Relationship of DevOps to Agile, Lean and Continuous Deployment

A Multivocal Literature Review Study

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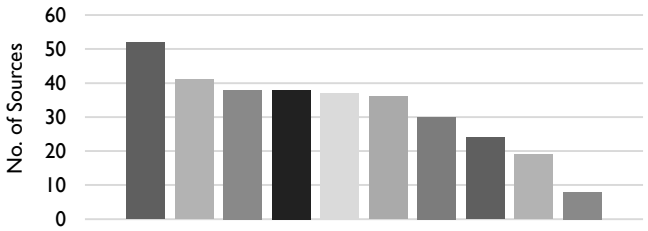
Introduction and Motivation

Introduction and Motivation

1 DevOps is an ambiguous phenomenon



Terms used to refer to DevOps

- Movement- Cultural and professional
- Practices
- Culture
- Approach
- Philosophy, Mindset, ideology
- Tool
- A set of values and principles
- Methodology, method, process
- Role,Team, Engineer
- Strategy

2 SE: community and culture

- Constant emergence of paradigms and new trends in SE (Sharp et al., 2000)
  - *Silver bullet solutions*
- Trends driven by practitioners, researchers lagging behind (Dingsøyr & Lassenius, 2016)
  - *Synthesizing and systematizing knowledge*
  - *Testing the many claims*

Introduction and Motivation

A Agile manifesto

- Individuals and interactions *over processes and tools*
- Working software *over comprehensive documentation*
- Customer collaboration *over contract negotiation*
- Responding to change *over following a plan*

L Lean in SE

- Value and waste
- Flow concept
- Automation and building in quality
- Kaizen and continuous improvement

CD Paradigm

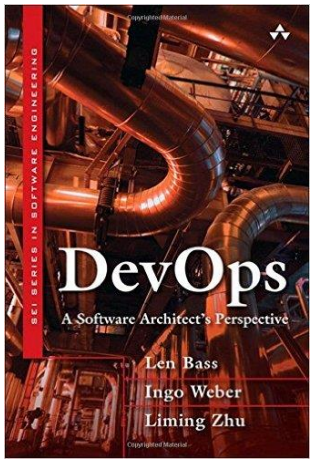
- Multiple daily deployments
- Deployment pipeline
- Delivery ecosystem

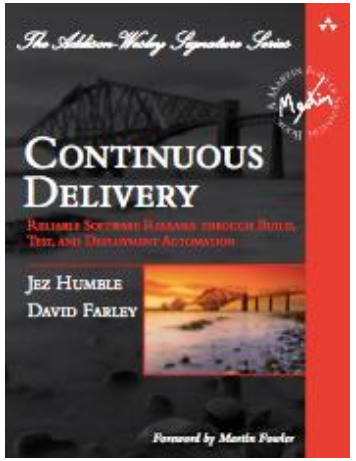
Why are terms conflated with DevOps?

Can we make what is believed to be implicit knowledge explicit?

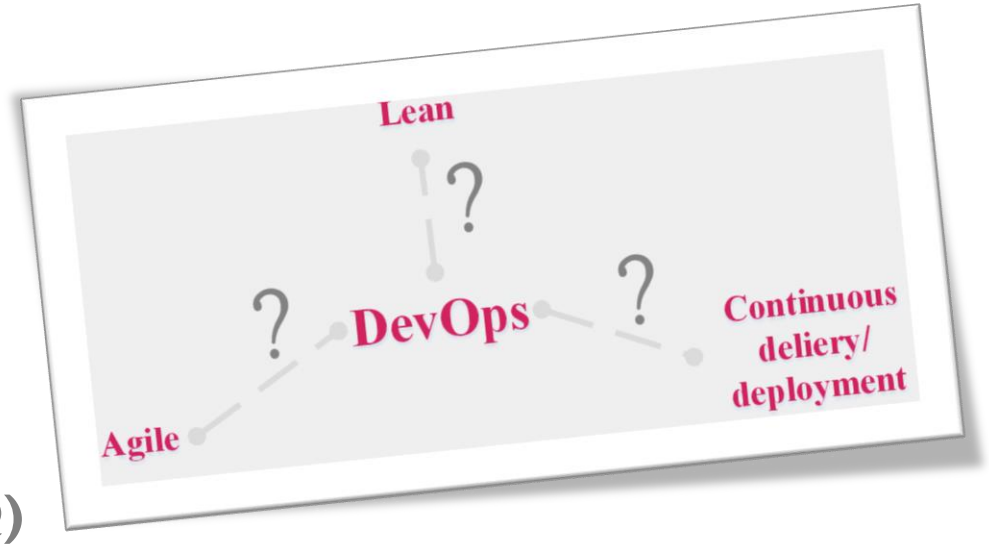
Introduction and Motivation

- One characterization of DevOps is its relationship to Agile practices (*Bass et al., 2015*)
  - ***DevOps practices affect and relate to all three phases of IBM's disciplined agile delivery i.e., inception, construction and transition***
- One key principle of DevOps movement relates to Agile (*Humble and Farley, 2011*)
  - ***"Agile techniques can be usefully brought to bear on managing infrastructure".***





