ATLAS.ti Report

UnifiedDevOps Selective Coding ITE5 ICA

Quotations grouped by Documents

Report created by Isaque Alves on 29 Jul 2023

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1 D1 2021 DevOps Team Structures: Characterization and Implications

29 Quotations:

1:1 p 5 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy

Content:

> Product team category emerges as a result of a set of codes that characterize these teams: collaboration, product ownership sharing, end-to-end product vision, cross-functionality (sometimes used as synonym of multidisciplinary or poly-skilled teams), self-organization and autonomy

1:2 p 5 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- role definition/attributions
- role definition/attributions
- role definition/attributions
- role definition/attributions

Content:

> Product teams are usually small (Amazon's two pizza rule) and are composed by high-qualiffed engineers and T-shape people. These teams promote skills over roles, leadership from management, and more frequently single management (referred to as product manager, product leader, technical leader, etc.) versus multi�ple management

1:3 p 5 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- collaboration
- collaboration
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- collaboration
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills

Content:

> Product teams may involve those skills re�lated to analysis, architecting and design, development, test�ing, operation (system administration, monitoring), security, etc. or collaborate with other teams/departments that own some of these skills.

1:4 p 5 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> the second one works closely with developers from the beginning of product development by establishing non-functional requirements (NFR shared responsibility), conffguration ffles, deployment scripts, and other activities related to operations.

1:5 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Hyperlinks:
— continued by → 1:6 p 6, and lack of collaboration in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:
- communication
- communication
- communication
- communication
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts
- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy

Content:
> Some participating organizations highlighted that prod�uct teams have external dependencies with other teams, mainly architecture, quality assurance, system administra�tion, database administration, security, and ffrst-level oper�ations dependencies. These dependencies usually generate organizational barriers due to poor communication

1:6 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Hyperlinks:
← continued by — 1:5 p 6, Some participating organizations highlighted that prod�uct teams have external dependencies with oth… in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:
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- organizational silos/conflicts
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- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy

Content:
> and lack of collaboration

1:7 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- cultural silos/conflicts
- cultural silos/conflicts
- cultural silos/conflicts
- cultural silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> Some other organizations, although they addressed these organizational barriers, still show cultural barriers mainly between developers and operators (some�times due to previous organizational silos that remain as vestigial cultural silos). Both organizational and cultural barriers are related to silos, which are instantiated as: op�eration silos, system administration silos, security silos, quality assurance silos, architecture silos, and so on.

1:8 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> Emerging product teams resulting from the eventual inter�departmental collaboration between dev & ops and showing organizational silos

1:9 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Hyperlinks:

— continued by → 1:10 p 6, showing some cultural barriers. in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams

Content:

> Stable product teams resulting from the creation of teams in which developers and operators daily collaborate, but there exist still a transfer of work between them

1:10 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Hyperlinks:

← continued by — 1:9 p 6, Stable product teams resulting from the creation of teams in which developers and operators daily c… in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- cultural silos/conflicts
- cultural silos/conflicts
- cultural silos/conflicts
- cultural silos/conflicts
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams

Content:

> showing some cultural barriers.

1:11 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Hyperlinks:

— continued by → 1:12 p 6, shared product ownership, end-to-end product vision and high-levels of self-organization and autono… in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- alignment of dev & ops goals
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- alignment of dev & ops goals
- alignment of dev & ops goals
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- cross-functionality/skills
- cross-functionality/skills
- cultural silos/conflicts
- cultural silos/conflicts
- cultural silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> Consolidated product teams, which have dealt both orga  nizational and cultural silos by aligning dev & ops goals with business goals and show cross-functional teams

1:12 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Hyperlinks:

← continued by — 1:11 p 6, Consolidated product teams, which have dealt both orga﷿nizational and cultural silos by aligning dev… in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- cross-functionality/skills
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- responsibility/ownership sharing
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- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy

Content:

> shared product ownership, end-to-end product vision and high-levels of self-organization and autonomy.

1:13 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Hyperlinks:

— continued by → 1:14 p 6, - Platform servicing (e.g., CI/CD and releasing tools) and infrastructure (e.g., cloud infrastructu… in D1 2021 DevOps Team Structures: Characterization and Implications

— continued by → 1:15 p 6, - Evangelization and mentoring on DevOps practices for pro﷿moting culture values, such as communicat… in D1 2021 DevOps Team Structures: Characterization and Implications

— continued by → 1:16 p 6, Rotary human resources, i.e., horizontal teams may facilitate and provide product teams with human… in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team

Content:

> We also realized that these product teams are supported by horizontal (cross) teams, which may provide:

1:14 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Hyperlinks:

← continued by — 1:13 p 6, We also realized that these product teams are supported by horizontal (cross) teams, which may prov… in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- culture, values & best practices
- culture, values & best practices
- culture, values & best practices
- culture, values & best practices
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- platform servicing
- platform servicing
- platform servicing
- platform servicing

Content:

> - Platform servicing (e.g., CI/CD and releasing tools) and infrastructure (e.g., cloud infrastructure, virtualization or containerization, etc.) to implement best practices, such as continuous integration, continuous testing, continuous delivery and deployment, infrastructure as code, and con�tinuous monitoring.

1:15 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Hyperlinks:

← continued by — 1:13 p 6, We also realized that these product teams are supported by horizontal (cross) teams, which may prov… in D1 2021 DevOps Team Structures: Characterization and Implications

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- culture, values & best practices
- culture, values & best practices
- culture, values & best practices
- culture, values & best practices
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- skills/knowledge sharing
- skills/knowledge sharing
- skills/knowledge sharing
- skills/knowledge sharing
- training, evangelization and mentoring
- training, evangelization and mentoring
- training, evangelization and mentoring
- training, evangelization and mentoring

Content:

> - Evangelization and mentoring on DevOps practices for pro�moting culture values, such as communication, transparency, and knowledge sharing.

1:16 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Hyperlinks:

← continued by — 1:13 p 6, We also realized that these product teams are supported by horizontal (cross) teams, which may prov… in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- cross-functionality/skills
- cross-functionality/skills
- culture, values & best practices
- culture, values & best practices
- culture, values & best practices
- culture, values & best practices
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team

Content:

> Rotary human resources, i.e., horizontal teams may facilitate and provide product teams with human resources when these teams lack speciffc skills to undertake and accomplish their work and implement best practices.

1:17 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Hyperlinks:

— continued by → 1:18 p 6, Despite there are some differences among these teams, all of them refer to the same construct, i.e.… in D1 2021 DevOps Team Structures: Characterization and Implications

— continued by → 1:19 p 6, and/or mentoring among others, as a service in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team

Content:

> While using these codes, we also realized that there were different kinds of horizontal teams such as DevOps Center of Excellence (DevOps CoE), DevOps chapter and Platform team.

1:18 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Hyperlinks:

← continued by — 1:17 p 6, While using these codes, we also realized that there were different kinds of horizontal teams such… in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- platform servicing
- platform servicing
- platform servicing
- platform servicing

Content:

> Despite there are some differences among these teams, all of them refer to the same construct, i.e., teams that provide platform, infrastructure, IT operation,

1:19 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Hyperlinks:

← continued by — 1:17 p 6, While using these codes, we also realized that there were different kinds of horizontal teams such… in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- training, evangelization and mentoring
- training, evangelization and mentoring
- training, evangelization and mentoring
- training, evangelization and mentoring

Content:

> and/or mentoring among others, as a service

1:20 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- platform servicing
- platform servicing
- platform servicing
- platform servicing
- team self-organization & autonomy
- team self-organization & autonomy
- training, evangelization and mentoring
- training, evangelization and mentoring
- training, evangelization and mentoring
- training, evangelization and mentoring

Content:

> This gives autonomy to product teams. We wrote some memos to clarify this meaning as follows: MEMO: Horizontal (cross) DevOps teams, either DevOps CoE, DevOps chapter, or Platform team, aim to provide a DevOps platform, IT operation, or mentoring, for autonomous product teams. They own DevOps skills & culture, platform, tools, and infrastructure to provide product teams with (i) servicing of CI/CD platform and environments for dev, test, or even pre-production, (ii) mentoring and evangelizing, and sometimes (iii) engineers who get involved in product teams with exclusive dedication but limited in time until these teams are capable of the “you build it, you run it”.

1:21 p 6 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- cross-functionality/skills
- cross-functionality/skills
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team

Content:

> Figure 1 shows a cross team composed of high qualiffed engineers in DevOps culture, speciffcally 5 se�nior developers, 10 testers and quality assurance engineers, and 10 IT operators (second-level operations), who get in�volved in product teams when necessary. These engineers are involved in product teams with exclusive dedication but limited in time, until product teams are capable of doing all their responsibilities, from planning, analysis, development, testing, deployment, to operation. This means that these horizontal teams are composed of engineers that move through the product teams according to their needs. The reason that these engineers are not part of the product teams is that these organizations (like ID2) do not have human resources enough to involve the necessary engineers in all the product teams.

1:22 pp 6 – 7 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- platform servicing
- platform servicing
- platform servicing
- platform servicing
- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy

Content:

> Figure 2 shows an example in which the operations department assumes the DevOps culture, provides to de�velopers (Scrum teams) with platforms and infrastructure, and enables scrum teams to be autonomous. This means, the operations department assumes the functions of a DevOps platform team. This example differs from the previous one
> This article has been accepted for publication in a future issue of this journal, but has not been fully edited. Content may change prior to final publication. Citation information: DOI 10.1109/TSE.2021.3102982, IEEE Transactions on Software Engineering JOURNAL OF LATEX CLASS FILES, VOL. 14, NO. 8, AUGUST 2015 7
> Fig. 1. Organizational team structure by ID2 in the fact that there is no immersion of engineers from the horizontal team to the product teams.

1:23 p 7 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- platform servicing
- platform servicing
- platform servicing
- platform servicing
- training, evangelization and mentoring
- training, evangelization and mentoring
- training, evangelization and mentoring
- training, evangelization and mentoring

Content:

> Figure 3 shows another approach in which a horizontal team (i) develops, in collaboration with the rest of the departments, a DevOps platform for internal use, and (ii) evangelizes DevOps practices. This example differs from the previous ones in the fact that the horizontal team behaves as a product team (the product is the DevOps platform) while it provides services to both product teams and classical operations (either cloud or on-premise).

