



# Overleaf at CERN

Supporting thousands of research collaborations

## About Overleaf

**Overleaf** is a collaborative, cloud-based writing platform with over 4.5 million users worldwide as of mid-2019. We're helping to make the process of writing, editing and publishing scientific documents quicker and easier for students, teachers and researchers alike.

Overleaf was founded by two mathematicians in 2012. They had been working on a project involving many partners to build autonomous cars, and work between team members had been challenging. So they built a light-weight, LaTeX-based collaboration system and used it for writing their research papers. It was simple to use - all you needed was a web browser.

Overleaf has since seen rapid adoption across science and research, and our market-leading collaboration technology is now in use in universities, labs and industry worldwide. These include major institutions such as Stanford and Caltech, with Overleaf becoming an important part not only of research collaborations but also of undergraduate teaching.

Most recently, Overleaf acquired its nearest competitor ShareLaTeX, and our combined team has worked together to build an even stronger next-generation platform to take collaborative writing to the next level.

## About the trial leaders

Nikos Kasioumis, Software Engineer in the IT department at CERN and Valeria Brancolini, Publisher in the CERN Scientific Information Service proposed and led the trial, from the first initiative through to the official launch of Overleaf at CERN at the start of 2018.



**Valeria** comes from a publishing background, and this experience helped in her role of evaluating the current processes and tools CERN researchers were using to write manuscripts, how researchers were working together, what tools were working, and what additional tools and support were required.



**Nikos** has always been involved in web-based services and software, including document-related software and services, and so was a natural fit to work with Valeria on this evaluation of authoring tools. After the trial was complete, Nikos coordinated the successful launch of the Overleaf platform at CERN, and continues to conduct follow up interviews and surveys to provide ongoing feedback to the Overleaf team.

# Contents

<b>1</b>	<b>Executive Summary</b>	<b>2</b>
<b>2</b>	<b>CERN: technology creator and technology adopter</b>	<b>3</b>
<b>3</b>	<b>The CERN authoring trial</b>	<b>5</b>
<b>4</b>	<b>The trial results</b>	<b>6</b>
<b>5</b>	<b>After the trial: the launch of Overleaf at CERN</b>	<b>7</b>
<b>6</b>	<b>User Impressions</b>	<b>8</b>
6.1	Stephanie van de Sandt . . . . .	8
6.2	Jean-Yves Le Meur . . . . .	8
6.3	Patrick Koppenburg . . . . .	9
6.4	Markus Aicheler . . . . .	10
6.5	Steinar Stapnes . . . . .	10
6.6	Sebastian Stefan Feger . . . . .	11



# I Executive Summary

Since its founding in 1954, CERN (<https://home.cern/>) has been at the forefront of the creation, development and adoption of new technology to help uncover what the universe is made of and how it works. CERN brings together people from all over the world to push forward the boundaries of human knowledge, helping to inspire and train the next generation of scientists and engineers in the process.

In 2016, CERN was looking to adopt a single, collaborative authoring tool to provide to their researchers. They conducted a year-long trial of three platforms, with Overleaf (<https://www.overleaf.com>) emerging as the best fit.

The subsequent launch of Overleaf at CERN has been a huge success, with usage in the first year and a half growing by over 800% to include more than 3,600 CERN members across many different departments and specialities.

