

# ConfLab: Web-based Conference Management System with Full Lifecycle Support

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## Abstract

The article describes workflow automation of scientific conferences by Conference (Abstract) Management System software named “ConfLab” (“Conference Laboratory”). The software provides the full lifecycle of scientific conferences organization. First phase of the lifecycle includes applying papers process, reviewing and interacting between committee and participants. Second phase is output documents generation including statistical spreadsheets and publishing of the received materials in the digest by generation of the output document fully prepared for printing. The Abstract Management Systems is the efficient way to decrease routine processes and provide transparent interaction inside scientific community.

## Keywords 1

AMS, abstract management system, conference management system, ConfLab, ConfID, Conference Laboratory, scientific conferences, scholar journals, SaaS, Web-application.

## 1. Introduction

One of the major problems of the processing the applications on scientific conferences are large amount of different routine processes. It includes structuring of submitted papers during review and editing of output document that will be printed finally.

Most of conferences are submitting their papers and theses by unsuitable methods. The widespread method is developing special form that receives participant information and forwards it to organizer’s e-mail address. So, application will be stored on the common e-mail that can be accessed by organizers. This is very inconvenient way because of all applications will be stored chaotic and some of them can be lost deep inside of mailbox folders. Application stored in mailbox is not consist any metadata and application statuses. At least it impossible to achieve it in proper structured order. Thus, it’s very difficult to search demanded application by specific criteria. In other cases, there are a lot of conferences that provide only e-mail or phone submission without any web-forms at all. It’s even more increases routine tasks and decreases processing rate.

The questions of automation of the science workflow are well-described and solved by many scientists in a different way. One of the famous systems of that type is EasyChair [1]. This system become one of the first and has own Call for Papers (CTFs) directory, individual constructor of each event and reviewing module. The major lack is limited functionality in comparison with modern requirements of cloud solutions of the kind and absence of contemporary technological design. Some conference systems oriented on a local market: UTILCONF [2] for Spanish-speaking market and eConf [3] and OPSS [4] for Indonesia. In other hand, conference systems MyConfree [5] and OpenConf [6] are open-source solutions but there are no any SaaS versions of it. The main feature of such services should be full lifecycle support but only few services could provide it in a high quality. For example, EDAS [7] system can also generate badges and CD-ROM content and program of the

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event. But this system doesn't provide the digest generation. Some of the systems emphasize on the special features. For example, authors [8] developed a document confident related system. Automatic clustering positioning [9], assigning papers to referees [10] and evaluating of conference using Machine Learning, [11] are positioning as the major features in the appropriate works. A detailed overview of other systems is described in [12].

In the paper we are decided the method of full lifecycle workflow automation applicable to scientific conferences and scholar journals. The practical side of the method has implemented in software deployment of conference management system "ConfLab" [13] or "Conference Laboratory". As described above there are a lot of other similar systems and it successfully used for a long time. But all of them do not have the full life cycle support based on modern design principles and with additional features on each stage. We are divided lifecycle into two main stages.

First stage implies interaction inside a scientific community [14] and involves potential participant or authors of the papers and editorial board who should review the application while submission process continues. When the author submits the paper it saved in the database and can be reviewed immediately by editor who can point the author to his mistakes in formal issues or even provide full scientific article review. After such editing a reviewer can choose the action for application: accept, decline or send it to revision.

Second stage related with creation of the output documents. We are tried hard to fully optimize that process by generation of such documents automatically. The most important document of each conference or journal issue is the digest of all reviewed papers or journal imprint. Such document will be fully generated by ConfLab with proper styles and consists each article followed one by one with all headers (subject, author's information, keywords) and the essential text. All articles sorted by their section in alphabetical way. Output document with minimal corrections can be sent in typography for printing. Thus, the author no longer need to download and edit a pre-prepared template.

So, we are almost fully minimized routine tasks in reviewing and publishing as well. Automation of scientific workflow will start with implementation of conference management systems as the key part of evolution of the scientific communities by focusing them exclusively on content of the papers.

The portfolio of the conference sites hosted by ConfLab freely available at: <http://conflab.ru>. The conferences supported both English and Russian language. It could be extended by other languages as well. Each site hosted on different domain. So, the conferences hosted independently from each other but powered by unified platform that allows to make data exchanging that could be used to generate the summary statistics.