1:24 p 7 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy

Content:

> Finally, the following excerpts show more evidence of the existence of horizontal DevOps teams in the participat&#xfffd;ing organizations and its importance to make product teams autonomous.

1:25 p 7 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> 3.2.1 Product ownership sharing We observed that there exists a relationship between how product teams share the product ownership and how these teams are structured. For example, ID29 shows a high level of sharing of the product ownership within product teams, which are cohesive, small (less than 12 people), and multidisciplinary

1:26 p 8 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> 3.2.2 Leadership from management We realized that shared ownership is highly related to lead ership from management, which is an interesting variable to be examined due to its impact on organizational team structures. Hence, non-shared leadership usually leads to non-shared ownership because, if there are multiple man agers within the same team (typically one development manager and one operation manager), then it is difffcult for all members to feel the product as a whole. This means that each member tends to take only a part of the responsibility (developers give priority to develop new features whereas operators give priority to service stability).

1:27 p 8 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- cultural silos/conflicts
- cultural silos/conflicts
- cultural silos/conflicts
- cultural silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> 3.2.3 Organizational silos & Cultural silos We also found that the existence of strong hierarchical organization charts and departmental structure impact the structure of teams because both organizational and cultural silos undermined the adoption of DevOps practices and culture. The structure of some organizations like ID01 leads to the creation of silos and ffnd themselves with serious problems to adopt DevOps. In other cases like ID27 the or�ganizational silos were broken, but the cultural ones remain (at least for a while) hindering the DevOps adoption. Many organizations like ID29 have managed to transform their structure, eliminated all the silos and achieved a complete adoption of DevOps. Recently founded organizations like ID09 usually do not face silo problems because they were born with a structure that favors DevOps. By observing the big picture, we established two levels on the organizational silo variable: yes, no; and three levels on the cultural silo variable: yes, no, vestigial (previous silos remain as vestigial cultural silos).

1:28 p 8 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- role definition/attributions
- role definition/attributions
- role definition/attributions
- role definition/attributions
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams

Content:

> 3.2.4 Collaboration We also noticed that collaboration frequency is highly re�lated to the team structures and is a critical variable for DevOps adoption. Indeed, collaboration is one of the key values of DevOps culture. Hence, the members of product teams may work together regularly on a daily basis to undertake all the product life-cycle, as it happens in orga�nizations like ID23. This implies a daily collaboration be�tween team members and usually a daily meeting, without detriment of other less frequent meetings with other related teams. However, the members of product teams in other organizations have more differentiated roles (dev versus ops) so that they work together but in different tasks. This means that there is not a real collaboration, but a transfer of responsibilities, as it happens in organizations like ID05. In these cases, the collaboration frequency is on a weekly basis or even more. In this way, we established three levels on the collaboration frequency variable: daily, frequent and eventual

1:29 pp 8 – 9 in D1 2021 DevOps Team Structures: Characterization and Implications

Codes:

- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy

Content:

> 3.2.5 Autonomy Last but not least, we found that autonomy might reveal the organizational team structure of a company. We under﷽stand that a DevOps product team is entirely autonomous when it does not have external dependencies to fulffll its responsibilities, this implies having an end-to-end vision Authorized licensed use limited to: Univ Politecnica de Madrid. Downloaded on August 16,2021 at 11:00:44 UTC from IEEE Xplore. Restrictions apply.
> 0098-5589 (c) 2021 IEEE. Personal use is permitted, but republication/redistribution requires IEEE permission. See http://www.ieee.org/publications_standards/publications/rights/index.html for more information.
> This article has been accepted for publication in a future issue of this journal, but has not been fully edited. Content may change prior to final publication. Citation information: DOI 10.1109/TSE.2021.3102982, IEEE Transactions on Software Engineering JOURNAL OF LATEX CLASS FILES, VOL. 14, NO. 8, AUGUST 2015 9 and taking complete charge of a product from its conception and implementation to its deployment and monitoring. This is hard to achieve and we only found a few organizations like ID03 whose product teams implement the practice con﷽tinuous deployment and continuous feedback, and thus, being completely autonomous. The most common practice is that product teams implement continuous delivery so that they can deploy in a pre-production environment, but they need external approval to go into production. These approvals may come directly from business or from technical areas such as quality or security. This was very usual in most orga﷽nizations like ID08, even if their DevOps maturity was high.
> However, in some organizations, product teams still have many dependencies and they do not manage continuous delivery, much less continuous deployment.

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2 D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

42 Quotations:

2:1 p 6 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- alignment of dev & ops goals
- alignment of dev & ops goals
- alignment of dev & ops goals
- alignment of dev & ops goals
- communication
- communication
- communication
- communication
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> With siloed departments, developers and the infrastructure staff are segregated from each other, with little direct communication among them. Frictions occurs among silos, since developers want to deliver as much as possible, whereas operations target stability and block de�liveries.

2:2 p 6 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- collaboration
- collaboration
- collaboration
- role definition/attributions
- role definition/attributions
- role definition/attributions
- role definition/attributions
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams

Content:

> → Developers and operators have well-defined and differentiated roles; as stated by #I20: “the wall was very clear: after committing, our work [as developers] was done”. Therefore, there are no conflicts concerning attributions. Well-defined roles and pipelines can decrease the need for inter-departmental direct collaboration (#I10).

2:3 p 6 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- alignment of dev & ops goals
- alignment of dev & ops goals
- alignment of dev & ops goals
- alignment of dev & ops goals
- collaboration
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> → Each department is guided by its own interests, looking for local optimization rather than global optimization, an old and problem�atic pattern [37]. Participant #I26 told us "there is a big war there. . . the security, governance, and audit groups must still be convinced that the tool [Docker/Kubernetes] is good".

2:4 p 6 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> → Developers have minimal awareness of what happens in production (#I26). So monitoring and handling incidents are mostly done by the infrastructure team (#I5).

2:5 p 6 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- alignment of dev & ops goals
- collaboration
- collaboration
- organizational silos/conflicts
- organizational silos/conflicts
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Developers often neglect non-functional requirements (NFRs), especially security (#I5). In #I30, conflicts among developers and the security group arise from disagreement on technical decisions.
> In other cases, developers have little contact with the security group (#I26).

2:6 p 6 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- communication
- communication
- communication
- communication

Content:

> Limited DevOps initiatives, centered on adopting tools, do not improve communication

2:7 p 6 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- collaboration
- collaboration
- collaboration
- collaboration
- skills/knowledge sharing

Content:

> collaboration among teams (#I30) or spread awareness about automated tests (#I5, #I15).

2:8 p 6 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> In #I30, a “De�vOps team” maintaining the deployment pipeline behaves as another silo, sometimes bottlenecking the delivery [38].

2:9 p 7 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- organizational silos/conflicts
- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy

Content:

> Organizations are less likely to achieve high delivery perfor�mance as developers need bureaucratic approval to deploy applications and evolve the database schema (#I5, #I30). Table 3 shows that only two of 13 siloed organizations presented high delivery performance, and these two were already transitioning to other structures. However, we observed cases in which low delivery performance was not a prob�lem, such as short-lived research experiments (#I13) and releases of new phases of a game not requiring code changes (#I10). Network isolation policies may also hinder frequent deployment (#B1, #I7).

2:10 p 7 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> → We observed a lack of proper test automation in many orga�nizations (#I5, #I15, #I23, #I26). In #I26, developers automate only unit tests. Organization #I15 was leaving test automation only for QA people, which is not suitable for TDD or unit tests. Although siloed organizations are not the only ones that lack test automation (#I3, #I32, #I35), in this structure developers can even ignore its value (#I5, #I23, #I37). We notice that some of the observed scenarios were more challenging for test automation, such as games.

2:11 p 7 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> The classical DevOps structure focuses on collaboration among de�velopers and the infrastructure team. It does not eliminate all conflicts, but promotes a better environment to deal with them (#I34). We named this structure “Classical DevOps” because we understand that a collaborative culture is the core DevOps concern [23,26,39]. We classified ten organizations into this structure. We also observed three organizations transitioning to this structure and three transitioning out of this structure.

2:12 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- role definition/attributions
- role definition/attributions

Content:

> → We observed that, in classical DevOps settings, many practices foster a culture of collaboration. We saw the sharing of database management: infrastructure staff creates and fine tunes the database, whereas developers write queries and manage the database schema (#I17).

2:13 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- alignment of dev & ops goals
- communication
- communication
- communication
- communication
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> We heard about open communication among developers and the infrastructure team (#I2, #I6, #I17, #I22, #I31, #I36). Participant #I2 highlighted that: “Development and infrastructure teams participate in the same chat; it even looks like everyone is part of the same team”.
> Developers also support the product in its initial production (#I31).

2:14 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- cross-functionality/skills
- role definition/attributions
- role definition/attributions
- role definition/attributions

Content:

> → Roles remain well-defined, and despite the collaboration on some activities, there are usually no conflicts over who is responsible for each task.

2:15 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- cross-functionality/skills
- cross-functionality/skills
- organizational silos/conflicts
- organizational silos/conflicts
- role definition/attributions
- transfer of work between teams

Content:

> → Developers feel relieved when they can rely on the infrastruc�ture team (#I17). Participant #I31 claimed that his previous job in a cross-functional team had a much more stressful environment than his current position in a development team in a classical DevOps environment. On the other hand, stress can persist at high levels for the infrastructure team (#I34), especially “if the application is ill-designed and has low performance” (#I36).

2:16 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- alignment of dev & ops goals
- alignment of dev & ops goals
- alignment of dev & ops goals
- alignment of dev & ops goals
- role definition/attributions
- role definition/attributions

Content:

> → In this structure, the project's success depends on the alignment of different departments, which is not trivial to achieve. In #B3, dif�ferent teams understood the organization's goals and the consequences of not solving problems, like wrongly computing amounts in the order of millions of dollars. Moreover, #I7 described that alignment emerges when employees focus on problem-solving rather than role attributions.

2:17 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> → Development and infrastructure teams share NFR responsi�bilities (#17). For example, in #I2, both were very concerned with low latency, a primary requirement for their application.

2:18 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- role definition/attributions

Content:

> → Usually, the infrastructure staff is the front line of tracking monitoring and incident handling (#I2, #I11, #I29, #I31, #I36).
> However, if needed, developers are summoned and collaborate (#I17, #I34). In #I34, monitoring alerts are directed to the infrastructure team but copied to developers. However, in some cases developers never work after-hours (#I2, #I22).