## Goals

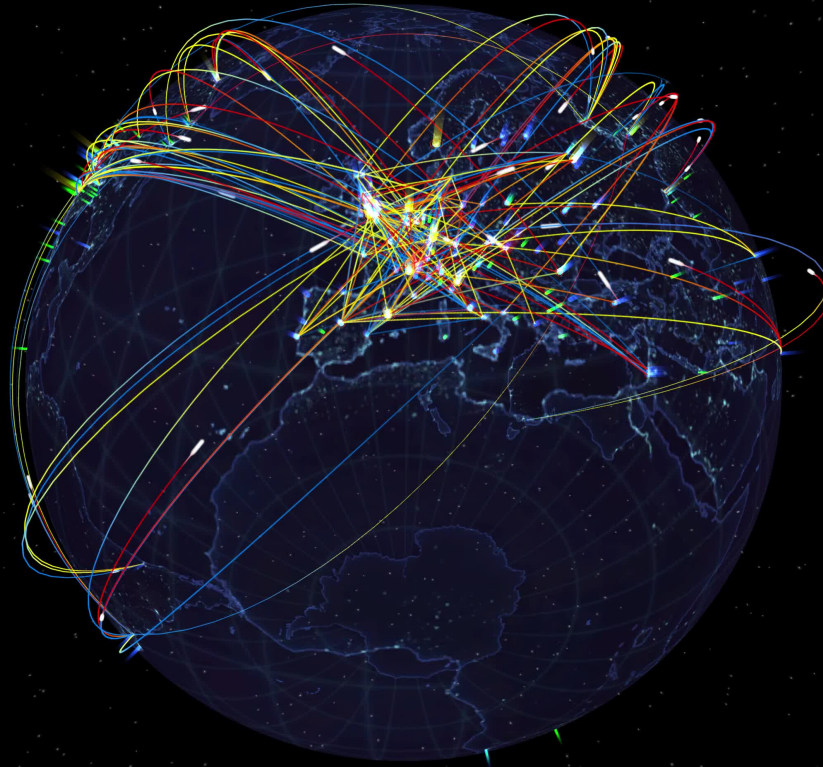
- To find an authoring tool which would allow CERN researchers to focus on the *content* of their writing and not the *process* of writing.
- To find an authoring tool which would work for CERN's large and varied collaborative projects, and help consolidate different writing styles and formats.
- To find an authoring tool which would be adopted and widely-used by the CERN community.

## Approach

- The trial included a broad cross-section of different types of users: 45 users across nine different departments in total.
- The trial provided access to three authoring platforms, and gave the users test cases and the flexibility to work on their own projects using the tools.
- The trial was initially expected to run for 6 months, but was extended to over a year to allow users to try real-collaborations, which naturally start at different times.

## Results

- Overleaf was the preferred option following the assessment by the trial participants.
- 97% of trial participants agreed that a CERN-supported authoring platform would be useful to them, and 63% chose Overleaf.
- Usage of the Overleaf service grew by over 800% during the first 18 months. (*User Stats: 411 users at the start of 2018 grew to 3600 by mid-2019*)



Running jobs: 365644  
Active CPU cores: 807139  
Transfer rate: 21.54 GiB/sec

(Above) The Worldwide LHC Computing Grid activity captured live by the EGL application<sup>1</sup> in August 2017. © CERN

## 2 CERN: technology creator and technology adopter

CERN is a large, highly connected organization, both in terms of the number of researchers who work together (more than 17,500 people around the world<sup>2</sup>) and in the number of institutions connected to CERN (as illustrated below).

Because of this size and scale, when evaluating new technology, CERN looks both inward and outward.

For example, CERN has a strong central IT department, and has often found it necessary to develop its own in-house tools (such as Invenio and EOS) before commercial external options were even available to consider.

<https://invenio-software.org/>  
<http://eos.web.cern.ch/>

However, when external options do appear on the market, CERN also looks to embrace software-as-a-service to ensure it is providing the right services to its community at the right time. Consideration is given for the cost and effort required in maintaining a technology versus using an outside vendor - as well as future growth potential.

There is not one typical path that describes the creation or adoption of new technology across different departments at CERN. However, there are some aspects of the process that are standard, and all new technology adoption starts with an analysis of what the users themselves want and need. Sometimes there is a known need or gap, and evaluation of new tools occur to fill the gap. Other times, a tool is being used successfully by a group, which could be adopted more widely.

In this case, where CERN was looking for a collaborative authoring tool, key context for the trial is the history of authoring and publishing at CERN, together with



the understanding that today it is increasingly common to see physics papers with hundreds or even thousands<sup>3</sup> of authors.