Figure 1: Example figure

## 2. Project Deployment

First of all, conference host or executive editor has to create his own environment to manage the applications from authors by the proposed system. The deployment of the system is divided into four steps:

1) *Fill the form with details of the conference or journal*

Future administrator of the project has to provide full information about his journal or conference. It includes name, description topics, date of submission, location, partners and etc. That information can be published on demand in the public directory on the official website of ConfLab.

2) *Choose the domain type*

Each project will be published on the separate website that has public pages about event or journal. Such pages can be edited by creator through the internal WYSIWYG-editor. Domain name for a future website can be registered in local zone or in any top-level domain.

3) *Choose key dates and deadlines*

To provide a full lifecycle of the event we have to identify key dates of each stage. There are following types of dates:

- a. *date of the beginning – when the conference will start of paper submission process;*
- b. *submission deadline – when the conference stops paper submission and goes to paper review;*
- c. *reviewing deadline – when editors stops reviewing received papers and participants can't make changes anymore;*
- d. *archivation date – when nobody can make changes to event or journal issue. It archives the conference with the whole content in a public directory. The whole content of the conference could be downloaded as archive in future.*

4) *Split the conference by sections and provide section names*

If the administrator has a big conference with a lot of topics, it is possible to divide the event into different sections according to the topics respectively. Responsible persons could be also delegated to each section for its management in future. Such persons will have their own permissions to review and moderate application flow inside the section.

Created sections can be customized according to their features and not limited with their topics. For example, section could have a different language. Such section will be showed only for users who choose that language in their setup options. Or it can be separated by age, location or other info. Each section by default follows the project key dates and deadlines but it also can be reconfigured individually. And the major feature of unique fields is based on global fieldset but also could be customizable (see next).

After all preparations, administrator gets fully functional website based on provided information configured from basic template. The template engine implemented in project is Smarty. So administrator can edit theme with Smarty syntax and put particular info generated by business-logic of the system.

List of users

ID	Name	Email	Reg date	Log date	Role	Control
25	Кейно П.П.	pavel@conflab.ru	2018-01-09 12:23:34	2018-05-05 13:11:47	Administrator	
70	Новиков А.Ю.	novikov@conflab.ru	2018-01-09 16:29:30	2018-05-12 10:59:48	Administrator	
143	Червяков А.А.	mwyoin8q@yandex.ru	2018-01-09 13:16:38	2018-04-04 12:45:12	Secretary of 8.4 Section	
150	Некрасова П.Г.	rxo290@mail.ru	2018-01-09 13:17:36	2018-04-04 13:50:04	Administrator	
155	Столяров И.В.	fq3ox@mail.ru	2018-01-10 17:32:35	2018-01-10 17:39:38	User	

Appointment as secretary Banned

Figure 2. List of users with their roles

Automatically generated public pages include conference summary, agenda, committee contacts and other.

### 3. Theses Management

#### 3.1. User Roles

Each user of the conference has the access to the unified control panel. The permissions of the user will be defined by his role. The system has several user roles that strongly describe actions allowed for each user:

- 1) *Project administrator* – this status will be automatically given to creator of the project. This role has the greatest authority for project management and includes all permissions of other roles. Administrator can assign other administrators and section supervisors.
- 2) *Section supervisor* – the person who provide theses review and formal conformity checking. He can accept or decline the received paper, transfer it to another section or send it to revision. All of the fields filled by applicant can be edited by section supervisor.
- 3) *Applicant* – the person who can send his paper for reviewing. He can watch on the status of his application and see all of the notices of section supervisor.
- 4) *Guest* – person who wish to participate in the conference as a listener.