2:19 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> Humble expects a culture of collaboration among developers and the infrastructure staff to prescind from a “DevOps team” [38].
> We understand this criticism applies to DevOps teams with dedicated members, such as we saw in #I30, since they behave as new silos.

2:20 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- enabler (platform) team
- enabler (platform) team
- skills/knowledge sharing
- skills/knowledge sharing
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> However, we found in #I36 a well-running DevOps team working as a committee for strategic decisions — a forum for the leadership of different departments. We also found DevOps groups working as guilds (#I4, #I8), supporting knowledge exchange among different departments [40]

2:21 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- collaboration
- collaboration
- collaboration
- collaboration

Content:

> → Collaboration and delivery automation, critical values of the DevOps movement, are not enough to achieve high delivery per�formance.

2:22 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management

Content:

> Of 10 classical DevOps organizations not transitioning from or to other structures, only three presented high delivery performance (Table 3). One possible reason is the lack of proper test automation (#I22, #I36) [41]. Another limitation for delivery performance is the adoption of release windows (#I11, #I31, #I14, #I36), which seek to mitigate deployment risk by restricting software delivery to periodic time slots. Release windows are adopted by considering either the massive number of users (#I31) or the system's financial criticality (#I36). Release windows may also result from fragile architectures (#I37) or the monolith architectural style (#I11) since any deployment has an increased risk of affecting the whole system

2:23 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- role definition/attributions

Content:

> Infra as development collaborator. The infrastructure staff con�tributes to the application code to optimize the system's performance, reliability, stability, and availability. Although this aptitude requires advanced coding skills from infrastructure professionals, it is a suitable strategy for maintaining large-scale systems, like the ones owned by #I31.

2:24 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- responsibility/ownership sharing
- responsibility/ownership sharing
- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy

Content:

> In our context, a cross-functional team takes responsibility for both software development and infrastructure management. This structure aligns with the Amazon motto "You built it, you run it" [42] and with the "autonomous squads" at Spotify [40]. This gives more freedom to the team, along with a great deal of responsibility. As interviewee #I1 described: "it is like each team is a different mini-company, having the freedom to manage its own budget and infrastructure".

2:25 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- alignment of dev & ops goals
- alignment of dev & ops goals
- alignment of dev & ops goals
- alignment of dev & ops goals
- communication
- communication
- communication
- communication
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills

Content:

> → Independence among teams may lead to misalignment. Lack of communication and standardization among cross-functional teams within a single organization may lead to duplicated efforts (#I28).
> However, this is not always a problem (#I1).

2:26 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- automated application life-cycle management
- automated application life-cycle management
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- skills/knowledge sharing

Content:

> → It is hard to ensure a team has all the necessary skills. For instance, we interviewed two cross-functional teams with no infrastruc�ture expertise (#I3, #I32). Participant #I27 recognizes that “there is a lack of knowledge” on infrastructure, deployment automation, and monitoring.

2:27 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- cross-functionality/skills
- cross-functionality/skills
- role definition/attributions
- role definition/attributions
- skills/knowledge sharing

Content:

> A possible reason for such adversity is that, as #I29 taught us, it is hard to hire infrastructure specialists and senior developers.
> → We expected cross-functional teams to provide too much idle time for specialists, as opposed to centralized pools of specialization.
> However, we find no evidence of idleness for specialists. From #I16, we heard quite the opposite: the infrastructure specialists were too busy to be shared with other teams. Having the infrastructure specialists code features in their spare time avoids such idleness (#I35).

2:28 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills

Content:

> → Most of the cross-functional teams we interviewed were in small organizations (Table 4), likely because there is no sense in creating multiple teams in too small organizations.
> Supplementary properties

2:29 p 8 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills

Content:

> Dedicated infra professionals. The team has specialized people dedicated to infrastructure tasks. In #I1, one employee specializes in physical infrastructure, and another is “the DevOps”, taking care of the deployment pipeline and monitoring. In this circumstance, the infrastructure specialists become the front-line for tackling incidents and monitoring (#I28, #I35).

2:30 pp 8 – 9 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- responsibility/ownership sharing
- responsibility/ownership sharing
- role definition/attributions
- role definition/attributions
- role definition/attributions
- role definition/attributions

Content:

> Developers with infra background. The team has developers knowledgeable in infrastructure management; these professionals are also called full-stack engineers or even DevOps engineers (#I25).
> Participant #I25 is a full-stack engineer and claimed to “know all the
> Information and Software Technology 139 (2021) 106672 9 L. Leite et al.
> Table 4 Organizational structures and organization size observed in our interviews.
> Organizational structure Organization size Number of interviews Siloed departments < 200 3 Siloed departments > 1000 4 Classical DevOps < 200 2 Classical DevOps > 200 and < 1000 4 Classical DevOps > 1000 4 Cross-functional < 200 5 Cross-functional > 200 and < 1000 2 Platform team > 200 and < 1000 2 Platform team > 1000 2 Siloed departments > 200 and < 1000 2 to Classical DevOps Siloed departments > 1000 1 to Classical DevOps Siloed departments > 200 and < 1000 1 to Cross-functional Siloed departments > 1000 2 to Platform team Classical DevOps < 200 1 to Cross-functional Classical DevOps > 200 and < 1000 1 to Platform team Cross-functional > 1000 1 to Platform team involved technologies: front-end, back-end, and infrastructure; so I am the person able to link all of them and to firefight when needed”. Participant #I29, a consultant, is skeptical regarding full-stack engineers and stated that “these people are not up to the task”. He complained that developers are usually unaware of how to fine tune the application, such as configuring database connections.

2:31 p 9 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- responsibility/ownership sharing

Content:

> No infra background. Product teams manage the infrastructure without the corresponding expertise. We saw this pattern in two places.
> One was a very small company and had just released their application, having only a few users (#I32) and being uncertain about hiring specialized people soon. Interviewee #I3 understands that operations work (e.g., spotting errors during firmware updates in IoT devices and starting Amazon VMs for new clients) is too menial for software engi□neers, taking too much of their expensive time. So the organization was planning the creation of an operations sector composed of a cheaper workforce. Interviewee #I19 argued that such an arrangement could not sustain growth in his company in the past.

2:32 p 9 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- automated application life-cycle management
- automated application life-cycle management
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- platform servicing
- platform servicing

Content:

> Platform teams are infrastructure teams that provide highly auto□mated infrastructure services that can be self-serviced by developers for application deployment. The infrastructure team is no longer a “support team”; it behaves like a product team, with the “platform” as its product and developers as internal customers.

2:33 p 9 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- enabler (platform) team
- enabler (platform) team
- platform servicing
- platform servicing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Product teams are fully accountable for the non-functional requirements of their services. They become the first ones called when there is an incident, which is escalated to the infrastructure people only if the problem relates to an infrastructure service (#I8, #I9, #I12, #I33).
> → Although the product team becomes fully responsible for NFRs of its services, it is not a significant burden that developers try to refuse (#I33). The platform itself handles many NFR concerns, such as load balancing, auto-scaling, throttling, and high-speed communica�tions between data-centers (#I4, #I8, #I16, #I33). As participant #I33 told us, “you do not need to worry about how things work, they just work”.
> Moreover, we observed infrastructure people willingly supporting de�velopers for the sake of services availability, performance, and security (#I9, #I14).

2:34 p 9 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- communication
- communication
- communication
- communication
- enabler (platform) team
- enabler (platform) team
- platform servicing
- platform servicing
- responsibility/ownership sharing

Content:

> I9, #I14).
> → Product teams become decoupled from the members of the platform team. Usually, the communication among these teams hap�pens when developers and infrastructure people gather to solve inci�dents (#I8, #I9); when infrastructure people provide consulting for developers to master non-functional concerns (#I9); or when develop�ers demand new capabilities from the platform (#I8, #I12).

2:35 p 9 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- enabler (platform) team
- enabler (platform) team
- platform servicing

Content:

> In this way, the decoupling between the platform and product teams does not imply the absence of collaboration among these groups.

2:36 p 9 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- automated application life-cycle management
- automated application life-cycle management
- enabler (platform) team
- platform servicing
- platform servicing

Content:

> The infrastructure team is no longer requested for opera�tional tasks. The operational tasks are automated by the platform.
> Therefore, one cannot merely call platform-team members “operators”, since they also engineer the infrastructure solution.

2:37 p 9 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- cross-functionality/skills
- cross-functionality/skills
- enabler (platform) team
- enabler (platform) team
- role definition/attributions
- role definition/attributions
- skills/knowledge sharing

Content:

> → The platform avoids the need for product teams to have in�frastructure specialists. Participant #I33 expressed wanting to better understand what happens “under the hood” of the platform, which indicates how well the platform relieves the team from mastering infrastructure concerns. On the other hand, since developers are re�sponsible for the deployment, they must have some basic knowledge about the infrastructure and the platform itself.

2:38 p 9 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- platform servicing

Content:

> → The platform may not be enough to deal with particular requirements. Participant #I16 stated that “if a lot of people do similar functionality, over time usually it gets integrated to the platform. . . but each team will have something very specialized. . . ” to explain the presence of infrastructure staff within the team, even with the usage of a platform, considering the massive number of virtual machines to be managed.

2:39 p 9 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- enabler (platform) team
- platform servicing
- platform servicing
- platform servicing
- platform servicing

Content:

> → If the organization develops a new platform to deal with its specificities, it will require development skills from the infrastruc�ture team. Nevertheless, even without developing a new platform, the infrastructure team must have a “dev mindset” to produce scripts and use infrastructure-as-code [43] to automate the delivery path (#I14).
> One strategy we observed to meet this need was to hire previous developers for the infrastructure team (#I14).

2:40 p 9 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- responsibility/ownership sharing
- responsibility/ownership sharing
- team self-organization & autonomy
- team self-organization & autonomy
- team self-organization & autonomy

Content:

> → All four organizations that have fully embraced the platform team structure are high performers, while no other structure pro�vided such a level of success (Table 3). An explanation for such a relation is that this structure decouples the infrastructure and product teams, which prevents the infrastructure team from bottlenecking the delivery path. As stated by #I20: “Now developers have autonomy for going from zero to production without having to wait for anyone”. This structure also contributes to service reliability by letting product teams handle non-functional requirements and incidents

2:41 p 10 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- automated application life-cycle management
- enabler (platform) team
- enabler (platform) team
- skills/knowledge sharing
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> Enabler team. An enabler team provides consulting and tools for product teams but does not own any service. Consulting can be on per�formance (#I18) or security (#I9, #I16, #I31), for example. Tools pro�vided by enabler teams include the deployment pipeline (#I4, #I30), high-availability mechanisms (#I11), monitoring tools (#I12), and se�curity tools (#I17).