In January of 1955, just months after the establishment of CERN, the first ever CERN Report was published, starting a publishing tradition that continues to this day. More than 1000 CERN Reports, often called CERN Yellow Reports, have since been published, including school proceedings, monographs and conference proceedings.

Up until some years ago, the Desktop Publishing service – and since 2011 the new E-Publishing service or simply CERN Publishing service – had been responsible for facilitating the production of these reports, providing supporting resources and performing or organising the proof-reading, copy-editing, printing, shipping etc. Stepping into the modern digital era of publishing, the CERN Publishing service welcomed automation on all possible fronts, and faced the resulting technical challenges.

Nikos Kasioumis, Software Engineer in the IT department at CERN and Valeria Brancolini, Publisher in the CERN Scientific Information Service were both keen to find new ways to help support authors at CERN.

Through Nikos and Valeria's experience and interaction with authors and editors, they identified gaps in the field of authoring when it comes to consolidating formats, using tools and collaborating efficiently. With a user-centered approach in mind, they decided to engage directly with the users and understand how CERN could help address those gaps. This led to the start of the CERN authoring trial in early 2016.

## Notes

1. The EGL application provides a close-to-real-time (refreshed every ten minutes) visualisation of the WLCG grid activity. It shows graphically information covering data movement for both Monte Carlo (simulation) production and Tier 0 export, and additional information about jobs running on the ATLAS, CMS, LHCb and ALICE grids. (Still frame from video by: João Pequeno Antunes/Mayank Sharma/CERN: <https://videos.cern.ch/record/2640380>). See <https://home.cern/science/computing/grid> for more information (accessed March 2019).
2. "Cooperation between nations, universities and scientists is the driving force behind CERN's research. As of 2017, more than 17 500 people from around the world work together to push the limits of knowledge. CERN's staff members, numbering around 2500, take part in the design, construction and operation of the research infrastructure. They also contribute to the preparation and operation of the experiments, as well as to the analysis of the data gathered for a vast community of users, comprising over 12 200 scientists of 110 nationalities, from institutes in more than 70 countries." <https://home.cern/about/who-we-are/our-people> (accessed March 2019)
3. "Physics paper sets record with more than 5,000 authors" from <https://www.nature.com/news/physics-paper-sets-record-with-more-than-5-000-authors-1.17567> (accessed March 2019) which refers to <https://cds.cern.ch/record/2004386> (accessed March 2019)

### 3 The CERN authoring trial

The goal of the CERN trial was threefold:

Firstly, to find an authoring tool which would allow CERN researchers to focus on the content of their writing and not the process of writing.

Secondly, to find a tool that would work for CERN's large and varied collaborative projects, and help consolidate different writing styles and formats.

Thirdly, and most importantly, CERN was looking to find a tool which would be adopted and widely-used by the CERN community.

Given the scale of CERN, the trial included a broad cross-section of different types of user: 45 users across nine different departments in total, to be as representative as possible of the needs of the community.

The trial began in early 2016 with Nikos and Valeria talking directly to the participants, to find out what they usually write, how they usually write it, and what they, as authors, would want to get out of the trial. They were keen to understand how researchers work together on papers across CERN.

The following requirements were set out following these initial interviews:

- **LaTeX**—this was a major requirement; in the fields CERN researchers typically work in (e.g. high-energy physics), LaTeX is the standard for writing up research.
- **Efficiency** and ease of use—authors should be able to focus on writing, rather than having to take a lot of time wrestling with software during the writing process.
- **Collaboration**—for CERN projects, collaboration during research and writing is a natural and essential part of the work.
- **Versioning**—it's very helpful for authors to be able to see who wrote what and when; the tool should provide a full history of each project in an easily accessible way.

The trial provided access to three authoring platforms, and gave the users test cases and the flexibility to work on their own projects using the tools.

The trial was initially expected to run for six months, but was extended to over a year to allow users to try real-collaborations, which naturally start at different times. Throughout this time, it gained a lot of interest in the CERN community, with trial participants talking to others at CERN about the tools, who then wanted to join the trial as well. This helped confirm the need at CERN for a collaborative authoring tool.

