FLAMINGO

European Seventh Framework Network of Excellence

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WP2 — Mobility, education and training

Deliverable D2.2 — Second version of course material and tutorials

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Executive Summary

This deliverable presents the second year achievements of FLAMINGO WP2, with a focus on the tasks Course design and Realization, Research Observatory, Tutorials Setup and Dissemination and Mobility and Exchange.

An excellent outcome of the task *Course Design and Realization* is that we have edited and published fourteen new videos on different topics of network and services management. These new videos add to the seven videos already published during the first year of the project, and together constitute the FLAMINGO video repository, which is accessible via the FLAMINGO YouTube channel. Using Google Analytics we analyzed the popularity of our videos, and concluded that several of them are doing very well; some are already viewed more than 5000 times and received many 'likes'. The information from Google Analytics also provides useful information for future video production, such as the average view duration (typically a few minutes), how viewers find videos (YouTube suggested videos is crucial) and audience retention.

The task *Research Observatory* managed the modification or creation from scratch of in total eight Wikipedia pages. The strategy has been to make incremental changes or start with relatively short new documents to deal better with any potential critics from the Wikipedia community. Nevertheless, FLAMINGO editors are among the ten top in terms of added text, which means that our contributions are significant. In addition to Wikipedia editing, we also started work on a web crawler to FLAMINGO research contexts and continued other observatory activities already started last year.

As part of the task *Tutorials Setup and Dissemination* project participants designed and taught three new tutorials in this second year. Two of these tutorials were clearly oriented to research hot topics, like a tool for fast network simulation and a testbed to deploy Openflow experiments, whilst the other was a general support tutorial for young PhD students regarding 'where to publish papers'. These three new tutorials add on top of the other three already released in the first year and are all of them available through the project web site and the Simpleweb.

The task *Mobility and Exchange* tracked the activities of FLAMINGO researchers that have been visiting other partners. The purpose of these visits has been to supervise joint PhDs or to perform specific integrated activities. A new form of joint PhD supervision is that four senior researchers participated in external PhD examination committees within the network, and that joint PhD degrees are being established between the University of Twente and the Universität der Bundeswehr München. At the end of year 2 the project has reached its objective to have 9 co-supervised PhDs.

Contents

1 Introduction

The goal of work package 2 is to integrate FLAMINGO partners by fostering their mobility, and to disseminate state of the art network and service management knowledge to students within the NoE, as well as researchers within academia and industry. This goal will be achieved through the design and implementation of four tasks extending the full lifecycle of the project. Each of these four tasks is in turn addressing a specific and measurable objective by means of which we can track and determine the level of success of this work package.

The first objective is "coordinate the mobility and exchange of FLAMINGO Ph.D. students and researchers". This coordination is grounded in a collaboration plan emanating from the activities promoted by the three research work packages of the NoE. The achievement of that objective will be stated in terms of the outcomes from stays of project participants in hosting institutions and other collaboration and integration activities.

The second objective is "coordinate the design and realization of network and services management course material for undergraduate and graduate students". The number of courses produced and the impact caused by these courses, measured by means of some statistics, are indexes to evaluate the success in this task.

The third objective is "coordinate the design and realization of network and services management tutorial material for researchers within academia and industry". This objective is highly related to the previous one and its main distinguishing feature is the scope (more oriented to the current needs of researches), and public addressed (which is also more oriented to people working in state of the art and hot topics in the network and service management area). In that respect, the duty assigned to this work package is to stimulate the project participants to create and give such tutorials from their respective areas of research and interest and to compete with external producers to have the tutorial accepted in public conferences.

Finally, the fourth objective is to "establish and maintain a research observatory in the area of network and service management". In the course of this second year of the project we have focussed in producing new articles in Wikipedia as well as improving existing ones, start the development of a web crawling tool aimed to analyse research trends and continue this type of activities maintaining and improving the Simpleweb site.

In addition to the work package related objectives summarized above, the project has a number of S.M.A.R.T. objectives, three of which are highly relevant to the goals and activities foreseen within WP2. These are:

- S.M.A.R.T. "Integration of Ph.D. Students" whose scope is within our first objective
- S.M.A.R.T. "Course and training material" whose scope lays within our second and third work package objectives
- S.M.A.R.T. "Integration of the research community" whose scope lays within our fourth work package objective

This deliverable reports the achievements of work package 2 in the second year of the project and it is structured as follows. After this Introduction, Section 2 presents the actions adopted to align the development of this work package with the recommendation received from the Commission after the first year review. In Section 3 we report the results in mobility and exchange. Section 4 discusses course design and realization. Section 5 lists the tutorials created and planned. Section 6 discusses the research observatory activities and in particular the work done in Wikipedia, the

activity related to the web crawler and the actions adopted in the Simpleweb. Finally, Section 7 concludes this document by summarizing the achievement made during the second year of the project from the point of view of the S.M.A.R.T. objectives above mentioned.

2 Actions adopted to implement the Commission recommendations on WP2

In the following we summarize the set of actions to align the work of WP2 with the recommendation received from the Commission on this work package after the first review of the project and detailed in the Technical Review Report.

Recommendation R3*: PhD student exchanges should be of significant length (at least 3 months)*

Action:

Making long duration stays is important. However, not all the FLAMINGO PhD students can spend a large amount of time out of their respective universities due to contractual constrains in respect to their teaching duties. Nevertheless, these students could almost reach 3 months of accumulated visits of a few weeks maximum duration.

The project will ensure through WP2 that the main aim of a long term visit of a PhD student at his/her co-supervisor institution, which is a real and deep collaboration, is taking place. In that sense we adopted a set of actions like managing to establish a joint degree for two of our PhD students between UniBwM and UT and exploring whether this model can be applied to other PhD collaborations as well. In case that this model is not possible we will push for the double degree option (double PhD defence). On the other hand, we have adopted several monitoring measures of the collaboration activities like being aware that meetings that have been taking place during this second year of project, namely in Bremen (16-17 December 2013), Zurich (14-16 July 2014), Barcelona (8-10 September 2014) and likely in Nancy (16-17 December 2014) are being used by the students as an opportunity to update their co-supervisors and get advice. In addition we also track within WP2 that contacts among the three actors of each co-supervised thesis are being kept alive through other communication means.

Recommendation R4*: Although reporting is overall of very good quality, it is suggested that future versions of all the deliverables include tables with planned and achieved indicators for the reporting period (and previous periods) to better represent project progress. Also, deliverables for the next periods should clearly identify the work really performed within the context of FLAMINGO project from the work done by the partners in other projects and contexts*

Action:

A table of planned and achieved targets for the period has been included at the beginning of the subsection corresponding to each task reported in this deliverable

Recommendation R8*: The consortium has improved the management taxonomy and has also identified different terms in Wikipedia. The articles for Wikipedia have to be adequately annotated, so that they can be linked, for example within DBpedia*

Action:

A key point to allow DBpedia to incorporate articles into its ontology is by making structured information like infoboxes. An infobox is a structured document based on attribute-value pairs that presents a subset of information in a given page. This structure is then used for indexing purposes by DBpedia. As this year has been the launching of Wikipedia activity, the main recommendation

to authors has been to contribute making small incremental changes to existing pages. We expect to introduce such information structuring in subsequent phases.

3 Mobility and Exchange

This activity corresponds to task T2.1 whose goal is to support the mobility of Ph.D. students and researchers, to foster both integration and jointly executed research among the FLAMINGO partners. Table 1 gives an overview of last year project visits that took place during the second year.

Table 1: Indicators of progress in mobility and exchange

Achieved in Y1	Planned for Y2	Achieved in Y2
5 short term visits (a few days) of PhD students to their co-supervisors	6 short term visits (duration not programmed)	1 visit of 1 day 1 visit of one week 2 visits of two weeks 2 visits of three weeks
		Participation of 4 researchers in 3 examination committees
		Creation of 2 joint PhD degrees

3.1 Visits of jointly supervised PhD students

At the start of the second year of the project we had nine PhD students co-supervised by two doctors of different participating institutions. These students and their supervisors and co-supervisors and the days they have spent visiting the later are presented in Table 2.

Table 2: Co-supervised PhD students visits within the second year of project

PhD student	Supervisor	Co-supervisor	Days
Jair Santana	Aiko Pras	Jürgen Schönwälder	5
Rick Hofstede	Aiko Pras	Gabi Dreo	10
Mario Flores	José L. Melús	Burkhard Stiller	1
Anthea Mayzaud	Remi Badonel	Jürgen Schönwälder	24

Each of the visits was planned to produce concrete results. In the following paragraphs we summarise each one.

Jair Santana (UT) visited Bremen to establish the details of collaboration on the topic of web sites that offer DDoS as a paid service, called Booters. During the visit, mitigation proposes were discussed, and a new investigation was decided to be performed on residential Internet connections. A set of experiments were conducted in the Emanicslab testbed. The results of this research were elaborated to be presented to the Deutsche Telekom meeting organised by this telecom provider and FLAMINGO.

