

Restructuring Software Systems in Education and Government

Edmund Laugasson, *edmund.laugasson@gmail.com*

Tallinn University, Institute of Informatics, Narva Road 25, 10120 Tallinn, Estonia

Silver Püvi, *silver.pyvi@atrauma.ee*

Arvuti Traumpunkt Ltd., Türi 10c, Tulbi 6-6, 795143 Rapla, Estonia

Kaido Kikkas, *kaido.kikkas@kakupesa.net*

Estonian Information Technology College, Raja St 4c, 12616 Tallinn, Estonia

Tallinn University, Institute of Informatics, Narva Road 25, 10120 Tallinn, Estonia

Abstract

The aim of this paper is to analyze the need for restructuring education and government software systems in Estonia. We discuss people's awareness as well as attitudes and changes in them, e.g. changing the mindset of school management concerning software, re-educating IT teachers and revamping government software policies. As well-rounded skills are important, we propose teaching three main operating system families (MS Windows, GNU/Linux and Mac OS – hereinafter: Windows, Linux, Mac) and also two main office suites (MS Office and LibreOffice) equally at schools. And as Estonia is still recovering from the economic crisis, its public sector has limited budget, therefore it should rethink its software policies and consider replacing proprietary software with free and open-source software (FOSS).

Keywords

free software, free and open-source software, proprietary software, awareness, attitude, software education, software training, FOSS

BACKGROUND

Estonian government has recently started five procurements in the field of free and open-source software (hereinafter FOSS) – Software Framework 2011 (hereinafter SF2011; RISO, 2011) and four state procurements involving LibreOffice – a portal, its content management, user interface Estonian translation plus speller and thesaurus development (Vallner, 2011). SF2011 is meant to be a guide for IT managers, project managers, IT specialists, procurement specialists, IT development companies, IT auditors as well as supervisory authorities and state information development coordinators – so this document plays a key role in Estonian information society. In Western Europe, similar initiatives include European Interoperability Framework (IDABC, 2004) and European portal of open-source software (EC, 2013) that indicate increasing FOSS demand and usage.

Yet educational software is not always open-source. For example Mitchel Resnick introduces the programming learning software called Scratch (Resnick, 2007), which is open-source software (MIT, 2012). Everyone can freely download and use it – this should be the rule for all educational software (Stallman, 2013). Scratch is also used at Estonian schools. At the same time, schools are using Lego robots

(Garcia-Cerezo et al., 2009), also in Estonia but its software isn't free (LEGO, 2006) and it works on proprietary Windows and Mac only.

Another point of concern is the continuing widespread usage of proprietary software (especially products of Microsoft) in Estonian public sector. The government uses taxpayers' money to provide advertisement and training for proprietary products of foreign software companies – and this has continued throughout the economic recession with risen unemployment and other social problems.

We note that people entering workforce will usually prefer to keep using the software they got familiar with at school, therefore schools affect students' perception and preferences of software. In case of closed, proprietary software, sharing is hindered – both for the software itself and the wider knowledge surrounding it.

In 2011, the World Bank rated Estonia as a high income country (HIC, 2013) (12 476 € or more per year) and shortly after that, Microsoft ended their program “Partners in Learning” (PiL) in Estonia – since July 1, 2011 MS School Agreement prices increased approximately 14 times. One month earlier Microsoft offered the old prices for three years but this period will end on July 1, 2014. This information has been directly e-mailed to Microsoft clients in Estonian language by Microsoft Estonia. In a situation like this, Estonian schools should seriously reconsider their needs for Microsoft software, as school budgets will not increase 14 times. Switching to FOSS is a legal solution here.

Another problem is the vendor lock-in via proprietary file formats. This results in data being encapsulated into proprietary formats, which are (usually on purpose) incompatible with others. The consequences include

- being forced to invest into proprietary software needed to access the data
- serious obstacles in information interchange – for example, even different versions of Microsoft Office cannot exchange files reliably
- dangers of losing the data after extended periods of storage – for example, documents created in early versions of Microsoft Word can be difficult to open reliably in new versions of MS Office. The most recent MS Office 2013 officially supports Word files from version 97 and Excel from 95 (Microsoft, 2013) – versions from 2.0 upwards are blocked by the Trust Centre by default, and documents from older DOS and Mac versions may need some creative solutions to open properly.

