esem
2012

Survey on Agile and Lean Usage in Finnish Software Industry

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Presentation @ ESEM 2012 6th International Symposium on Empirical Software Engineering and Measurement – IndustryTrack
September 19, Lund University, Sweden

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Presentation contents

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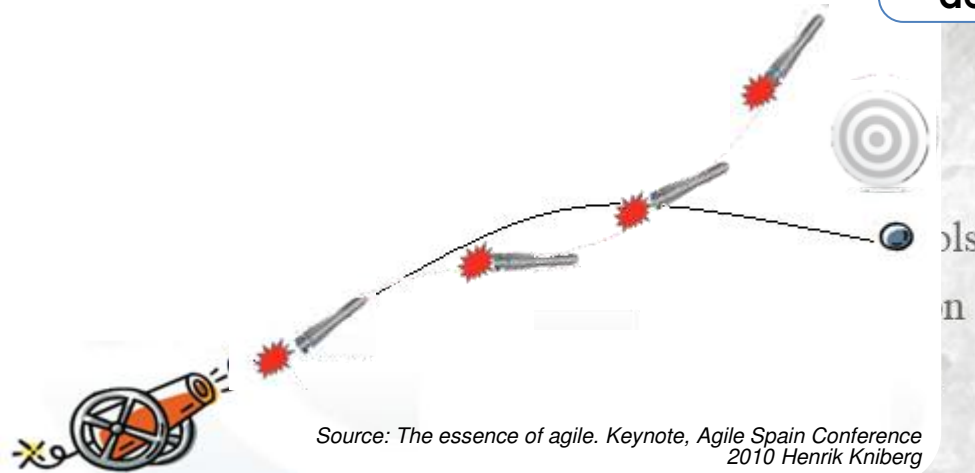
Agile Software Development

2001

Source: Agile Manifesto, 2001
http://agilemanifesto.org/

Agile Software Development

2001

Agile methods aim to provide FLEXIBILITY

Customer and value oriented development

Manifesto for Agile Software Developm...

Source: The essence of agile. Keynote, Agile Spain Conference 2010 Henrik Kniberg

Traditional approach

That is, while there is value in the items on the right, we value the items on the left more.