Rick Hofstede (UT) visited Munich in two times along this second year of the project. The main purpose of these visits was to make arrangements for setting up Joint PhD degrees being possible

to draft a contract, which is being double-checked by the legal councils of UT and UniBwM. He also had opportunity to discuss with Gabi Dreo, her co-supervisor, technical aspects of the PhD. In addition, the grounds for a paper planned to be published as part of our WP5/WP6 collaboration were setup. Finally, he was also able to participate in a PhD seminar at UniBwM, organized for all the group's PhD students.

Mario Flores (UPC) visited for one day his co-supervisor in Zurich. The main objective was to brief the later about the focus and initial steps of the PhD research work and get the corresponding advice. Discussions were also attended by the members of the UZH team. More briefings have been taking place afterwards but via e-mail and teleconference.

Anthea Mayzaud (INRIA) worked with the team of his co-supervisor to setup a new research collaboration between the research groups at Jacobs and INRIA on the topics of distributed network monitoring for the Internet of Things (IoT). She also worked jointly to establish the scope of a paper for IM 2015 and a possible submission to the ComMag IoT Security special issue. Finally she began the implementation of the distributed network monitoring approach in Contiki 2.7

In addition to the above mentioned students, FLAMINGO has other three integrated PhD students and one more who is also co-supervised that didn't have face to face ad-hoc meetings. Nevertheless, as mentioned in Section 2, work package 2 is tracking several indexes to ensure the collaboration between PhD students and their co-supervisors. This collaboration is satisfactory in general for all the eight students and those who didn't make any visit are candidates with high priority to do it in the course of year three of the project.

3.2 Other researchers' visits

In addition, other FLAMINGO researchers have been also traveling abroad to collaborate with other colleagues of the NoE as detailed in Table 3 and described immediately after.

Table 3: Other FLAMINGO researchers' mobility within the NoE

Researcher	Home institution	Visited institution	Days
Corinna Schmitt	UZH	UniBwM	10
Marinos Charalambides	UCL	iMINDS	21

Corinna Schmitt visited Gabi Dreo's team in Munich where they worked together in the edition of the IPFIX Wikipedia page. Also they discussed about enablers relevant for wireless sensor networks, the outcome of which has been reported in deliverable D6.2, as well as cooperation opportunities in ongoing projects at UniBwM and upcoming calls of H2020. The bases of a joint publication on the area of IoT and security were also established.

Marinos Charalambides visited iMinds at Ghent for 3 weeks in June 2014. During his visit he collaborated with people from iMinds in the extension of the joint research work on multi-tenant cache management in the context of WP6. A joint paper has been recently accepted at CNSM'14 and an extended version is planned for the IEEE Transactions on Networking. He worked as well on the extension of the joint research work on the business perspectives of in-network caching in the context of WP7. He had discussions for setting up a new collaboration on software defined networking in the context of WP6. He also devoted time to the organisation activities and contributions to the EUCNC'14 workshop co-organised by Flamingo (keynote and panel) in the context of WP3. Finally, he also carried out organisation activities for the 1st International Workshop on Management of SDN and NFV Systems in the context of WP3.

3.3 Participation of FLAMINGO researchers in PhD examination committees

In the course of the reported year several FLAMINGO researchers have travelled abroad to participate as members of the examination board of all the FLAMINGO PhD students that defended their thesis. This is one of several mobility activities that will continue in the future as well.

Gabi Dreo (UniBwM) and Olivier Festor (INRIA) participated in the examination of Rafael Barbosa that took place the 4th April 2014 at the University of Twente.

Gabi Dreo (UniBwM) will participate in the examination of Rashid Mijumbi that will take place the 6th of November 2014 at Universitat Politècnica de Catalunya in Barcelona.

George Pavlou (UCL) will participate in the examination of Ricardo Schmidt that will take place the 26th of November 2014 at the University of Twente.

3.4 Creation of joint PhD degrees

Triggered by the Commission recommendations from last year review, FLAMINGO has managed to achieve an agreement signed between the Universität der Bundeswehr München (UniBwM) and the University of Twente (UT) to provide joint PhD degrees for Mario Golling, student of UniBwM, and Rick Hofstede student of UT. As mentioned in Section 2 we pretend to apply this policy to the other jointly supervised PhDs. Therefore the consortium is investigating the feasibility of such agreements between UT and JUB, UPC and UZH, UniBwM and UZH, UZH and UniBwM and finally, between JUB and IMinds for the specific cases of their respective jointly supervised students, namely Jair Santana, Mario Flores, Anthea Mayzaud, Christos Tsiaras and Vaibhav Bajpai respectively.

4 Course Design and Realization

FLAMINGO partners have continued the production of video courses, an activity that was already initiated in the previous year. In summary, courses are being edited in the frame of a syllabus coined in EMANICS, a previous NoE. Courses adopt different styles according to the targeted audiences and preferences of creators and all give credit to FLAMINGO. Finally courses are made available in the FLAMINGO Youtube channel [1]. We remind the reader that the reason of this selection was that videos in high definition are openly accessible to everyone without the need for people to sign up to YouTube. Also, with only using a descriptive name of the video, keywords and a more detailed video description, video courses offered by FLAMINGO partners can easily be found searching on Google or directly on YouTube. Also, YouTube allows every participant to contribute to the project channel at any time without the need to share credentials.

In Table 4 we give the overview of progress on that activity activity and in the following subsections we present a fiche of each video created during the second year of the project.

Table 4: Indicators of progress in course design and realisation

Achieved in Y1	Planned for Y2	Achieved in Y2
7 videos	12 new videos	14 new videos

4.1 Videos produced in the second year of the project

4.1.1 SNMP Monitoring (Part 2 of 2)

- Editor: Marinos Charalambides (UCL)
- Course type: Practical examples
- Target audience: Researchers and students that are interested to learn how to monitor SNMP agents through practical examples
- Duration: 10 minutes

This course is the second part in a series of two. The first part, which was recorded in the first year of Flamingo, described how to program management applications that monitor SNMP agents based on the low-level SNMP API. The second part demonstrates the polling of information from a real agent according to the SNMP MIB (RFC 1213). Practical examples include retrieving single-instanced objects, retrieving multiple-instanced objects, periodic polling and averaging.

4.1.2 Economic Traffic Management (ETM) Introduction

- Editor: Burkhard Stiller (UZH)
- Contributor: Sebastian Golaszewski (UZH)
- Course type: Short and teaser-like overview of main approach
- Target audience: Addresses a broad audience in the area of communications and economics.
- Duration: 4:53 minutes

The introduction into “Economic Traffic Management (ETM)” covers the basics of an approach to manage and control Internet traffic at Internet Service Providers by economic mechanisms.

Utility functions are used to find an optimal resource allocation, while maximizing the utilization of this resource. For a given example of a file transfer service users value a certain quality-of-service over price. But those utility functions are in practice neither scalable nor effective. Thus, an applicable approach is needed to avoid the use of utility functions, but gaining the same effects. By applying ETM on an overlay network in the Internet, ETM leads to an incentivized collaboration between Internet Service Providers, users, and overlay network providers. This provider-independent communication between users is supported by an ETM Information Server, either part of each ISP or provided as a third party service. In case of a file sharing overlay, these ETM Information Servers offer ranked lists of resource locations for files. Such data is collected in a decentralized manner and placed into ETM Information Servers according to ISPs, overlay providers’, and users’ knowledge. An example on how the access of a resource is handled by ETM Information Server is presented. Since scientific evaluations have shown that ETM Information Servers are populated correctly according to every stakeholders’ incentives, the collaboration between all stakeholders makes all of them better off, especially if they decide to collaborate.

4.1.3 Secure Communication Applied to Internet-of-Things

- Editor: Corinna Schmitt (UZH)
- Contributors: Burkhard Stiller (UZH), Alexander Filitz (UZH)
- Course type: Short and teaser-like overview
- Target audience: Addresses broad audience in the area of secure communication.
- Duration: 4:36 minutes

The course entitled Secure Communication Applied to Internet-of-Things gives a basic motivation why it is essential to look on security in communication. This request becomes essential when entering the application area of Internet-of-Tings, where each device can speak with each other using wireless communication as well.

The basic security principles are introduced by using “Alice” and “Bob” as the once who want to communicate with each other. The simplest way to secure communication is using symmetric cryptography. But also gives an attacker “Chris” the possibility to interrupt the communication. In order to make it more challenging for “Chris” to get access to the communication, Alice and Bob can use asymmetric communication. Both principles are presented in detail.

Due to the fact that the devices used for Internet-of-Things application can be resource-constraint (e.g., bandwidth, power, memory) it must be decided which solution should be used. Thus, a different number of algorithms for both security options exist and just listed. For completeness sack certificate-based mutual authentication and trusted computing are mentioned. Those two solutions are highly resource consuming but very save at the same time.

4.1.4 What is TomP2P?

- Editor: Thomas Bocek (UZH)
- Contributors: Burkhard Stiller (UZH), Sebastian Golaszewski (UZH)
- Course type: Short and teaser-like overview of TomP2P / DHTs
- Target audience: Addresses a broad audience in the area of distributed systems and P2P networks.
- Duration: 3:46 minutes

The video gives an introduction into TomP2P and DHTs. It shows how a DHT is working and the goal of the video is for the viewer to understand how a DHT works internally and where it can be used.