#### 3.2. Status History

The main part of the first stage of conference lifecycle is paper review. All of submitted applications will be reviewed and checked for formal conformity several times. During that process the application can have many process iterations and each iteration must be accompanied with proper status. There are following types of statuses:

- 1) *Accepted* – the paper successfully accepted and will be published in the digest or journal;
- 2) *In processing* – the paper under review now and reviewer will provide their corrections and notices later. The applicant can make any changes while the status is applied;

Date	Status	Description	Secretary
24.02.2018 15:28	Approved	We are waiting for you at the meeting of the section!	Гордеева М.И.
22.02.2018 20:18	Processing	Application updated. Updated files: Consent to the processing of personal data.	Новиков А.Ю.
21.02.2018 18:43	Incompleted	You must attach a signed consent to the processing of personal data.	Гордеева М.И.
20.02.2018 23:54	Processing	Application has been successfully submitted, please wait for the result.	Новиков А.Ю.

[Watch the full status history...](#)

Figure 3. Application status history

- 1) *Incompleted* – the reviewer has made some notices and corrections to the application. It can be formal notices of the provided information or corrections related to the content of the paper;
- 2) *Declined* – the reviewer completely rejected the paper due to the gross violations or the paper does not correspond to the subject of publication or specific rules of the event. The applicant can't be changed and modified anymore.

Each application consists the status history, so every related person can overlook the application status and get a full understanding of application reviewing process. Each of statuses followed by short comment including automatic comments provided by the system.

For example, all fields where participant made his changes will be reflected in automatic comment. Notifications about status changing will be sent to all users by e-mail involved in application processing. Finally, it helps applicants correct their work properly and helps supervisors from scientific community check all received works carefully so it totally excludes applications loss.

### 3.3. Flexible Field Model

Various events or journals can demand different set of input fields for applications. Flexible field model is the key feature of the ConfLab conference management system. It provides special interface to customize a fieldset that includes: type, name and other kind of options. Full list of options is:

- 1) *Type* – option that similar to HTML-inputs and provides a proper view of the field in forms and respective validation.
- 2) *Label* – text caption of the field displayed nearby input.
- 3) *Description* – hint that also displayed near input field.
- 4) *Required* – this option specifies that field is obligatory be filled by user. It has also third state that specifies that field can be filled later. In that case application will be saved with “Incompleted” status.

**Figure 4.** Visual field editor

- 1) *Restrictions* – specifies additional validation rules based on regular expression pattern or file extension (in case of file field).
- 2) *Options* – specifies additional options for specific types of fields. It has JSON-array with key-value pairs. For example, this field can specify a set of values for listbox or radiobox.
- 3) *Sort* – specifies the order of a field in the form;

- 4) *Spreadsheet* – if true, the value of the field will be added to output spreadsheet (for example in Excel format) generated later;
- 5) *Borrowing Check* – this option specifies value check of a field for borrowings and plagiarism via external services.

The described model is universal and specifies the different kinds of fields for each section particularly or for conference globally. The specified fields will be processed individually based on their options. The model allows to describe any dataset of any conference and can be used in a very flexible way via metamodeling nature [15]. Every time the system will build a proper algorithm of data processing with interpreted metamodel.

Visual editor provides easy-to-use interface for making such metamodels graphically and does not require any programming or web-developing skills. The developed metamodels has multidimensional configuration that makes it flexible and universal with multiple ways of using.

### 3.4. Plagiarism Search Services Integration

Reviewer usually would like to know originality of each paper and make sure that he reviews authentic work that has not been stolen from third-party sources. It can be very powerful tool with having some hypothetic scale that allows to measure in observable units the scientific cost of the paper.

The system has some arrangements of integration with an external services aimed at searching incorrect borrowings of papers from public databases. Conflab interacts with such system named RuContext through the simple REST-API protocol.

