Community Usage of the Online Conference Service: *an Experience Report from three CS Conferences*

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Abstract: In this paper we report on a field experience in the usage and support of an advanced Online Conference Service (OCS) as a virtual Program Committee organization tool. Three communities of users (bound to computer science conferences) were involved: they served as beta tester, and as impulse giver and validators of the stable features of the Version 3.0 of the online platform. Important is the observation that these communities are directly comparable and representative of the general setting in this application domain: this is to our knowledge the only quantitative study in this application area. Here we document and discuss the service usage patterns of the three communities, we describe the observed phenomena for weekly, daily, and feature-specific usage, and discuss the results and lessons learned.

1 THE FIELD EXPERIMENT: MOTIVATION AND SETTING

In this paper we report on experiences and observations gained this Fall in the course of an experimental study in the field, concerning virtual communities constituted by Program Committees of scientific conferences that operate exclusively online (i.e., without a physical PC meeting). The motivation for this study was to carry out a larger field test on the usability of our service under normal workload and usual deadlines conditions. We wished to gather comparative data concerning the usability and acceptance of the service we developed, and to gain insights on usage patterns in virtual Program Committee operations. Program Committees operate on a voluntary basis, and the quality of refereeing strongly influences the quality of the conferences. It is thus important for the entire scientific community to dispose of optimal, state-of-the-art support for the parties involved in the

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screening of scientific content: this ultimately determines the attractiveness and value proposition of our scientific conferences.

During the period September 2001-January 2002 METAFrame Technologies supported¹ the virtual Program Committee operations for three events affiliated to ETAPS 2002. ETAPS, the European Joint Conferences on Theory and Practice of Software², is a loose and open confederation of conferences and other satellite events which established itself as a primary European forum for academic and industrial researchers working on topics relating to Software Science.

Two main events (the conferences FASE³ and ESOP⁴) and a satellite event (the SPIN⁵ workshop) used the METAFrame Online Conference Service (see [3, 4, 6]), an advanced online information system specifically designed for the process-based support of virtual Program Committee operations. It helps the corresponding community definition of scientific conferences, to collect and review the submitted contributions, to support the Program Committee's decision phase, and to collect the final version and pass the information to the proceedings composers. Altogether, this field study involved around 200 users in five different roles, and treated 154 full paper submissions (See Tab. 1).

Conference/ Workshop	Chairs	Com- mittee	Sub- missions	Users	Period [d]	Logfile [MB]
ESOP 2002	1	15	74	89	108	90
FASE 2002	1	15	56	71	108	65
SPIN 2002	2	17	24	41	87	32
total	4	47	154	201		187

Table 1: The Field Experiment Setting

The Online Conference Service (OCS) was hosted at METAFrame Technologies in Dortmund, where a dedicated support team composed of an ap-plication domain expert, a service expert, and a system and technology expert, ensured the smooth operation of the service and of the three virtual program committees. The team offered basically second-level support: the PC Chair (or Administrator) were the first contact point for each

¹ This experiment was financially supported by the Springer Verlag Heidelberg.

² See <http://www-etaps.imag.fr> for full information on this year's ETAPS.

³ FASE : *International Conference on Fundamental Approaches to Software Engineering*, see www.cis.cs.tu-berlin.de/~fase2002/index_general.html.

⁴ ESOP: *European Symposium On Programming*, <http://www.trusted-logic.fr/esop2002/>

⁵ SPIN2002: *Intern. SPIN Workshop on Model Checking of Software* (<http://tele.informatik.uni-freiburg.de/spin2002/>).

community (for Authors and PC Members), and forwarded to the support team only questions exceeding their current knowledge.

Our constellation was therefore unique:

- the *service developer*, coincident with the service hosting institution, has clearly strong interest in an experimental analysis of its usage.
- we were able to *simultaneously observe* three *comparable* communities: in the context of a larger community, (e.g the yearly ca. 250 conferences with proceedings appearing in the Springer Serie *Lecture Notes in Computer Science*), these communities had average size (central parameters are the size and average spread of the PC),
- given the common affiliation to ETAPS, they additionally had *fairly synchronized deadlines* and jointly adopted the ETAPS guidelines for *program committee policies*,
- each community is *representative* of a significant research field (i.e. worldwide distributed active subcommunities) and together representative of the technology-affine group of the LNCS community,
- given the co-located hosting, we observed them under the *same experimental conditions* (actually, the services run independently, on the same machines, with the same internet connection, thus sharing the same hardware and software): potentially significant difference factors which in principle may invalidate the comparability of behavioural observations were thus absent.

