2020 State of InnerSource

About This Document

This report is thanks to the great work of Tapajit Dey. Tapajit is a Postdoctoral Researcher at Lero, The Irish Software Engineering Research Institute. Tapajit is experienced in Empirical Software Engineering, InnerSource development, Software Repository Mining, and Machine Learning and has a Ph.D. in Computer Science (Empirical Software Engineering) from the University of Tennessee.

This report was created as a summary of the State of InnerSource survey that Tapajit conducted in 2020.

Tapajit's detailed work can be found on his Github page. If you are interested in the underlying data, the Survey Questions are available here and the refined data of the Survey responses is available here.

This report is supported by:

Contents

Executive Summary

In the past few years, InnerSource is gaining much attention from companies around the globe. Since its inception in 2015, the InnerSource Commons community is constantly growing and experimenting with open source development practices to overcome the many barriers and challenges that exist in many software organizations. The community now has over 800 members in the InnerSource Commons Slack channel.

The 2020 State of the InnerSource Survey was conducted as a checkpoint to assess how the InnerSource community is shaping up, what we have been doing right, and what aspects need improvement.

The goal of the survey was to address three main questions -

1. What is the state of InnerSource adoption across different organizations?
2. What factors influence the success of InnerSource adoption?
3. What are the main obstacles for adopting InnerSource?

Since a number of studies (e.g. Key Factors, Adoption Book, Adoption Tutorial) already documented the Key Factors for InnerSource success in detail, we focused more on exploring the key motivations for contributors and the *obstacles*.

Key Findings

InnerSource Adoption
The top 3 reasons for adopting InnerSource are removing silos and bottlenecks, improving quality and knowledge sharing which most of the respondents noticed a measurable increase in. At the same time, 60% of companies have indicated that they have a dedicated InnerSource team.

Effects of InnerSource
97% of respondents reported having a better idea about other teams' work, 81% felt an increase in job satisfaction and 57% have seen an increase in productivity

Pain Points
Most of participants identified a lack of transparency in project decisions, lack of documentation for new contributors and the projects seldom listing where they need help, as the main challenges in adopting InnerSource.

Success Factors
The most common motivation for contributing to InnerSource projects is that people enjoy interacting with others with similar interests. Most of the respondents stated that they have contributed to projects that are somehow related to their daily work. The most desirable trait for a project is having functionality useful for multiple stakeholders.

Key Findings

Collaboration
79% of respondents stated that they work with new people and 74% of them would like to work with them again in the future

Biggest obstacle
The biggest obstacle in InnerSource success was found in the lack of time as reported by the 82% of all respondents and 90% of the developers.

How to Ensure InnerSource Success?
Enlisting management support, the need to build a community around the projects, proper incentivisation of the InnerSource contributions, encouraging people to openly share their code as well as raising awareness around InnerSource and fighting the biggest misconceptions around it are seen as aspects that need immediate attention for ensuring InnerSource success.

Net Promoter Score
A main result of the survey was that people enjoy practicing InnerSource as evidence by the fact that almost all of them are willing to recommend it to colleagues outside of their own organization.

Demographics

Gender

Gender breakouts from this year's survey responses show an increase of male responders to 82.9% vs. 68% in 2016 and a correlating decrease in female responders to 17.1% vs 27% in 2016.

Age Group

We have seen a shift in the age distribution of the survey respondents with a much higher number of people in their late 30's, early 40's completing the survey as opposed to 50% of respondents being in the 46-60 age bracket in 2016.
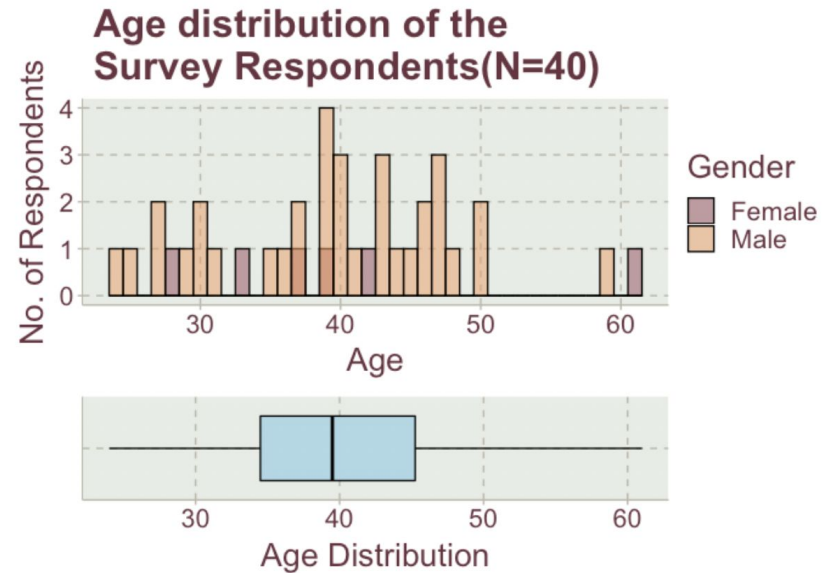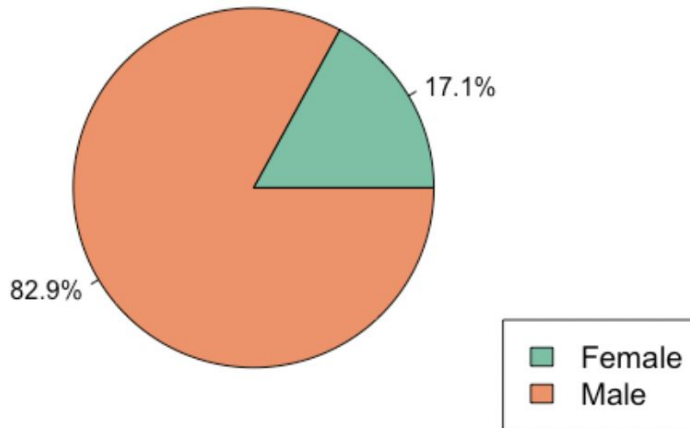
Demographics

The professional role of respondents has shifted from our 2016 survey where the majority of respondents had a Middle Manager/ director role (47%) towards more technical roles in the 2020 survey. It is interesting to see that the number of respondents identifying as InnerSource evangelist/ Innovation planner has doubled to 22% in 2020 vs. 11% in 2016.
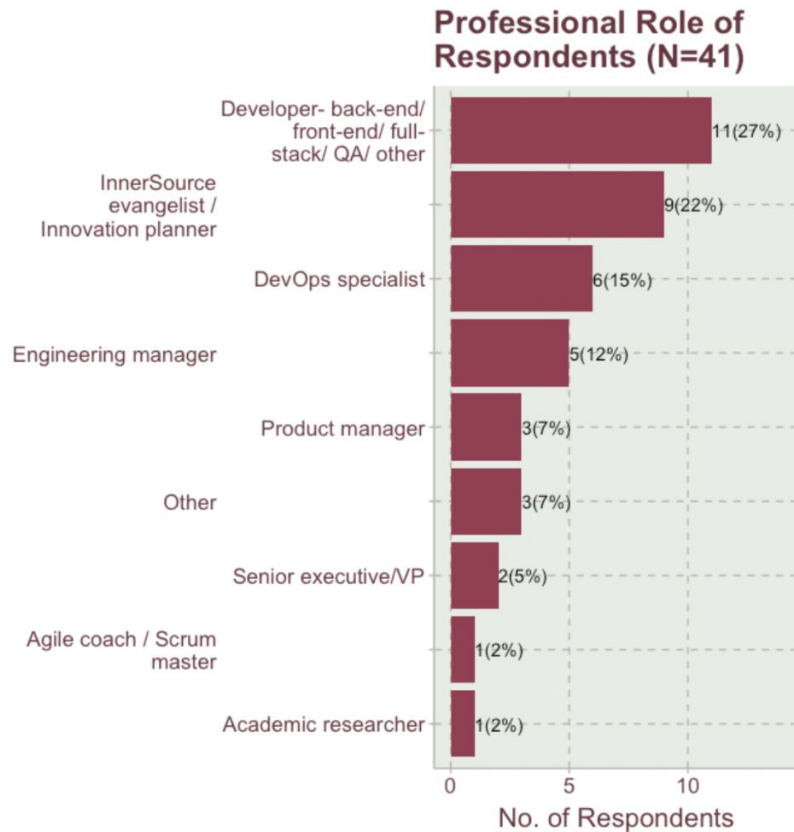
Firmographics

Industry

Similar to our previous survey, most respondents work within the technology industry, followed by financial services.

Organization Size & Number of Software Developers

The sample represents organizations of all sizes with an increase in the number of global enterprises employing over 50,000 people: 31.7% of respondents vs. 27% in 2016, as well as a fivefold increase in the number of medium size companies of up to 500 employees, from 4% in 2016 to 21.95% in 2020.