2:42 p 10 in D2 2021 The organization of software teams in the quest for continuous delivery: A grounded theory approach

Codes:

- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- collaboration
- collaboration
- collaboration
- collaboration
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- organizational silos/conflicts
- organizational silos/conflicts
- platform servicing

Content:

> With a platform. The organization possesses a platform that can provide deployment automation, but not following the patterns of human interaction and collaboration described by the core properties of platform teams. Participant #I25 developed an "autonomous IaaC for integration and deployment with Google Cloud", which provides a platform's capabilities to other developers of the team. However, since in this context there is a single cross-functional team, it cannot be called a "platform team". We classified organization #I30 as a siloed structure, even with a platform team, since developers and the platform team have a conflicted relationship.

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4 D4 2020 An Empirical Taxonomy of DevOps in Practice

21 Quotations:

4:1 p 4 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- collaboration
- collaboration
- collaboration
- collaboration

Content:

> Generally, participants described DevOps as better collaboration between developers and Ops teams. Some interviewees also described DevOps as end-to-end automation of the software development pipeline, providing better software quality, and creating seamless workffow of products at the shortest possible time.

4:2 p 4 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team

Content:

> The culture of collaboration between developers and Ops specialists was widely reported among interviewers. In FinCo1, the DevOps team assist developers re-conffgure their codes for containerisation.

4:3 p 4 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- skills/knowledge sharing
- skills/knowledge sharing
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> Knowledge is shared and a mutual understanding of basic activities across the boundaries of teams, achieved through collaborative resolution of code-related challenges. Similarly, [Finco1 DOps2] mentioned knowledge ffow from developers to DevOps Engineers:

4:4 p 4 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- automated infrastructure management
- automated infrastructure management
- automated infrastructure management
- automated infrastructure management
- collaboration
- collaboration
- collaboration
- collaboration
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- responsibility/ownership sharing
- skills/knowledge sharing
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> DevOps teams in these organisations understand the codes of developers and help out where necessary. Developers are also made aware of how the automated infrastructure works, though not directly involved in its creation or maintenance. According to some practitioners, a level of conffdence brought about by the basic understanding of other aspects of the process and familiarity with the other actors. Intra-team collaboration is reported as brainstorming and coding together when issues are encountered. Collaboration in FinCo2 involves the DevOps team creating users' stories from requirements, breaking them into manageable tasks and delegating these tasks to developers through Azure DevOps.

4:5 p 5 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- platform builder
- platform builder
- platform builder
- platform builder
- role definition/attributions
- role definition/attributions
- role definition/attributions
- role definition/attributions

Content:

> Some of the interviewees had the job title of 'DevOps Engineer' and worked in distinct DevOps teams or departments. "We don't actually have developers in our team. So, in our case. . . it's just DevOps" [Finco1 DOps1]. They further described their team as "platform builders" for developers, "who support them and host their applications on our platform." Here, we see DevOps being presented as a job description, with DevOps Engineers responsible for carrying out "DevOps functions",

4:6 p 5 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- automated infrastructure management
- automated infrastructure management
- automated infrastructure management
- automated infrastructure management
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Developers-Ops mode (shown in Fig. 2a) of DevOps implementation depicts the instance where senior developers performed automated infrastructure management alongside development activities in a hybrid cloud deployment environment. Here, senior developers were seen as the facilitators of DevOps practices.

4:7 p 5 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams

Content:

> The IT Ops team support the physical infrastructure and on-premises hosted application, while developers wrote application codes, deployed their codes through CI/CD pipelines, and managed applications themselves.

4:8 p 5 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- automated infrastructure management
- automated infrastructure management
- automated infrastructure management
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> The Developers-Outsourced Ops mode (shown in Fig. 2b) is similar to Developers-Ops mode described above. Senior developers also write infrastructure codes to create and manage deployment pipelines, the difference being that its deployment environment is cloud-based, eliminating the need for Ops experts.

4:9 p 5 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- platform builder
- platform builder
- platform builder
- platform builder

Content:

> Fig. 2c depicts the Developers-DevOps mode where DevOps teams creates, deploys, and manages both the cloud infrastructure and deployment pipelines. Developers applications are also deployed and maintained by the DevOps team.

4:10 p 5 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams

Content:

> Here, developers are not responsible for application deployment and management. Completed applications or features are handed over to the DevOps teams for deployment and management, who are the DevOps practices facilitators.

4:11 p 5 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- culture, values & best practices
- culture, values & best practices
- culture, values & best practices
- culture, values & best practices
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- transfer of work between teams

Content:

> DevOps bridge team mode was the mode widely used in our study. This mode (shown in Fig. 2d) was found in hybrid environment of cloud and on-premises deployment. Here, DevOps teams interface with both developers and IT Ops to drive the practices of DevOps like conffguration management, continuous integration and continuous delivery, automated testing, deployment, monitoring, and metrics collection.

4:12 p 5 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams

Content:

> Developers provide business solution, leaving the creation, deployment, and management of both the cloud infrastructure, virtual systems, and deployment pipelines to the DevOps teams. These teams are provided services of on-premises infrastructure by the Ops team. Essentially, the DevOps teams are customers to the Ops team, and service providers to developers. It is important to note that in this approach to DevOps, everyone is responsible for their actions.

4:13 p 5 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Hyperlinks:

← continued by — 4:15 p 5, these activities are solely the responsibility of the DevOps teams. in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- culture, values & best practices
- culture, values & best practices
- culture, values & best practices
- culture, values & best practices
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team

Content:

> Using automation tools, DevOps engineers create pipelines to enable continuous practices such as continuous integration/continuous deployment, continuous testing etc

4:14 p 5 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Hyperlinks:
← continued by — 4:15 p 5, these activities are solely the responsibility of the DevOps teams. in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:
- automated infrastructure management
- automated infrastructure management
- automated infrastructure management
- automated infrastructure management
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team

Content:
> Scripts are created for conffguration management, and the deployment of infrastructure-as-code.

4:15 p 5 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Hyperlinks:
— continued by → 4:13 p 5, Using automation tools, DevOps engineers create pipelines to enable continuous practices such as con… in D4 2020 An Empirical Taxonomy of DevOps in Practice
— continued by → 4:14 p 5, Scripts are created for conffguration management, and the deployment of infrastructure-as-code. in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:
> these activities are solely the responsibility of the DevOps teams.

4:16 p 5 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Linked Memos:
Organizational structures

Content:
> Despite the seeming prevalence of bridge teams in the study, some interviewees thought it was not the right approach to DevOps implementation, as “there is still segregation between development and infrastructure in some way.”

4:17 p 7 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- platform builder
- platform builder
- platform builder
- platform builder

Content:

> The DevOps teams under study are be tasked with migration from existing platforms to either cloud based or an automated on-premises environment, and its subsequent maintenance. Generally, they act as intermediary between IT Ops and developers, providing the means to an end in software development (SD) by creating automated pipelines on both physical and virtualized servers to enable continuous integration and continuous delivery.

4:18 p 7 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams
- transfer of work between teams

Content:

> DevOps teams are responsible for all deployments. Developers hand over applications to these teams, who oversee the journey through the CI/CD pipeline. The teams also monitor the applications and function as ffrst line ofsupport.

4:19 p 7 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Also, while the DevOps team works with the goal of giving developers the best tools to get their work done, they expect developers to take responsibility for their products. This suggests boundaries of responsibilities.
> Another observed instance is the distinction between DevOps and IT Ops, clearly seen in the responsibility

4:20 p 7 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- devops (bridge) team
- devops (bridge) team

Content:

> All deployments in the study, from developers and DevOps teams, go through automated pipelines.

4:21 p 7 in D4 2020 An Empirical Taxonomy of DevOps in Practice

Codes:

- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- cross-functionality/skills
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- devops (bridge) team
- platform builder
- platform builder
- platform builder
- platform builder

Content:

> our ffndings show DevOps being described by practitioners in the study as not just a culture and speciffc job description, but also distinct teams separate from both developers and IT Ops teams. Although members of these teams have backgrounds in either software development or IT Ops, the nomenclature “DevOps” now separates them from their original silos and classiffes them as a unique team of “platform builders”

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5 D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

19 Quotations:

5:1 p 2 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Mix responsibilities: assign both development and operations responsibilities to all engineers,

5:2 p 2 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- communication
- communication

Content:

> Mix personnel: increase communication

5:3 p 2 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- collaboration
- collaboration

Content:

> collaboration between Dev and Ops

5:4 p 2 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- role definition/attributions
- role definition/attributions

Content:

> but keep existing roles differentiated,

5:5 p 2 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- devops (bridge) team
- devops (bridge) team

Content:

> Bridge team: create a separate DevOps team that functions as a bridge between Devs and Ops

5:6 pp 2 – 3 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- automated infrastructure management
- automated infrastructure management
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Which approach to use may be difffcult to decide on. An argument for fol  lowing Approach 1 (mix responsibilities) lies in the concept of Infrastructure
> On the Impact of Mixing Responsibilities Between Devs and Ops 133 as Code. What this concept refers to is that the infrastructure for deploying software is fully automated, and is controlled by code. As mentioned in [11]: “If infrastructure is code, then almost by deffnition, infrastructure becomes to some degree a function of development, or at least so hard to separate from development that the distinction becomes almost irrelevant.” Assuming that infrastructure is code, this statement suggests that Approach 1 (mix responsibilities) is a natural approach, because Ops will be involved in Dev tasks by developing the infrastructure together with the Devs.

5:7 p 3 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- cross-functionality/skills
- cross-functionality/skills
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> As for Approach 2 (mix personnel), it is stated in [12] that creating cross-functional teams is a good approach when adopting DevOps. These teams should consist of Devs, testers, Ops personnel and others, and then each of them would contribute code to a shared repository.

5:8 p 3 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Hyperlinks:

— continued by → 5:9 p 3, and collaboration is promoted. in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- communication
- communication
- cross-functionality/skills
- cross-functionality/skills
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> In this way, the Dev and Ops responsibili-ties are maintained, but communication

5:9 p 3 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Hyperlinks:

← continued by — 5:8 p 3, In this way, the Dev and Ops responsibili-ties are maintained, but communication in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- collaboration
- collaboration
- cross-functionality/skills
- cross-functionality/skills
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> and collaboration is promoted.