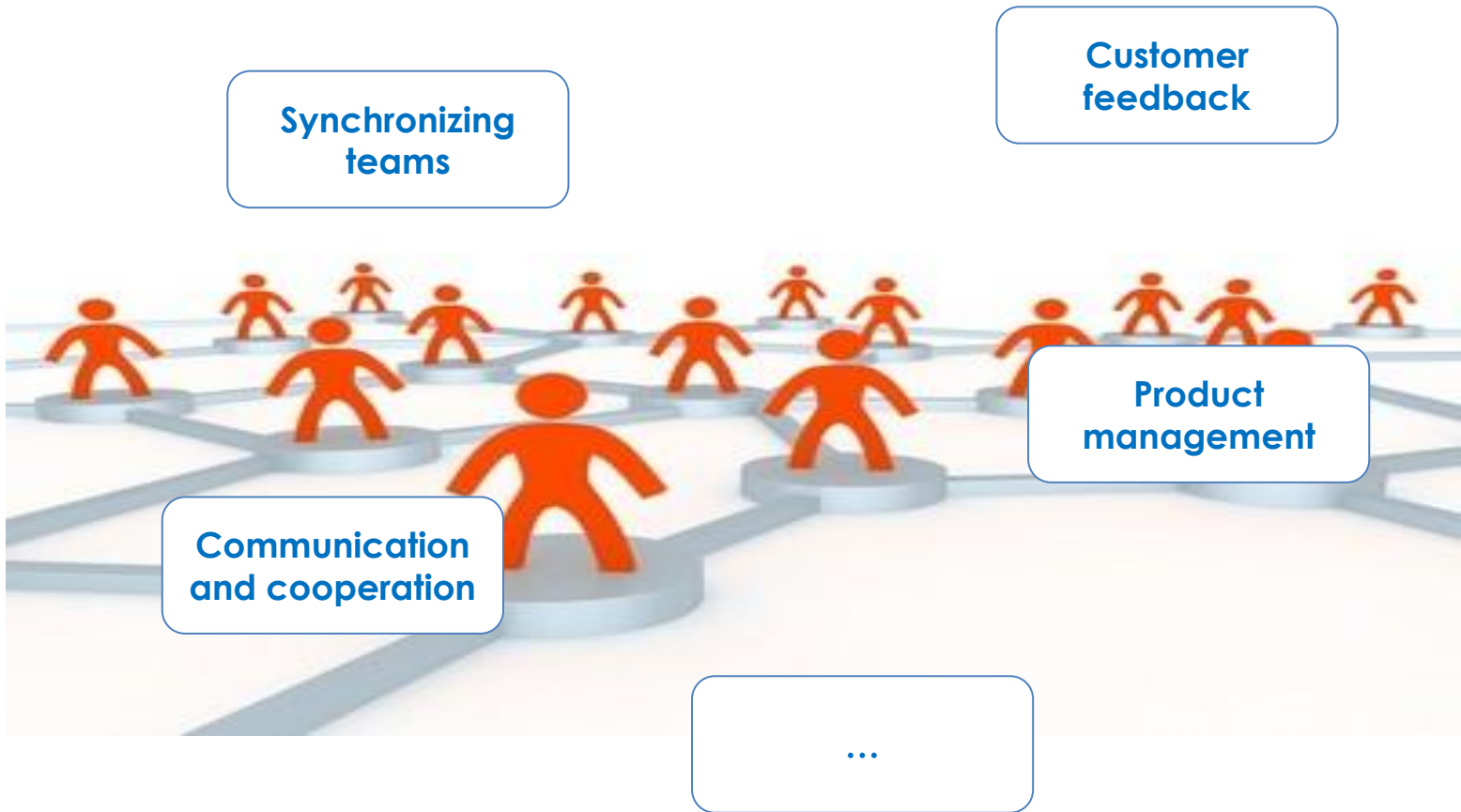# Scaling Agile Software Development

Agile and Lean Software Development

Study Design

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Conclusions, Limitations and Future work

Synchronizing teams

Customer feedback

Product management

Communication and cooperation

...

Why Learn from Lean Thinking?

- ***Improved profitability and productivity****. Toyota cut $2.6 billion out of $113 billion manufacturing costs, without closing a single plant in 2002. Toyota led in global automobile sales until 2011.*

- ***Faster time-to-market****. Zara reduced lead time via a business model based on Lean. It delivers new items 12 times faster than its competitors and launches 30000 designs each year (as opposed to 2000–4000 introduced by competitors)*

- ***Improved product quality and customer satisfaction****. Toyota Lexus CT200h recently received the maximum rating under the Japanese overall safety assessment (Source: 2011 Japan New Car Assessment Program)*