Organizational Sector Distribution (N=36)
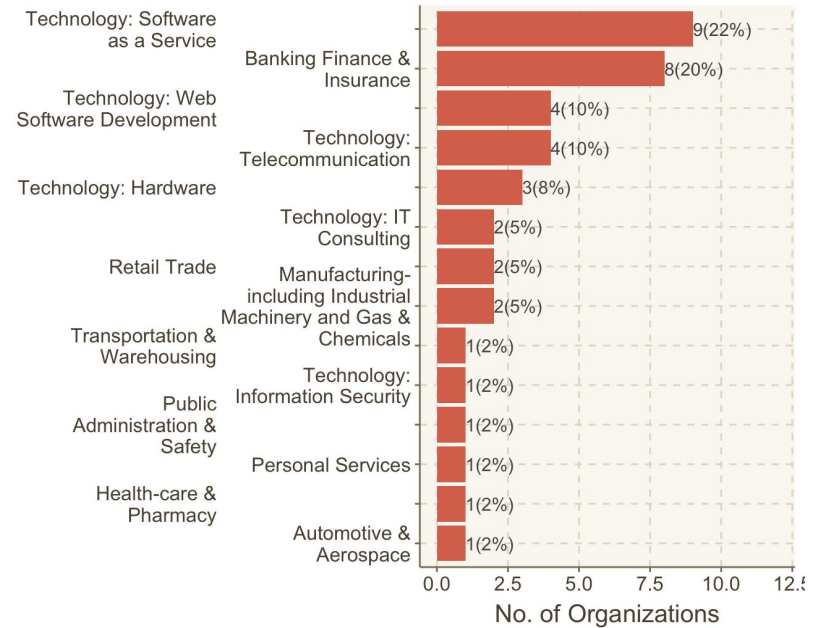

Sector	No. of Organizations
Technology: Software as a Service	9(22%)
Banking Finance & Insurance	8(20%)
Technology: Web Software Development	4(10%)
Technology: Telecommunication	4(10%)
Technology: Hardware	3(8%)
Technology: IT Consulting	2(5%)
Retail Trade	2(5%)
Manufacturing-including Industrial Machinery and Gas & Chemicals	2(5%)
Transportation & Warehousing	1(2%)
Technology: Information Security	1(2%)
Public Administration & Safety	1(2%)
Personal Services	1(2%)
Health-care & Pharmacy	1(2%)
Automotive & Aerospace	1(2%)

Organization Size

- 50,000+ — 31.7%
- 20,000 - 49,999 — 9.8%
- 10,000 - 19,999 — 9.8%
- 5,000 - 9,999 — 9.8%
- 2,000 - 4,999 — 12.2%
- 500 - 1,999 — 9.8%
- 100 - 499 — 22.0%

Number of software developers in organization

- 50,000+ — 9.8%
- 20,000 - 49,999 — 7.3%
- 10,000 - 19,999 — 4.9%
- 5,000 - 9,999 — 14.6%
- 2,000 - 4,999 — 9.8%
- 500 - 1,999 — 22.0%
- 100 - 499 — 22.0%
- <99 — 9.8%
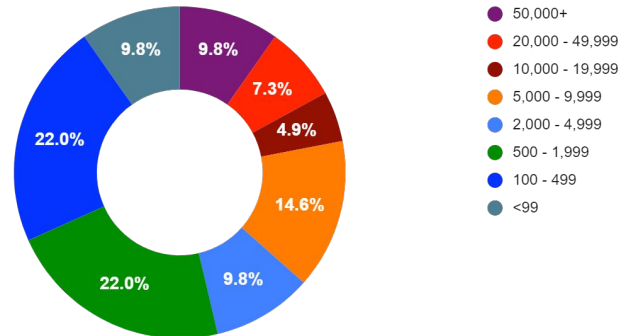
Firmographics

Where the organization operates?

Most respondents worked at organizations which have operations across the globe. 73% of the respondents' organizations have operations in North America vs. 86% in 2016, and 66% in Europe vs. 77% in 2016. Other regions where respondent organizations have operations are Central & South America (36.6% of respondents), Africa (27%), Middle-East (27%), Central & South Asia (46%), East Asia & Pacific (41%) and Oceania (32%).
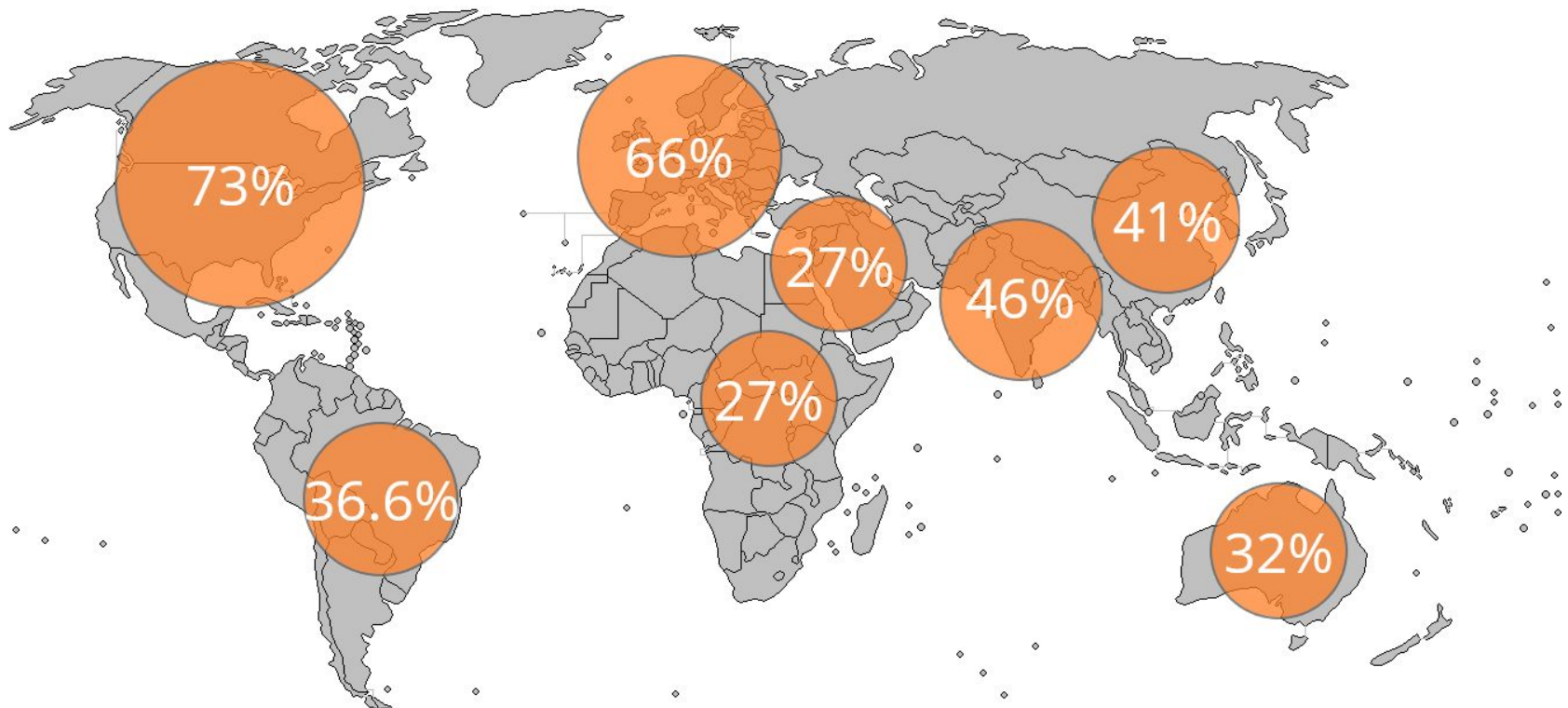
Why do Organizations adopt InnerSource?

An important goal that organizations have when adopting InnerSource is to remove silos and bottlenecks that inevitably exist when large organizations have optimised for ownership culture. Over time cross-silo knowledge can be lost in an organization therefore knowledge sharing across different organizational units is an important goal for many organizations adopting InnerSource. This goal was also top of the list in our 2016 report, which recognised 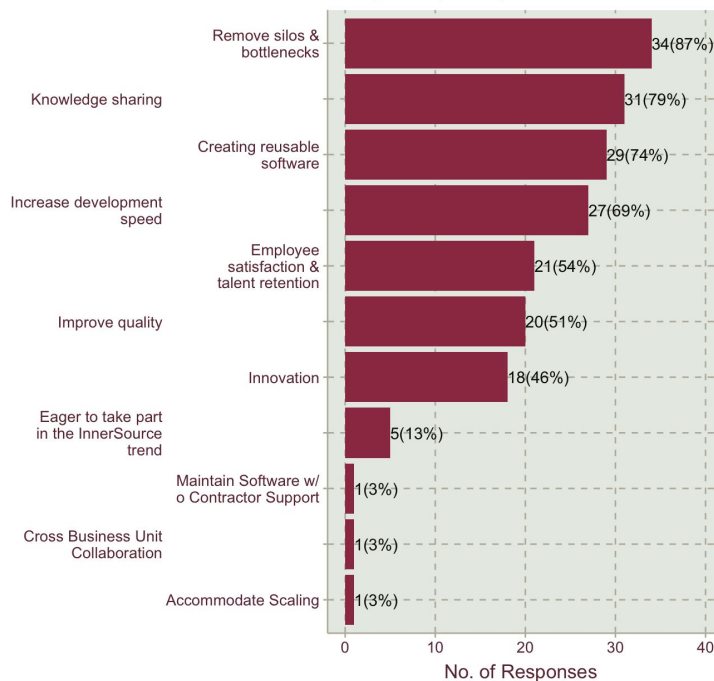that by involving others from different organizational units (teams, departments, etc.), developers can draw on those "internal outside experts."