The basic P2P principles are introduced by Alice and Bob that want to synchronize and send files. Since one of them is not always online, the content need to be stored on other peers. This can be done in a DHT with many participants having their peer identities arranged in a ring. The file can be uploaded to Chuck and once Bob is online again, he can download the file from Chuck. The end of the video explains the benefits of TomP2P, which is a DHT implementation.

4.1.5 What is P2P?

- Editor: Thomas Bocek (UZH)
- Contributors: Burkhard Stiller (UZH), Alexander Filitz (UZH)
- Course type: Short and teaser-like overview of P2P
- Target audience: Addresses a broad audience in the area of distributed systems
- Duration: 3:48 minutes

The video gives an introduction into P2P. It shows use-case where P2P can be used and in which situations it can be beneficial. The main argument is that P2P is more than just file sharing.

The basic P2P principles are introduced by Alice and Bob that want to synchronized data and in a second scenario want to transfer money. In the first scenario with the synchronization, the main motivation is privacy and control of its own data, which is difficult to achieve with cloud providers. The main motivation for the second scenario is that with P2P crypto-currencies it is easy to transfer money worldwide with very low transaction fees. The end of the video states that P2P is more than file sharing and shows where P2P can used and what type of applications exist.

4.1.6 Advanced Configuration of Nagios

- Editor: Remi Badonnel (INRIA)
- Course type: Conventional slide-based course
- Target audience: Addresses people with background on Nagios
- Duration: 25 minutes

This course provides an overview of advanced configuration methods for the Nagios monitoring system. It complements the first course on Nagios “Introduction to Nagios-based Monitoring” part of the Flamingo Network of Excellence Series. In particular, it describes through a use case scenario the concepts of groups and templates to factorize configurations, the notification escalation method to allow a hierarchization of contacts, and the specification of dependencies in Nagios for improving root cause analysis when a failure is detected.

4.1.7 Introduction to computer forensics

- Editor: Sebastian Seeber
- Course characteristics: Short and teaser-like overview
- Target audience: Public in general
- Duration of the video: 6:53 minutes

The video gives a short overview of computer forensics and the evolving of it in the past. In addition it explains how computer forensics can be seen in the scientific process and which steps need significant attention. Furthermore the use cases for computer forensics are explained. Nevertheless a straight forward approach to preserve forensic evidence is presented and described in detail.

4.1.8 How does WPA/WPA2 work?

- Editor: Sebastian Seeber
- Course characteristics: Short and teaser-like overview
- Target audience: Public in general interested in wireless security
- Duration of the video: 15:25 minutes

The video explains how WPA and WPA2 works and gives an overview of existing Wi-Fi security standards. In addition it tries to aware users of wireless connections to pay attention to security mechanism in wireless networks. Challenges in VPN connections over wireless networks are explained as well. In the end details about the four way handshake in WPA are explained.

4.1.9 Management of Virtualized Networks

- Editors: Jeroen Famaey, Filip De Turck
- Course type: short tutorial to learn basics and pointers to more details
- Target audience: people with network management knowledge, but not familiar with management of virtualized resources
- Duration: 4 minutes

Very recently, leading equipment providers in the network infrastructure market launched the first software-enabled appliances that support network virtualization capabilities. The main advantage of Software Defined Networking (SDN) is that network control is separated from the forwarding plane and allows for a flexible management of the network resources. Network virtualization (NV) brings virtualization concepts to the network, similar to cloud computing, which was enabled by virtualization of servers.

In this video, the main technologies and enablers for this promising paradigm are detailed, and pointers to more detailed information are provided.

4.1.10 Network Function Virtualization

- Editors: Jeroen Famaey, Filip De Turck
- Course type: short tutorial to learn basics and pointers to more details
- Target audience: people with network management knowledge, but not familiar with virtualization of network functions
- Duration: 4 minutes

Network Function Virtualization (NFV) focuses on virtualization of software-based network functions. Service Function Chaining (SFC) consists of building services using virtual network functions (VNFs).

In this video, the main technologies and enablers for NFV are detailed. It is highlighted why network operators and service providers are eager to adopt the above principles. We believe that efficient management of software-defined virtualized telecommunication systems and data centers will be of key importance in the future. Some key challenges for future research are addressed as well in this video.

4.1.11 Wireless Sensor Networks integrated in Internet of Things

- Editor: Corinna Schmitt (UZH)
- Contributors: Burkhard Stiller (UZH), Sebastian Golaszewski (UZH)
- Course type: Slide-based lecture
- Target audience: Students to gain basic understanding of wireless sensor networks and their application areas
- Duration: 39:55 minutes

The course entitled “Wireless Sensor Networks integrated in Internet of Things” is three-folded: (1) Definition on basic terms, (2) introduction to wireless sensor networks, and (3) application area.

The first part motivated why a basic understanding of wireless sensor networks is required today and where they are already deployed (e.g., Internet of Things, Cyber-Physical Systems). The second part of the lecture presents the basics of wireless sensor networks raising from structure, involved components, and their hardware characteristic. Followed by requirements (e.g., scalability, quality of service) the user has to be aware of when deploying a wireless sensor network and the corresponding design principles (e.g., network organization). With this basic knowledge the user is able to deploy such a network. In order to give the audience an impression where wireless sensor networks are already deployed, part three of the lecture focus on this. The application area is manifold and selected ones are presented, such as structural health and habitat monitoring, health applications, logistic and military scenarios, and automation.

4.1.12 Network Management Principles

- Editor: Aiko Pras
- Course type: short tutorial
- Target audience: people with knowledge on computer networks, which want to know about network management principles
- Duration: 9:44 minutes

In this tutorial we explain the principles behind Network Management. Firstly, we introduce the terms “manager” and “agent”, giving practical examples on how they interact between them. Then, we explain the Simple Network Management Protocol (SNMP) as the most known and useful network management protocol. After that, we explain each part of the SNMP protocol, focus on different types of PDUs. Finally, we discuss about Management Information Bases (MIBs) giving example on how MIBs can be used with SNMP.

4.1.13 DRDoS: What is DDoS attack? Reflection? Amplification?

- Editor: Jose Jair Santanna
- Contributor: Aiko Pras
- Course type: short tutorial

- Target audience: people without advanced knowledge on computer networks, which want to know more about DDoS attack
- Duration: 5 minutes

In this video we explain one of the worst types of Denial of Service attacks called Distributed Reflection Denial of Service (DRDoS). To do so we explain this acronym in a reverse order. We start explaining the concept of DoS attacks, which an attacker overwhelms an end-system preventing people to access it. Then, we explain the concept of "reflection" that is a technique to abuse UDP services (such as DNS and NTP). After that, we introduce the concept of "amplification" as a strategy to make an attack stronger than a direct attack. Finally, we explain the meaning of "distributed" that implies to abuse not just one source of attack but hundreds, thousands of them. We conclude this video explaining what should be done if someone is under a DRDoS attack. The novelty of this movie is to explain DRDoS attacks, never before explained on Youtube, and provide good references to researches participants on FLAMINGO project.

4.1.14 Where to Publish?

- Editor: Jürgen Schönwälder
- Course type: Recording of Aiko's talk at AIMS 2014 [2]
- Target audience: MSc and PhD Students
- Duration: about 60 minutes

In this talk we stress the importance of publishing your research results at the right venues. First we identify the workshops, conferences, magazines and journals in the area of network and systems management, but also in the broader networking area. We will discuss the quality of some of our conferences and journals, as perceived by experts in our field, as well as people outside our area. In addition we present acceptance rates, acceptance procedures, conference and journal rankings, as well as impact factors. Although some Ph.D. students may believe that a main goal is to publish as many papers as possible, this talk will stress that there are other important metrics, such as some key venues and the number of citations. We will discuss the pros and cons of the H-index, a metric that is currently quite popular for judging quality of people as well as conferences, but has several limitations. The talk concludes with explaining the importance of publishing in journals indexed in Thomson's Science Citation Index (SCI), or alternatives like Scopus. It also explains CPP, JCS and FCS factors.

4.2 Analysis of impact

As much important as the creation of new videos is to track the impact of already published ones. In that sense we have used Google Analytics to see the most prominent aspects reflected by these statistics with the aim to extract lessons to improve the impact. The following figures reflect a few of such statistics, which we comment along.