Lean Paradigm

Agile and Lean Software Development

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Lean is based on fundamental industrial engineering principles and a philosophy of maximizing value and minimizing waste
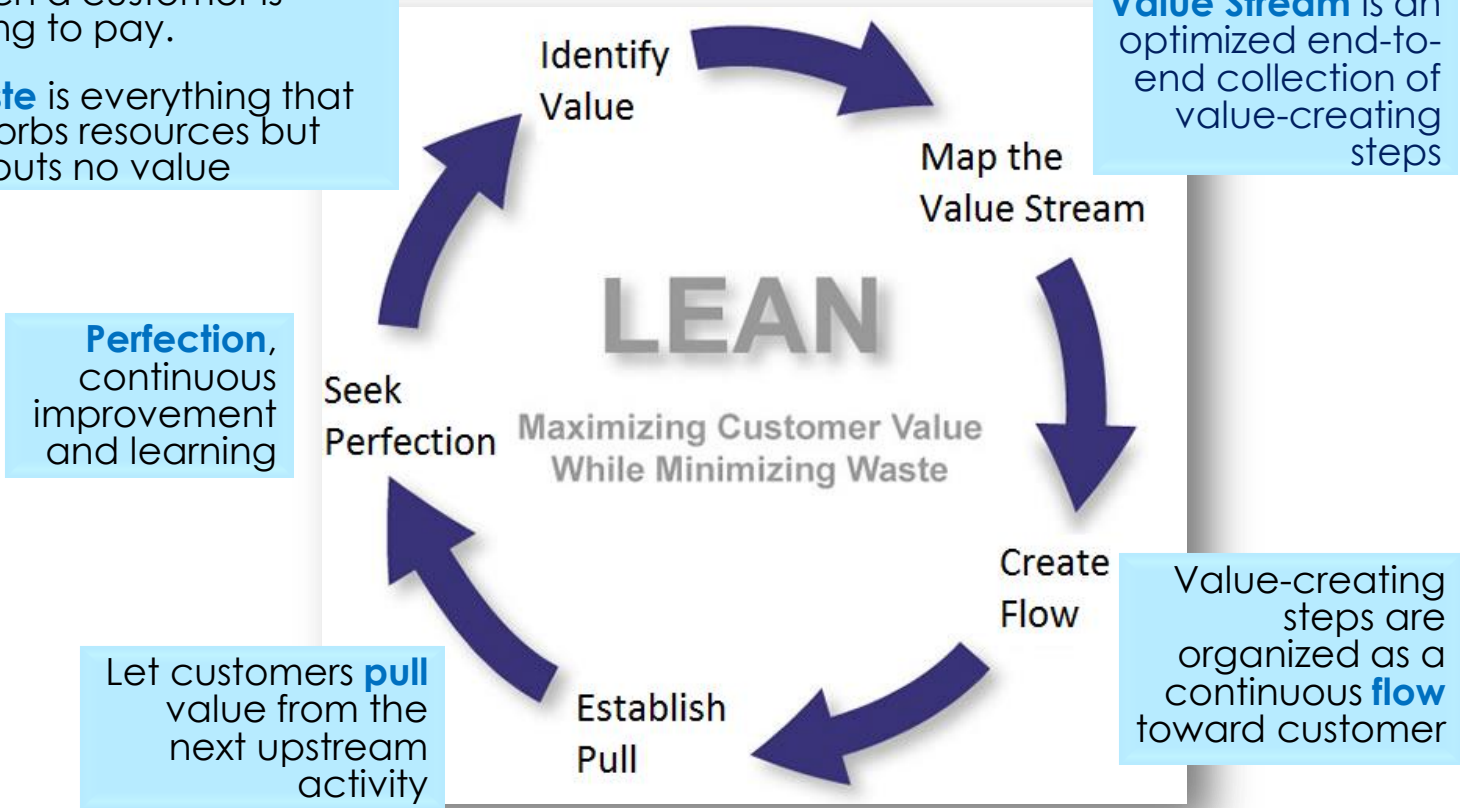
- **Value** is everything for which a customer is willing to pay.