5:10 p 3 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- communication
- communication
- training, evangelization and mentoring
- training, evangelization and mentoring

Content:

> training for Devs and Ops on the responsibilities of other departments can be very beneffcial for communication.

5:11 p 3 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Linked Memos:

- Organizational structures

Codes:

- devops (bridge) team
- devops (bridge) team

Content:

> Approach 3 (bridge team) should not be followed when adopting DevOps, since a separate DevOps team will not break any silos, but instead create new ones.

5:12 p 5 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- enabler (platform) team
- enabler (platform) team
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> the organizational structure, or more speciffcally, the fact that operations were attending the products for all the different organizational units, had an impact on several of the things mentioned below. Most notably, this resulted in operations having limited possibilities in taking on development responsibilities.

5:13 p 5 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- organizational silos/conflicts
- organizational silos/conflicts
- responsibility/ownership sharing
- skills/knowledge sharing

Content:

> A New Source for Friction. In order to enable Devs to deal with operations tasks, it was necessary to give administration rights to Devs to different environ�ments. Based on the comments from the employees, it was evident that gaining access served as a cause for friction and mistrust. It was also mentioned that the process for obtaining access was long and tedious.
> The long process also had negative implications on the work efffciency, because employees often realized too late that they needed the access, caus�ing extra delays. The decision process for who was granted the access was also described as unfair. Some employees mention that access seem to have been granted based on shown interest rather on experience and knowledge. Devs also complained about Ops getting access faster than Devs. This made them angry and irritated.

5:14 p 5 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Mixing the responsibilities of Devs and Ops was considered educating for the Devs.

5:15 p 6 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Linked Memos:

- Shared Responsability

Codes:

- collaboration
- collaboration
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> Seeing the operations side also surprised the Devs in the sense that they now realized how far from production ready their software usually was, although it had passed all the tests in their own environment.
> Through teaching others and learning from others, Devs and Ops were begin�ning to trust each other more. The increased level of trust was accompanied with stress relief, speciffcally for operations personnel as they could trust Devs to do part of the operations tasks. As a consequence, knowledge about operations tasks and problems were increased among the Devs. This lead to Devs starting to improve test environments to better correspond with production environments, while also contributing to increased collaboration between Devs and Ops.

5:16 p 6 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Linked Memos:

- Shared Responsability

Content:

> Devs mentioned the greater need for knowledge and expertise, since they now were responsible for everything and consequently needed to know every technology used.

5:17 p 6 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- organizational silos/conflicts
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Shared Responsibilities. The view on how responsibilities were shared var�ied. Devs largely felt that responsibilities were shared, and if something went wrong, it was everybody's fault, while some Ops felt that Devs were somewhat unaccountable, speciffcally when it came to ffxing problems late in the evenings.
> Their opinion was that Devs wanted to decide on everything, how the product is designed, how it is deployed, etc., without involving operations personnel. Then at the end of regular offfce hours, Devs would not care anymore and would want Ops to take care of it.
> Employees agreed that within development, the responsibility of deploying software was shared among the Devs. They mentioned that whenever someone had problems with deploying software, they simply needed to shout it out, and everyone was alert and helping that person if needed.

5:18 p 6 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- collaboration
- collaboration
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Improved Collaboration. Mixing the responsibilities brought Devs and Ops closer to each other. Employees mentioned that Devs and Ops now collaborate on different tasks, since they now realize the importance of collaboration. Everyone agreed that collaboration between Devs and Ops is good on an individual level, and to some extent also on team level, but some employees called on the support from managers to further improve collaboration by providing more reasons for collaboration. It was mentioned that through the improved collaboration, it was easier to get things moving forward, since Devs could discuss directly their issues with Ops personnel, which is much faster than having to contact managers to get the issues solved.

5:19 p 7 in D5 2016 On the Impact of Mixing Responsibilities Between Devs and Ops

Codes:

- collaboration
- collaboration
- responsibility/ownership sharing

Content:

> Through the collaboration, both Devs and Ops had become more trusting and understanding towards the other. Ops had seen that Devs can do the operations tasks without jeopardizing service stability and Devs had realized what Ops have to struggle with in order to deploy their software

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6 D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

21 Quotations:

6:1 p 4 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- automated application life-cycle management
- automated application life-cycle management
- collaboration
- collaboration
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> Separate Dev and Ops teams with higher collaboration: Our analysis has disclosed that for a couple of the interviewees' organizations, in particular hierarchical ones, adopting CD does not necessarily mean huge changes in team structure or complete breakdown of silos (i.e., divisions of labor) between teams. They tried to leverage their existing Dev and Ops teams by providing the needed infrastructures and emphasizing the culture of empowerment in order to make a higher and tighter collaboration between Dev and Ops teams (See Figure 2-A).
> Through this strategy, they were able to achieve DevOps and CD goals as much closeness as they could. The amount of collaboration between teams and team members, in particular application developers and operations team, increased after adopting CD.

6:2 p 5 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Hyperlinks:

— continued by → 6:3 p 5, to facilitate communication and collaboration between Dev and Ops teams (See Figure 2-B). This team… in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- collaboration
- collaboration
- devops (bridge) team
- devops (bridge) team

Content:

> Separate Dev and Ops teams with facilitator(s) in the middle: As part of the strategy to improve communication and collaboration between developers and operators, some interviewees' organizations would go a step further by defining and establishing a team, for example, so called DevOps team

6:3 p 5 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Hyperlinks:

← continued by — 6:2 p 5, Separate Dev and Ops teams with facilitator(s) in the middle: As part of the strategy to improve com… in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- communication
- communication
- devops (bridge) team
- devops (bridge) team
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> to facilitate communication and collaboration between Dev and Ops teams (See Figure 2-B). This team acts as an integrator between these teams to consolidate work together and knowledge sharing.

6:4 p 5 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- enabler (platform) team
- enabler (platform) team
- training, evangelization and mentoring
- training, evangelization and mentoring

Content:

> Small Ops team with more responsibilities for Dev team: DevOps often recommends that developers take more accountability about their code in production environments [5]. Some interviewees' organizations have gradually and smoothly shifted operational responsibilities from infrastructure and operations teams to Dev team. By applying this change, Ops team is more responsible for mentoring, coaching and helping developers to write operational aspects of code, for example writing provisioning code.

6:5 p 5 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- automated application life-cycle management
- automated application life-cycle management
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> There is no specific and visible Ops team; all team members have a shared responsibility and purpose to cover the entire spectrum of software application, from requirement gathering, to continuously deploying, monitoring, and optimizing application in production environments.

6:6 p 5 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- cross-functionality/skills
- cross-functionality/skills
- product management
- product management

Content:

> Those organizations have structured team members in cross-functional team for each software unit (e.g., service and component); therefore, each team includes developers, business analyst, quality assurance (QA) people, and operations people. It is also asserted that creating cross-functional team (e.g., operations team is completely embedded in development team) necessitates highly skilled people and this pattern have usually been found in Start-up or highly innovative web companies [

6:7 p 6 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- automated application life-cycle management
- automated application life-cycle management
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> A small number of the interviewees emphasized that if organizations want to efficiently adopt and implement DevOps practices, in particular CD practices, they cannot really have operations silo (i.e., separate Ops team), even small one. Having operations silo may lead to a lot of frictions in deployment process and fail organizations to achieve the real anticipated benefits of CD practices.

6:8 p 6 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- automated application life-cycle management
- automated application life-cycle management

Content:

> It is asserted that the success of adopting DevOps practices (e.g., in particular CD) in organizations would heavily depend on the choice of appropriate tools, technologies, infrastructures, and level of automation to implement Continuous Deployment Pipeline (CDP) or also known as continuous delivery pipeline [38; 44]. It is worth noting that organizations used different terminologies to refer CD

6:9 p 6 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- enabler (platform) team
- enabler (platform) team
- platform servicing
- platform servicing

Content:

> Software organization may found a team to build and maintain platforms, infrastructures and tool chain (e.g., Jenkins and Chef) to set up a (semi-) automated CDP [1]. Then all project teams in the organization are able to use this CDP to build, test, package, and run their applications [5].

6:10 p 6 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Linked Memos:

Platform builder

Content:

> Centralized Team: According to our participants, adopting and scaling CD practices at a large organization with multiple teams and applications necessitates a CDP that supports traceability, scalability and flexibility [42]. The CDP must be able to perform no matter how large or many applications it processes, or how large their test suites are. It must also be flexible in a way that organizations can extend and tune it or parts of it without major disruption or major effort. Furthermore, the CDP should support traceability, in which enables a wide range of stakeholders to understand what is happening, what has happened, and why. For some interviewees' organizations, that is achievable by establishing a dedicated and centered team to design, develop and continuously improve CDP in the long term. One of the interviewees told us: "We had Squad that was responsible for basically taking care of the platform. … So my colleagues, Squad was responsible for DevOps platform layer" P6.
> This was the most commonly chosen pattern by the survey respondents, with 39.7% (37) choosing that a central team in their organizations designed a CDP that would work best for all teams and applications. We found that this model of forming CDP team mainly appeared and practiced in large (20) and medium-sized (12) organizations.
> Temporary Team: In contrast to the previous pattern, CDP in this pattern is built by a temporarily established team in an organization and then the members of that temporary team join other teams because there is no need for them anymore. As one interviewee explained that: "Once we have set up continuous integration, they would call pipeline, once the pipeline there, and if there is no problem, we will go back to the pool, we don't stay all days." P8.
> Table 2 shows that there were 23 (24.7%) survey participants that indicated this pattern. We observed a fairly uniform distribution of this pattern across small and medium-sized organizations.
> External Team: An external consulting organization helps both software provider and customer organizations by creating a customized CDP and then team members in the organization are trained to use and maintain that pipeline. Our results show that a few number of the interviewees' and survey participants' organizationssought external organizations for this purpose.

6:11 p 7 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- automated application life-cycle management
- automated application life-cycle management
- collaboration
- collaboration

Content:

> organizations are increasingly improving collaboration among teams and team members to effectively initiate and adopt CD practices. We asked the survey respondents to rate how they strongly agree or disagree that the collaboration between teams (e.g., developers, quality assurance team, testers, and operations personnel) has increased in their respective organizations since the adoption of CD practices (See statements S1 in Figure 3).