The collected access data from the log files accompanying the operation of the single services tracked time-stamped access to the single features and to specific relevant pages within the service in an anonymous way. The only information we cannot reconstruct is the correspondence between users and actions (a design criterion for the service), but the data is sufficiently detailed to analyze profiles for roles, conferences, time slices, and to study access and usage patterns. The basis data are reported in Tables 1 to 3, and diagrams evidence interesting patterns.

In the rest of the paper, we briefly describe the features of the Online Conference Service and our previous experiences (Section 2), then we report on our observations and experiences (Section 3), discussing the data evaluation methodology (Section 3.1), and comparing the behaviours of the three communities concerning service access patterns (Section 3.2) and usage of the service features (Section 3.3). Finally we discuss related work (Section 4) and draw conclusions in form of some lessons learned (Section 5).

2 THE ONLINE CONFERENCE SERVICE

The Online Conference Service (see (Lindner, 2001) for a description of the service and of its method of development) offers a fully customizable, advanced role-based business-process support and it is tailored for personalized support of each participant in the course of the operations of a virtual Program Committee. The thorough flexibility is evident from the fact that the service is customizable and flexibly reconfigurable online at any time for each role, for each conference, and for each user. The service's capabilities are grouped in **features** typically assigned to specific **roles**.

2.1. Role Description

The traditional roles in a scientific conference are (see Tab.1):

Program Committee Chairperson (PCC), responsible for running the PC, for review allocation, report collection, discussion moderation, final decision and composition of the conference scientific program,

Program Committee Member (PCM), responsible for peer review of the assigned submissions, report submission, participation in the collective successive paper selection process, resulting in the conference program,

Author (A), responsible for the submission of original contributions and, upon acceptance, of a revised final version conform to the conference standard layout and publisher's copyright policy, and

Administrator (Admin), responsible for the management aspects of the service. This concerns set up and customization of the service for the specific conference, and management of users, roles, rights, deadlines, conflicts, newsgroups, settings for the automatic e-mails, and other less frequent tasks. Due to the varying distribution of management tasks between the PCC and Admin roles in the observed communities, we joined the two roles in our statistic (indeed, in two of three cases the same person covered both roles).

The features are primarily allocated to the roles, and can be fine-granularly tuned for conference-specific policies. In this paper we concentrate the analysis on the principal features, which we briefly present in Sect. 3 together with the experimental observations and our analysis.

2.2. OCS Usage

So far, the Online Conference Service was used to support 11 international virtual Program Committees, all of them in Computer Science but with different sizes and policies. Among the supported PCs, 8 of them were international conferences and workshops, the largest with 140 sub-

missions and 157 users, and 3 events had minitrack character (with about 15 submissions and 30 users each). Altogether, we handled so far 560 submissions and 740 users, of which 17 were PC Chairs and 180 were PC Members.

3 EXPERIMENTAL OBSERVATIONS AND ANALYSIS

3.1. Data Evaluation Methodology

The presented evaluation is based on three logfiles of the OCS server. Each logfile that was evaluated covers the days from September 2001 to January 2002 (from its service installation day till confirmation by the PC Chairs that all final version had been successfully received). About 39.013 server accesses had occurred altogether in this period, resulting in three logfiles of more than 182 MByte.

Each entry of the logfile has essentially the structure

<date and time><logtype><operation descriptor><operation id>

where

- <date and time> specifies the date and time when the operation was carried out
- <logtype> gives information about the kind of logging,
- <operation descriptor> describes the operation that was carried out, and
- <operation id> identifies the id of the operation.

The following example is an excerpt of a logfile.

02.11.01 17:57 DEBUG executing code of SIB ShowArticleList

This line logs a potentially debug-relevant activity and indicates that an operation *ShowArticleList* was executed that at the given date and time. This and similar information was the basic data for the evaluation.

Due to the particularly accurate conditions of our data collection (based on controlled, structured, complete datasets), no spurious records needed to be purged. To obtain the relevant aggregated data discussed in this paper, all three datasets were separately processed in the same way, in order to keep their comparability. To this aim, we proceeded in two successive phases:

- 1) the raw logfiles were first filtered by the help of a perl script. This script considered only "debug" lines of the logfile, each of which indicates that a significant action has been executed. They all conform to the structure of the example above. This program computed the total, hourly, and weekly accesses for each operation and wrote the results into a file using an intermediate format.