- **Waste** is everything that absorbs resources but outputs no value

THE FIVE PRINCIPLES OF LEAN

Value Stream is an optimized end-to-end collection of value-creating steps

Identify Value

Map the Value Stream

LEAN

Maximizing Customer Value While Minimizing Waste

Perfection, continuous improvement and learning

Seek Perfection

Create Flow

Value-creating steps are organized as a continuous **flow** toward customer

Let customers **pull** value from the next upstream activity

Establish Pull

Source: The Machine that Changed the World: The Story of Lean Production. Harper Perennial, New York (1990) Womack et al. (1990) Womack, J.P., Jones, D.T., Roos, D.:
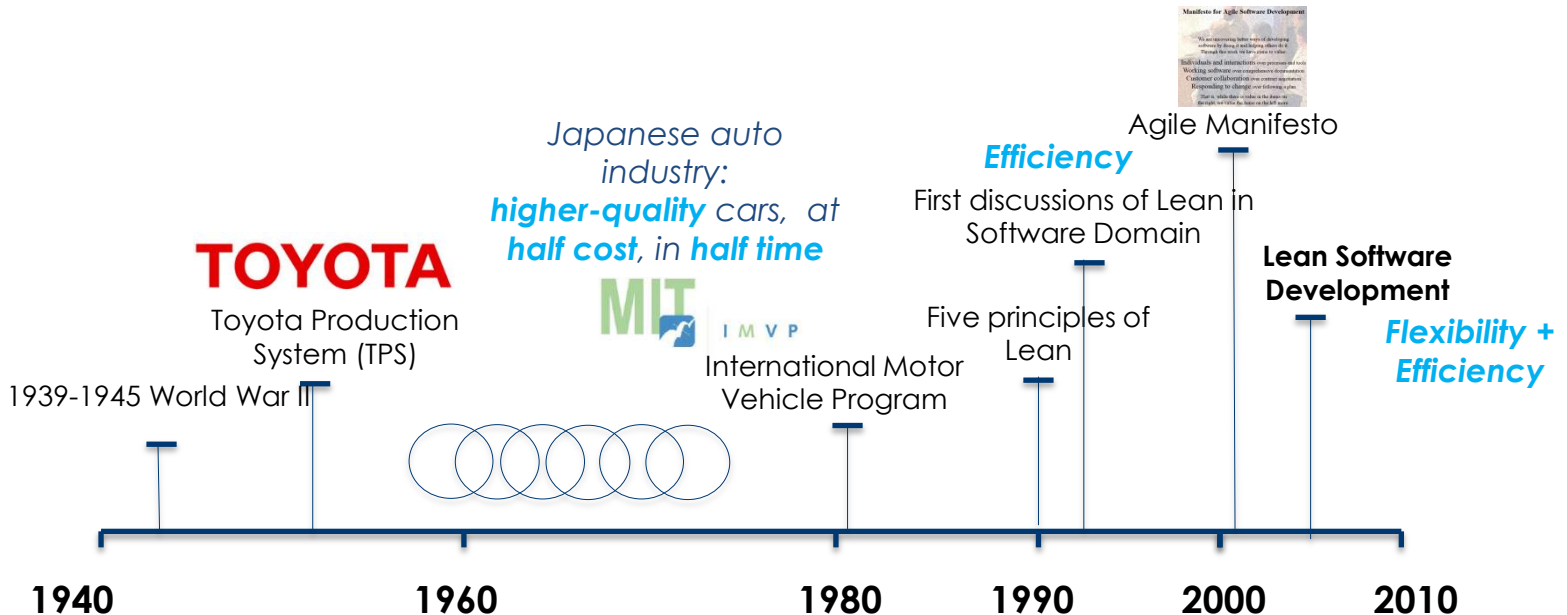
Lean Software Development

"If Lean is thought of as a set of principles rather than practices, then applying lean concepts to product development and software engineering makes more sense and can lead to process and quality improvements."

(Source: Poppendieck M, Cusumano MA. Lean software development: a tutorial, Software, IEEE , 29(5): 26-32, Sept.-Oct. 2012)

Agile Manifesto

Efficiency

First discussions of Lean in Software Domain

Japanese auto industry: higher-quality cars, at half cost, in half time

TOYOTA

MIT IMVP

Toyota Production System (TPS)

Five principles of Lean

Lean Software Development

Flexibility + Efficiency

1939-1945 World War II

International Motor Vehicle Program

1940   1960   1980   1990   2000   2010

Research on Agile and Lean Software Development

Agile and Lean Software Development

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- The relationship between ASD and LSD has not been clearly defined, limiting the current comprehension of the phenomenon

- To our best knowledge, **there are not studies exploring the level of Lean adoption** in software development

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OULUN YLIOPISTO

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Research Objectives and Questions

Agile and Lean Software Development

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1. To provides more generalizable and up-to-date results on the state of ASD and LSD usage in the real-world industry

2. To identify most applied methods and practices as well as most experienced benefits and challenges on using ASD and LSD

RQ1: What is the **current state of adoption** and usage of ASD and LSD methods and practices in the software industry?