Introduction and Motivation



Research Questions (RQ)

1. *How does DevOps relate to agile, lean and CD?*
2. *What are the claimed effects of DevOps, and what metrics can be used to assess those effects?*

Research Approach

1. Multi-vocal literature review *i.e., blog posts, web articles, journals, surveys etc.*

- Google Search of 'What is DevOps' — *230*
- Include ML based on initial coding — *201*
- Include ML based on RQ.1 — *75*

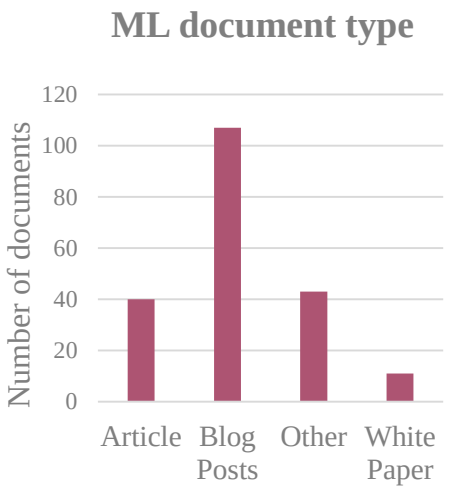
2. Extended literature review, *Dimensions of DevOps*, from Nov. 2015 - Mar. 2016

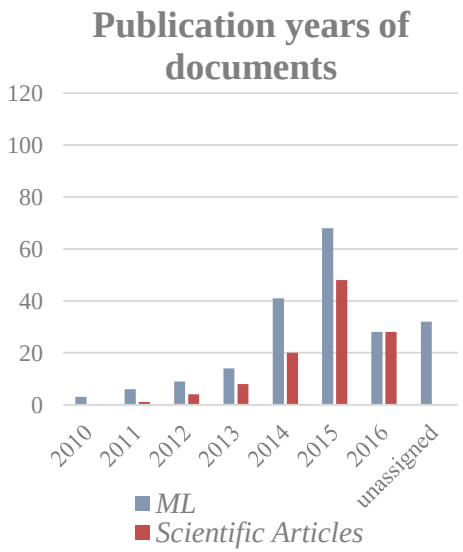
- Include 22 studies from initial study; extend search until March 2016 — *22*
- Search 'DevOps' in 5 databases and include studies based on selection criteria — *87*
- Include studies based on RQ1 of the paper — *33*

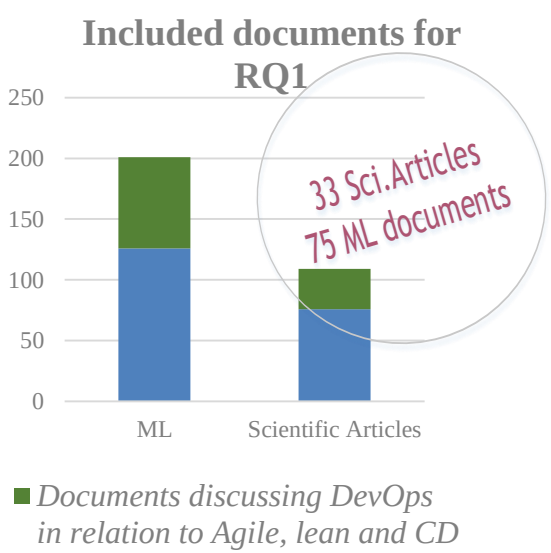
MLR useful in contemporary topics. Wide variety of writings; diverse views of various authors; employing different research/non-research logics

Research Approach

1. Multi-vocal literature review *i.e., blog posts, web articles, journals, surveys etc.*
2. Extended literature review *i.e., Dimensions of DevOps*



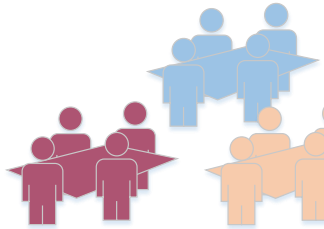




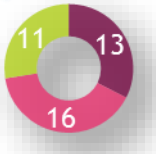
Research Approach

3 Workshop with practitioners of *Need for Speed(N4S) Project*

- Plan and conduct workshop with practitioners
- Record and take notes during workshop
- Transcribe workshop audio recordings



11 Practitioners representing 7 companies in N4S project



Large SME's Research

70 %
Industry partners
16 SME's and 13 large companies.