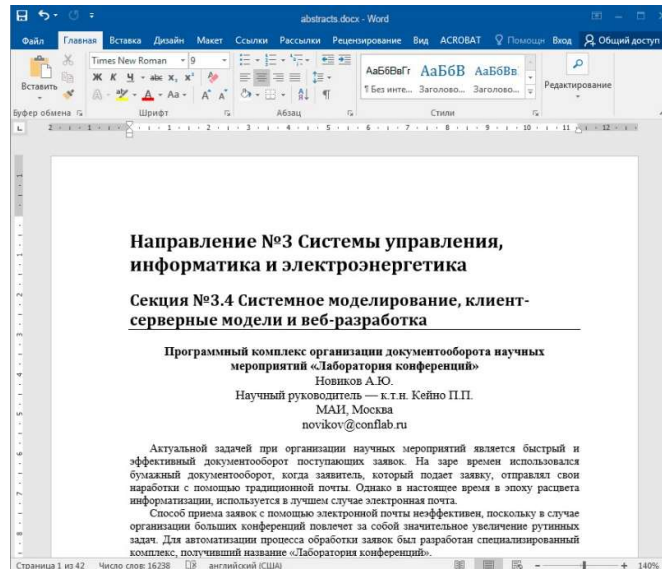


Figure 5. Generated collection of theses

The script is called every 15 minutes by crontab scheduler. It sends unchecked works to external server through API for deferred processing. It's a very useful way to distribute the load between several services and reduce potential delays during execution.

The script has developed using adapter pattern in proper class. It makes possible to implement of other borrowing check services due to unified programming interface with a special set of functions and properties. It's enough to rewrite business-logic of the class for migration to other services. So, any administrator can develop preferred borrowing checking service plugin or choose it from the library of plugins developed earlier. Dataset that will be sent to borrowing check depends on

respective option of fields (see above). It is possible to check attached files in standard text document formats.

#### **4. Output Processing**

Most conferences finally publish all their theses and articles in the digest as result of their work. The major lack of the process is layout of the digest or journal that usually made manually. The goal of the conference management system is to automate this process. ConfLab will generate output document in Microsoft Word format with the all accepted theses. Each thesis will be published separately with proper styles and indents. Beside the theses, output document will have cover, table of contents, subject index and more. It could also have pictures that properly putted into their places with correct formatting if necessary. All major changes will be made during review process.

So, administrator does not need to make any changes in document. He could only put minor corrections before it will be sent for printing to publishing services.

Statistical spreadsheet with participants and their accepted papers also can be generated by ConfLab. As described before, each field of the thesis can be marked as exportable for spreadsheet. So, such fields will be generated in output spreadsheet in Microsoft Excel format. Of course, it gives unlimited opportunities for data analysis with building of analytical graphs, summary tables and so on.

At the end of the conference committee wants to cheer best participants and award them by memorable diplomas and certificates. Printing of diplomas is also routine process. In the system there is functionality that allows to award user application in control panel. So, the certificate will be generated automatically with the name of the section and participant. It can be downloaded from the control panel in PNG, JPG, SVG or PDF format and printed by participant or organizer.

There are several types of awards: 1st place, 2nd place, 3rd place, winner, gratitude for conference organizing and more. Administrator can create user-defined types of awards and with visual editor choose a position of text, font and size of sign and other options.

Described principle can be used for generation other types of related documents: badges, posters, handouts, agenda, official protocols and more.

#### **5. ConfID: Science Portfolio Network**

Conference management system ConfLab has developed for scientific events and journals and can be used to organize a lot of events as described above. So, user achievements should be stored in one place to accumulate the portfolio individually for each user. All achievements separated by type of participation and level of presented work.

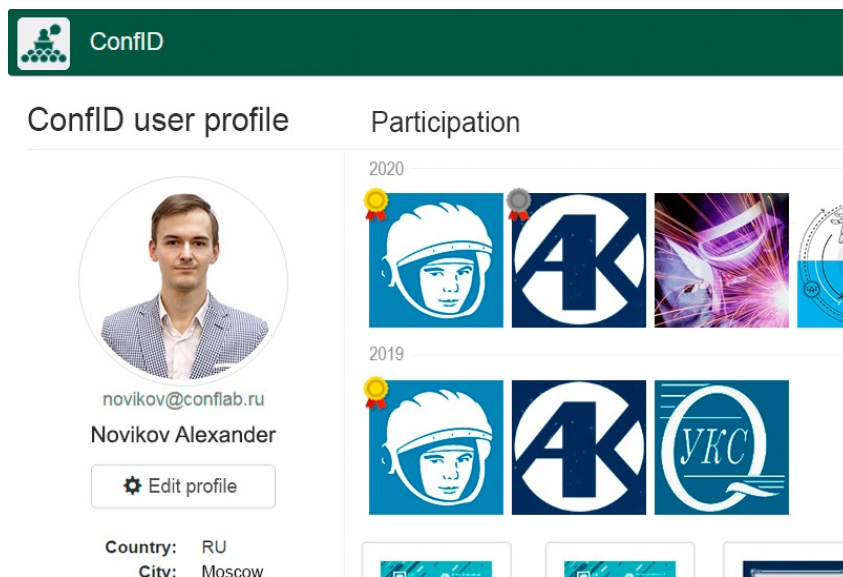
There are several kinds of participation types. User can be full or extramural speaker of the conference, organizer or just guest. All actions and roles of the participation will be saved in user portfolio [16].