Figure 1 presents the 10 most viewed videos in the latest 365 days (up to 06/10/2014). As it can be seen, the first three advance the others about an order of magnitude. Arguing on the potential reasons, we can say that the former is on a very specific tool which is still in use in several domains. What is also true is that the fourth is also on a specific tool although much less used

Flamingo project

Created: Jul 18, 2013 • Videos: 27 • Lifetime views: 20,299

CHANNEL

Last 365 days (Oct 5, 2013 – Oct 4, 2014)

Performance

VIEWS
19,246 ▲

ESTIMATED MINUTES WATCHED
74,321 ▲

SUBSCRIBERS
90

Engagement

LIKES
78

DISLIKES
3

COMMENTS
11 ▲

SHARES *
15

FAVORITES ADDED
19 ▲

FAVORITES REMOVED
1 ▲

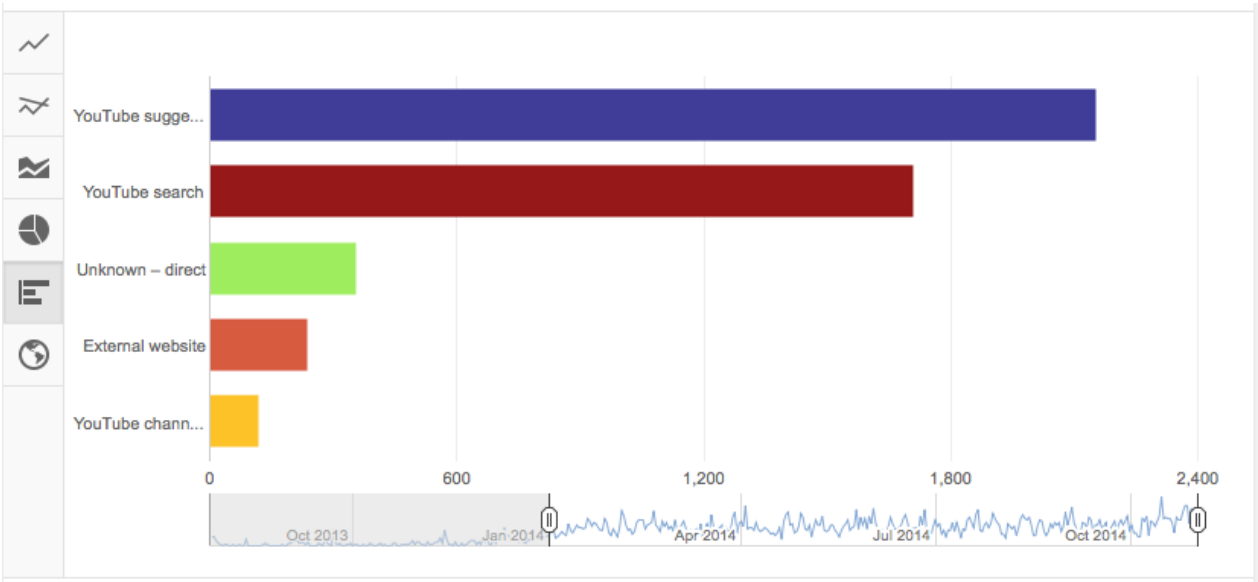
Top 10 Videos

Browse all content

Video	Views	Estimated minutes watched	Likes
Introduction to Nagios-based Monitoring	6,468 (34%)	34,544 (47%)	12
Network Management Principles	4,424 (23%)	15,497 (21%)	18
What is P2P?	3,986 (21%)	8,573 (12%)	18
SNMP Monitoring (Part 1 of 2)	844 (4.4%)	2,705 (3.6%)	3
Secure Communications applied to Internet-of…	449 (2.3%)	1,043 (1.4%)	7
RMON, NETCONF and YANG - Interview with…	422 (2.2%)	2,588 (3.5%)	3
Introduction to Network Management	414 (2.2%)	1,032 (1.4%)	1
IT Service Management	392 (2.0%)	1,064 (1.4%)	0
NETCONF - Interview with Kent Watsen (Juni…	253 (1.3%)	1,214 (1.6%)	1
SNMP history - Interview with Dan Romascan…	216 (1.1%)	1,186 (1.6%)	2

Figure 1: The 10 most viewed FLAMINGO videos in 365 days

than the former. What is surprising is that the second in the list is dealing about the same topic as the seventh, which has a much lower number of visits. Therefore the conclusion would be that title/topic is not the only reason inviting people to open and see the videos. In fact, as illustrated in Figure 2, the most important factor to 'find' videos are suggestions made by YouTube, as well as YouTube find. Interestingly, links from external websites and from Google search do not play an important role.



Traffic source*	Views	Estimated minutes watched	Average view duration
YouTube suggested video	2,151 (46%)	7,542 (47%)	3:30
YouTube search	1,707 (36%)	5,876 (36%)	3:26
Unknown – direct	356 (7.5%)	1,076 (6.6%)	3:01
External website	236 (5.0%)	675 (4.2%)	2:51
YouTube channel page	118 (2.5%)	407 (2.5%)	3:26
YouTube playlists	51 (1.1%)	162 (1.0%)	3:11
YouTube Guide	44 (0.9%)	128 (0.8%)	2:54
Unknown – embedded player	32 (0.7%)	200 (1.2%)	6:14
YouTube – other features	13 (0.3%)	54 (0.3%)	4:11
Google search	7 (0.1%)	19 (0.1%)	2:42
External app	5 (0.1%)	17 (0.1%)	3:22
YouTube advertising	1 (0.0%)	10 (0.1%)	9:33
YouTube video annotation	1 (0.0%)	9 (0.1%)	9:22

Figure 2: How do viewers find FLAMINGO videos

Looking more insight we present figures 3, 4 and 5 where it can be observed how long logged users stay observing the video.

According to Figure 3, the interest of people to stay in the video entitled Introduction to Nagios-based Monitoring, which by the way has a high number of visits, drops quickly to stabilize around a

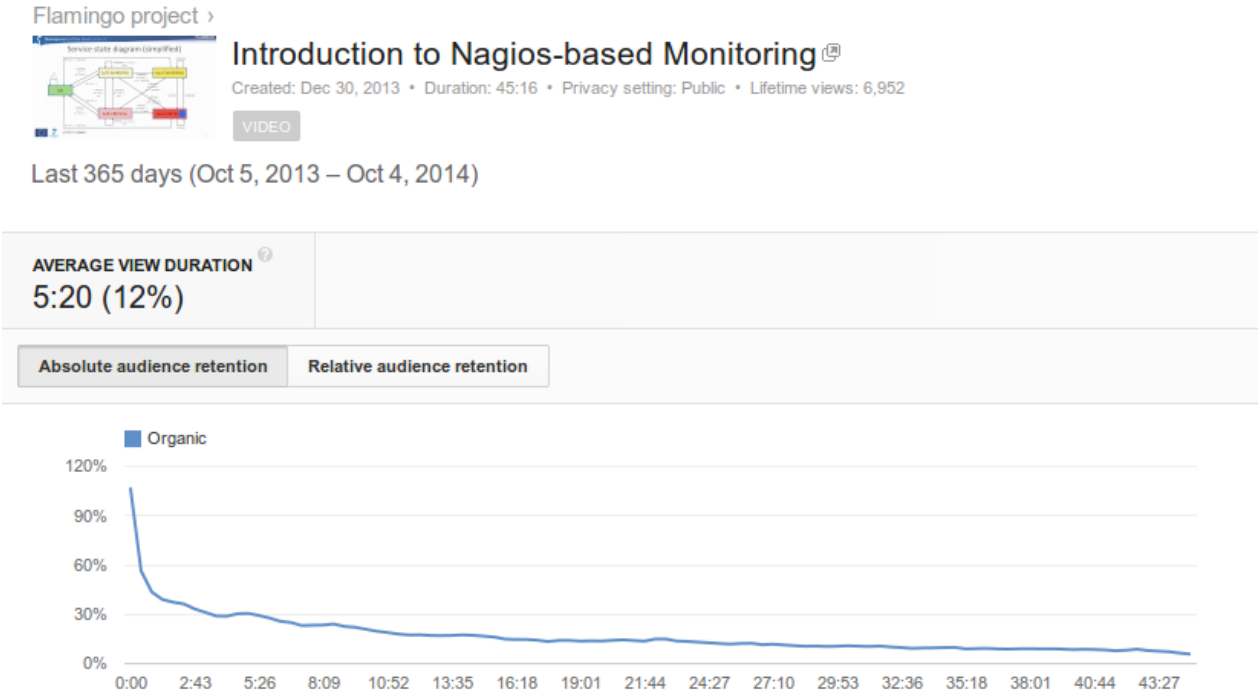


Figure 3: Audience retention of the video Introduction of Nagios-based

12% of people staying up to the end (keep in mind that this video lasts for more than 40 minutes).