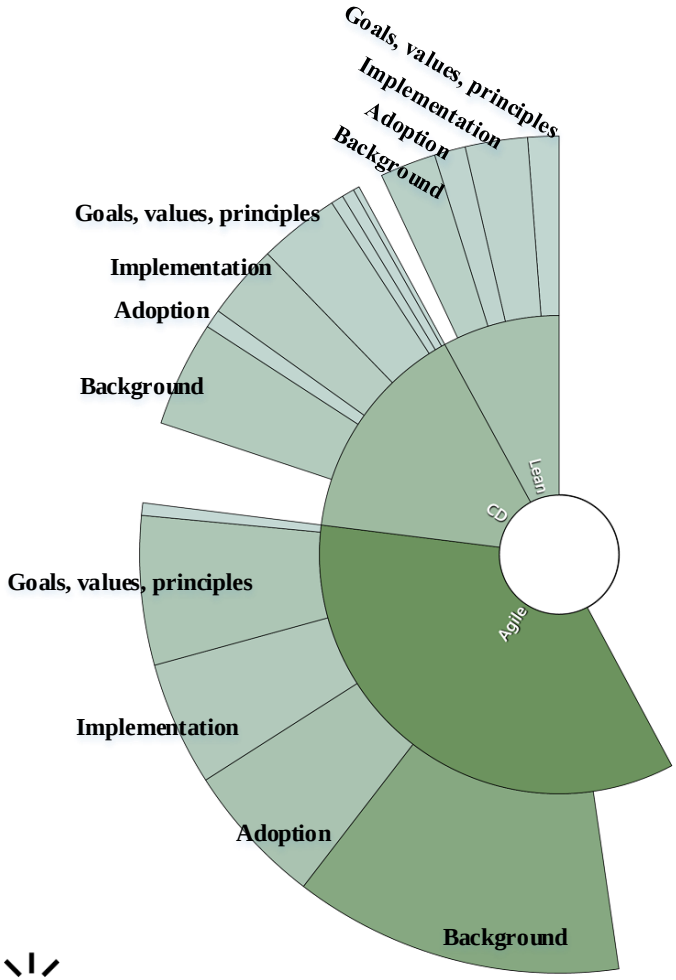
30%
Research organizations
11 research institutes and universities.

3
Work Packages
Real time value delivery, deep customer insight and mercury business.

http://www.n4s.fi/en/

Thematic data analysis to analyse all collected data

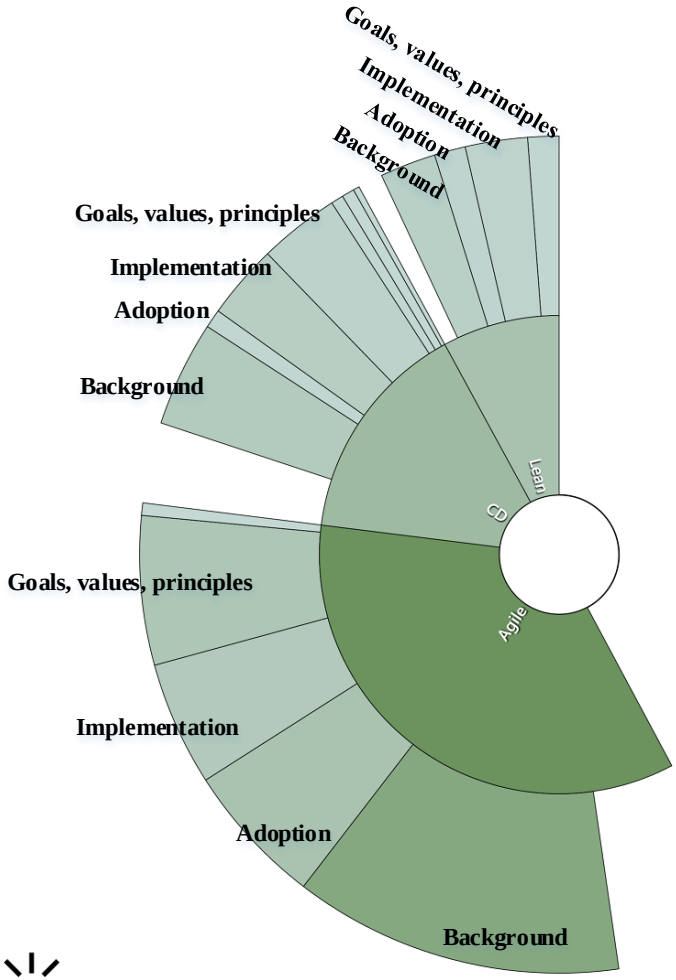
Findings: *How does DevOps Relate to Agile, Lean and Continuous Deployment (RQ1)*