Reasons for InnerSource Adoption (N=39)

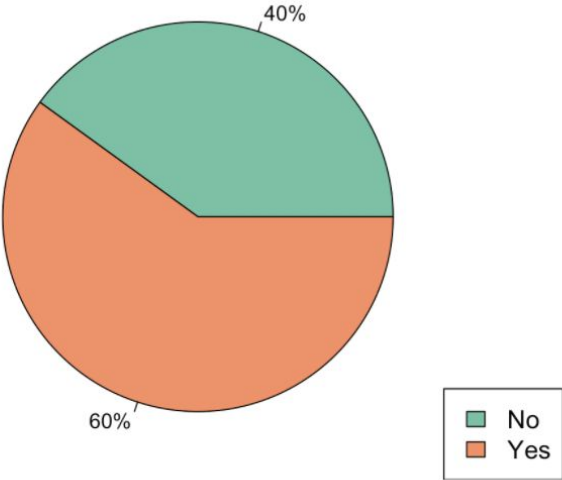| Reason	No. of Responses
Remove silos & bottlenecks	34 (87%)
Knowledge sharing	31 (79%)
Creating reusable software	29 (74%)
Increase development speed	27 (69%)
Employee satisfaction & talent retention	21 (54%)
Improve quality	20 (51%)
Innovation	18 (46%)
Eager to take part in the InnerSource trend	5 (13%)
Maintain Software w/o Contractor Support	1 (3%)
Cross Business Unit Collaboration	1 (3%)
Accommodate Scaling	1 (3%)

Creating reusable software and increasing development speed are also important drivers for InnerSource adoption in organizations, that we've also seen in 2016. However, two goals that have gained momentum over the past 4 years have been innovation and employee satisfaction which scored the lowest in our 2016 report.

State of InnerSource Adoption

State of InnerSource

Starting the InnerSource Journey

When it comes to introducing InnerSource to an organization the majority of companies surveyed stated that the practice was initiated in 40% of the cases by developers, in a Bottom-Up approach and an equal 40% of respondents mentioned a mix of Top-Down and Bottom-up practices.

60% of respondents also stated that their organizations have a dedicated InnerSource team.

Does the Organization have a dedicated InnerSource Team? (N=40)

40%

60%

☐ No
☐ Yes

Introduction of InnerSource N=(40)

Bottom-Up: Initiated by developer(s) — 16(40%)

A Mix of Top-Down & Bottom Up — 16(40%)

Top-Down: Initiated by Management — 7(18%)

Ad-hoc: Favor to open-up projects but do not seem to care about IS practices. — 1(2%)

No. of Respondents
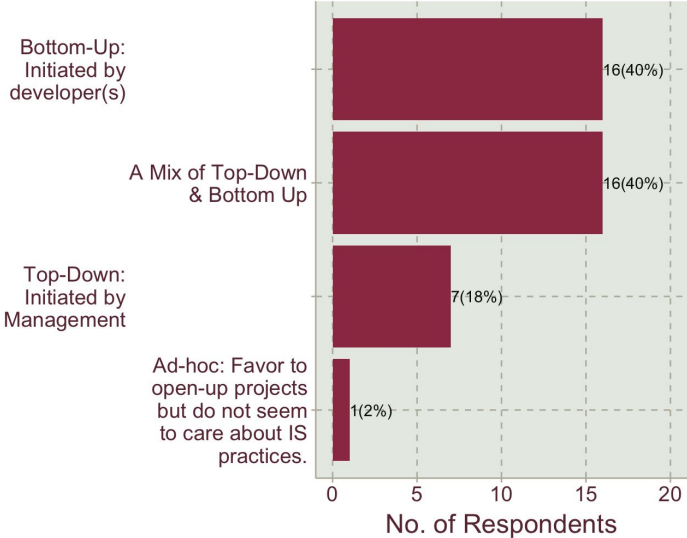
InnerSource Internal Promotion

Organising workshops for developers and managers and Enlisting help from management are at the top of the activities InnerSource advocates use to promote the practice within an organization. The second set of activities that 44% of the respondents list include Asking the InnerSource Commons community for advice, following InnerSource patterns 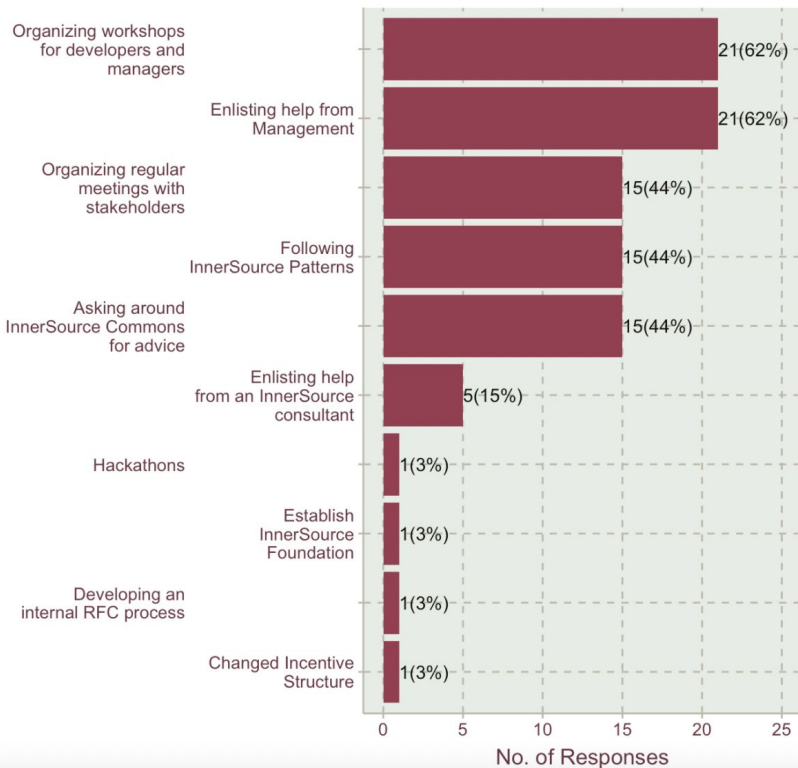and organising regular meetings with stakeholders. Only 15% of respondents are looking externally when it comes to securing the success of InnerSource by enlisting help from an InnerSource Consultant.

Steps taken to make InnerSource Successful (N=39)

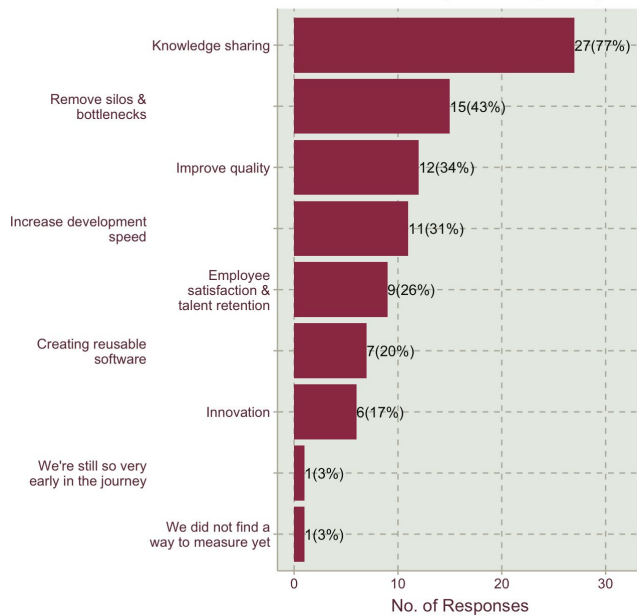| Step	No. of Responses
Organizing workshops for developers and managers	21(62%)
Enlisting help from Management	21(62%)
Organizing regular meetings with stakeholders	15(44%)
Following InnerSource Patterns	15(44%)
Asking around InnerSource Commons for advice	15(44%)
Enlisting help from an InnerSource consultant	5(15%)
Hackathons	1(3%)
Establish InnerSource Foundation	1(3%)
Developing an internal RFC process	1(3%)
Changed Incentive Structure	1(3%)

Measuring success

Organizations have listed a variety of efforts in measuring the success of InnerSource, from surveys and interviews that collect employee feedback to having InnerSource dashboards listing the participating repositories, measuring collaboration and cross-team contributions with extrapolating savings.

State of InnerSource Adoption

InnerSource progress within organizations

Out of the organizations surveyed 66% stated that InnerSource was introduced in their organization within the past 3 years. With 13% of organizations mentioning time frames of 3 to 10 years and 10% of respondents engaging in InnerSource for up to 20 years.

"Specialization and ownership culture both drive the creation of silos of knowledge. Over time, cross-silo knowledge can be lost within an organization, which can be damaging if you need to quickly mobilize resources to another area of the stack."[1] Since adopting InnerSource 77% of companies reported an increase in knowledge sharing, followed by 43% of respondents noticing a decrease in bottlenecks and reduction of silos.

