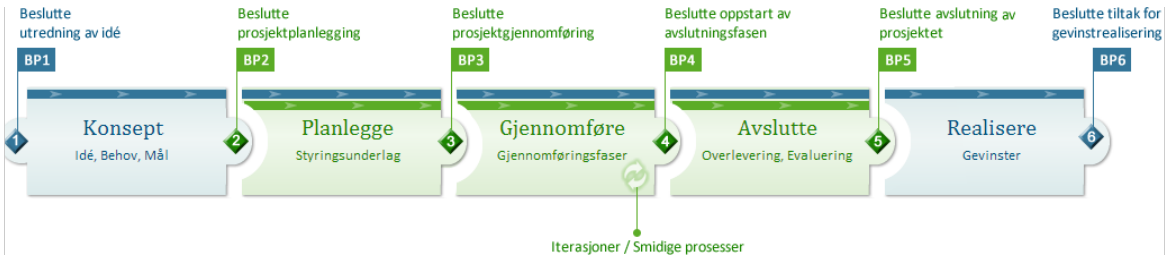
DIGITALIZATION COUNCIL OF NORWAY

Advising Norwegian digitalization projects

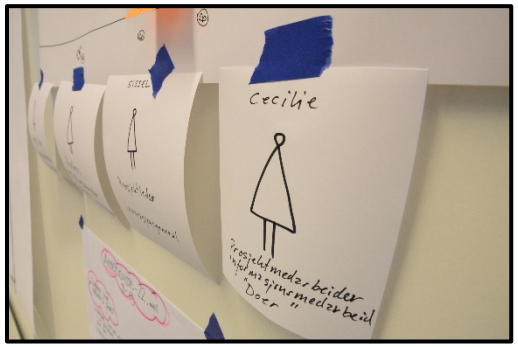
Composition and objectives

- Achieve successful IT projects
- Increase top leader engagement
- Learn from successful – and less successful – IT projects