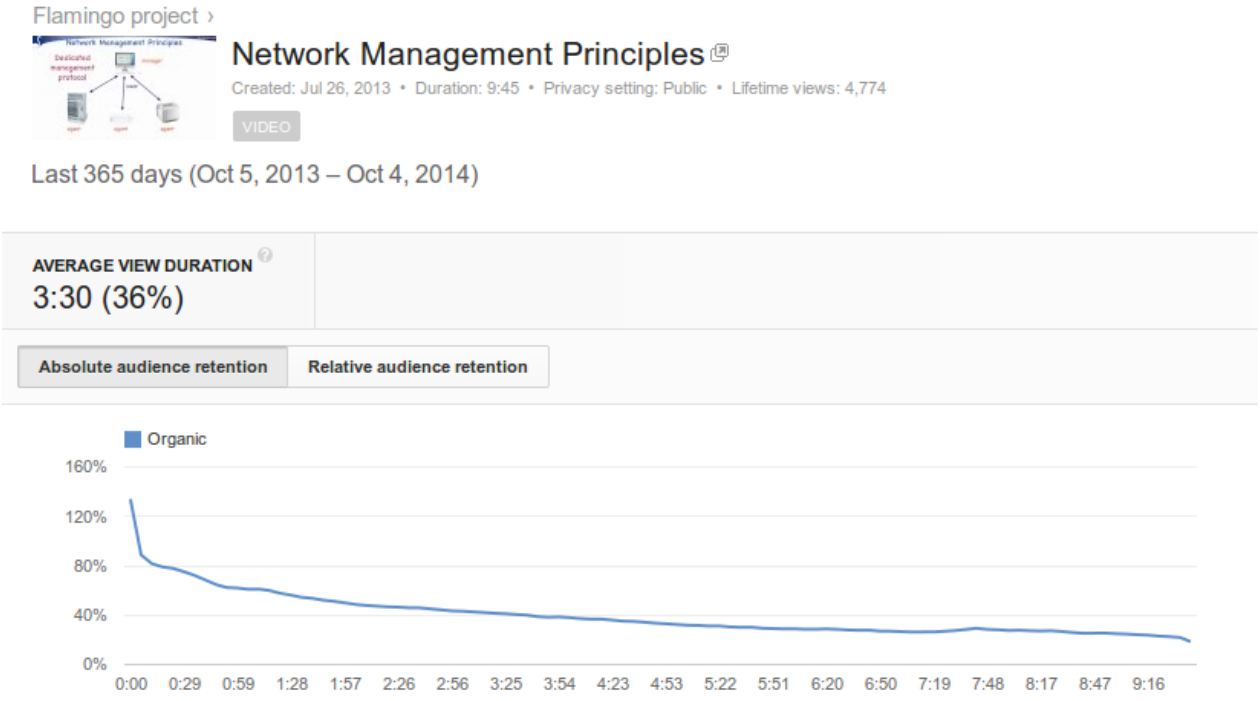


Figure 4: Audience retention of the video Network Management Principles

Figure 4 reveals that the fall of interest in the video entitled Network Management Principles is less dramatic than in case of Figure 3. Likely the reason can be attributed to the fact that this video is much shorter than the former.

Finally, Figure 5 shows the same retention figure but in this case for the P2P video. The trends are similar to the previous case but without the initial fall that is shown in the former cases. This can be attributed perhaps to the edition style of What is P2P, which keeps the interest of the viewers much more than a conventional slides-based tutorial. We also continue observing that videos of duration of 5 minutes or less are followed with more people up to the end.

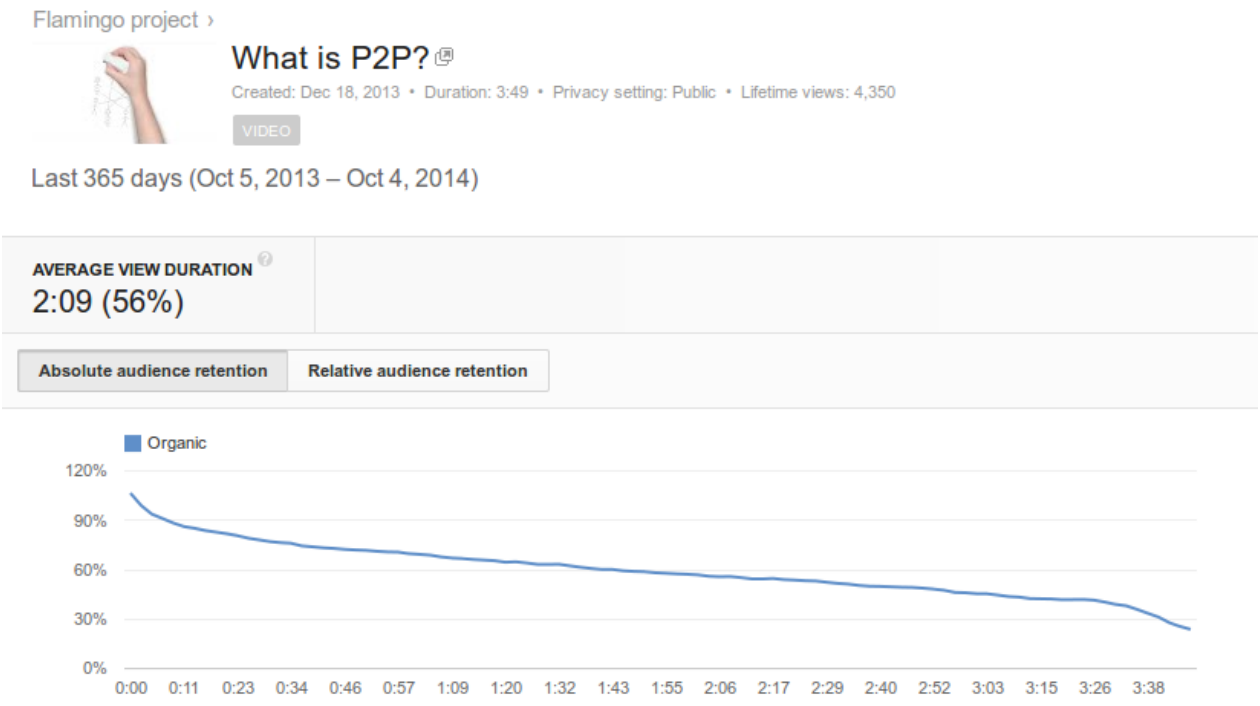


Figure 5: Audience retention of the video What is P2P?

5 Tutorials Setup and Dissemination

The goal of this task is to develop and present advanced tutorials for PhD students and researchers in general. We already started this activity in year one and have continued in year two. Table 5 gives an overview of global progress.

Table 5: Indicators of progress on Tutorials setup and dissemination

Achieved in Y1	Planned for Y2	Achieved in Y2
3 tutorials organised and given	2 new tutorials	3 new tutorials organised and given

The three tutorials were organized and presented to the public attending the AIMS 2014 workshop in Brno (Czech Republic) [2]. The average number of attendees to these tutorials were 20 people

each, the majority PhD students from different universities. In the following subsections we present a summary of each one.

5.1 Fast network simulation setup (tutorial download)

- Organizer: Lorenzo Saino (UCL)
- Event: 8th International Conference on Autonomous Infrastructure, Management and Security (AIMS 2014)

This tutorial was on the Fast Network Simulation Setup (FNSS) toolchain [3] that allows users to generate even complex experiment scenarios with few lines of Python code and deploy them in the preferred target simulator or emulator. In the first part of this tutorial, the audience was familiarised with various models and datasets of network topologies. Participants also learned the most commonly used models to assign link capacities, delays and buffer sizes and how to synthetically generate realistic traffic matrices. The second part provided an overview of the FNSS toolchain and demonstrated, through some live coding examples, how to easily generate complex simulation scenarios and deploy them on a number of different simulators and emulators. Finally, in the third part, the audience of the tutorial was given a set of exercises to practise the material presented in the previous two parts.

5.2 Deploying OpenFlow experiments on the Virtual Wall testbed (tutorial download)

- Organisers: Niels Bouten (iMINDS), Maxim Claeys (iMINDS) and Jeroen Famaey (iMINDS)
- Event: 8th International Conference on Autonomous Infrastructure, Management and Security (AIMS 2014)

The goal of this hands-on tutorial is to familiarize the participant with the concept of SDN in general and with OpenFlow in particular. We will explore OpenFlow's capabilities to dynamically reroute traffic, guarantee bandwidth, and differentiate flows. Participants will be given the opportunity to apply their acquired knowledge by setting up an OpenFlow-based experiment that guarantees the Quality of Service requirements of a networked video application. The experiment will be run in a live network setting, facilitated by the Virtual Wall testbed. The Virtual Wall is a testbed facility for setting up large-scale network topologies. The Virtual Wall nodes can be assigned different functionalities and organised in arbitrary network topologies on the fly. As such, it is a generic experimental environment for advanced network, distributed software and service evaluation, and supports scalability research. The facility has been made available to the research community through different FP7 FIRE projects. The tutorial will provide a brief theoretical introduction about the Virtual Wall's capabilities in preparation of the hands-on part.

5.3 Where to Publish? (tutorial download)

- Organiser: Aiko Pras (UT)
- Event: 8th International Conference on Autonomous Infrastructure, Management and Security (AIMS 2014)

In this talk we stress the importance of publishing your research results at the right venues. First we identify the workshops, conferences, magazines and journals in the area of network and systems management, but also in the broader networking area. We will discuss the quality of some of our conferences and journals, as perceived by experts in our field, as well as people outside our area. In addition we present acceptance rates, acceptance procedures, conference and journal rankings, as well as impact factors. Although some Ph.D. students may believe that a main goal is to publish as many papers as possible, this talk will stress that there are other important metrics, such as some key venues and the number of citations. We will discuss the pros and cons of the H-index, a metric that is currently quite popular for judging quality of people as well as conferences, but has several limitations. The talk concludes with explaining the importance of publishing in journals indexed in Thomson's Science Citation Index (SCI), or alternatives like Scopus. It also explains CPP, JCS and FCS factors.