6:12 p 7 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- collaboration
- collaboration
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> Co-locating teams: The most common strategy to improve collaboration is co-locating teams and discuss, for example, operational issues more often before an application is released to production or customers

6:13 p 7 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- communication
- communication
- organizational silos/conflicts
- organizational silos/conflicts
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> teams need to be physically close to each other to enable face-to- face communication, faster and easier interaction and knowledge sharing

6:14 p 7 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:
- automated application life-cycle management
- automated application life-cycle management
- metrics, visibility & feedback
- metrics, visibility & feedback

Content:

> Rapid feedback: A few number of the participants emphasized that having shorter feedback loop at each stage in CDP enables teams and team members to partner in producing high quality software.

6:15 p 7 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:
- automated application life-cycle management
- automated application life-cycle management
- organizational silos/conflicts
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Joint work and shared responsibility: Our results reveal that the speed and frequency demanded by DevOps and CD practices drive the need for a more holistic view, in which team members from each side of the fence are needed to jointly work together and adopt shared responsibility as much as possible

6:16 p 7 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Hyperlinks:

← continued by — 6:18 p 7, y increase by establishing cross-functional teams in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:
- collaboration
- collaboration
- cross-functionality/skills
- cross-functionality/skills

Content:

> Collaboration

6:17 p 7 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Hyperlinks:

← continued by — 6:18 p 7, y increase by establishing cross-functional teams in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- communication
- communication
- cross-functionality/skills
- cross-functionality/skills

Content:

> communications

6:18 p 7 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Hyperlinks:

— continued by → 6:16 p 7, Collaboration in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

— continued by → 6:17 p 7, communications in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- cross-functionality/skills
- cross-functionality/skills

Content:

> y increase by establishing cross-functional teams

6:19 p 8 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- collaboration
- collaboration
- metrics, visibility & feedback
- metrics, visibility & feedback
- skills/knowledge sharing

Content:

> we found that the lack of suitable awareness on status of project (e.g., build status, release status) among team members can be a bottleneck for collaborative work and significantly hinders the CD success.

6:20 p 8 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- collaboration
- collaboration
- responsibility/ownership sharing

Content:

> Giving more power to Ops personnel and engaging them in software development life cycle right from the beginning was referred by a couple of the survey participants as enablers for collaboration

6:21 p 9 in D6 2017 AdoptingContinuous Delivery and Deployment:Impactson Team Structures, Collaboration and Responsibilities

Codes:

- automated application life-cycle management
- automated application life-cycle management
- cross-functionality/skills

Content:

> Expand skill-set: Interestingly most of the respondents indicated that they have to constantly learn best practices and new tools for reliable release (e.g., “[working in CD context] requires familiarity with cloud deployment tools” R24 or “focus on tools of CI and CD” R67). In our survey, we perceived that development team needs to significantly develop their operational skills as well. As the participant R76 stated that “Coming from a development side, I had to develop some "ops" skills. When your commit goes automatically to production you've to care about security, on-call and performance of your application”. One of the operational skills that mostly mentioned by the respondents was monitoring and logging skills. Working in CD context necessitates developing monitoring skills and spending more time on monitoring to triage and quickly respond to production incidents. As stated by R20 “Ensuring the product stays deployment ready all the time. Each check﷯in and change gets monitored” and R23 “I have to be more watchful on the deliverables, more stress is on test automation”. Scripting and automation skills were another skills that were referred by several survey participants (e.g., “Scripting, deploying, automate everything instead of programming only” R58). We found that CD seeks new bureaucracies to access and manage production environments (e.g., “Infrastructure and Platform now treated as code [in CD context] and environments defined at last minute” R45). This helped them to reduce security problems, avoid down time in production environment and better follow ITIL (i.e., Information Technology Infrastructure Library) in transition towards CD practices. In addition, for some of the respondents adopting CD means to understand the whole stack of the application: database, backend, front-end, OS, and build. One of them stated this in these words: “Skillset required has expanded to more of complete DevOps workflow” R65. This helped them to further and better be involved in bug fixing (e.g., “More in depth knowledge of the entire stack - to debug when something fails” R38).

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7 D7 2019 Adopting DevOps in the real world: A theory, a model, and

a case study

21 Quotations:

7:1 p 4 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- collaboration
- collaboration
- cross-functionality/skills
- cross-functionality/skills
- organizational silos/conflicts
- organizational silos/conflicts
- skills/knowledge sharing

Content:

> The collaborative culture is the core category for DevOps adoption. A collaborative culture essentially aims to remove the silos between development and operations teams and activities. As a result, operations tasks—like deployment, infrastructure provisioning management, and monitoring— should be considered as regular, day-to-day, development activities. This leads to the ffrst concept related to this core category: operations tasks should be performed by the development teams in a seamless way.

7:2 p 4 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- platform servicing
- platform servicing
- team self-organization & autonomy

Content:

> bring the deployment into day-to-day development, no waiting anymore for a speciffc day of the week or month. We wanted to do deployment all the time. Even if in a ffrst moment it were not in production, a staging environment was enough. [...] Of course, to carry out the deployment continuously, we had to provide all the necessary infrastructure at the same pace.

7:3 p 5 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- automated application life-cycle management
- automated application life-cycle management
- collaboration
- collaboration
- organizational silos/conflicts

Content:

> When a collaborative culture is fomented, teams collaborate to perform the tasks from the ffrst day of software development. With the constant exercise of provisioning, management, conffguration and deployment practices, software delivery becomes more natural, reducing delays and, consequently, the confficts between teams.

7:4 p 5 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- collaboration
- collaboration
- cross-functionality/skills
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> As a result of constructing a collaborative culture, the development team no longer needs to halt its work waiting for the creation of one application server, or for the execution of some database script, or for the publication of a new version of the software in a staging environment. Everyone needs to know the way this is done and, with the collaboration of the operations team, this can be performed in a regular basis.

7:5 p 5 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- alignment of dev & ops goals
- alignment of dev & ops goals
- collaboration
- collaboration

Content:

> A collaborative culture requires product thinking, in substitution to operations or development thinking.

7:6 p 5 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> The development team has to understand that the software is a product that does not end after “pushing” the code to a project’s repository and the operations team has to understand that its processes do not start when an artifact is received for publication.

7:7 p 6 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- communication
- communication

Content:

> There should be a straightforward communication between teams. Ticketing systems are cited as a typical and inappropriate means of communication between development and operations teams. Face-to-face communication is the best option, but considering that it is not always feasible, the continuous use of tools like Slack and Hip Chat was cited as more appropriate options.

7:8 p 6 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- blame
- blame
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> There is a shared responsibility to identify and ffx the issues of a software when transitioning to production. The strategy of avoiding liability should be kept away. The development team must not say that a given issue is a problem in the infrastructure, then it is operations team’ responsibility. Likewise, the operations team must not say that a failure was motivated by a problem in the application, then it is development team’s responsibility. A blameless context must exist. The teams need to focus on solving problems, not on laying the blame on others and running away from the responsibility. The sense of shared responsibilities involves not only solving problems, but also any other responsibility inherent in the software product must be shared. Blameless and shared responsibilities are the remaining concepts of the core category

7:9 p 6 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- automated application life-cycle management
- automated application life-cycle management
- cultural silos/conflicts
- cultural silos/conflicts

Content:

> 3.2.1. Automation This category presents the higher number of related concepts. This occurs because manual proceedings are considered strong candidates to propitiate the formation of a silo, hindering the construction of a collaborative culture

7:10 p 6 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- automated application life-cycle management
- automated application life-cycle management
- collaboration
- collaboration
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> Although transparency and sharing can be used to ensure collaboration even in manual tasks, with automation the points where silos may arise are minimized.
> In addition to contributing to transparency, automation is also considered important to ensure reproducibility of tasks, reducing rework and risk of human failure.
> Consequently, automation increases the conffdence between teams, which is an important aspect of the collaborative culture.

7:11 p 7 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- automated application life-cycle management
- automated application life-cycle management
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> The eight concepts regarding the automation category will be detailed next. In all interviews we extracted explanations about deployment automation (1), as part of DevOps adoption. Software delivery is the clearest manifestation of value delivery in software development. In case of problems in deployment, the expectation of delivering value to business can quickly generate confficts and manifest the existence of silos. In this sense, automation typically increases agility and reliability.
> Some other concepts of automation go exactly around deployment automation.
> It is important to note that frequent and successfully deployments are not sufffcient to generate value to business. Surely, the quality of the software is more relevant. Therefore, quality checks need to be automated as well, so they can be part of the deployment pipeline, as is the case of test automation (2)

7:12 p 7 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- automated infrastructure management
- automated infrastructure management

Content:

> the environment where the application will run needs to be available. As a consequence, infrastructure provisioning automation (3) must be also considered in the process. Besides being available, the environment needs to be properly conffgured, including the amount of memory and CPU, availability of the correct libraries versions, and database structure. If the conffguration of some of these concerns has not been automated, the deployment activity can go wrong. Therefore, the automation of infrastructure management (4) is another concept of the automation category.

7:13 p 7 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- automated application life-cycle management
- automated application life-cycle management

Content:

> Monitoring automation (7) and recovery automation (8) are the remaining concepts. The former refers to the ability to monitor the applications and infrastructure without human intervention. One classic example is the widespread use of tools for sending messages reporting alarms—through SMS, Slack/Hip Chat, or even cellphone calls—in case of incidents. The latter is related to the ability to either replace a component that is not working or rollback a failed deployment without human intervention.

7:14 p 7 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- communication
- communication
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> Transparency and sharing It represents the grouping of concepts whose essence is to help disseminate information and ideas among all. Training, tech talks, committees lectures, and round tables are examples of these events. Creating channels by using communication tools is another recurrent topic related to sharing along the processes of DevOps adoption. According to the content of what is shared, we have identiffed three main concepts: (1) knowledge sharing: the professionals interviewed mention a wide range of skills they need to acquire during the adoption of DevOps, citing structured sharing events to smooth the learning curve of both technical and cultural knowledge; (2) activities sharing: where the focus is on sharing how simple tasks can or should be performed (e.g., sharing how a bug has been solved). Communication tools, committees, and round tables are the common forum for sharing this type of content; and (3) process sharing: here, the focus is on sharing whole working processes (e.g., the working process used to provide a new application server). The content is more comprehensive than in sharing activities. Tech talks and lectures are the common forum for sharing processes.