DevOps and Agile

- DevOps an evolution or extension of agile – principles and values to Operations (B)
- Agile is key factor in DevOps adoption (A)
- DevOps builds upon CI practices and enhances existing roles in Agile to take into account operations activities (I)
- Both driven by similar basic values e.g. collaboration (G)

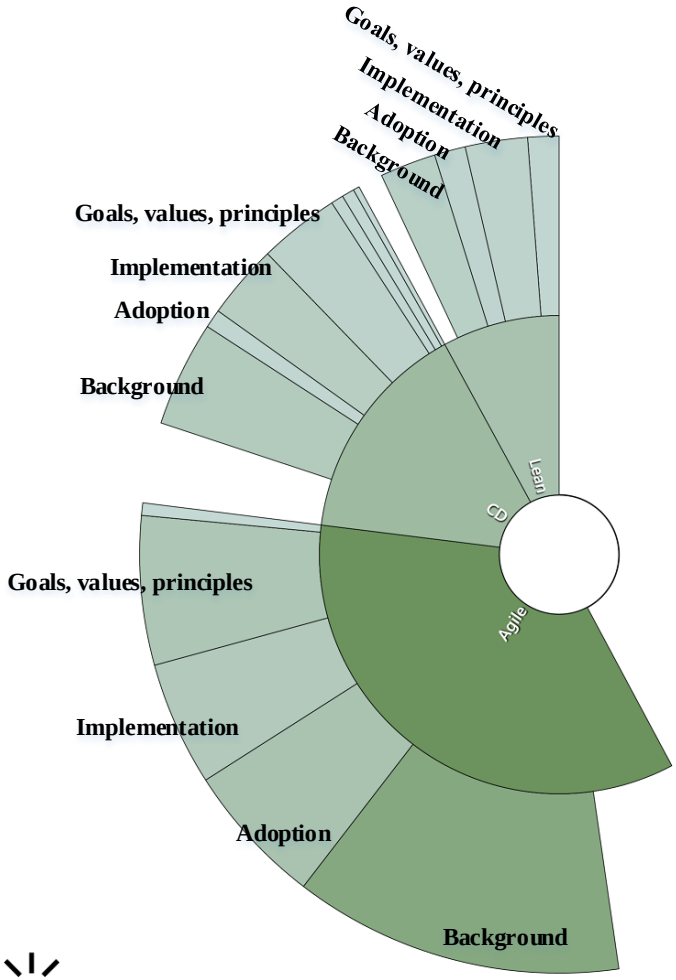
Findings: *How does DevOps Relate to Agile, Lean and Continuous Deployment (RQ1)*



DevOps and CD

- DevOps movement emerged as a result of CD paradigm (B).
- DevOps is required to enable CD (A).
- Automation of deployment process and infrastructure management, monitoring (I).
- Both share background in agile and lean thinking hence shared goals though CD is broader (G)

Findings: *How does DevOps Relate to Agile, Lean and Continuous Deployment (RQ1)*



DevOps and Lean

- DevOps is informed by lean thinking that goes further than agile (B).
- Continuous improvement 'Kaizen' culture resulting to increased feedback (A).
- Systems thinking approach in lean requires team's connectedness (I).
- IT as a value stream that extends to production (G)

Findings: *How does DevOps Relate to Agile, Lean and Continuous Deployment (RQ1)*

Summary of the findings for RQ1:

1. Agile software development principles, values and practices are required for successful DevOps adoption

2. DevOps implementation is necessary to enable CD

3. Lean software development principles and practices inform DevOps implementation

Findings: *What are the claimed effects of DevOps, and what metrics can be used to assess those effects? (RQ2)*

Effects of DevOps
Fast and more frequent releases/deployments (fast time-to-market, shortened lead time, rapid releases)
Improved quality and reliability of software product and deployments
Increased efficiency through automation
Fast recovery time following unexpected events, security flaws etc.
Increased transparency and collaboration between stakeholders especially developers and operations
Lower chance of product failure once deployed

Metrics for DevOps
Deployment frequency/rate
Mean time to recover
Cycle/Lead Time (Time to release software to production)
Change success/failure rate
Frequency of production failures/outages
Customer/business associated metrics (customer satisfaction, conversion rate, sales)

Conclusion

- DevOps originated from CD as an evolution of agile software development and is informed by a lean principles background
- Claimed DevOps effects and metrics are too generic to argue as merely DevOps
- Many sources had some assertions over the presented claims without empirical evidence or justification
- Like agile, lean and CD, DevOps makes it's own significant contribution thus future research should be clear about unique contribution whilst also make the differences clear

Future Research

- Lack of empirical evidence calls for more empirical studies investigating DevOp in real contexts

- Future research (ongoing):
  i. *DevOps practices and their impacts in selected cases employing DevOps*
  ii. *DevOps mindset and organizational culture*
  iii. *Dev and Ops interactions*

Thank You !

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