6 Research Observatory

As stated in the DoW the goal of the research observatory is to educate researchers within industry and academia regarding the state of the art in network and service management. In terms of global progress we have to highlight that in year two we started the activity in Wikipedia having edited or created a total of eight pages. Also, it is worthy to mention the task of adapting a crawling tool developed in another project to the needs of FLAMINGO researchers.

Table 6: Indicators of progress on the research observatory

	Achieved in Y1	Planned for Y2	Achieved in Y2
Through Wikipedia	Not yet started	9 pages edited/created	8 pages edited/created
Web crawling	Not yet started	Start its adaptation to FLAMINGO	First adaptation steps completed
Through Simpleweb	Maintenance of RSS feeds, conference announcement and tools' repository	Continue maintenance	Maintenance tasks conducted

6.1 Wikipedia activity

In the second year of the project we did the firsts steps to contribute to Wikipedia. The work was organised to avoid a too wide front in terms of pages being edited at a time. For this reason, we asked all FLAMINGO members to propose which pages they would like to edit or to create and we made a map with the set of more supported pages, identifying a coordinator and a group of contributors. In some cases we had to allow also some pages with only one editor because the corresponding topics were very specific and nobody else had expertise on it. In the following subsection we go through all these pages highlighting the work done. Note that on the side of the page title we provide its link and on the side of the name of each editor his Wikipedia username.

6.1.1 Internet of Things (link to page)

- Editor: Anuj Sehgal (Jrtknight)
- Contributor: Anthea Mayzaud

The Internet of Things page was discovered to have a lot of outdated content that was written in an opinion style and often contained incorrect information. In fact, a lot of the article was written to read as a collection of advertisements for individuals, companies or their products. Most of the information in the article was lacking appropriate citations as well.

As a result, it was decided to reorganize the article completely. Towards this goal, a new structure for the content was developed along with significant new content to be added to the article. Incremental updates have been made to the page in order to ensure that the Wikipedia community has time to observe the changes and reach consensus before moving to the next set of changes.

As sown in Figure 6, data fetched on 01-10-2014 reveals thatthe FLAMINGO editor for this page has already contributed above 16% of the text in the article, which is the single largest contribution.

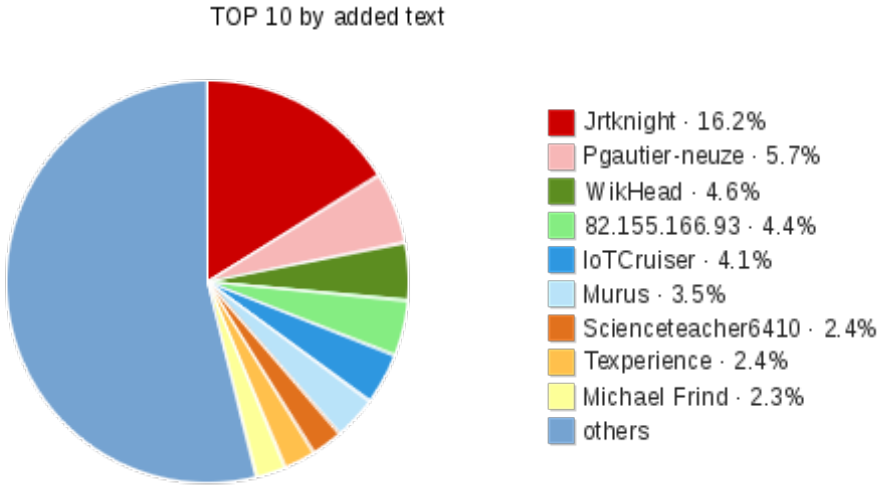


Figure 6: Relative contribution of the 10 top editors to the Internet of Things. FLAMINGO editor is depicted in red

An overview of the edits (in chronological order) is as follows:

1. Removed most of the historic content from the introductory text.
2. Merged historic content with the Original Definition section and renamed it to *Early History*.
3. Rewrote introductory text to provide a better overview the IoT, including citations.
4. Fixed editorial issues in the introductory text.
5. There was a discussion on different (and proprietary) technologies talking to each other in the *Unique addressability of things* section. This was moved to the *Trends and characteristics* section.
6. Text from the *Basket of remotes* section was merged into appropriate locations in the article and this section removed.

7. Moved the section on *Applications* to right after *Early History* since things like architectures, characteristics, and etc. are a direct fallout of the use cases.
8. Expanded the *Applications* section by adding information regarding Environmental Monitoring, Infrastructure Management, Industrial Applications, Energy Management, Medical and Healthcare Systems, Transport Systems and Building and Home Automation.
9. Cleaned up text to ensure appropriate links to other relevant Wikipedia pages were included.
10. Added additional examples of planned and ongoing IoT deployments to the *Large Scale Deployments* section.

Further editing of the article is continuing to ensure that appropriate information is included. Information regarding device types, architectures, communication technologies and operating systems will be added to the page. Content from existing sections on intelligence, size considerations, timing and geographic implications will be edited and carried over to the new article. Information regarding different frameworks (IETF protocols, XMPP, OMA, IPSO, ZigBee, etc.) will also be included. Information related to management, security and privacy will also be added to the article.

6.1.2 NETCONF (link to page)

- Editor: Jürgen Schönwälder (Schoenw)

The NETCONF page did not contain much information regarding the protocol in the beginning and it was sometimes presented in a hard to read way. As such, a process of incremental updates to the article content has been adopted.

As shown in Figure 7, data fetched on 01-10-2014 reveals that the FLAMINGO editor for this page has already contributed over 16% of the text in the article.

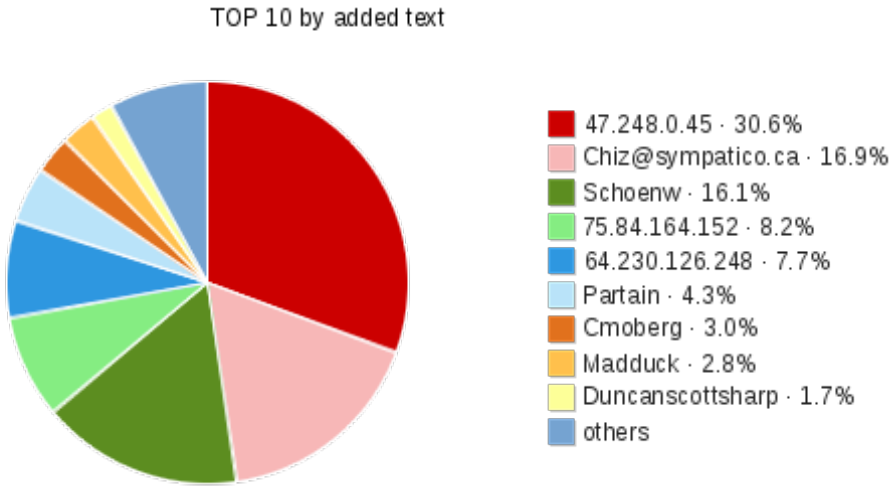


Figure 7: Relative contribution of the 10 top editors to NETCONF. FLAMINGO editor is depicted in green

An overview of the edits (in chronological order) is as follows:

1. Replaced line drawing of the NETCONF layers with a pre-existing SVG image. Added text regarding the function of each conceptual layer.

2. Included text in the *Introduction* regarding message exchanges over a secure transport protocol, implementation by vendors and mechanisms supported by NETCONF.
3. Included text regarding the historical development of the NETCONF protocols.
4. Updated incorrect or missing RFC numbers in the text.
5. Reorganized article so that the *History* is presented in the beginning.
6. Rearranged text around the four protocol layers.
7. Added text describing the messages layer.
8. Added a table for the base operations.
9. Created a new, more accurate and up-to-date, SVG image depicting the NETCONF layers. Updated the image in WikiMedia.

Further updates will be made to the article, so as to provide more information about NETCONF.

6.1.3 YANG (link to page)

- Editor: Jürgen Schönwälder (Schoenw)

As reflected in Figure 8, data fetched on 01-10-2014 reveals that the FLAMINGO editor has already contributed over 52% of the text in the article through the history of the YANG page.