7:15 p 7 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- collaboration
- collaboration
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> Sharing concepts contribute with the collaborative culture. For example, all team members gain best insight about the entire software production process

7:16 p 7 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- communication
- communication
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> with a solid understanding of shared responsibilities. A shared vocabulary also emerged from sharing and this facilitates communication.

7:17 p 7 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- automated infrastructure management
- automated infrastructure management
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> The use of infrastructure as code was recurrently cited as a means for guaranteeing that everyone knows how the execution environment of an application is provided and managed

7:18 p 7 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- automated application life-cycle management
- automated application life-cycle management
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> Regarding transparency and sharing, we have also found the concept of sharing on a regular basis, which suggests that sharing should be embedded in the process of software development, in order to contribute effectively to transparency (e.g., daily meetings with Dev and Ops staff together was one practice cited to achieve this). As we will detail in the continuous integration concept of the agility category, a common way to integrate all tasks is a pipeline. Here, we have the concept of shared pipelines, which indicates that the code of pipelines must be accessible to everyone, in order to foment transparency.

7:19 p 8 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- automated application life-cycle management
- automated application life-cycle management
- collaboration
- collaboration

Content:

> With more collaboration between teams, continuous integration with the execution of multidisciplinary pipelines is possible, and it is an agile related concept frequently explored. These pipelines might contain infrastructure provisioning, automated regression testing, code analysis, automated deployment and any other task considered important to continuously execute.

7:20 p 8 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- automated application life-cycle management
- automated application life-cycle management

Content:

> resilience refers to the ability of applications to adapt quickly to adverse situations. The ffrst related concept is auto scaling, i.e., allocating more or fewer resources to applications that increase or decrease on demand. Another concept related to the resilience category is recovery automation, that is the capability that applications and infrastructure have to recovery itself in case of failures. There are two typical cases of recovery automation: (1) in cases of instability in the execution environment of an application (a container, for example) an automatic restart of that environment will occur; and (2) in cases of new version deployment; if the new version does not work properly, the previous one must be restored. This auto restore of a previous version decrease the chances of downtimes due to errors in speciffc versions, which is the concept of zero down-time, the last one of the resilience category

7:21 p 8 in D7 2019 Adopting DevOps in the real world: A theory, a model, and a case study

Codes:

- automated application life-cycle management
- automated application life-cycle management
- collaboration
- collaboration
- metrics, visibility & feedback
- metrics, visibility & feedback
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Continuous Measurement. As an enabler, regularly performing the measurement and sharing activities contributes to avoiding existing silos and reinforces the collaborative culture, because it is considered a typical responsibility of the operations team. As an outcome, the continuously collection of metrics from applications and infrastructure was appointed as a necessary behavior of the teams after the adoption of DevOps. It occurs because the resultant agility increases the risk of something going wrong. The teams should be able to react quickly in case of problems, and the continuous measurement allows it to be proactive and resilient.
> Quality Assurance. In the same way as continuous measurement, quality assurance is a category that can work both as enabler and as outcome. As enabler because increasing quality leads to more conffdence between the teams, which in the end generates a virtuous cycle of collaboration. As outcome, the principle is that it is not feasible to create a scenario of continuous delivery of software with no control regarding the quality of the products and its production processes.
> Another two concepts cited as part of quality assurance in DevOps adoption are the use of source code static analysis (4) to compute quality metrics in source code and the parity between environments (development, staging, and production) to reinforce transparency and collaboration during software development.

8 D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

21 Quotations:

8:1 p 4 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- cross-functionality/skills
- cross-functionality/skills
- product management
- product management
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Treat each strategic service like a product, managed end to end by a small team that has firsthand access to all of the information required to run and change the service (see Figure 3).
> Use the discipline of product management, rather than project management, to evolve your services.

8:2 p 4 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- collaboration
- collaboration
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> There are many ways people can be organized to form product teams, but the key is to improve collaboration and share responsibilities for the overall quality of service delivered to the customers.

8:3 p 4 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- skills/knowledge sharing
- skills/knowledge sharing

Content:

> As the teams come together and share, you will develop a knowledge base that allows you to make better decisions on what can be retired and when.

8:4 p 5 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- platform servicing
- platform servicing
- responsibility/ownership sharing

Content:

> In a product development approach, the central application management function goes away, subsumed into product teams.
> Nonroutine, application-specific requests to the service desk also go to the product teams. The technical management function remains but becomes focused on providing IaaS to product teams. The teams responsible for this work should also work as product teams.

8:5 p 5 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- cross-functionality/skills
- cross-functionality/skills

Content:

> there is more demand for the skills, experience, and mindset of operations people who are willing to work to improve systems, but less for those who create “works of art” — manually configured production systems that are impossible to reproduce or change without their personal knowledge and presence.

8:6 p 5 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- automated application life-cycle management
- cross-functionality/skills
- cross-functionality/skills

Content:

> Create a cross-functional product team to manage this service and create a new path to production, implemented using a deployment pipeline, for this service.

8:7 p 5 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- alignment of dev & ops goals
- alignment of dev & ops goals
- product management
- product management

Content:

> Another lesson we've learned is that it's not only the technology side that was improved by using services. The development and operational process has greatly benefited from it as well. The services model has been a key enabler in creating teams that can innovate quickly with a strong customer focus. Each service has a team associated with it, and that team is completely responsible for the service — from scoping out the functionality, to architecting it, to building it, and operating it.

8:8 pp 5 – 6 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- responsibility/ownership sharing
- responsibility/ownership sharing
- team self-organization & autonomy
- team self-organization & autonomy

Content:

> Giving developers operational responsibilities has greatly enhanced the quality of the services, both from a customer and a technology point of view. The traditional model is that you take your software to the wall that separates development and operations, and throw it over and then forget about it. Not at Amazon. You build it, you run it. This brings developers into contact with the day-to-day operation of their software. It also brings them into day-to-day contact with the customer. This customer feedback loop is essential for improving the quality of
> the service

8:9 p 6 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Linked Memos:

- Conway's Law

Content:

> Many organizations attempt to create small teams, but they often make the mistake of splitting them functionally based on technology and not on product or service. Amazon, in designing its organizational structure, was careful to follow Conway's Law: "Organizations which design systems ... are constrained to produce designs which are copies of the communication structures of these organizations.

8:10 p 6 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- alignment of dev & ops goals
- collaboration
- collaboration

Content:

> All IT teams should be able to talk and collaborate with each other on how to best reach the common goal of successful, stable deployments to production. If your IT teams don't talk and collaborate with each other throughout the service/ product delivery lifecycle, bad things will happen

8:11 p 6 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- automated application life-cycle management
- automated application life-cycle management

Content:

> Reducing the risk of error or fraud in the delivery process is better achieved through the use of an automated deployment pipeline as opposed to isolated and manual processes. It allows complete traceability from deployment back to source code and requirements. In a fully automated deployment pipeline, every command required to build, test, or deploy a piece of software is recorded, along with its output, when and on which machine it was run, and who authorized it. Automation also allows frequent, early, and comprehensive testing of changes to your systems — including validating conformance to regulations — as they move through the deployment pipeline.

8:12 pp 6 – 7 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- team self-organization & autonomy
- team self-organization & autonomy

Content:

> People downstream who need to approve or implement changes (e.g., change advisory board members,
> database administrators) can be automatically notified, at an appropriate frequency and level of detail, of what is coming their way. Thus, approvals can be performed electronically in a just-in-time fashion.

8:13 p 7 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- automated infrastructure management
- automated infrastructure management
- team self-organization & autonomy

Content:

> Automating all aspects of the pipeline, including provisioning and management of infrastructure, allows all environments to be locked down such that they can only be changed using automated processes approved by authorized personnel

8:14 p 7 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- automated application life-cycle management
- automated application life-cycle management
- metrics, visibility & feedback
- metrics, visibility & feedback

Content:

> Modern release management systems allow you to lock down who can perform any given action and will record who authorized what, and when they did so, for later auditing. Compensating controls (monitoring, alerts, and reviews) should also be applied to detect unauthorized changes.

8:15 p 7 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- automated application life-cycle management
- automated application life-cycle management
- metrics, visibility & feedback
- metrics, visibility & feedback

Content:

> Continuous delivery enables businesses to reduce cycle time so as to get faster feedback from users, reduce the risk and cost of deployments, get better visibility into the delivery process itself, and manage the risks of software delivery more effectively. At the highest level of maturity, continuous delivery means knowing that you can release your system on demand with virtually no technical risk. Deployments become non-events (because they are done on a regular basis), and all team members experience a steadier pace of work with less stress and overtime. IT waits for the business, instead of the other way around. Business risk is reduced because decisions are based on feedback from working software, not vaporware based on hypothesis. Thus, IT becomes integrated into the business

8:16 p 7 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- collaboration
- collaboration

Content:

> a culture of collaboration between all team members

8:17 p 7 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- metrics, visibility & feedback
- metrics, visibility & feedback

Content:

> measurement of process, value, cost, and technical metrics;

8:18 p 7 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- skills/knowledge sharing
- skills/knowledge sharing

Content:

> sharing of knowledge and tools;

8:19 p 7 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- continuous improvement
- continuous improvement

Content:

> regular retrospectives as an input to a process of continuous improvement

8:20 p 7 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- automated application life-cycle management
- collaboration
- collaboration
- organizational silos/conflicts

Content:

> mplementing continuous delivery. We have shown that objections to continuous delivery based on risk management concerns are the result of false reasoning and mis interpretation of IT frameworks and controls. Rather, the main barrier to implementation will be organizational.
> Success requires a culture that enables collaboration and understanding between the functional groups that deliver IT services.

8:21 p 7 in D8 2011 Why Enterprises Must Adopt Devops to Enable Continuous Delivery

Codes:

- automated application life-cycle management
- collaboration
- collaboration
- metrics, visibility & feedback
- metrics, visibility & feedback

Content:

> The hardest part of implementing this change is to deter mine what will work best in your circumstances and where to begin. Start by mapping out the current deployment pipeline (path to production), engaging everyone who contributes to delivery to identify all items and activities required to make the service work. Measure the elapsed time and feedback cycles. Keep incrementalism and collaboration at the heart of everything you do — whether it's deployments or organizational change.