Several measures work together



The creation of the IT Council



2014: User needs

2015: Stakeholder involvement

2016: Implementation

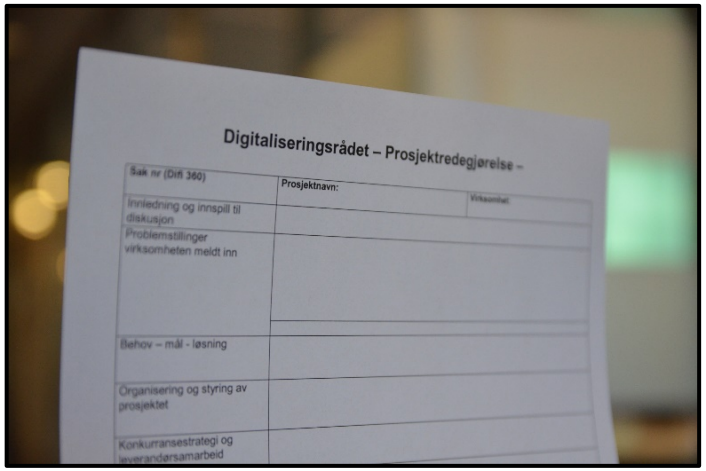
Lessons learnt

Competence

Thorough preparation

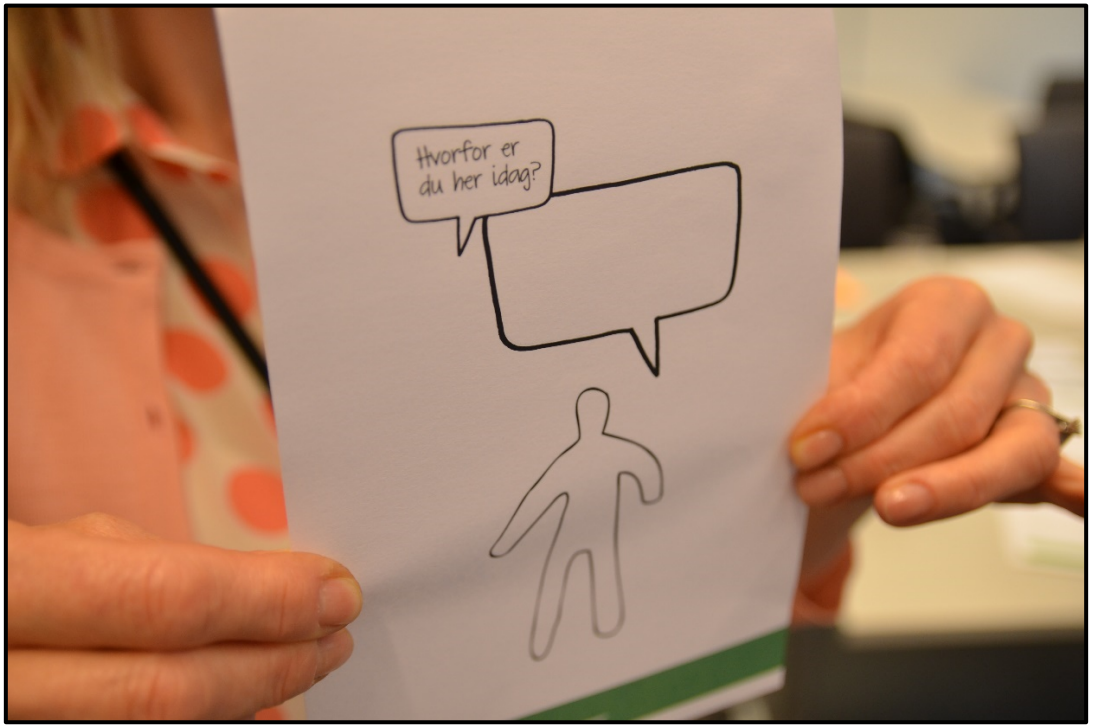
Lessons learnt

Dialogue



Non bureaucratic

Introduction to cases



The Norwegian Courts Administration

The digitisation of the Norwegian Courts

«From paper, folders and post to digtal, seamless legal processes»

The Norwegian Courts Administration

The Challenges

- Organisational development
- User involvement
- Stakeholder management across agencies

The recommendations

- Involve users
- Create guiding stars
- Break silos
- Change the legislations if necessary

The National Archives of Norway

e-Archive

«Saving the digital document heritage»

The National Archives of Norway

The Challenges

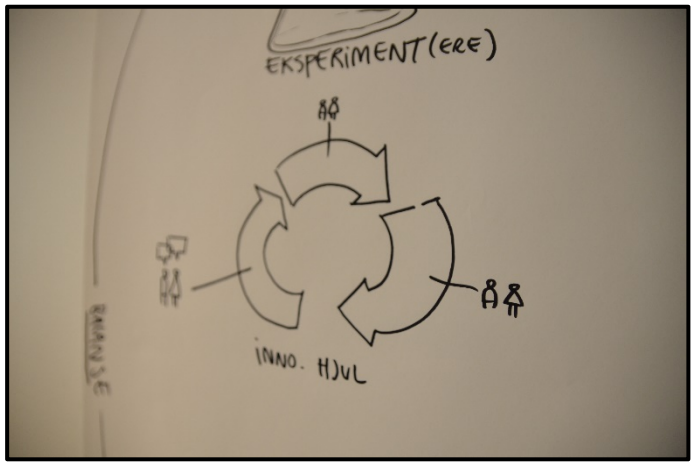
- Roles and responsibilities
- User involvement and stakeholder management across agencies
- Communication