## 4 The trial results

### Overleaf was the preferred option

At the conclusion of the trial, 39 out of the 45 trial participants had extensively tested all three platforms. They were then given a detailed evaluation questionnaire in order to provide their feedback. The key questions focused on whether the participants thought an authoring platform would be useful to them, and of those they had used during the trial, which they preferred:

*Do you think a CERN-supported authoring platform would be useful to you?*

- 97% agreed (71% Fully agreed, 26% Somewhat agreed)

*What is your preferred authoring platform?*

- 63% chose Overleaf - with some providing further comments:

*“I hope Overleaf is adopted by CERN”, and several stating that they would “continue using Overleaf after the trial, whether or not it was supported officially.”*

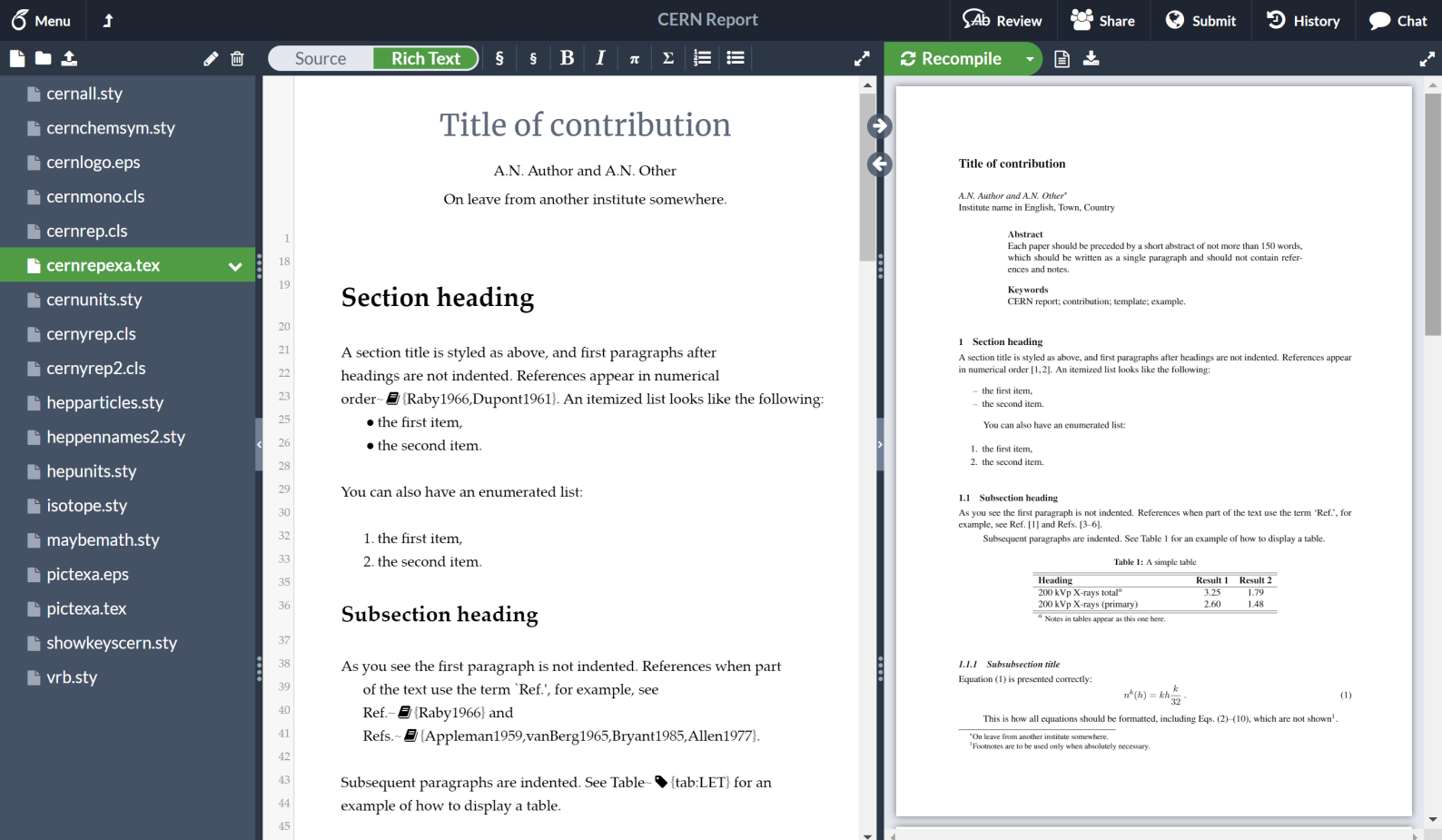
A more in-depth discussion was had with the most active users in the trial, going through their feedback in detail. This allowed the users to provide specific examples of how Overleaf would benefit their daily research and writing.