Award degree is also reflected in the profile. For example, if the participant has been noted with 1st place as speaker for outstanding work it will be specially highlighted in his portfolio.

Portfolio plays unifying role to make scattered scientific communities acts together. It enforces scientific exchange and relieves unlimited possibilities for search other colleagues with flexible search system.

It is necessary to provide data synchronization process to accumulate a user portfolio in ConfID by the end of lifecycle of each event. ConfLab project initializes the data transfer interface as a result of

which the ConfID will receive a JSON object in a special form which stores the information about the event.



**Figure 6.** ConfID user profile

ConfID successfully solves also the social function. Each author and scientist could easily share their own achievements like publication of science papers, results of participation in conference proceedings, awards, patents, grants, etc. Moreover, all users could communicate with each other by creating their own scientific communities and research networks.

## 6. Video conference service

The epidemiological situation has made serious adjustments to our life, imposing restrictions on the holding of mass events [17]. In this regard, the format of most of the planned scientific conferences was changed to a remote one. As a result, the organizers had to search for solutions for the transition to the new format [18].

The services like Zoom, MS Teams and others have become widespread. However, these services have some drawbacks. Limits on the number of participants and session duration, as is the case with Zoom, and the unfriendly MS Teams interface [19].

It is also worth noting that the use of third-party products complicates the process of registering users, adding tasks for moderators to check the list of participants.

The authors have implemented the online video conferencing mechanism as a separate service integrated into the software package. Its functionality included increasing accessibility for participants who are away from the venue. Currently, the relevance of expanding functionality in this direction has increased like an avalanche. As a result of the analysis, the open source software BigBlueButton was chosen, the main concept of which is that “the beginning of the conference should be as simple as pressing the blue button”. This software is designed as a video server module, which has a positive effect on the ability to integrate with other services like ours.

The function of recording speeches is in great demand, which will give an opportunity to access scientific discussions to those scientific colleagues who, for some reason, could not be presented online. In most cases, this task is solved by publishing a recording on a video hosting site, which is not always convenient for those who want to get acquainted with the speech of only a certain speaker. Since the real time of the presentation almost never coincides with the schedule of conferences, it is



not possible to predict the exact time stamp. Therefore, a label management interface has been added for the moderators of the video room. During the event, it is possible to add a time point, indicating, for example, the beginning of the next speaker. Then, after the end of the online meeting session, video and audio streams will cut according to the intervals, then presentation slides, marks made with drawing tools, and the coordinates of the pointer cursor are divided into fragments. Further, different types of data are combined for each fragment, forming a link that can be used to play the recording for the selected speaker.

Conducting international online conferences requires precise synchronization of meeting timings. For this, a mechanism is provided for the automatic generation of the program of events, taking into account the time zone of the participant. Support for multiple video rooms has been implemented, as well as viewing modes: general schedule, program by day, program by session.

## 7. Conclusion

Abstract management systems are the essential part of automatization of document workflow during the whole lifecycle of such events. Authors proposed the new toolkit which provides an automatization on each stage from applying the paper, their processing and publication.

The most important thing is to provide useful toolbox for construction event configuration that consist the visual editor which allows to choose a number of sections and subsections, a fields with proper type include a special file attach fields with its own options. Administrator can choose additional properties of each field such size, file type, character counter and other. So, it provides a flexible interface that can be customized in a various ways depended on purposes of event organizers. Special user roles could be successfully assigned to users who should be administrators, secretaries or other members of organizing committee. Processing of each paper has own history of changes that allows to trace the review process from submitting to publishing. To unite scattered science communities and individual research fellows ConfID project has developed by authors. It allows accumulating the whole science portfolio of each scientist and sharing it with others to make an interchange of the knowledge between each other.