- 2) A second perl script analysed these results: it mapped each operation-id to a feature and converted the results into a comma-separated-values (csv) format. An excerpt of a generated csv file as follows
Weekly,	Mo,	Di,	Mi,	Do,	Fr,	Sa,	So,	Total
Feature articles,	429,	368,	232,	287,	767,	192,	56,	2331
Feature evaluation,	157,	158,	79,	89,	98,	48,	22,	651
Feature users,	377,	155,	194,	109,	135,	69,	33,	1072

shows the aggregated daily usage of the article, evaluation, and the users feature. This format was used to import the data into Excel, where further evaluation of the data and graphical display has been carried out.

The OCS system allows also some anonymous access: a public area that contains general information on the conference, sponsors etc. is reachable without registration. Users do not have to log in with a user name and password in order to reach this information. This "unregistered" usage does not involve any service feature, so it does not provide information about the behaviour of actual users of the system. Accordingly, such anonymous access is not logged and thus it is not included in the here considered data: we report here on the service usage statistic, and not in general on the access to the conference website.

In the following, the analysis is usually split per user group. De facto, the PCC users were the real power users, the PCM users were qualified users, and the A users quite lightweight users of the service.

3.2 Usage Statistics

The general usage data are resumed in Table 1 and illustrated via diagrams in Figures 1 and 2 to illustrate the absolute activity registered in each conference community, measured in number of sessions started (i.e. login feature executions) and their daily and hourly distributions and variations.

3.2.1 Weekly Community Behaviour

Figure 1 shows the distribution of session starts observed for each community, where data is aggregated according to the day of the week.

- With a total of 2536 logins is ESOP the largest conference, followed by FASE with 1745 and SPIN with 927 (see Table 3 in section 3.3.2).
- The communities had quite a difference usage pattern in the week: with 1128 session starts was Friday the hottest day, followed by the mid-week days (Wednesday 1042 and Thursday 952).
- Weekend activity was present and significant for all communities, varying between 5% and 11.8%.

Individual differences in the weekly usage pattern emerge if we observe the percentual diagrams for session starts in each single community. This is shown in Fig. 1 (normalized daily login distribution): while SPIN shows a typical "bell" curve, with strongest activity on Wednesday and Thursday, FASE's bell shape is corrected with a Monday *peak*. ESOP shows a completely different u-shaped contour: Friday and Monday are the hottest days.

As a consequence, we see that a "24x7" service provision modus concerning both service and support availability is of central importance: the typical weekday patterns for e.g. university-based technical staff (Mon-Fri, with early Monday traditionally devoted to system servicing and weekend start earlier on Friday afternoon) is here clearly insufficient.

Indeed, we observed that most support requests happened in the border time intervals, with a peak on Friday afternoon.

Figure 1: Session activity per week day: **normalized** (percentual) data per conference

3.2.2 Daily Community Behaviour

As evident from Figure 2 (reporting the normalized hourly login distribution), the *hot hours* were for all communities concentrated during the European working hours (8.00 to 19.00 GMT+1). This is not surprising, since the conferences are associated to ETAPS, a European event.

Still, activity outside this interval was significant:

- The *evening hours* (19.00 till 24.00) counted for an aggregated 16% of the total activity: it is evening in Europe and afternoon in the USA,

which means that virtually all PC Members of the observed communities could be simultaneously active.

- The *night and early morning hours* (0.00 till 8.00) still had significant incidence: they accounted for a global 6,6% of the sessions.

Here too different time zones, mobility, and different personal patterns of use concur in requiring for a continuous service availability: even at the lowest usage time-slice we still observed altogether over 30 sessions starts.

Figure 2: Normalized daily session activity (aggregated per conference on an hourly basis)

3.3 Usage Patterns for Roles and Features

Concerning the usage inside a session, we aggregate data according to roles and content-features (i.e. non-login features). Table 2 lists the central features, the roles they concern, and for each community their feature usage (measured, percentual, and average per user (column apu)).

In the following, we analyze some observations concerning the usage of single features and their incidence in relation with the roles, and comment some global observations pertinent to the single communities.