At the same time, awareness about free and open-source software is still very low and people are not ready to use it in their computers.

METHODS

We collected and analysed data using an electronic survey in Estonian language (25 questions plus open-ended comments). The respondents included

- current students and teacher at schools
- public sector IT specialists
- ministries
- business sector
- private sector

The following issues were addressed:

- knowledge of the FOSS-related terms and policies in Estonia
- awareness and attitudes about FOSS
- FOSS vs proprietary software
- readiness to continue work using FOSS

Results and analysis

We collected answers from different parts of society – public sector including schools, all twelve ministries in Estonia (EM, 2013) but also from Estonian private

and business sector. The survey was carried out from November 26 to December 9, 2012 (14 days). We received 235 responses in total (see Figure 1 for details).

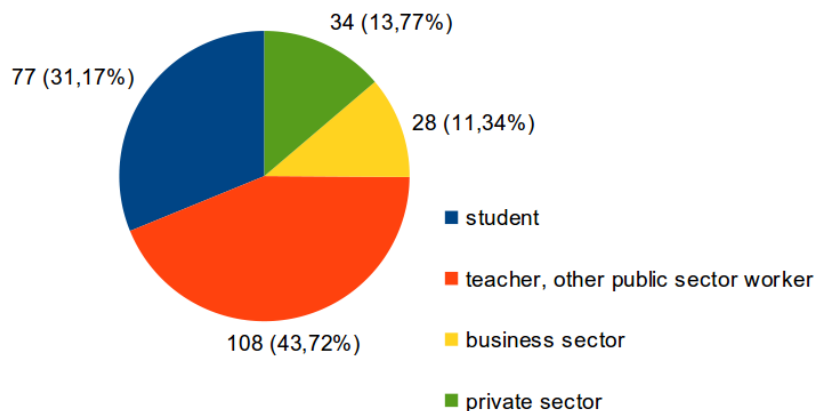


Figure 1: Distribution of participants

First of all we asked about knowledge of FOSS-related terms and policies in Estonia. Most respondents know the term “free software” (note: in common Estonian usage, the term “vaba tarkvara” usually encompasses both free and open-source software, thus being roughly equivalent to FOSS). Basically the only significant share of unawareness occurred among students (~14%) which points to the problem of unidimensional teaching at schools.

Actually in Estonia, there are several steps taken by the government to raise awareness – the five state procurements are the main ones. In the e-democracy portal (EDP, 2013) where every Estonian citizen can make proposals there was a case when a question about foreign-language software sold in Estonian shops received an official reply from the government recommending the localized versions of Linux and LibreOffice (ELIC, 2013). At the same time, awareness of the Estonian Interoperability Framework was remarkably lower with the percentage ranging from 36 to 61 in different sectors. This suggests that the state efforts are not known enough yet among the wider public.

More than 70% of the respondents claim experience with freeware and FOSS. While schools still mostly teach proprietary software, people in different sectors do use FOSS rather widely. We note that the usage of FOSS and (proprietary) freeware differ somewhat in favour to FOSS – freeware usage is at 40-50% in different sectors while FOSS is used by 70-80% of the respondents. However, many people do not understand the difference between freeware and FOSS (this is why we studied these categories together as well).

We also note that there is a strong negative correlation between FOSS experience and prejudice towards it – 60...70% of FOSS users do not hesitate to use it, whereas a sizable share of non-users did express some prejudice.

The respondents from all sectors (70-90%) stressed the need for freedom to choose software. While this can also be interpreted as a sign of inertia (“don’t make me change my ways”), it also shows resistance to lock-in and centralization. However, coupled with about 90% expressing readiness to implement FOSS (somewhat surprisingly, the percentage even reached 97 for business sector) it should be taken as a clear indicator for government that the fertile ground for wider-scale FOSS adoption does exist.

A part of the Estonian Interoperability Framework state procurement was to create ALVATAL – Estonian Open Source and Free Software Alliance (ALVATAL, 2013). This organization was mostly created in order to offer FOSS support at commercial level. In addition, Estonia has organized five state procurements about FOSS. Yet, all these initiatives remain relatively unknown as indicated by our study

– only about a quarter of the respondents were aware of them. This shows a serious lack of wider manifestation on the government level.

There are some serious shortcomings in the education as well. Estonian national curriculum now prescribes teaching at least two operating systems – yet only 46% of teachers and 20% of students were aware of the fact (ENC, 2013). Moreover, the business sector remains almost totally unaware (less than 4%).