State of InnerSource Adoption

Observed Progress since InnerSource Adoption in: (N= 39)

Category	No. of Responses
Knowledge sharing	27(77%)
Remove silos & bottlenecks	15(43%)
Improve quality	12(34%)
Increase development speed	11(31%)
Employee satisfaction & talent retention	9(26%)
Creating reusable software	7(20%)
Innovation	6(17%)
We're still so very early in the journey	1(3%)
We did not find a way to measure yet	1(3%)

[1] Danese Cooper, Klaas-Jan Stol: Adopting InnerSource: Principles and Case Studies, O'Reilly Media, 2018

Time since introduction to InnerSource

- Past 3 years — 66%
- 3 - 10 years — 13%
- Up to 20 years — 10%

State of InnerSource
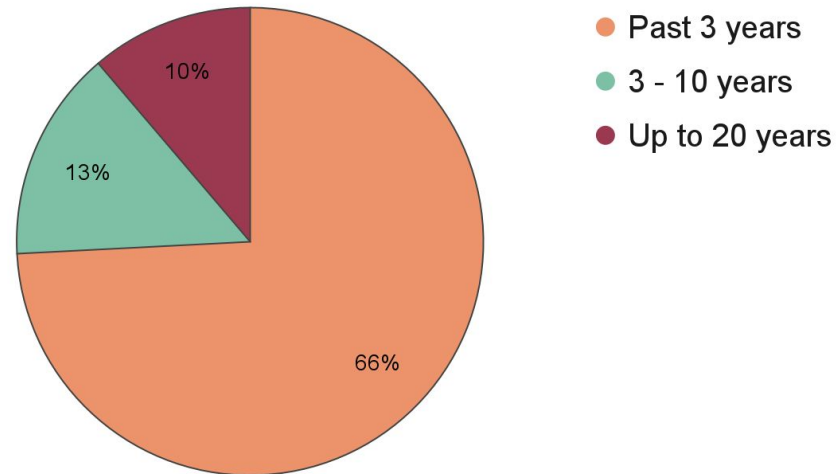
# Perceived Progress & Success in InnerSource Adoption

When analysing the data for statistically significant relationships we found the following:

- The perceived InnerSource success and perceived InnerSource progress are **positively correlated**.
- There is a **positive correlation** between having an InnerSource team and the perceived current progress with InnerSource as well as the perceived success of the InnerSource projects.
- How long ago InnerSource was introduced was also **positively correlated** to the perceived current progress with InnerSource and to the perceived success of the InnerSource projects.
- However the number of InnerSource projects had **no significant relationship** with the perceived InnerSource progress or success

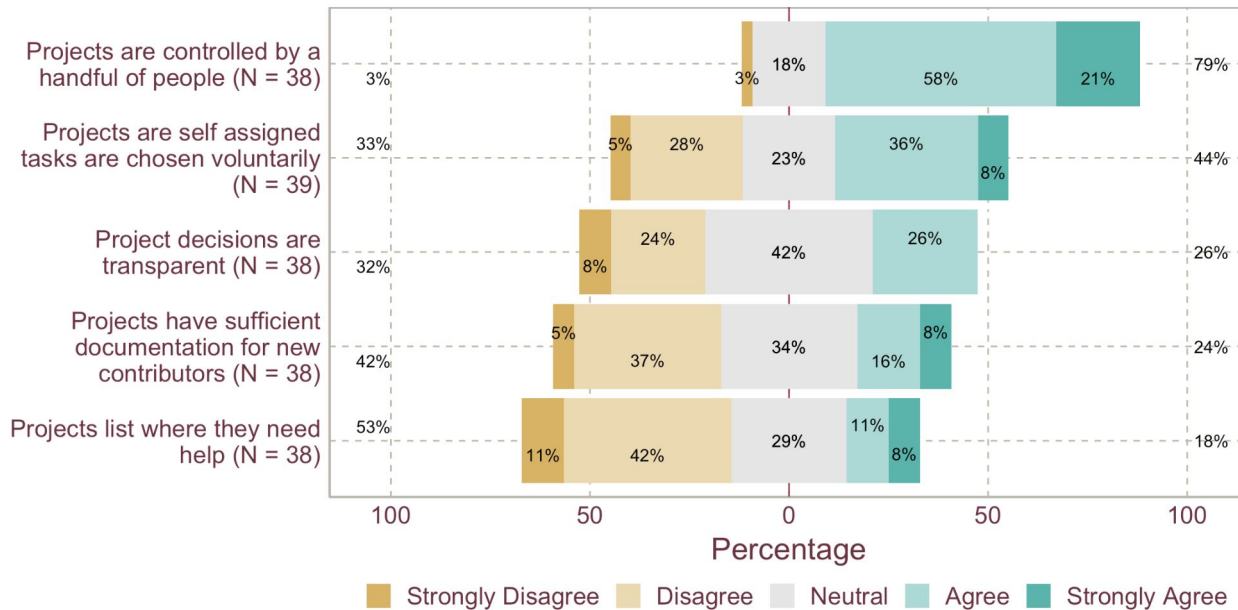**Perceived Current Progress with InnerSource (on a scale of 1-5, 1 - Preparing for Adoption, 5 - InnerSource Pioneer)**
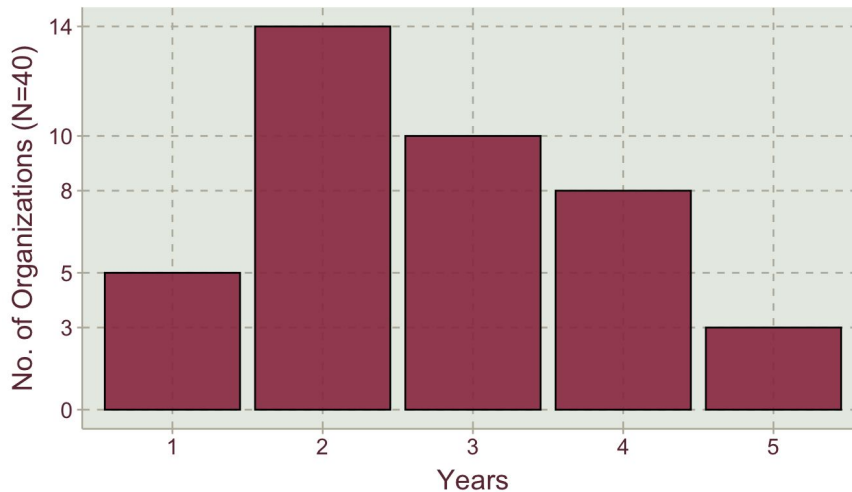
Perceived Success of the InnerSource Projects (on a scale of 1-5, 1 - Not Successful, 5 - Extremely Successful)

State of InnerSource Adoption
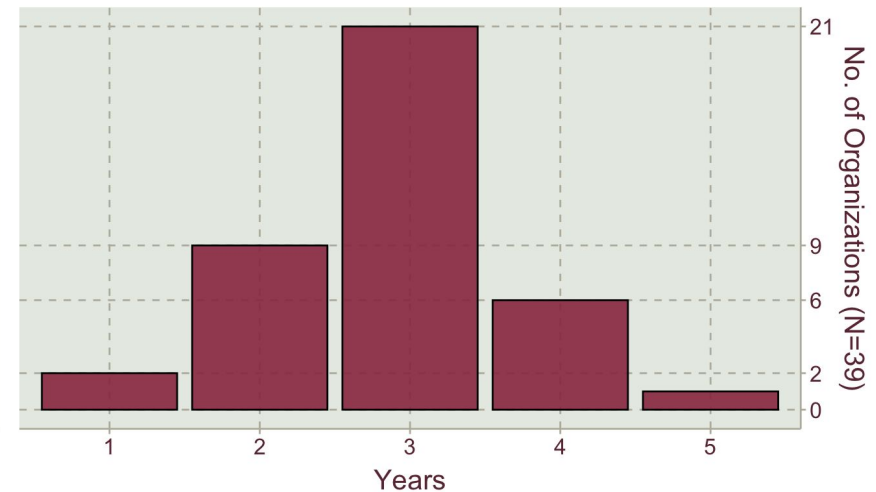
InnerSource Project Practices

The traditional development practice put all decision making and control in the hands of a single team that maintained the code, who were petitioned by users to add enhancements through feature requests. In contrast, InnerSource democratizes development and control over the direction of the project by encouraging pull requests over feature requests. However, when asked about it, 79% of respondents stated that projects are controlled by a handful of people in their organization. At the same time only 18% of respondents agree with the fact that projects in their organization list where they need help and only 24% of the respondents consider projects to have sufficient documentation for new contributors.

Transparent and inclusive decision making builds trust and encourages collaboration. Out of all the respondents only 26% agree that project decisions are transparent in their organizations.

Organizational Culture

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Projects are controlled by a handful of people (N = 38)	3%		3%	18%	58%	21% → 79%
Projects are self assigned tasks are chosen voluntarily (N = 39)	33%	5%	28%	23%	36% / 8% → 44%
Project decisions are transparent (N = 38)	32% / 8%		24%	42%	26% → 26%
Projects have sufficient documentation for new contributors (N = 38)	42% / 5%		37%	34%	16% / 8% → 24%
Projects list where they need help (N = 38)	53% / 11%		42%	29%	11% / 8% → 18%

Percentage

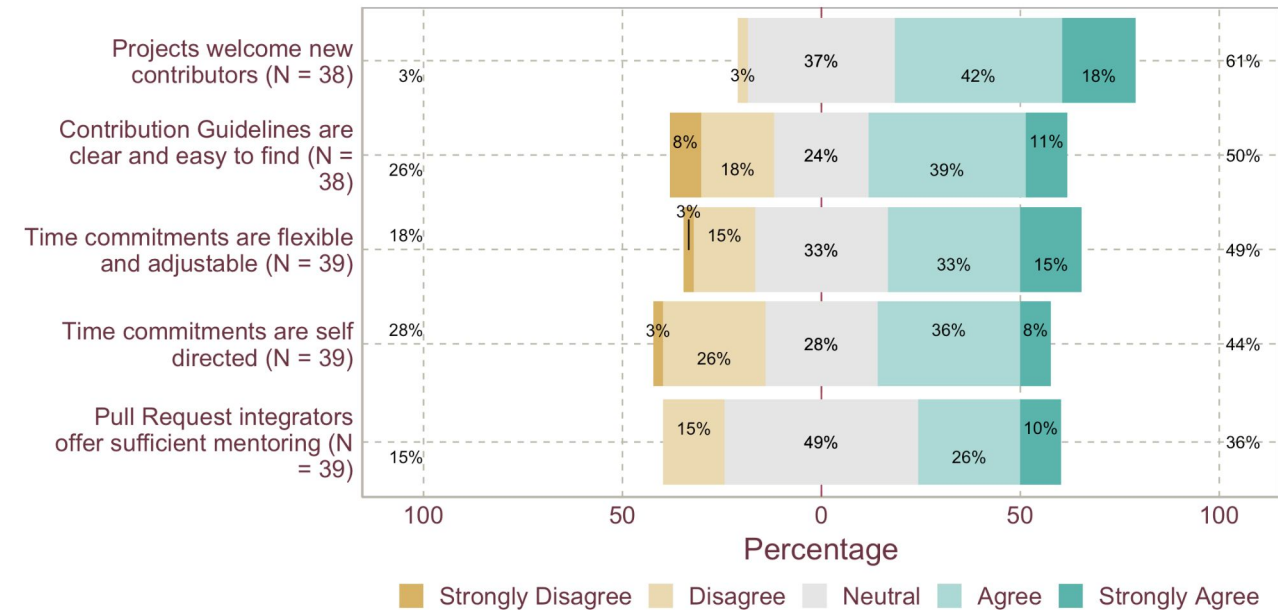Legend: Strongly Disagree · Disagree · Neutral · Agree · Strongly Agree

InnerSource Practices in Organizations

By creating an environment and culture where new contributors are welcomed, and where a governance structure makes it clear what benefits and rewards they gain via their contributions, the community itself will thrive and grow. 61% of our survey respondents agree that projects welcome new contributors, with 50% of respondents considering contribution guidelines clear and easy to find.

