Meetings managed

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Twenty years ago, the particle physics community launched Indico, an open-source software package for handling all aspects of meetings. On behalf of the Indico team, Tim Smith explains what Indico can do, and how the wider physics community could benefit from adopting it.

Outside of particle physics, Indico might be unfamiliar, but for us in the community, working without it would be unimaginable. We use this open-source tool not only to manage the complexities of our biggest multi-track headline conferences, but for our full spectrum of events and workshops, down to the everyday meetings. Indico can manage the agenda, presentations, minutes, video and webcast connections, abstracts, papers, badges and even attendees! Everything is kept online, for reference anytime in the future. And because the package is open-source software, the code is available for the whole world to reuse, modify and improve.

Over the years, the feature set of Indico grew in a very natural way, taking into account the needs expressed by its users, event organizers and participants, and the will of its managers to make it a one-stop shop for event organization (BOX 1). This growth happened in three main areas: event organization, event operation, and information discoverability.

Event organization

Indico covers the whole conference lifecycle: it allows organizers to create the web site for their event and to manage its detailed timetable, whether a simple flat list of talks, or a fully-fledged multi-track conference. It allows creating multiple registration forms, for participants, speakers or exhibitors, and can track payments for these registrations, and also generate tickets. For large conferences, Indico offers reviewing workflows that can be used to receive and select abstracts, and to review and edit submitted material like papers, slides and posters, before final publication. Indico also includes a booking system for spaces, such as conference and meeting rooms, or even offices and desks, and can be used standalone or tightly integrated with the event management part.

Through a system of plugins, it can also be tightly integrated with the local environment. For example, at CERN, a registration plugin manages access authorization for conference participants and their cars to the lab's premises. Similarly, Indico is tightly integrated with CERN's videoconferencing platform and facilitates creation of new virtual rooms directly from the event page, as well as the booking of related services such as webcast, lecture recording and audio–visual support. It even provides an interface to collect speaker consent agreements.

Event operation

Indico is also very useful during the event proper. Session conveners at larger conferences normally use it as an aid, because it provides a single access point from which they can collect both the timetable and the most up-to-date version of each presentation. Speakers can quickly update their materials too. Thanks to Indico, all presentations can be done using a single computer, which means less time spent switching between speakers' laptops and the occasional technical issues that come with doing so.

Information discoverability

Indico is not only a tool used daily to prepare and run meetings, but also an exhaustive record of all the meetings that took place at CERN since the tool was born. With close to 1,000,000 events stored in the CERN Indico server alone, covering activities since the late 1990s, information discoverability is paramount. Users can browse the thousands of categories that compose Indico's hierarchical structure, or navigate through several calendar-like views. But probably the most powerful way to discover information in Indico is through its rich integrated search interface, whose backend relies on Citadel Search[1], another CERN-developed product. Thanks to it, users can search both data and metadata and filter it according to their needs.

Open to the world

The evolution of Indico was not always linear, and has overcome challenges of rapid growth through improvements in performance, scalability, technology refreshing, database replacement, and finally extensibility through a plugin framework. This flexibility led the United Nations Office in Geneva (UNOG) in 2015 to consider Indico as the cornerstone of their new conference registration and accreditation system. The experience paid off and, as of the time of writing, the UN is not only working on adopting Indico worldwide, but its developers are also contributing back to Indico's core product, in a rare display of two international organizations collaborating to solve a