Authors developed a complex software as a service system (SaaS) to automatize the workflow with full lifecycle support and collect the whole achievements during science activities into one own portfolio. All of it is a main part of digital transformation process according to the world-wide tendencies.

## 8. References

- [1] EasyChair, 2019, Conference Management Using EasyChair. [Online]. Available: <https://easychair.org/cfp/>. [Accessed: 27 Jan 2019].
- [2] Castillo-Velazquez J. I., Trigueros-Galicia M. I. "UTILCON 1.0: A Conference Management System trainer in Spanish with strict refereeing control" in IEEE XXVI International Conference on Electronics, Electrical Engineering and Computing (INTERCON). – IEEE, pp. 1-4, 2019.
- [3] Ahmar A. S. et al. "eConf: an Information System to Manage the Conference" in Journal of Physics: Conference Series. – IOP Publishing – Vol. 1028. – no. 1. – pp. 012044.
- [4] Rotikan R. "OPSS: Online Paper Submission System Untuk Kegiatan Konferensi Ilmiah" in Cogito Smart Journal. – Vol. 2. – no. 2. – pp. 229-239, 2016.
- [5] Santiputri M., Agustin N. S., Delimayanti M. K. "MyConfree: a web-based conference management system" in International Conference on Applied Engineering (ICAE). – IEEE – pp. 1-4, 2018.
- [6] OpenConf Conference Management System [Online] <http://www/openconf.com> [Accessed: 27-Jan-2019].
- [7] EDAS Editor Assistant [Online]. Available: <http://edas.info> [Accessed: 27-Jan-2019].

- [8] Kanav S., Lammich P., Popescu A. “A conference management system with verified document confidentiality” in International Conference on Computer Aided Verification. – Springer, Cham – pp. 167-183, 2014.
- [9] Kalmukov Y. et al. “Automatic Clustering of Papers in Thematic Fields and Working Sessions” in TEM Journal – vol. 6. – no. 2. – pp. 315-325, 2017.
- [10] Mehlhorn K. “Assigning papers to referees” in International Colloquium on Automata, Languages, and Programming. – Springer, Berlin, Heidelberg, – pp. 1-2, 2009.
- [11] da Silva Almendra, Vinicius, Denis Enăchescu, and Cornelia Enăchescu. "Ranking computer science conferences using self-organizing maps with dynamic node splitting." in Scientometrics 102.1 pp. 267-283, 2016.
- [12] Ware M. “Online submission and peer-review systems” in Learned publishing. – Vol. 18. – no. 4. – pp. 245-250, 2005.
- [13] Novikov A., Keyno P., Khoroshko L. Architecture development of internet-service for science conferences organizing with workflow automatization. Prikladnaya Informatika — Journal of Applied Informatics, 2018, vol. 13, no. 4 (76), pp. 70–76 (in Russian).
- [14] Chan L., Loizides F. (ed.). “Expanding Perspectives on Open Science: Communities, Cultures and Diversity in Concepts and Practices” in Proceedings of the 21st International Conference on Electronic Publishing. IOS Press, 2017.
- [15] Ströele V. et al. “Data abstraction and centrality measures to scientific social network analysis” in IEEE 21st International Conference on Computer Supported Cooperative Work in Design (CSCWD). – IEEE. – pp. 281-286, 2017.
- [16] Novikov A., Keyno P. “Heterogeneous data collecting in scientific communities using portfolio management system in ConfID service” Prikladnaya Informatika — Journal of Applied Informatics, 2020, vol. 15, no. 2 (86), pp. 28–36 (in Russian).
- [17] Gegenfurtner, A., Zitt, A., & Ebner, C. (2020). Evaluating Webinar-Based Training: A Mixed Methods Study of Trainee Reactions Toward Digital Web Conferencing. International Journal of Training and Development, 24(1), 5-21.
- [18] Sandars, J., Correia, R., Dankbaar, M., de Jong, P., et al. (2020). Twelve Tips for Rapidly Migrating to Online Learning During the COVID-19 pandemic, MedEdPublish, 9, [1], 82.
- [19] TechRadar (2020). Best Video Conferencing Software in 2020. URL: <https://www.techradar.com/best/bestvideo-conferencing-software>.