The recommendations

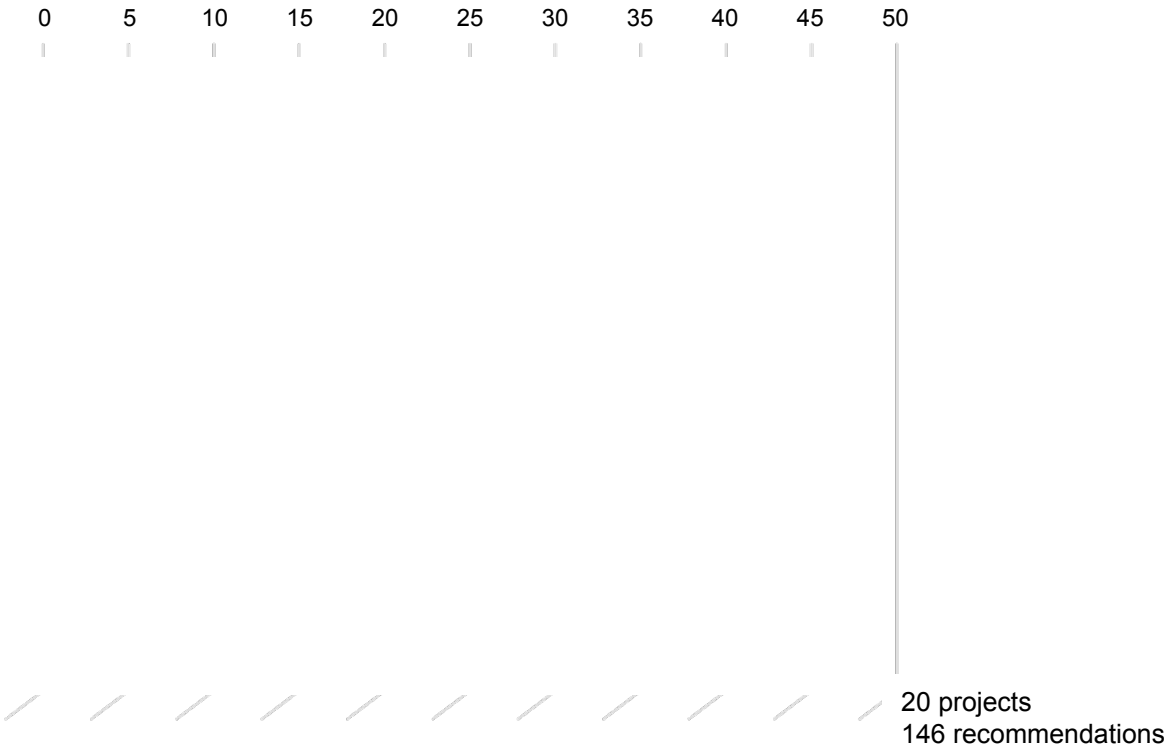
- Start over!
- Involve the users and stakeholders systematically
- Use a language that everybody understands

Lessons learnt

- Involve users
- Break the silos
- Make sure lessons are learnt!



Our recommendations



How to spread lessons learnt

The planning and execution process

- https://www.anskaffelser.no/it
- https://www.anskaffelser.no/digitalisering/digitalisering-oppdragsgivere

Failure factors from a study of 400.000 small projects

Predictor variable	Coefficient	p-value	Odds ratio	95% confidence interval	
				Lower	Upper
Constant	-2.90	0.00			
SatisfactionScoreProviderCat=Low	0.35	0.00	1.42	1.39	1.45
SatisfactionScoreProviderCat=No Scores	0.91	0.00	2.49	2.33	2.67
FailureRateProviderCat=Low	-0.66	0.00	0.52	0.51	0.53
FailRateProviderCat=No Projects	-0.34	0.00	0.71	0.67	0.76
SkillTestPassRateProviderCat=Low	0.07	0.00	1.07	1.02	1.12
SkillTestPassRateProviderCat=No Tests	0.58	0.00	1.79	1.74	1.85
SatisfactionScoreClientCat=Low	0.18	0.00	1.20	1.17	1.23
SatisfactionScoreClientCat=No Scores	0.25	0.00	1.28	1.23	1.33
FailureRateClientCat=Low	-0.64	0.00	0.53	0.52	0.54
FailureRateClientCat=No Projects	-0.63	0.00	0.53	0.51	0.56
PreviousCollaboration=Yes	-1.74	0.00	0.17	0.17	0.18
FocusLowPriceCat=Low	-0.19	0.00	0.83	0.81	0.85
FocusLowPriceCat=Medium	-0.08	0.00	0.92	0.89	0.95
FailureRateProviderRegionCat=High	0.27	0.00	1.31	1.28	1.33
FailureRateClientRegionCat=High	0.42	0.00	1.53	1.48	1.58
GeographicalDistance=Neighbor	-0.07	0.02	0.93	0.90	0.97
GeographicalDistance=Offshore	0.02	0.10	1.02	1.00	1.05
logProjectSize	0.71	0.00	2.03	1.99	2.06

Jørgensen, Magne. "Failure factors of small software projects at a global outsourcing marketplace." Journal of systems and software 92 (2014): 157-169.