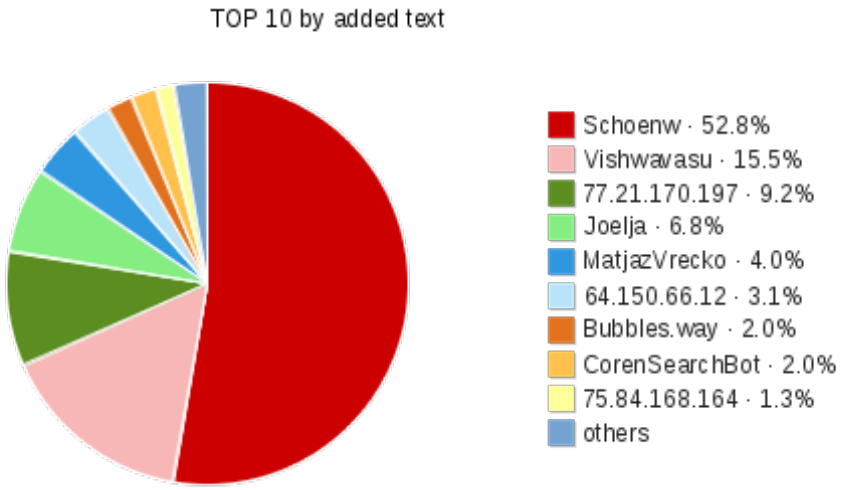


Figure 8: Relative contribution of the 10 top editors to YANG. FLAMINGO editor is depicted in red

An overview of the edits (in chronological order) is as follows:

1. Added a section about the history of the YANG language.
2. Removed text that was irrelevant to the discussion on YANG.
3. Added a section on the usage of YANG.
4. Performed editorial cleanup of the article.

5. Added appropriate RFCs to the list of RFCs using YANG.

Further edits will be made to the page, as necessary.

6.1.4 sFlow (link to page)

- Editor: Rick Hofstede (Rjh2805)
- Contributors: Sebastian Seeber

According to Figure 9, data fetched on 01-10-2014 reflects that the FLAMINGO editor has had a remarkable activity having added the 38% in respect to all added text to this page

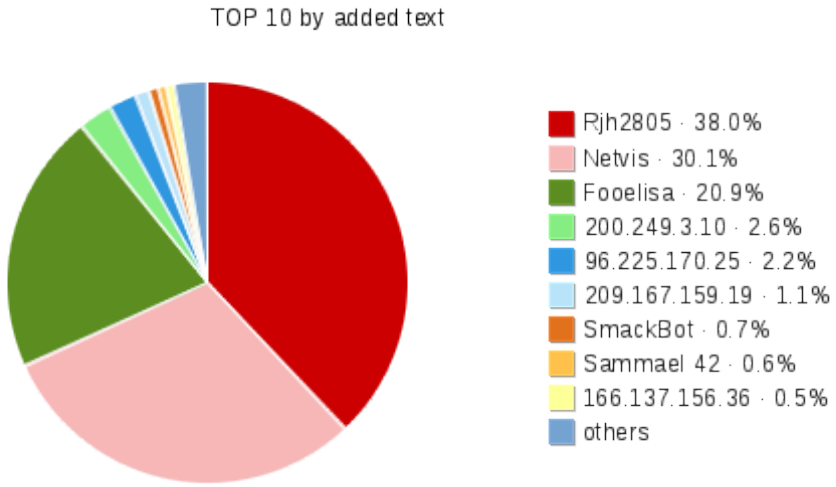


Figure 9: Relative contribution of the 10 top editors to sFLOW. FLAMINGO editor is depicted in red

An overview of the edits (in chronological order) is as follows:

1. Improved the general introductory paragraph.
2. Overview of sFlow versions.
3. Comparison to related technologies, such as NetFlow, IPFIX and OpenFlow. For an encyclopaedia, this may be of most use. Moreover, it could be reused in the NetFlow and IPFIX articles, for example.

The steps above have been added in multiple minor revisions. All made modifications have been accepted by other Wikipedia users so far.

6.1.5 Denial-of-service attack (link to page)

- Editor: Jair Santanna (Jjsantanna)

The FLAMINGO editor for the Denial-of-service attack page does not appear within the top 10 contributors. The fact is that this article has more than ten years of creation and a very active community. An overview of the edits (in chronological order) made by the FLAMINGO editor is as follows:

1. Added a section about Reflected / Spoofed attack.
2. Removed text that was irrelevant to the discussion of IP spoofing.
3. Added a reference to a paper of FLAMINGO researches.
4. Performed editorial cleanup of the article.

Further edits will be made to the page in the future when the actual ones show to be stable.

6.1.6 Termination rates (link to page)

- Editor: Christos Tsiaras (Christostsiaras)

This was an already existing page that the FLAMINGO editor has improved in the aspects following hereafter:

1. A new section (Section number 4) concerning the Mobile Termination Rates Monopoly was added.
2. Fixed a broken link from Swisscom referring to the Mobile Termination Rates in Switzerland compared to neighbour countries.
3. Linked the *calling party pays* phrase to the newly created Wikipedia page about the Calling party pays concept by the same FLAMINGO editor.

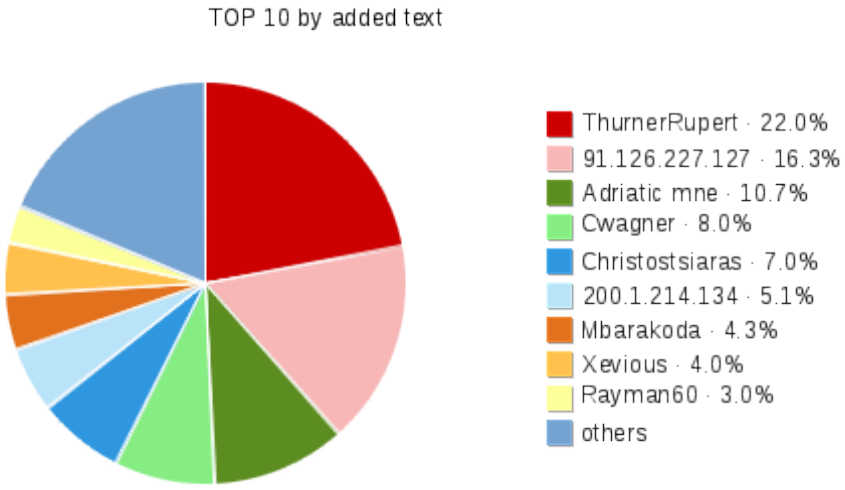


Figure 10: Relative contribution of the 10 top editors to Termination rates. FLAMINGO editor is depicted in blue

According to Figure 10, data fetched on 01-10-2014 reveals that the relative contribution of the FLAMINGO editor in this page is 7% of added text.

6.1.7 Calling party pays (link to page)

- Editor: Christos Tsiaras (Christostsiaras)

This a newly created page by this editor on the charges that the provider of a call's receiver will charge to caller's operator, in order to terminate that call into his network.

The page consists of a single paragraph describing the calling party pays principle. The content is supported by two references. Up to the moment of closing this deliverable no feedback has been received from other Wikipedia users/editors.

6.1.8 Software-defined networking (link to page)

- Editor: Sebastian Seeber (SsGer0710)
- Contributor: Gaetan Hurel

This page on the concept of software defined networking was improved by adding a 15,5% of text in respect to the total added text, as shown in Figure 11, according to data fetched on 01-10-2014.

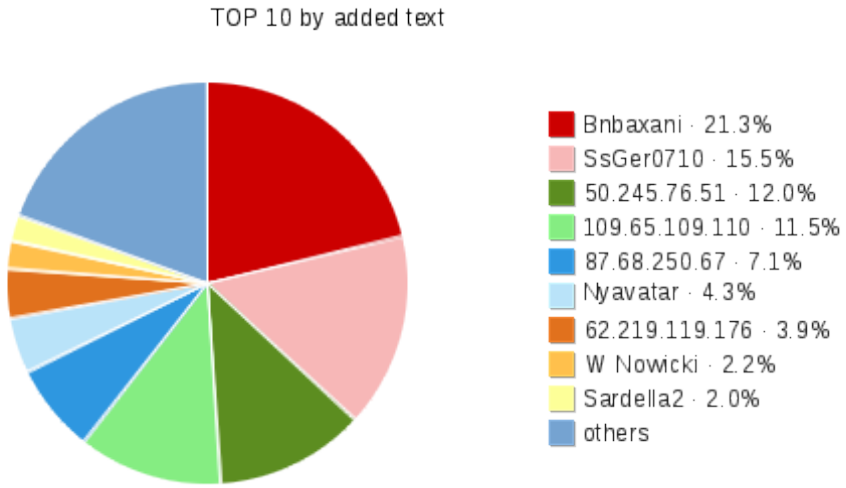


Figure 11: Relative contribution of the 10 top editors to Software-defined networking. FLAMINGO editor is depicted in pink

The main parts of the edits are summarised as follows:

1. In the first step we updated the deployment models.
2. After we added the reactive and proactive approaches. In addition we removed the other deployment models because there exists no relevant literature which explains these models.
3. In a second edit we added a paragraph which gives an overview of security approaches specific for SDN.

Up to the moment of closing this deliverable no feedback has been received from other Wikipedia users or editors.

6.2 The Web Crawling tool

The web crawler is a tool developed within a national research project call [4], whose concept is summarised in Figure 12. One goal of this project is to identify emerging key technologies. For the purpose of the support of finding and observing these technologies a web crawler is developed and implemented to analyse input data from various sources and visualize them in an appropriate way. For this reason approaches from the area of word sense disambiguation, automatic query extraction and information visualization are considered and implemented.