Time commitment is sometimes a controversial subject as software developers are traditionally facing the famous three-way tension between delivering high-quality software in a timely fashion and within budget. However, in an InnerSource environment, 49% of respondents agree that their time commitments are flexible and adjustable and 44% agree that they are self directed.

Organizational Culture

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Agree Total
Projects welcome new contributors (N = 38)	3%	3%	37%	42%	18%	61%
Contribution Guidelines are clear and easy to find (N = 38)	8% / 26%	18%	24%	39%	11%	50%
Time commitments are flexible and adjustable (N = 39)	3% / 18%	15%	33%	33%	15%	49%
Time commitments are self directed (N = 39)	3% / 28%	26%	28%	36%	8%	44%
Pull Request integrators offer sufficient mentoring (N = 39)	15%	15%	49%	26%	10%	36%

Percentage

Strongly Disagree   Disagree   Neutral   Agree   Strongly Agree

InnerSource and Self

InnerSource aims to increase transparency so that it becomes more clear who's working on what, but also allows developers to contribute where they can.

A continuing trend from our 2016 report is an increase in job satisfaction for developers engaged in InnerSource projects. Job satisfaction is increasingly important for organizations that seek to retain their talent

"It has been shown that happiest software developers are significantly better analytical problem solvers."[2] The results of our study also show this correlation between InnerSource contributors having an increased job satisfaction and seeing an increased productivity in their own projects.
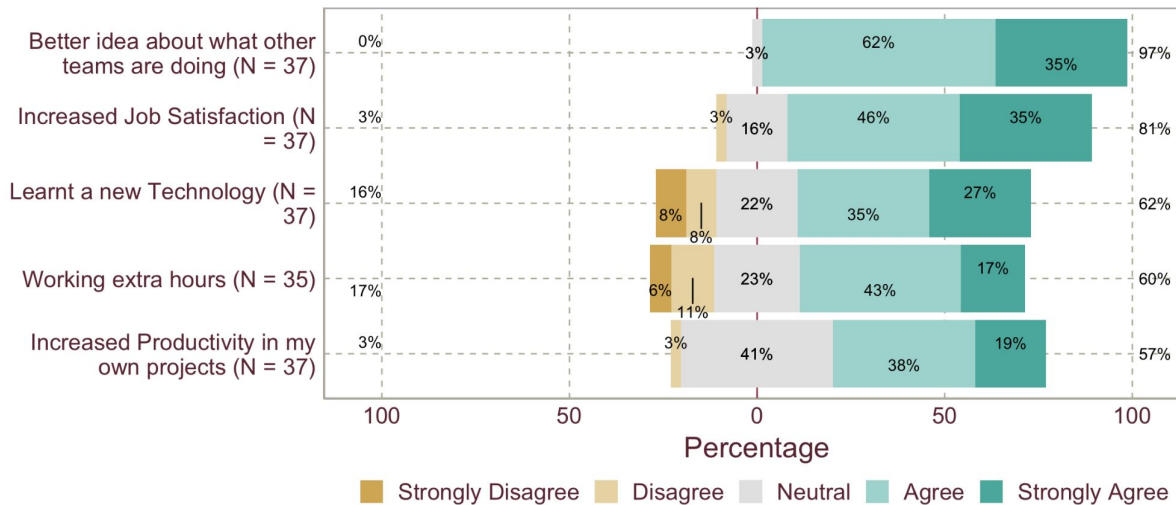
Some studies indicated that InnerSource contributors spend more time on the job,[3] which is also shown in our survey results and represents a difference to our 2016 report where the results were inconclusive and widely varying.

[2] D. Graziotin, X. Wang, and P. Abrahamsson: Happy software developers solve problems better: psychological measurements in empirical software engineering, PeerJ, 2:e289, 2014
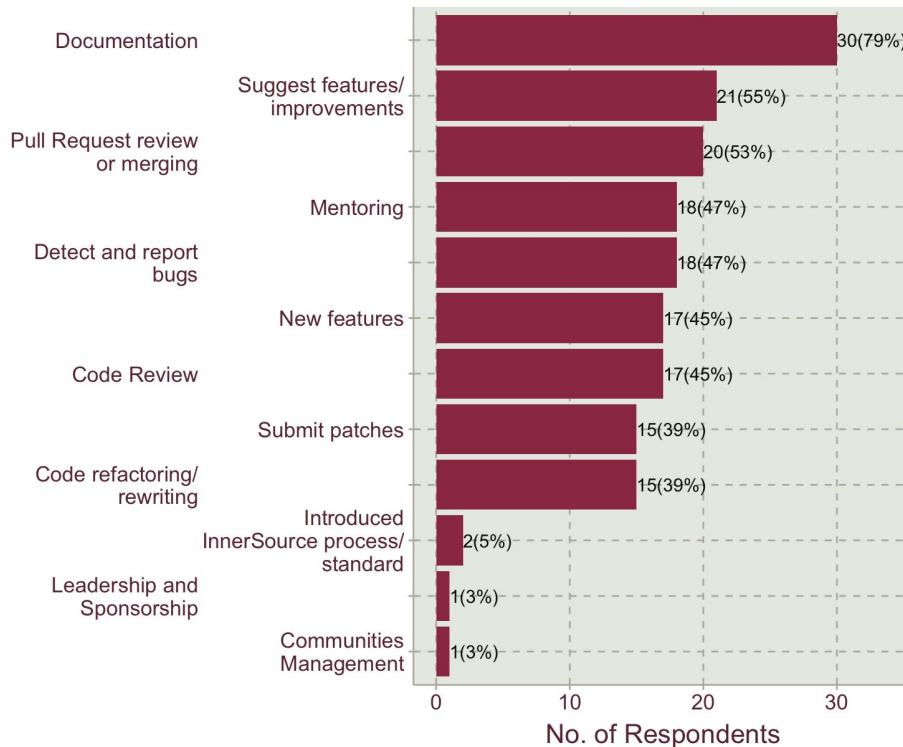
[3] V.K. Gurbani, A. Garvert, and J.D. Herbsleb: A Case Study of a Corporate Open Source Development Model, Proc. International Conference on Software Engineering, 2006

InnerSource Project Contributions

Writing documentation is at the top of InnerSource contributions the respondents are making. Documentation is highly important for promoting InnerSource as it provides a history of the project, and helps outsiders understand it so that more people can contribute to it.

Some other types of contributions that also ranked high among our survey respondents are suggesting features and improvements and pull request review or merging.

InnerSource Contributions & Motivations

InnerSource Project Contributions (N=38)

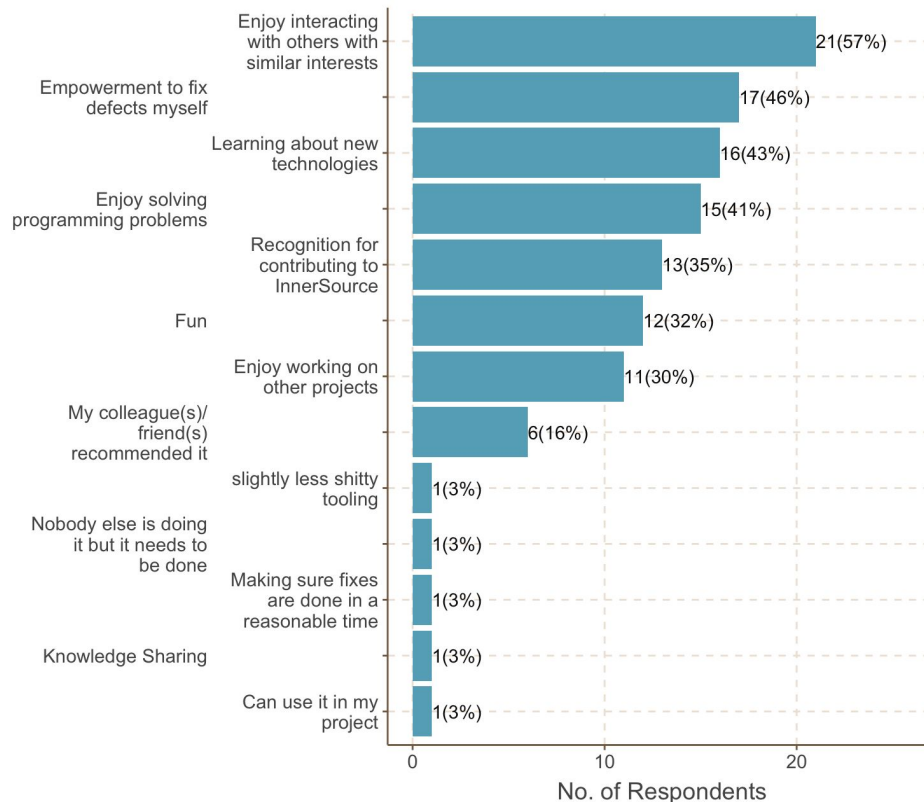| Category	No. of Respondents
Documentation	30(79%)
Suggest features/ improvements	21(55%)
Pull Request review or merging	20(53%)
Mentoring	18(47%)
Detect and report bugs	18(47%)
New features	17(45%)
Code Review	17(45%)
Submit patches	15(39%)
Code refactoring/ rewriting	15(39%)
Introduced InnerSource process/ standard	2(5%)
Leadership and Sponsorship	1(3%)
Communities Management	1(3%)

No. of Respondents

What Motivates Developers?