Valeria said about the interviews:

*“In a place like CERN, where there are so many people doing things in so many different ways, it helped me understand better how people were producing their manuscripts. And different people can work in different ways on the same manuscript. LaTeX users have LaTeX editors, their own scripts, and are used to their own environments – it’s not always straightforward to bring people on-board. But Overleaf could be a help for them – they could see the benefits of a collaborative platform which didn’t necessarily mean they had to change their existing way of working.”*

These trial results backed up the recommendation that **Overleaf be the preferred tool and service provided to CERN researchers and staff.**





(Above) The Overleaf editor with the CERN report template preloaded.

## 5 After the trial: the launch of Overleaf at CERN

An agreement between Overleaf and CERN now provides Overleaf Professional accounts to all CERN researchers and staff. Implementation was straightforward with the set up of a custom CERN web portal on the Overleaf website: , and there is now very little administrative overhead. CERN researchers and staff receive their upgraded Overleaf account automatically, simply by registering on Overleaf with their CERN email address, or adding it to their existing account. CERN administrators have access to additional metrics dashboards showing statistics on the use of Overleaf at CERN.

Nikos commented, “*When you work with the users and they see that you base your decisions on their feedback, the result is stronger.*”

CERN hierarchy were very supportive of the initiative as well, supporting it with resources, time and encouragement. The fact that Overleaf had such a positive, clear trial result paid off in ease of approval; Nikos and Valeria had the data to support the recommendation that Overleaf be made officially available to members of the CERN community.

The case for Overleaf was strong, not only when it was presented at CERN and officially implemented, but also seen in the usage since implementation.

Nikos said: “*We’ve seen the number of CERN users and projects on Overleaf grow steadily, and it’s becoming a standard part of the CERN authoring workflow. It becomes something that people use not just because it’s a suggestion to them, but because it’s useful to them and they came across it and found that ‘it just works for me.’*”

<https://www.overleaf.com/org/cern>

## 6 User Impressions

### 6.1 Stephanie van de Sandt

Stephanie is a PhD student, whose work is focused on how publicly available research data is reused. She started using Overleaf about 4-5 years ago.

*“When writing LaTeX locally everyone had a different environment, sharing was not easy, and rendering was unpredictable. Versioning, and figuring out which file is the right one to edit was also a problem.*

*Overleaf makes it easier because everything is online, everything is in one place. LaTeX rendering is the same for everyone so I don’t have to worry about not being able to correctly render other people’s files in my local environment. I label versions within Overleaf, so when I share documents for other people to reuse I can easily see what changes or improvements they’ve made.*

*Overleaf also has many templates available, so I don’t have to write them myself or look for them elsewhere, and I can see immediately what the end result will look like.”*

### 6.2 Jean-Yves Le Meur

Jean-Yves is in charge of the CERN digital memory project, a program to digitise all the past historical patrimony of CERN and host it in an ISO-compliant digital archive. He started using Overleaf during the authoring trial at CERN.