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9 D9 2022 How SRE Relates to DevOps

20 Quotations:

9:1 p 2 in D9 2022 How SRE Relates to DevOps

Codes:

- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts
- organizational silos/conflicts

Content:

> The historically popular but now increasingly old-fashioned arrangement of separate operations and development teams

9:2 p 2 in D9 2022 How SRE Relates to DevOps

Codes:

- collaboration
- collaboration
- collaboration
- skills/knowledge sharing
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> The fact that extreme siloization of knowledge, incentives for purely local optimization, and lack of collaboration have in many cases been actively bad for business4

9:3 p 2 in D9 2022 How SRE Relates to DevOps

Codes:

- blame
- blame
- blame
- blame

Content:

> The second key idea is that accidents are not just a result of the isolated actions of an individual, but rather result from missing safeguards for when things inevitably go wrong.5 For example, a bad interface inadvertently encourages the wrong action under pressure; a system misfeature makes failure inevitable if the (unarticulated) wrong circumstances occur; broken monitoring makes it impossible to know if something is wrong, never mind what is wrong. Some more traditionally minded businesses possess the cultural instinct to root out the mistake maker and punish them. But doing so has its own consequences: most obviously, it creates incentives to confuse issues, hide the truth, and blame others, all of which are ultimately unprofitable distractions. Therefore, it is more profitable to focus on speeding recovery than preventing accidents.

9:4 p 3 in D9 2022 How SRE Relates to DevOps

Codes:

- change management
- change management
- change management
- change management

Content:

> The third key idea is that change is best when it is small and frequent. In environments where change committees meet monthly to discuss thoroughly documented plans to make changes to the mainframe configuration, this is a radical idea. However, this is not a new idea. The notion that all changes must be considered by experienced humans and batched for efficient consideration turns out to be more or less the opposite of best practice. Change is risky, true, but the correct response is to split up your changes into smaller subcomponents where possible

9:5 p 3 in D9 2022 How SRE Relates to DevOps

Codes:

- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- automated application life-cycle management
- change management
- change management

Content:

> Then you build a steady pipeline of low-risk change out of regular output from product, design, and infrastructure changes.6 This strategy, coupled with automatic testing of smaller changes and reliable rollback of bad changes, leads to approaches to change management like continuous integration (CI) and continuous delivery or deployment (CD).

9:6 p 3 in D9 2022 How SRE Relates to DevOps

Codes:

- culture, values & best practices
- culture, values & best practices
- culture, values & best practices
- culture, values & best practices

Content:

> , proponents of DevOps strongly emphasize organizational culture—rather than tooling—as the key to success in adopting a new way of working. A good culture can work around broken tooling, but the opposite rarely holds true. As the saying goes, culture eats strategy for breakfast.

9:7 p 3 in D9 2022 How SRE Relates to DevOps

Codes:

- metrics, visibility & feedback
- metrics, visibility & feedback
- metrics, visibility & feedback
- metrics, visibility & feedback

Content:

> Finally, measurement is particularly crucial in the overall business context of, for example, breaking down silos and incident resolution. In each of these environments, you establish the reality of what's happening by means of objective measurement, verify that you're changing the situation as you expect, and create an objective foundation for conversations that different functions agree upon.
> (This applies in both business and other contexts, such as on-call.)

9:8 p 4 in D9 2022 How SRE Relates to DevOps

Codes:

- alignment of dev & ops goals
- alignment of dev & ops goals
- alignment of dev & ops goals
- collaboration
- collaboration
- collaboration
- enabler (platform) team
- enabler (platform) team
- metrics, visibility & feedback
- metrics, visibility & feedback
- metrics, visibility & feedback

Content:

> the product team and the SRE team select an appropriate availability target for the service and its user base, and the service is managed to that SLO.
> 9 Deciding on such a target requires strong collaboration from the business. SLOs have cultural implications as well: as collaborative decisions among stakeholders,

9:9 p 4 in D9 2022 How SRE Relates to DevOps

Codes:

- blame
- blame
- blame
- blame
- metrics, visibility & feedback
- metrics, visibility & feedback

Content:

> SLO violations bring teams back to the drawing board, blamelessly.

9:10 p 5 in D9 2022 How SRE Relates to DevOps

Codes:

- automated application life-cycle management
- automated application life-cycle management
- enabler (platform) team
- enabler (platform) team
- enabler (platform) team
- platform servicing
- platform servicing

Content:

> an SRE team winds up automating all that it can for a service, leaving behind things that can’t be automated

9:11 p 6 in D9 2022 How SRE Relates to DevOps

Codes:

- organizational silos/conflicts
- organizational silos/conflicts
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Share Ownership with Developers Rigid boundaries between “application development” and “production” (sometimes called programmers and operators) are counterproductive.

9:12 p 6 in D9 2022 How SRE Relates to DevOps

Codes:

- skills/knowledge sharing
- skills/knowledge sharing
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> SREs tend to be inclined to focus on production problems rather than business logic problems, but as their approach brings software engineering tools to bear on the problem, they share skill sets with product development teams. In general, an SRE has particular expertise around the availability, latency, performance, efficiency, change management, monitoring, emergency response, and capacity planning of the service(s) they are looking after.

9:13 p 6 in D9 2022 How SRE Relates to DevOps

Codes:

- stack & tools sharing
- stack & tools sharing
- stack & tools sharing
- stack & tools sharing

Content:

> both product development and SRE teams should have a holistic view of the stack—the frontend, backend, libraries, storage, kernels, and physical machine— and no team should jealously own single components.

9:14 p 7 in D9 2022 How SRE Relates to DevOps

Codes:

- stack & tools sharing
- stack & tools sharing
- stack & tools sharing
- stack & tools sharing

Content:

> teams minding a service13 should use the same tools, regardless of their role in the organization. There is no good way to manage a service that has one tool for the SREs and another for the product developers, behaving differently (and potentially catastrophically so) in different situations. The more divergence you have, the less your company benefits from each effort to improve each individual tool.

9:15 p 7 in D9 2022 How SRE Relates to DevOps

Codes:

- change management
- change management
- continuous improvement
- continuous improvement
- continuous improvement

Content:

> change is necessary in order to improve. Without that, there’s not much room for maneuvering.

9:16 p 7 in D9 2022 How SRE Relates to DevOps

Codes:

- collaboration
- collaboration
- collaboration
- collaboration
- organizational silos/conflicts
- organizational silos/conflicts
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing
- responsibility/ownership sharing

Content:

> Collaboration is front and center for DevOps work. An effective shared ownership model and partner team relationships are necessary for SRE to function. Like DevOps, SRE also has strong values shared across the organization, which can make climbing out of team-based silos slightly easier.

9:17 p 7 in D9 2022 How SRE Relates to DevOps

Codes:

- change management
- change management
- change management
- change management

Content:

> Change management is best pursued as small, continual actions, the majority of which are ideally both automatically tested and applied.

9:18 p 7 in D9 2022 How SRE Relates to DevOps

Codes:

- stack & tools sharing
- stack & tools sharing
- stack & tools sharing
- stack & tools sharing

Content:

> The right tooling is critically important, and tooling to a certain extent determines the scope of your acts.

9:19 p 7 in D9 2022 How SRE Relates to DevOps

Codes:

- continuous improvement
- continuous improvement
- metrics, visibility & feedback
- metrics, visibility & feedback
- metrics, visibility & feedback
- metrics, visibility & feedback

Content:

> Measurement is absolutely key to how both DevOps and SRE work. For SRE, SLOs are dominant in determining the actions taken to improve the service. Of course, you can’t have SLOs without measurement (as well as cross-team debate—ideally among product, infrastructure/SRE, and the business). For DevOps, the act of measurement is often used to understand what the outputs of a process are, what the duration of feedback loops is, and so on. Both DevOps and SRE are data-oriented things, whether they are professions or philosophies.

9:20 p 7 in D9 2022 How SRE Relates to DevOps

Codes:

- blame
- blame
- blame
- blame

Content:

> The brute reality of managing production services means that bad things happen occasionally, and you have to talk about why. SRE and DevOps both practice blameless postmortems in order to offset unhelpful, adrenaline-laden reactions.

11 D11 2020 State of DevOps Report

3 Quotations:

11:1 p 3 in D11 2020 State of DevOps Report

Codes:

- platform servicing
- platform servicing

Content:

> Internal platform usage is widespread.
> • Sixty-three percent of respondents say their company has at least one self-service internal platform.
> • Of those with internal platforms, 60 percent have between two and four.
> • Almost a third of respondents have 25 to 50 percent of developers using an internal platform

11:2 p 3 in D11 2020 State of DevOps Report

Codes:

- platform servicing
- platform servicing

Content:

> Higher levels of DevOps evolution mean more self-service offerings for developers. Highly evolved firms offer a wide range of self-service capabilities, including: – CI/CD workflows – Internal infrastructure – Public cloud infrastructure – Development environments – Monitoring and alerting – Deployment patterns – Database provisio

11:3 p 4 in D11 2020 State of DevOps Report

Codes:

- change management
- change management

Content:

> The most effective change management is achieved by firms that emphasize: • A high degree of testing and deployment automation • A high degree of automated risk mitigation • Less rigid and much less manual approval processes • Writing changes in code • Allowing employees more scope to influence change management • DevOps processes and culture

12 D12 2022 A Cross-Company Ethnographic Study on Software Teams for

4 Quotations:

12:1 p 6 in D12 2022 A Cross-Company Ethnographic Study on Software Teams for

Codes:
- culture, values & best practices
- culture, values & best practices

Content:

> Deferred culture switch. Trust, the cultural core of DevOps and microservices, needs to be cultivated across software teams.

12:2 p 6 in D12 2022 A Cross-Company Ethnographic Study on Software Teams for

Codes:
- collaboration
- collaboration

Content:

> Com�plaints are still the most prominent collaboration problem among cross-stream collaborations in the three companies.

12:3 p 6 in D12 2022 A Cross-Company Ethnographic Study on Software Teams for

Codes:
- skills/knowledge sharing
- skills/knowledge sharing

Content:

> Although knowledge-sharing has become a consensus, it takes time to be fostered in software teams. After a knowledge-sharing course on database in C2, merely less than 10% of the participants expressed their opinion about the content (Figure 4), which may indicate that the current climate of knowledge-sharing is not as expected yet.

12:4 p 6 in D12 2022 A Cross-Company Ethnographic Study on Software Teams for

Codes:
- automated application life-cycle management
- stack & tools sharing

Content:

> The development tools for the virtual team were not unified