Some interesting responses were found at the question “Who is responsible for the domination of Microsoft software at schools?”. The three prevailing answers were “IT specialists” (20-30%), “The Ministry of Science and Education” (about 20%) and “Microsoft” (25-30%). We believe this to indicate the success of corporate lobbying on both national and local level.

When asked about possible measures by the government to implement FOSS, the most important steps for all sectors were a) teaching it at schools and b) implementing in the government structures to allow communication with the state using FOSS tools (both were considered important by 60-70% of the respondents. The two often-cited measures – training (courses) and support – were considered important, but at 40-50%, they fell behind the schools and state.

Interestingly, many respondents suggest that state should offer free FOSS courses for everyone (when software is free, courses should be as well). This is the most common opinion which however is at odds with most FOSS-related business models.

There is also an interesting difference in perception of time needed to implement software – if a proprietary solution would take one year, its FOSS counterpart is believed to need three years. Here, people are probably taking the skills with proprietary solutions for granted (“anyone can use Word”) while assuming the need for serious retraining in order to use FOSS.

Nevertheless, people seem to support the transition – even if only morally (70-80% agree that it would be ‘the right thing’ to do). What comes to funding the transition, a clear majority sees the saving potential of such transition (about 80% believe that the savings will balance the costs (Wheeler, 2007)), although they also suggest including outside funding (EU grants etc).

When asked about the financial sources that supported the adoption of proprietary solutions, most respondents (80-90%) point towards the taxpayers’ money (state budget). Thus, the realization that everyone’s tax money has gone to finance foreign companies is there already.

Asked about what should be the savings from the FOSS transition be used on, most respondents suggest FOSS courses, school infrastructure, and sustainable development of FOSS projects (the national ID card software was particularly mentioned).

There is also one earlier study from 2007 in a similar setting (Bekman, 2007) involving 12 teachers and 156 students. The comparison can be seen from Figures 2 and 3.

Over the five years, awareness of free software has increased about 7% and of the Estonian Interoperability Framework even 30%. People are also 14% more ready to make use of FOSS. These observations form a good base for further FOSS deployments in Estonia.

DISCUSSION

The first problem is related to terms – seeing the difference between “freeware” and “free software” seems to be common problem in Estonia. If the difference is not understood, the basic freedoms granted by free software (and not by freeware) will be missed too.

While Estonian government intends to change the situation (the first attempt was including FOSS to state procurements). But the awareness remains low – and when ordinary citizens are unaware of government policies, they will be alienated from it.

A good example is the Estonian Interoperability Framework – as the study shows, it remains rather obscure (even more so than the FOSS overall). We therefore suggest that the next state procurement should significantly address the awareness of freeware/free software concepts (and their differences) and also the Interoperability Framework. At the same time, the study shows the overall level of FOSS experience to be more than 70% – so the problem is not in total lack of knowledge but rather in details and recognizing the role of government.