RQ2: What are the **reasons why ASD and LSD are being adopted** in some software development organizations?

RQ3: Which are the **impacts, in terms of benefits**, of using ASD and LSD?

RQ4 :Which are the **limitations and factors that can challenge** the usage of ASD and LSD?

RQ5: Which are the **reasons of some organizations for not using** ASD and LSD?

Study Design

Extensive exploratory **web survey** study, including almost fifty questions

- Conducted among Finnish software practitioners in 2011
  - Finland takes up the second position in the IT Industry Competitiveness Index 2011 of the BSA/Economist's report[1]

- Sampling frame: Finnish Information Processing Association (FIPA)

[1]Source: Business Software Alliance. 2011. Investment for the Future Benchmarking IT Industry Competitiveness Report.

- **408 responses from 200 companies** collected (response rate: 9%)

Results

Results

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Positions in organization

Position	n	Position	n
Developer	113	Scrum master	33
Project manager	99	Process manager	31
IT staff	79	Product owner	25
Architect	63	Product manager	23
Consultant/Trainer	52	President/VP/CEO/COO/CIO/CTO	22
Quality assurance/Tester	38	Sales/Marketing personnel	10
Operations/Support staff	35	Other	48

Experience in software development

Years of experience	n	%
None	42	10,3
Less than 2	31	7,6
2-5	56	13,7
5-10	80	19,6
10-20	144	35,3
More than 20	55	13,5
Total	408	100,0

The respondents belonged to **200 different organizations**.

Size of the organizational unit

Employees	n	%	Cumulative %
1-10	93	23,8	23,4
11-50	141	35,4	58,8
51-100	66	16,6	75,4
101-200	44	11,1	86,4
201-500	28	7,0	93,5
501-1000	16	4,0	97,5
More than 1000	10	2,5	100,0
Total	398	100,0	

– Respondents were mainly developers and project managers

– Quite experienced in software development

– Organizational unit size rather small

Results

Usage of Agile and Lean Methods

Agile and Lean usage	n	%
Only Agile	137	33,6
Agile and Lean	88	21,6
Only Lean	11	2,7
No Agile or Lean	172	42,2
Total	408	100,0

Strong position that Agile methods in software development

Lean appears as a new player being used by 24% of respondents, mainly in combination with Agile (21%)

Earlier studies have reported much lower levels of Lean usage (around 2%)

Results

Agile and Lean Software Development

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Usage of specific agile methods

Methods	n	%
Scrum	196	83,1
Extreme Programming (XP)	43	18,1
Agile Modeling	27	11,4
Feature-Driven Development (FDD)	21	8,9
Kanban	11	4,7
Adaptive Software Development	10	4,2
Dynamic Systems Development Method (DSDM)	6	2,5
TDD	4	1,7
Crystal Methods	2	0,8
Other	18	7,6

Usage of specific agile practices

Practices	n	Mean	Median
Prioritized work list	204	4,2	4
Iteration/sprint planning	203	4,1	4
Daily stand-up meetings	209	3,7	4
Unit testing	199	3,7	4
Release planning	196	3,9	4
Active customer participation	196	3,5	4
Self-organizing teams	194	3,5	4
Frequent and incremental delivery of working software	189	4,1	4
Automated builds	185	3,5	4
Continuous integration	182	3,8	4
Test-driven development (TDD)	179	2,7	3
Retrospectives	177	3,6	4
Burn-down charts	174	3,2	3
Pair programming	174	2,4	2
Refactoring	163	3,4	3
Collective code ownership	159	3,3	3
Other	9	1,8	1