Of the respondents who actively participate in InnerSource programmes within their organizations, most indicate that interacting with other people with similar interests is a major reason to participate. For many respondents, empowerment also played an important role: rather than waiting for others to fix a bug, InnerSource enables developers to do it themselves, which can lead to a shorter time-to-market. These are also the top two motivations identified in our 2016 survey.

Motivations for Contribution (N=37)

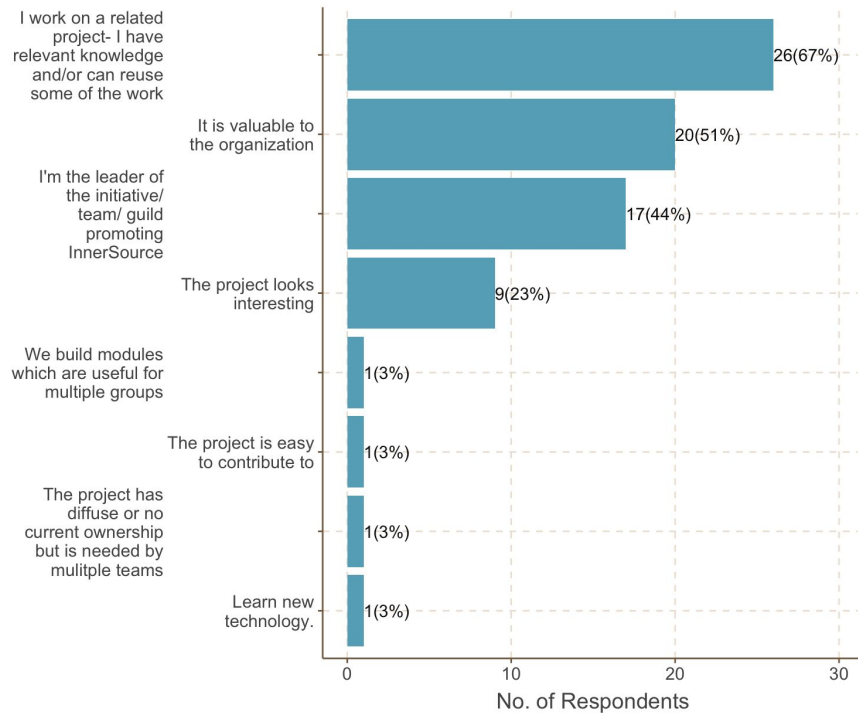| Motivation	No. of Respondents
Enjoy interacting with others with similar interests	21(57%)
Empowerment to fix defects myself	17(46%)
Learning about new technologies	16(43%)
Enjoy solving programming problems	15(41%)
Recognition for contributing to InnerSource	13(35%)
Fun	12(32%)
Enjoy working on other projects	11(30%)
My colleague(s)/ friend(s) recommended it	6(16%)
slightly less shitty tooling	1(3%)
Nobody else is doing it but it needs to be done	1(3%)
Making sure fixes are done in a reasonable time	1(3%)
Knowledge Sharing	1(3%)
Can use it in my project	1(3%)

No. of Respondents

Learning about new technologies and enjoyment in solving programming problems were also prevalent reason, as well as recognitions for contributing to InnerSource. In addition, 32% of respondents indicated that participating in InnerSource was fun in general, which is a significant increase from 1 respondent in 2016.

InnerSource Success Factors

State of InnerSource

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What Projects do Developers Contribute to?

Most respondents to our survey choose the InnerSource project to contribute to based on the current project they are working on, their relevant knowledge and the ability to reuse some of their previous work.

Selecting an InnerSource Project to Contribute (N=39)

Category	Value
I work on a related project- I have relevant knowledge and/or can reuse some of the work	26(67%)
It is valuable to the organization	20(51%)
I'm the leader of the initiative/ team/ guild promoting InnerSource	17(44%)
The project looks interesting	9(23%)
We build modules which are useful for multiple groups	1(3%)
The project is easy to contribute to	1(3%)
The project has diffuse or no current ownership but is needed by mulitple teams	1(3%)
Learn new technology.	1(3%)

No. of Respondents

Over half of respondents also choose projects for their value to the organization and some engineers decide to work on a project because they find it interesting. Learning new technology and ease of contributions (clear documentation on how to contribute) were some of the motives least chosen by developers as making part of their decision process.

InnerSource Success Factors

State of InnerSource

# Characteristics of Successful InnerSource Projects

Having functionality useful to multiple stakeholders is seen as one of the most important characteristics for a successful InnerSource project by 85% of our respondents.
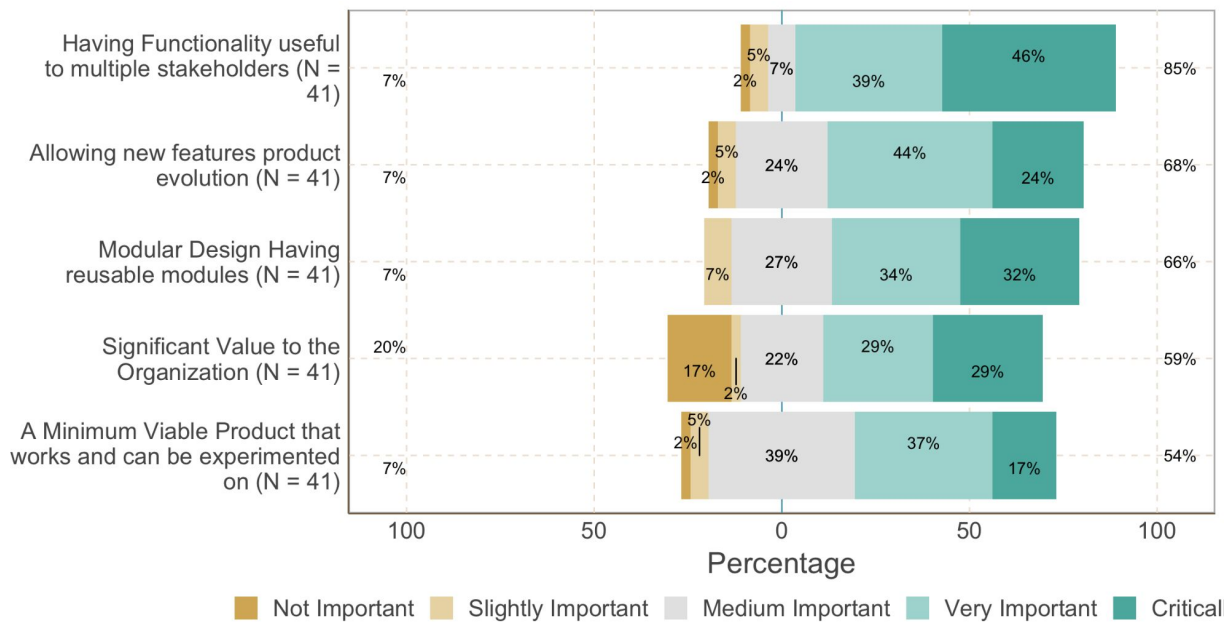
Modularity refers to the level of independence of different subsystems. It enables a large number of people to work on different subsystems without getting in each other's way. Modular design with reusable modules has also been identified as one of the important characteristics for a Successful InnerSource Project.