3.3.1 Usage per Feature

As evident from Tab. 2, the top feature was *Articles*, followed by *Tasklist* and *Users*. This is related to the fact that *Articles* is a central feature for all users, while *Tasklist* and *Users* are central features for the PC Members and PC Chair, who are responsible for the bulk of the service usage.

We examine in the following the single **management features** in the order of their average percentual relevance.

- 1) **Articles:** it consistently constitutes over 30% of the non-login activity. Here we consider as additional figure the number of accesses per user⁶ (apu column in Tab.2). ESOP made exceptionally strong use of the Articles feature: 121 accesses in average for each non-author is a high figure, explainable if we consider that the Article overview also contains links to activities like report submission or paper delegation that go beyond just going to each article's page.

Feature	Roles	ESOP20002				FASE2002				SPIN2002			
		u	total	%	apu	u	total	%	apu	u	total	%	apu
Articles	PCC, PCM, A	89	2331	35,4	121	71	1557	32,6	78	41	1089	30,5	54
Conflicts	PCC	1	57	0,9	57	1	45	0,9	45	2	59	1,7	30
Delegation	PCC	1	189	2,9	189	1	331	6,9	331	2	156	4,4	78
Email	PCC	1	18	0,3	18	1	15	0,3	15	2	44	1,2	22
Evaluation	PCC, PCM	15	651	9,9	43	15	591	12,4	39	17	404	11,3	24
Preferences	PCC, PCM	15	18	0,3	1	15	19	0,4	1	17	30	0,8	2
Profile	PCC, PCM, A	89	142	2,2	2	71	74	1,6	1	41	77	2,2	2
Reports	PCC, PCM	15	356	5,4	24	15	302	6,3	20	17	263	7,4	15
Roles	PCC	1	173	2,6	173	1	93	2	93	2	84	2,4	42
Search	PCC	1	11	0,2	11	1	15	0,3	15	2	1	0	1
Setup	PCC	1	44	0,7	44	1	108	2,3	108	2	275	7,7	138
Staff	PCC	1	44	0,7	44	1	40	0,8	40	2	37	1	19
Tasklist	PCC, PCM	15	1485	22,5	99	15	951	19,9	63	17	591	16,6	35
Users	PCC	1	1072	16,3	1072	1	635	13,3	635	2	456	12,8	228
total			6591	100	1898		4776	100	1484		3566	100	690
apu indicates the average usage per user										u = users			

Table 2: Feature Usage - Collected data (measured, percentual, and average per user)

- 2) **Tasklist:** with ca. 16% to 22% of the overall feature activity, it is consistently the second frequently accessed one. The difference in the usage per user among the communities is not extreme and it is a good indicator of the average activity of the PC Members in the different communities.

⁶ The apu figures in Fig. 7 indicate in the *Article* case the usage per *qualified* (i.e. non-Author) user: they are purged of the minimum authors' use.

- 3) **Users:** it is the default feature reached after login by the PC Chairs. It was used by the PC Chairs to define users and roles for their PC Members (which required several uses of the feature), and later to assign new passwords to users who had forgotten it (one of the main support activities). Indeed, the ESOP PC Chair was very active, and closely monitored the evolution of the community through the service: this PC Chair activity indicator well reflects our observations as support team. The fact that SPIN distributed the responsibility of the abovementioned tasks over two people (one mainly acting as PC Chair and one mainly acting as Admin) partly explains the relative low incidence of this feature per SPIN user.
- 4) **Evaluation:** Measuring that this feature consistently scored as strongest non-default one (10% to 12.5%) confirms our intuition that the evaluation matrix offers the central view to the PC Members as well as the central overview and operation center for the PC Chair. In short, it is the comfort feature for all the power users of the service.
- 5) **Reports:** according to each conference's policy, 3 to 4 reports were requested for each paper. Reports were accessible online at any time to the PC Member who authored them and to the PC Chair. They were accessible online to the Authors once the results were published, but, more importantly, available to all PC Members of a conference during the discussion phase. In fact, the whole discussion in the Newsgroups was started and carried out in relation to the scores published in the evaluation matrix, but more importantly according to the contents of the referee reports, which were thus heavily and repeatedly consulted by the whole PC.
- 6) **Delegation:** this feature concerns the selection of reviewing PC Members by the PC Chair, and determines the entries in each PC Member's tasklist. The usage correlates very well with the 3 reports policy adopted by ESOP and SPIN, with little additional access due to PC Chair deadline and conflicts checks. On the contrary, FASE had a significantly higher delegation activity (average close to 6 delegations per paper vs. average of 3 for the other conferences). Two causes concur here: 4 reports were initially aimed at, and, due to difficulties by some PC members in their refereeing activity, a significant reassignment phase took place. In this exceptionally fluid situation, being able to delete delegations and to reschedule single deadlines helped the PC Chair to maintain the overview.
- 7) **Setup:** this feature was particularly relevant for SPIN: here the Administrator carried out the complete service configuration himself. For the other conferences the initial set up had been prepared by the support team prior to service publication so that the PC Chair and Admin then just used it for sporadic online reconfigurations (e.g. of global deadlines), or to publish messages on selected web pages. Given the precise