*“Sharing documents over email to get comments was not very intuitive, it was cumbersome. Overleaf helps with that.*

*I am now using Overleaf even when I’m the solo author of a document—it has replaced my local LaTeX editor. It’s centralised, I can see all my work in one place. The transition was very easy, very straightforward.”*



## 6.3 Patrick Koppenburg

Patrick is working on the LHCb experiment and is the chair of the editorial board (also known as publication committee in other experiments) for LHCb. He oversees the editorial process from the last stages of the analysis to the publication. He chairs a group of 11 people who are reading all papers and share the work among themselves.

*“We started using Overleaf shortly after it was advertised at CERN, as an idea of one of the members of the editorial board, in order to solve a problem we had: when members of the editorial board were reading a paper individually and in parallel they would often make identical comments and corrections.*

*We wanted to streamline the process, and for that we wanted the reviewers to immediately fix the problems they spotted, rather than to send emails. Overleaf makes this possible, and saves time by removing the need for each reviewer to write and send a separate email with a list of corrections identified by line number.*

*It also makes my work easier and saves me time: when I have to circulate an author’s draft to the reviewer, if I spot a simple error I can make a correction right away, produce a new PDF and circulate that, instead of getting back to the author to correct it, which can take a long time.*

*In future I would like to see Overleaf integrated with CERN SSO (single sign on), to allow me to log in with the same credentials and be able to share documents with CERN groups more easily.”*



**Patrick Koppenburg**

@PKoppenburg

Following



First meeting of the LHCb Editorial Board to discuss policies rather than a paper. A lot of enthusiasm for @overleaf. We'll try it for some @LHCbPhysics papers.

#LHCbEditorialBoard

4:33 PM - 4 May 2018

8 Likes



<https://twitter.com/PKoppenburg/status/992426986156056576>



## 6.4 Markus Aicheler

Markus is an engineer for the Compact Linear Collider (CLIC). He recently produced the CLIC Project Implementation Plan (PIP) on Overleaf—a 280 page, 50+ MB document, where he was one of the two technical editors. He was aware of Overleaf and decided to try it out for this document, knowing that it would be a collaborative project.

*“You don’t actively have to worry about versioning with Overleaf. When we used to work locally for the CLIC CDR in 2012 we would often wonder what is the actual latest version and conflicts would appear. Anybody can just log in and start working and versioning right away with Overleaf.*

*Overall, it changed the way we approached the document and it took away a lot of the workload, especially when it comes to collaborative editing. When I want a colleague to see my project, I just give them the appropriate access rights—I don’t have to share a PDF with them over email.”*



## 6.5 Steinar Stapnes

Steinar is the Linear Collider Study Leader in the Accelerators and Technology (AT) sector. Other studies/projects in the sector include the Future Circular Collider (FCC), the High Luminosity LHC (HiLumi) - which is a major construction project, AWAKE and Physics Beyond Colliders. Steinar is mainly concerned with the Compact Linear Collider (CLIC) and the International Linear Collider (ILC).

*“I’ve been using Overleaf since May 2018, following a suggestion from an external collaborator. At the same time it was quickly spreading among colleagues at CERN. If it hadn’t been for that external collaborator, someone else would have suggested it shortly thereafter.*

*I’ve used Overleaf for several projects this year. There was one where 20 people collaborated to write 100 pages, another one with more than 250 pages. I know a little bit of LaTeX, but I don’t usually set up the full structure of the document with the necessary libraries etc.*

*What I find particularly useful is the history feature—you can go back and check who has made a change and when, and that helps you when things go wrong. Especially when there are many people working on the same project. Also the possibility to jump back and forth between LaTeX and PDF. Version 2 is more versatile than version 1.*

*As of today, Overleaf is the tool I prefer to use for LaTeX.”*

## 6.6 Sebastian Stefan Feger

Sebastian is a PhD student in Human Computer Interaction. He has conducted several major studies, and written papers about them. He started using Overleaf at the beginning of his PhD.

*“I use Overleaf because I wanted to use LaTeX and you don’t have to set up anything, you don’t have to worry about anything, and you can work collaboratively.*

*It helps because it’s a straightforward tool to write my papers and there are good templates for the conferences I submit to.*

*It’s fast, it’s easy to use.”*