InnerSource Success Factors

Management Support

85% of respondents agree that support from upper management is critical to InnerSource success. Which is also supported by research into the factors of adopting InnerSource in organizations.[4] A vast majority of participants also agree that management is welcoming new ideas for product features and process improvements and 64% of respondents also agree that management within their organization does not try to micromanage InnerSource Projects.
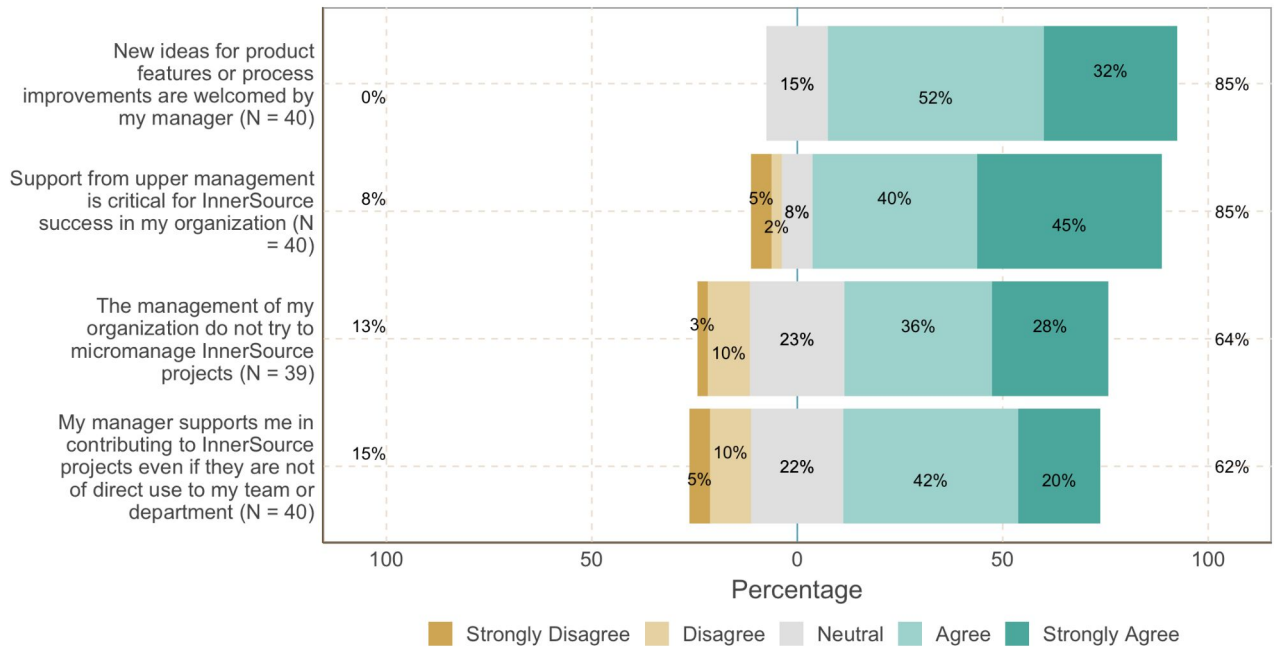

Most respondents indicated that their managers supported them to work on InnerSource projects which is consistent with the results of the 2016 survey.

[4] K. Stol, P. Avgeriou, M. Babar, Y. Lucas, and B. Fitzgerald: Key Factors for Adopting Inner Source, ACM Transactions on Software Engineering and Methodology, vol. 23, 2014

Collaboration on InnerSource Projects

InnerSource is all about open collaborations and most of our survey respondents agreed that InnerSource offers more collaboration opportunities than otherwise might happen which continues the trend from our 2016 survey. 74% of developers indicated that through InnerSource projects they have collaborated with new colleagues they would like to work again with in the future and 58% of developers have had contributions peer-reviewed by people they have not met in real life. Rather than having contributions reviewed by a friendly colleague, review by 'unknown' colleagues might be better as this means that the feedback is more objective.

InnerSource Success Factors
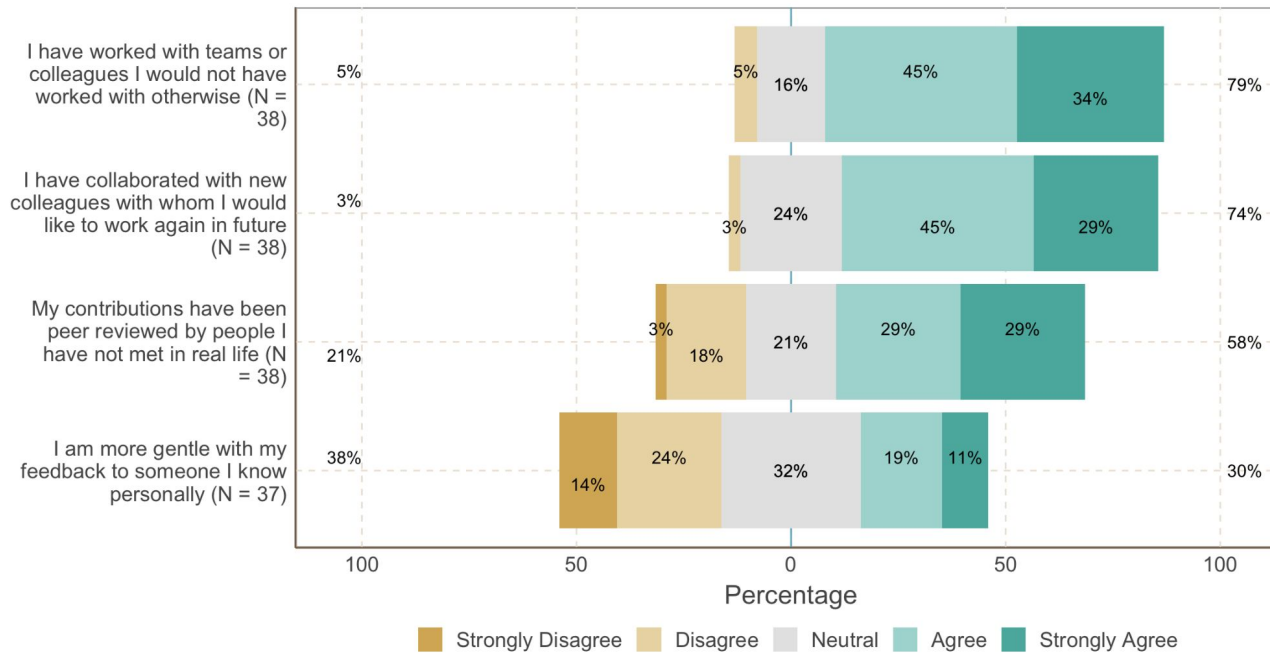
30% of the respondents agreed with feeling the need to be more gentle in their feedback when they know the contributor which is a significant change from the 2016 survey where only 1 participant agreed with this statement.
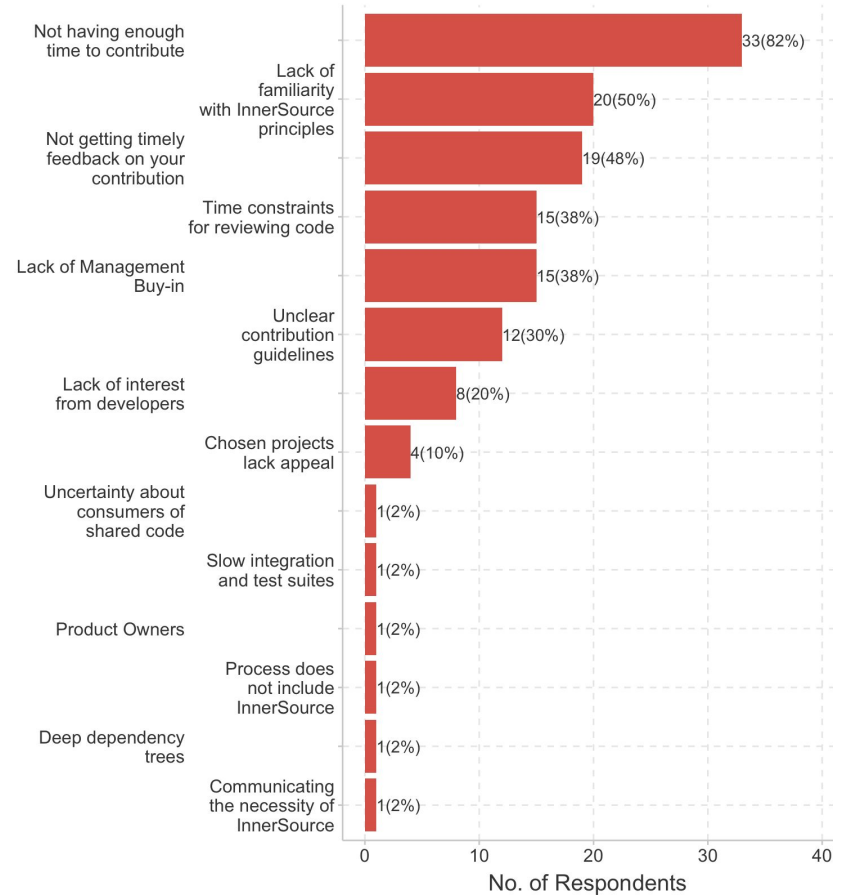
Obstacles for InnerSource

The biggest obstacle to InnerSource success was found in the lack of time participants can dedicate to contributions as reported by the 82% of all respondents and 90% of the developers. A further 50% of participants reported a lack of familiarity with InnerSource principles followed by not getting timely feedback on your contribution which was stated by 48% of respondents.

Getting buy-in and commitment from management, was also identified as quite challenging. This is because many of the benefits of InnerSource - productivity as a result of developer happiness, employee retention, and personal growth, to name a few - are hard to quantify.

Some of respondents also stated that the lack of appeal for the chosen project as well as lack of interest from developers and unclear contribution guidelines are seen as obstacles for InnerSource in their organizations.