documentation of all the configurable parameters contained in the setup pages, we noted that it was also often consulted by the PC Chairs when the conference evolved from a PC phase to the next (e.g. from the paper submission to the reviewer selection and delegation).

- 8) **Roles:** this feature happened to be more important for those conferences whose Setup had been carried out by the support team. Since the Setup allows the PC Chair or Admin to globally configure default rights in particular for the PC Members, proficiency in the Setup use allowed the SPIN team to reduce the fine granular tuning activity in the Roles feature.
- 9) **Profile:** since each user must complete the own profile during or after registration, there is a minimum of one feature access per user.
- 10) **Conflicts:** intuitively, we expected the number of conflicts to be higher for tighter communities. Indeed SPIN (a more specialized workshop) shows an almost double conflict incidence than the two conferences. The conflict relation was also relevant (and often consulted) during the discussion phase - which took place via newsgroups - e.g. in order to "correctly" formulate comparisons in messages concerning papers co-authored by PC members (who should be excluded from any information on their decision status).
- 11) **E-mail:** the heaviest use of the *group email* feature was observed for SPIN: with 44 mails, the SPIN PC Chairs quite regularly communicated this way with their Authors or PC Members. The incidence is also 4 times higher than in the other communities.

3.3.2 Usage per Conference Community

Global data contained in Table 3 (Conference data overview) allow a further sketch of rough *community profiles* for the observed behaviour.

ESOP turned out to be an active and lively community, with a **very interactive** Program Committee: this clearly emerges from the number of logins and from the Newsgroup activity during the discussion phase. Concerning discussion activity, we define a *discussion index* as

$$\text{Discussion Index} = \text{News total usage} / \text{Evaluation usage},$$

to indicate how many discussion-related actions were performed by each PC Member (including the Chair) every time they theoretically could⁷. With 2951 discussion feature uses and with 254 message postings ESOP reaches a discussion index of 4.5, compared to 1,12 for FASE and 0,91 for SPIN.

⁷ This index is an underestimation: the discussion was opened several days after the evaluation matrix was available to the PC Members.

The **FASE** community had to face some problems with some of its members, evident if we look at the number of *paper downloads* (687, i.e. an average over 12 per submission⁸), and also at the number of *automatic e-mails* sent by the system: 2628 messages, concerning reminders (usually of elapsed deadlines) and notifications (of pending or completed tasks), compared with less than 1000 for ESOP indicate that responsiveness was somehow unnaturally obstructed.

Data	ESOP	FASE	SPIN
Logins	2536	1745	927
Autom. Emails	968	2628	334
Uploads	121	88	27
Downloads	553	687	338
Reports	239	163	70
Final Reports	76	56	22
News (list)	1769	395	204
News (post)	254	68	35
News (read)	928	202	128
News total use	2951	665	367
Evaluation use	651	591	404
Discuss. Index	4,53	1,12	0,91
Pwd. Changes	27	37	14
Users	89	71	41
PWD Index[%]	30,3	52,1	34,1

Table 3: Global Community Activity Data

SPIN was the most autonomous community, partly due to the larger confidence gained by its PC Chair and Admin in the handling and configuring of the system, partly possibly due to the specific community composition: a homogeneous group of tool-affine people, who made optimal use of all the service features.

4 RELATED WORK

This is to our knowledge the only study of online conference service support so far. Programs like **START** or **Cyberchair** are usually installed at

⁸ Downloads may include the PC Chair printability check of submission and final version.

each PC Chair's institution, so that their developers do not dispose of usage data, and PC Chairs have no reason for collecting and analyzing log data (so far as available) for other purposes than debug of own runtime problems. Comparative analysis of PC communities behaviour is thus impossible.