The following data is extracted: author, co-author, title of publication, description, type and year of publication and number of publications per author. IEEEXplore and CiteseerX are accessed via API since this seems to be much easier and faster than crawling these sources.

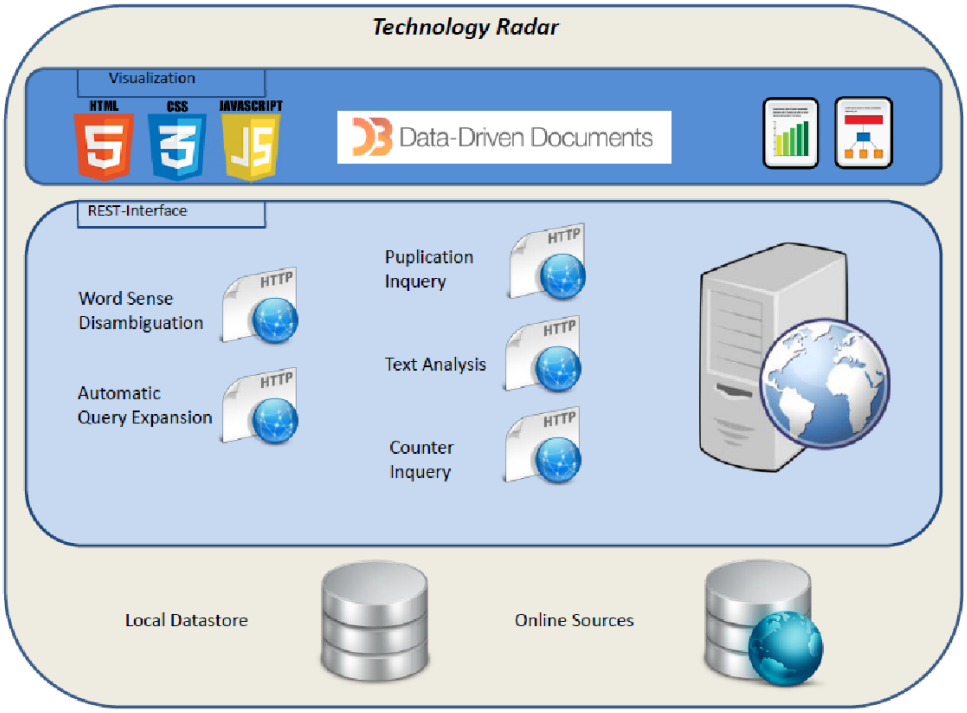


Figure 12: Entities and functions used in the Web Crawling tool

Word sense disambiguation, automatic query expansion and text analysis are key functional components. The word sense disambiguation function is used to map search terms to areas of similar topics. Therefore DBpedia is used as mapping provider to extract information and topic areas from Wikipedia. An automatic query expansion is used to expand the original search term with additional relevant terms. For example the method word sense disambiguation results a Wikipedia article and automatic query expansion extracts relevant terms from the respective Wikipedia page. Therefore stopwords are removed in a preliminary step. Finally, a text analysis method recognizes variations of terms and calculates the Levenshtein distance [5]. Furthermore a frequency analysis of terms in text sources is done.

These aforementioned steps are necessary to analyse recent publications and display the occurrence of search terms and keywords within the tools database. This allows the user of this expert systems to get a perception of what emerging key technologies could look like.

The presentation of the results is realized via a website representation which is based on the

concept of Data Driven Documents [6], where all the results from previous queries are stored. The tool is accessible at `https://researchobservatory.fp7-flamingo.eu`

The research observatory part of this tool, as being adopted in FLAMINGO, is based on online sources and locally stored crawled data. Currently only data which is available to the library of Fit4Sec is used (IEEEXplore, CiteseerX, DBLP, FP7-CORDIS). This could be extended later with crawled data from other FLAMINGO participants. The FLAMINGO taxonomy can be used to identify further keywords and support the automatic query extension. Therefore the search terms provided to the tool will be placed automatically in the right FLAMINGO context.

6.3 Maintenance of Simpleweb

A list of open source and commercial software in the area of network and service management is maintained on Simpleweb website [7]. During the second year of project the list of software was updated to contain only the most known and downloaded tools, such as Wireshark, Ntop, Nmap, NfSen, NfDump, net-SNMP, Nagios, Libsmi, Fprobe, Cloud-View, Cacti, SURFmap, and SSHCure, depicted in Figure 13.

Figure 13: Snapshot of software tools on Simpleweb website

Software tools with outdated links and never downloaded were manually analysed and removed.

In addition, we plan to update the list with mature open-source packages that have been tested in the context of WP1 [8].

On the other hand, lists of conferences and call for papers are maintained in the Simpleweb wiki [9] and [10], respectively. Both of them have been updated on weekly base and showed upcoming events. In addition, both information are also available via RSS feeds [11] and [12], respectively, which have been used to automatically be included on the FLAMINGO project website.

7 Conclusions

Work package 2, devoted to mobility, education and training has achieved its intended goals of providing orientation and guidance to project participants to help forming a well-integrated community.

FLAMINGO has been keeping the nine PhD students already identified in year 1 doing their respective research activities under the co-supervision of at least two senior researchers of the NoE. In addition, it has designed a collaboration plan consisting of activities directly emanated from the research work packages. These collaborations triggered visits ranging from 1 day to more than 3 weeks of six FLAMINGO researchers abroad. This visits strengthened the link between the PhD student and his/her co-supervisor, set the grounds of collaborative work between partners or designed the edition of common papers among others. Although in absolute terms these visits don't account for a long time period, cooperation is ensured through other communication channels.

The project S.M.A.R.T. objective entitled Integration of Ph.D. Students, states "After 9 months each research WP will have identified at least two fully integrated Ph.D. students, which means that these students will be jointly supervised and financially paid by FLAMINGO. At the end of the FLAMINGO project, we will have at least 9 fully integrated Ph.D. students". For the reasons explained in the above paragraph we conclude that this objective has been achieved along the second year of project.

The production of courses and training material has been one of the focus of this work package during this second year. A total of 14 course modules (videos) in different subject and areas were produced. Also these courses are different in terms of format. Tracking the impact of these videos based on the number of times each has been viewed, we have concluded that videos on specific tools and of shorter duration (a few minutes) have more acceptance. In addition, FLAMINGO partners have developed and taught three tutorials of three hours duration each on network management topics.

The S.M.A.R.T objective entitled Course and training material states "FLAMINGO will develop course material for network management, and make such material available to European and other universities. In addition, FLAMINGO will develop training material to facilitate current researchers within industry to keep up with the latest developments in this important field". Therefore, based on what we summarized in the paragraph above we can conclude that this S.M.A.R.T. objective has also been achieved for the reported period.

Finally, FLAMINGO has devoted effort to create or modify articles in Wikipedia. A total of eight pages were created or edited, with a significant relative contribution of the FLAMINGO editor in this second case. The impact and acceptance of these changes in pages as well as the new ones will be continually tracked and appropriate feedback will be extracted to continue this activity in the next year. Also, other activities already initiated in the previous year like the database and RSS channels of the Simpleweb platform, have been continued. Finally this second year has seen the start of work in the adaptation of a web crawler to the researchers profile in the network and service management community.

The research observatory is related to the S.M.A.R.T. Objective Integration of the research community, which states “To integrate the Network and Service management community, FLAMINGO partners will create a research observatory. An initial version will be operational by the end of year one”. Therefore, according to the outcomes summarised in the previous paragraph we conclude that this S.M.A.R.T. objective has been achieved through the second year of the project.

8 Acknowledgement

This deliverable was made possible due to the large and open help of the WP2 Partners of the FLAMINGO NoE. Many thanks to all of them.

9 References

[1] Flamingo youtube channel. http://www.youtube.com/user/fp7flamingo. Accesed: 2014.

[2] Aims 2014 website. http://www.aims-conference.org/2014/. Accesed: 2014.

[3] Fast network simulation setup (fnss) toolchain. http://fnss.github.com. Accesed: 2014.

[4] Fit4sec. http://www.fit4sec.de. Accesed: 2014.

[5] Christopher D. Manning, Prabhakar Raghavan, and Hinrich Schütze. *Introduction to Information Retrieval*. Cambridge University Press, New York, NY, USA, 2008.

[6] Michael Bostock, Vadim Ogievetsky, and Jeffrey Heer. D3 data-driven documents. *IEEE Transactions on Visualization and Computer Graphics*, 17(12):2301–2309, December 2011.

[7] Software tools at the simpleweb site. http://www.simpleweb.org/software/. Accesed: 2014.

[8] FLAMINGO project. Work-package 1.

[9] Simpleweb wiki. conferences and workshops. http://www.simpleweb.org/wiki/Conferences_&_Workshops. Accesed: 2014.

[10] Simpleweb wiki. call for papers. http://www.simpleweb.org/wiki/Cfp. Accesed: 2014.

[11] Simpleweb rss feeds. conferences and workshops. http://www.simpleweb.org/conferences.rss. Accesed: 2014.

[12] Simpleweb. rss feeds. call for papers. http://www.simpleweb.org/cfp.rss. Accesed: 2014.