InnerSource Adoption Obstacles

The Biggest Obstacles for InnerSource Success (N=40)

Obstacle	No. of Respondents
Not having enough time to contribute	33(82%)
Lack of familiarity with InnerSource principles	20(50%)
Not getting timely feedback on your contribution	19(48%)
Time constraints for reviewing code	15(38%)
Lack of Management Buy-in	15(38%)
Unclear contribution guidelines	12(30%)
Lack of interest from developers	8(20%)
Chosen projects lack appeal	4(10%)
Uncertainty about consumers of shared code	1(2%)
Slow integration and test suites	1(2%)
Product Owners	1(2%)
Process does not include InnerSource	1(2%)
Deep dependency trees	1(2%)
Communicating the necessity of InnerSource	1(2%)

InnerSource Obstacles From a Management Perspective

One of the biggest challenges identified by our respondents when it comes to managing InnerSource projects is resource allocation. Resources are easier to plan and distribute when work is assigned to a single team with a known set of developers. But this simplicity is also illusory, because schedules in software development are notoriously unreliable.
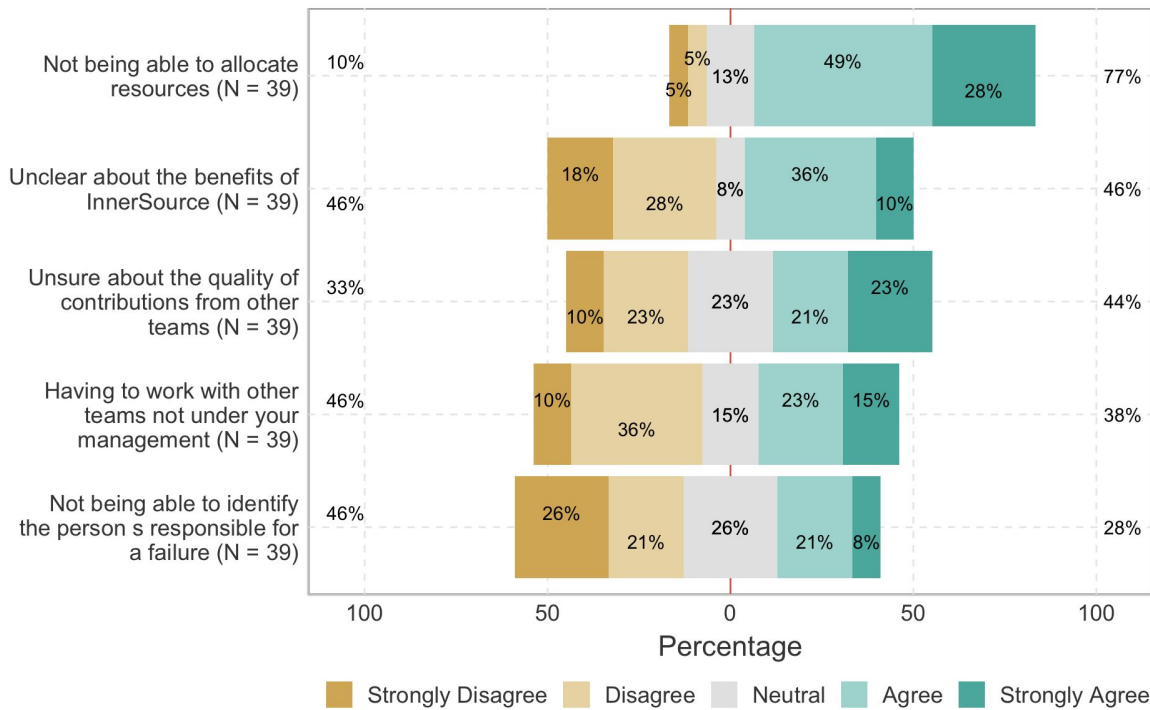

Close to half of the participants have also indicated that lack of clarity about the benefits of innersource is also a big challenge.

The quality of contributions from other teams is also a management concern when it comes to InnerSource projects. But the mere awareness that code will potentially be reviewed by a large number of strangers has the effect of causing developers to strive to put their best foot forward, because nobody wants public humiliation.

InnerSource Adoption Obstacles

InnerSource Obstacles From the Employee's Perspective

Time constraints have been identified as the number one concern of employees when being asked to adopt InnerSource, with 90% of our respondents agreeing with the statement. A high number of developers also feel that their contribution to InnerSource wouldn't be valued by management which is in contrast to the 62% positive response to the statement: "My manager supports me in contributing to InnerSource projects even if their are not of direct use to my team" outlined in the Management Support section. Not receiving timely feedback on their code was another concern that many participants had.
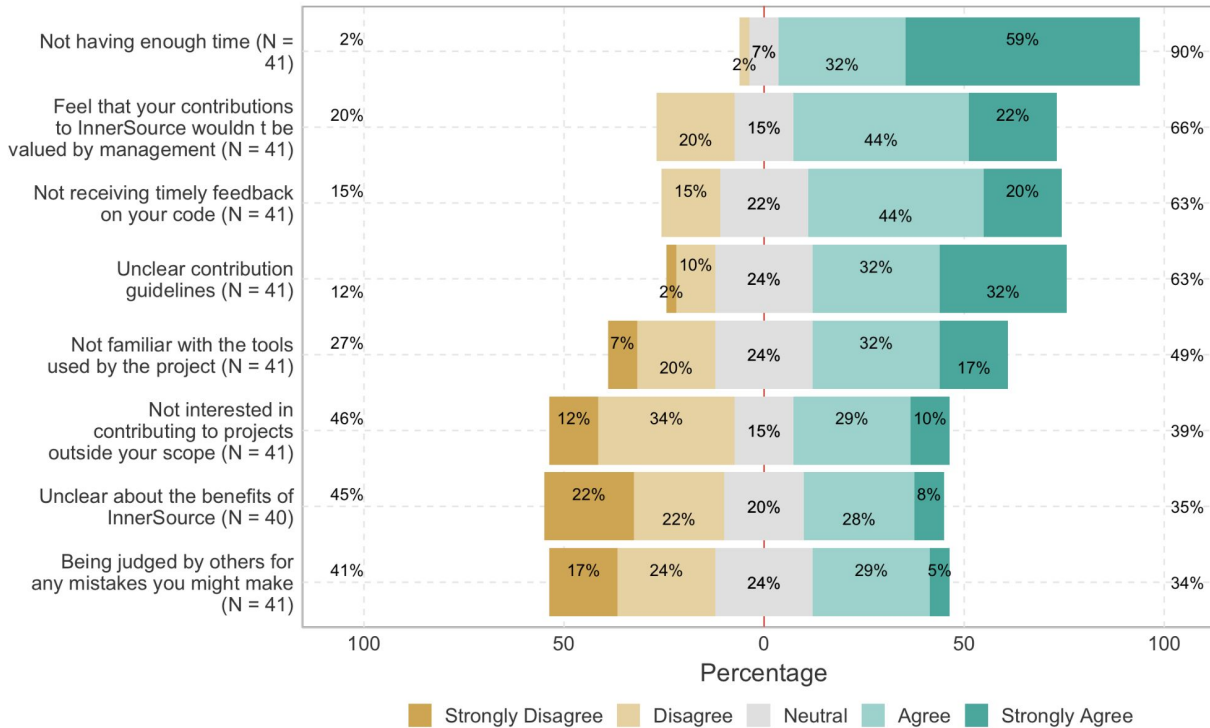
In relation to InnerSource projects developers are concerned about their unfamiliarity with the tools used by the project and they see an obstacle in unclear contribution guidelines.
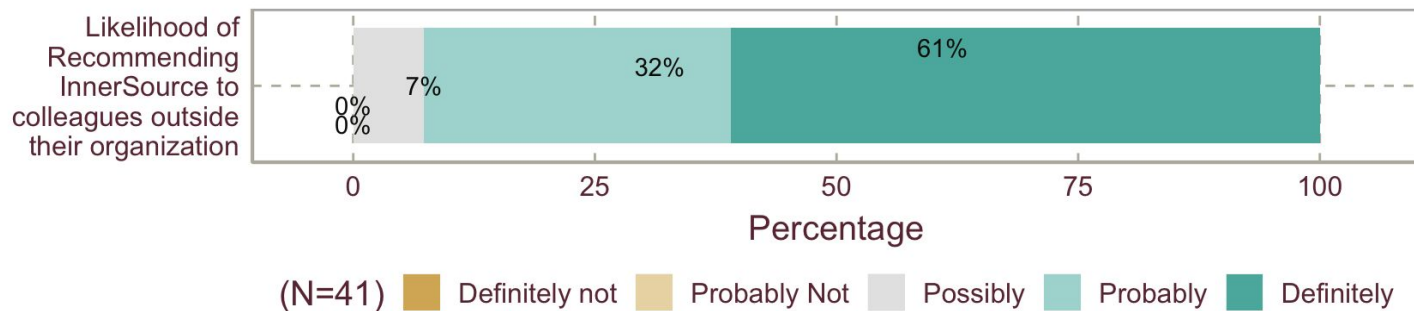
Being judged by other for their mistakes was the least concerning for developers as most of them don't see this as an obstacle to adopting InnerSource.

Conclusion

InnerSource is gaining momentum in the industry. The idea that open development methods offer many benefits is widely accepted in young companies and start-ups. Recently we have been seeing established organizations, used to hierarchy and development silos that inhibit cross-team collaborations, opening up to the concept of InnerSource and its benefits.

The biggest obstacle in InnerSource success for these organizations was found in the lack of time as reported by the 82% of all respondents and 90% of the developers. However, the majority of participants reported having a better idea about other teams' work, increase job satisfaction and increase productivity.

Our survey showed that people see the value in InnerSource and they are willing to recommend it to colleagues who are even working outside of their organization.

Likelihood of Recommending InnerSource to colleagues outside their organization: 0%, 0%, 7%, 32%, 61%

(N=41) — Definitely not | Probably Not | Possibly | Probably | Definitely

Methodology

We designed an online questionnaire using Google Forms targeting practitioners of InnerSource, which we advertised through the InnerSource Commons Slack channel and other social medias like LinkedIn & Twitter. A few responses were cleaned manually to correct spellings, remove unrelated answers, and coining common themes. The Survey Questions are available [here](#). The refined data of the Survey responses is available [here](#).

About the InnerSource Commons

The InnerSource Commons was founded in 2015 and is an industry-led initiative to advocate open development practices within organizations. The InnerSource Commons community interacts through an archived Slack channel, a dedicated mailing list, and organizes several events per year. Further information on the InnerSource Commons can be found on its website: www.innersourcecommons.org

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