- **Scrum** clearly the most widely used method

- **Kanban** and **TDD reported as methods** by the respondents

- Results of Agile practices in use well aligned with earlier studies

Results

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Usage of specific lean principles

Principles	n	Mean	Median
Focus on creating customer value	209	3.9	4
Eliminate waste and excess activities	199	3.4	3
Create a culture of continuous improvement	198	3.5	4
Do it right the first time	196	3.4	3
Respect and empower people	190	3.8	4
Minimize inventory or work in progress	189	3.2	3
Pull from demand	184	3.6	4
Focus on optimizing the whole system and not only local optimizations	181	3.3	3
Continuous flow of small batches in the development process	179	3.5	4
Make decisions as late as possible	175	3.0	3
Root source analysis is done after problems are discovered	174	3.2	3
Look simultaneously for multiple solutions	174	3.2	3
Create trusted relationships with suppliers	165	3.6	4
Create cadence	147	2.9	3

viewpoints

Michael A. Cusumano

Technology Strategy and Management
Reflections on the Toyota Debacle
A look in the rearview mirror reveals system and process blind spots.

"Whether the component comes from an in-house Toyota factory or a supplier makes no difference. Toyota engineers are responsible."

Results

Agile and Lean Software Development

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Goals in agile and lean adoption

Goals	n	%
To increase productivity	158	66,9
To improve product and service quality	145	61,4
To reduce development cycle times and time-to-market	137	58,1
To improve process quality	113	47,9
To increase the ability to adapt to changes in the business environment	110	46,6
To improve team communication	100	42,4
To improve development flow	99	41,9
To reduce risks	86	36,4
To remove waste and excess activities	75	31,8
To decrease development costs	75	31,8
To improve customer understanding	65	27,5
To create transparency within the organization	63	26,7
To improve stakeholders' satisfaction	57	24,2
To improve organizational learning	45	19,1
To improve the management of business/product value	42	17,8
To establish team-wide project comprehension	33	14,0
To improve our understanding of the whole value stream	31	13,1
To achieve success others have achieved using lean methods	27	11,4
Other	6	2,5

Effects of adoption of agile and lean

Effect	n	Mean	Median
Improved team communication	204	4,0	4
Enhanced ability to adapt to changes	203	3,9	4
Increased productivity	201	3,8	4
Enhanced process quality	198	3,7	4
Improved learning and knowledge creation	197	3,7	4
Enhanced software quality	196	3,8	4
Accelerated time-to-market/cycle time	192	3,7	4
Reduced waste and excess activities	190	3,5	4
Improved customer collaboration	190	3,7	4
Improved organizational transparency	187	3,5	4
Improved customer understanding	188	3,7	4
Reduced risks	184	3,4	3
Improved alignment between IT and business objectives	180	3,4	3
Enhanced value creation	178	3,6	4
Improved stakeholder satisfaction	169	3,6	4
Reduced costs	163	3,2	3
Other	13	3,8	4

Results

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Challenges in agile and lean adoptipn

Challenges	n	Mean	Median
Top management commitment	201	4,0	4
Customer/supplier collaboration	192	3,9	4
Cultural change/translating agile/lean principles from development teams to the rest of the business	190	3,8	4
Measuring agile/lean success	190	3,6	4
Resistance to change	186	3,6	4
Defining business value	184	3,9	4
Need for specialized skills	183	3,1	3
Tailoring agile/lean practices	182	3,5	4
Lack of formal guidelines	176	2,8	3
Inadequate documentation	175	3,2	3
Scalability of agile/lean methods	174	3,6	4
Inadequate training	174	3,3	3
Synchronizing activities	172	3,4	4
Synchronizing activities	168	3,5	4
Loss of management control	168	2,8	3
Lack of big design up front	167	3,0	3
Fixed price contracts	161	3,3	3
Steep learning curve	159	3,1	3
Inappropriateness of existing technologies/tools	158	3,1	3
Achieving flow	157	3,5	4
Decreased predictability	155	3,1	3
Other	12	3,2	3