Centrally hosted solutions like the service offered by the ACM may allow for data collection, but the interest of the hosting entity in comparative studies is limited: in our research no such studies could be found.

The closest evaluation scenario we could find concerned CSCW environments: (Appelt, 2001) provides a quantitative/qualitative analysis of the usage of GMD's BSCW server based on logfile evaluation. However, reading the system description and the comment, we discovered significant difference in the application profile: BSCV supports a group of people in the activity of producing a common document. This means that (1) BSCV's usage is document-driven, while a virtual PC works in a task driven modus, (2) there is no significant workflow component, while our system is actually a business process organization environment, where single workflows are organized and personalized for each role and user, (3) usage was documented to happen in long online sessions during working hours (as natural for editing documents), while we observed burst traffic spread at any time (as natural in a "consultation" modus). Accordingly, given the different application profiles, comparing these quantitative results does not provide useful insights.

5 CONCLUSIONS AND LESSONS LEARNED

Although the observed communities are representative for a significative population of scientists in Computer Science, we have so far too little data for any statistical investigation. Still, some global observations are useful and likely to be valid in a more global setting:

- Hosting should be done professionally, with equipment that grants continuous availability even if bulk activity is concentrated during "normal" working hours on the side of the Atlantic predominant in the PC composition. We had an offline-time of one day during a weekend, caused by a construction machine ripping off the Deutsche Telekom cable that serves the whole Technology Park area of Dortmund (including the university), and this was well noted by the users!
- Additionally, peculiar personal usage patterns and other unforeseen phenomena cause peaks at unexpected times: there is no "granted" weak-usage window. Users who are active under these circumstances tend to be the generally most active and motivated, or to be under extreme pressure (e.g. short before deadlines elapse or before leaving for

a trip). This has a consequence for support availability too: perceived lack of support in such conditions is particularly critical and leaves extremely negative impressions.

- A support team should be as available as the service: in spite of online explanations and textual description in the page, many questions reach the support team in their role as "human facilitators", where people expect quick reaction from other people, sometimes just to be reassured that their interpretation or behaviour is correct.
- The extreme flexibility of the OCS turned out to be a central strength: retrospectively looking at the number of "exceptions" managed during the three PCs, we agree with previous studies [Shipman, 1999 and Ellis] stressing the vital importance of handling non-standard situations and procedures. Indeed it was absolutely important to dispose of continuous customized overviews for both the PC Chairs and PC Members, as well as of reconfiguration and local undo/cancellation features that allowed different forms of rollback to adequate earlier stages in the process.
- Online PC meetings are usually perceived as lengthy, slow and non-interactive alternative to real meetings. The collected figures do not support this view: in a discussion phase carried out via newsgroups, ESOP's average of 38.8 news accesses per paper and a discussion index of 4,5 beats the interactivity at physical meetings, where several members are excluded because absent and where a human fatigue factor hits after a few hours of continued concentrated discussion. In our opinion, if tools adequately support a natural behaviour, interaction develops very quickly in primarily motivated communities.

Our evaluation so far is quite aligned to the observations in (Shipman, 1999) concerning principles of good structuring of information, directions, and support in interactive systems: since the OCS system designers developed it on the basis of extensive direct experience in all of the roles, the dangerous trap of a large cultural gap between developers and the community of users fortunately did not exist. The formalization issue in the OCS concerns content (documents, metadata) only marginally: it is centered on the *interactions* between users and system, and in particular it concentrates on adequately structuring the *potential interactions* between users, roles, actions, and information. This level of complexity and abstraction is far beyond the usual CSCW systems, and has to do with advanced configuration of personalized, distributed collaborative workflows treating confidential information in the setting of a flexible business process environment that is additionally dynamically reconfigurable online. Indeed several confidentiality and right/role management properties could be proved (i.e. formally verified) by means of model checking techniques (Steffen, 2001) and later tested on the real service (Niese, 2002).

As a next step in our investigation we hope to validate our observations and preliminary conclusions on a larger number of virtual Program Committees, in order to pose the basis for a statistically significant investigation. In particular we would like to extend the investigation to the support and communication patterns between the different community subgroups, e.g. on a role basis. A good structuring and organization of such participation may empower the users and may result in new kinds of dynamics in the collaboration among the user communities, and between the users and the support and development teams.

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