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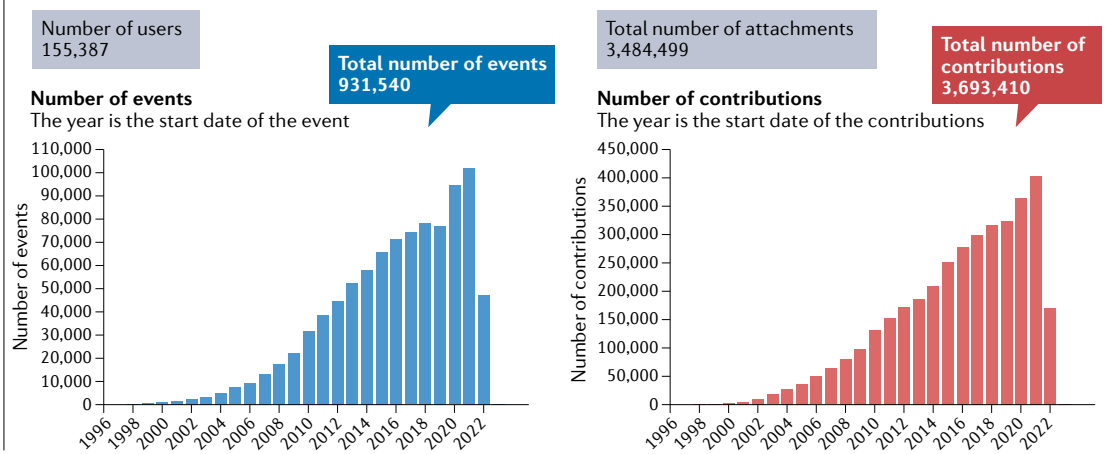
Box 1 | **Grown from user needs**

Pushing the frontiers of particle physics knowledge has meant innovating, not only in accelerators and detectors, but also in information sharing across our world-wide community. The Web[2] was created to help organize information and make it accessible to any collaborator anywhere, arXiv[3] was created to help broadcast our findings, and Indico was created to ensure the fruits of our discussions and workshops were not only available live for presentation but also safe for future reference.

The Large Electron–Positron (LEP) experiments at CERN in the 1990s already had hundreds on the author lists, but the next generation of experiments for the Large Hadron Collider (LHC) would require thousands of authors, and take decades to build. This massive and increasingly distributed workforce, spread between laboratories, campuses and offices around the world, needed better tools for collaboration, and better ways to keep records of how discussions turned to decisions to constructions to experiments to results over the decades. ATLAS, one of the LHC experiments, contacted the CERN Document Server (CDS) team to request an online repository to store their presentations and meeting minutes, and CDS Agenda was spawned. Encouraged by its utility, they requested more and more features, but when these reached the complexity of displaying parallel session event timetables it was clear a new tool was required, so we launched an Integrated Digital Conference European Project together with four partners to develop a Web platform to easily manage scientific events. The project, abbreviated as InDiCo, had its kick-off meeting on 17 May 2002. The 10,000 events already stored in CDS Agenda were merged into the new Indico service, one by one all of CERN's experiments jumped on board, and Indico took an increasingly centralized role in collaboration.

Twenty years later, Indico's resilience and longevity is due in large part to CERN's insistence to continue funding and nurturing the software after the European Project ended, continuously evolving it in line with the needs of this very challenging user community. The tool was quickly adopted by other HEP laboratories and physics institutes around the world, and by other CERN departments, extending from the scientific domain to engineering to administration to outreach, eventually serving all aspects of CERN's collaboration needs. In 2021, more than 100,000 events and 400,000 contributions (talks) were created on the CERN Indico server alone in a single year, as shown in the figure. During the COVID pandemic, Indico proved essential to seamlessly transition from physical, to virtual, to hybrid meeting organization.

The usage of Indico has grown steadily since its inception, both in terms of number of events and of contributions created yearly, with only a brief deceleration during the initial COVID-19 lockdowns. As a valuable historical archive, users have even retroactively created events in the decade before its inception, to store minutes and presentations of lasting value.



problem they have in common: managing events and preserving their own histories. Furthermore in this anniversary year the Indico team was proud to receive a "special award for effective and innovative online meetings" at the recent 7th Geneva Engage Awards event.

Today, Indico is used in more than 300 research institutes, universities and companies worldwide. An active community of service providers and developers meet through Internet forums and a chat room, sharing ideas, solutions and contributing back with their own improvements to the tool. Collaborating with strong partners and a vibrant community, we hope Indico can help serve wider and wider needs. If you too want your meetings managed, please test-drive Indico in the sandbox or go ahead and freely download and install it, to join and contribute to the collaborative community.

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2. Problem solved (probably). *Nat. Phys.* **5**, 237 (2009).
3. Ginsparg, P. Lessons from arXiv's 30 years of information sharing. *Nat. Rev. Phys.* **3**, 602–603 (2021).

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Competing interests
The author declares no competing interests.