Limitations in agile and lean adoption

Limitations	n	Mean	Median
Limited support for developing large, complex software	189	3,3	3
Limited support for development involving large teams	185	3,1	3
Limited support for sub-contracting	181	2,8	3
Limited support for development involving legacy systems	179	3,1	3
Limited support for distributed development environments	178	2,9	3
Limited support for building reusable artifacts	176	3,0	3
Limited support for developing safety/mission-critical software	174	2,9	3
Other	16	3,3	3

Top challenges

- **Top management commitment**
- **Customer/supplier collaboration**
- **Cultural change**
- **Measuring Agile/Lean success**

Results

The survey responses included also 137 practitioners in whose organizational units agile or lean methods were not in use

Agile and Lean Software Development

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Why did they not consider these methods appropriated for their software development?

Reasons for not adopting	n	%
Lack of knowledge and training	64	46,7
Too traditional organizational culture	59	43,1
Lack of support or commitment from the management	28	20,4
Fixed price contracts	25	18,2
Customers are not ready for agile/lean methods	22	16,1
Resistance to change	18	13,1
Inappropriate technology and tools	17	12,4
Incompatible business domain (please specify your business domain)	12	8,8
The burden of changing to agile/lean methods	10	7,3
Lack of quality assurance procedures	10	7,3
Unstable project requirements	9	6,6
Lack of progress-tracking mechanism	9	6,6
Our organization lacks customer understanding	7	5,1
Lack of scalability	6	4,4
Lack of support for reward system	6	4,4
Lack of big design up front	6	4,4
Limited support for building reusable artifacts	3	2,2
Limited support for distributed development environments	3	2,2
Decreasing predictability	2	1,5
Other	27	19,7

Do they have plans for adopt agile or lean in the near future?

Planned adoption	n	%
Within a year	14	10,2
Within two years	8	5,8
Not planned	52	38,0
Don't know	63	46,0
Total	137	100,0

What methods do they plan to adopt?

Planned methods	n	%
Scrum	19	90
Lean Software Development	3	14
Agile Modeling	2	10
Extreme Programming (XP)	1	5
Dynamic Systems Development Method (DSDM)	0	0
Feature Driven Development (FDD)	0	0
Crystal Methods	0	0
Adaptive Software Development	0	0
Other	3	14

Conclusions

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Conclusions, Limitations and Future work

- The majority of respondents' organizational units are **using Agile and/or Lean methods (58%)**.

- There is an interest of combining Agile and Lean approaches
  - Agile is not abandoned when Lean is adopted
  - The transformation is being actually conducted as a single trip where the borders between agile and lean are not clearly defined

- Main Lean principles in usage:
  - Focus on customer value
  - Eliminate waste
  - Continuous improvement

- Main practices in usage:
  - Prioritized work list
  - Iteration/sprint planning
  - Daily stand-up meetings

- Main **benefits**:
  - Improved team communication
  - Enhanced ability to adapt to changes
  - Increased productivity

- **Challenges** and limitation were also identified
  - Challenges: obtaining management support
  - Limitations: developing large and complex software

Limitations and Future work

LIMITATIONS

- Although we consider the Finnish Software industry as a suitable population for the study the generalization of the results is still limited

- The confusion and inconsistency in how agile and lean are understood can impact the results of the study

FUTURE WORK

- To replicate the study using other samples (for example from other countries)

- To conduct case studies that allow a deeper understanding of the phenomenon of agile and lean transformation in software intensive companies
  - Value and waste in software development
  - Measuring Lean and Agile 's impacts
  - Software lean enterprise including suppliers and customers
  - Cultural and organizational change

Thank you!

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