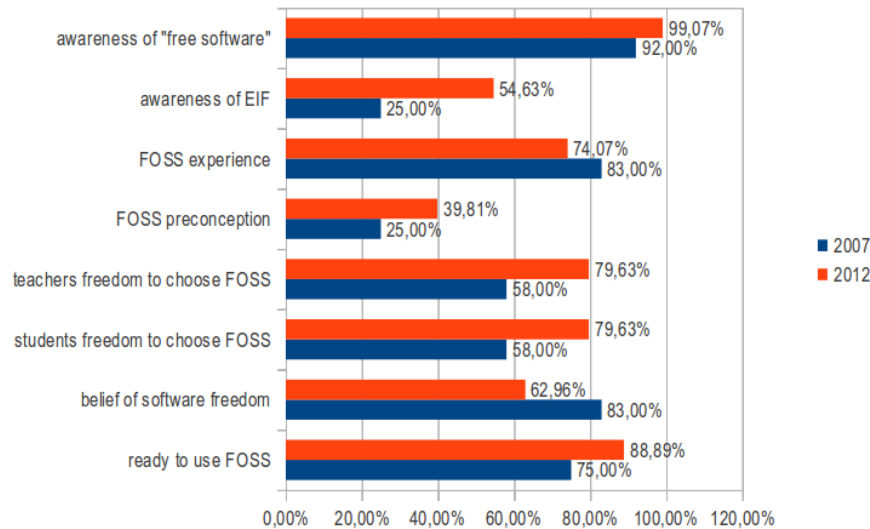


Figure 2: Teachers FOSS awareness comparison between 2007 and 2012

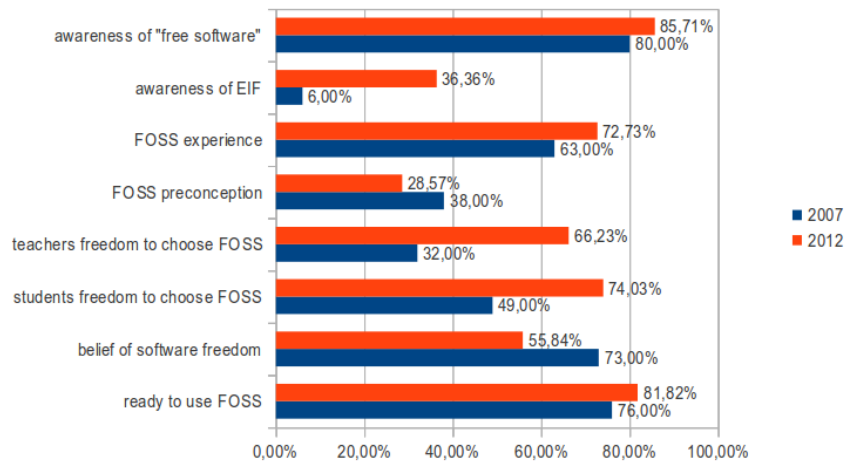


Figure 3: Students FOSS awareness comparison between 2007 and 2012

On the other hand, the level of prejudice is also shown to be rather high at 60-70% – a large number of people have formed strong opinions without actual experience in FOSS. At the same time people from all sectors claim the need for freedom to choose software – thus people are not ready to pay for proprietary solutions but are still wary of free software. This shows the lack of proper education in FOSS field and also the need for governmental activity.

Readiness to implement FOSS is over 90% – in addition, the Estonian National Curriculum has recently included the requirement to teach at least two operating systems at schools. But ICT-specialists are not ready yet and need some time and possibly also training on FOSS adoption. ALVATAL (Estonian Open Source and Free Software Association) has listed 10 companies ready to offer commercial support for FOSS – the government could use their know-how (it was actually planned this way in the first state procurement).

FOSS-related governmental activities would also raise awareness in business sector so they can expect FOSS-ready people for future employment. Currently, only 4% of the business sector knows that schools are required to teach at least two operating systems. Companies in Estonia still tend to believe that they can only get people competent in solely Microsoft software from schools (actually, this was largely true for a long time). Therefore, better cooperation between public and business sector should also be achieved in future through procurements by government.

At the same time, Microsoft is still actively lobbying on different levels. For example, they have been organizing an educational conference in Estonia for five years (MEC, 2013). This event claims to be the biggest and only event in this field, involving approximately half of all Estonian IT-teachers. The event does have strong advertising undertones in favour of Microsoft products and services. Their efforts have been increasing as July 2014 is almost at hand. After this, the low prices by the Microsoft School Agreement will be a thing from the past for Estonia and schools will acquire strong incentives to choose something else than proprietary software.

Right now, the reasoning at schools is mostly economic – as Estonian schools keep running on shoestring budgets, the 14 times increase in software expenses would likely be unthinkable. A FOSS awareness campaign by the government should stress the idea that education is possible also using FOSS. The two operating systems requirement points to the same direction – although schools are free to choose which systems to teach, at least one of the choices has almost universally been Linux (as Apple products requiring the whole infrastructure would be even more expensive than Microsoft).

Here comes an interesting conflict: most respondents suggest that state should offer free FOSS courses and even readiness to use it is high but prejudice remains a deterrent. Whom should these courses address if people have so much prejudice that they would not even attend?

People also assume that if software is free, courses should be alike. A possible solution for a governmental campaign could be to start with free courses. This process has already started with the state procurement to create free learning materials for LibreOffice (LLM, 2013).

One of the main points for such activity is also to keep taxpayers' money to Estonia – today, this is going out of the country. Using FOSS will give IT companies bigger domestic demand and therefore reason to hire more employees, which will reduce unemployment in Estonia and help revive the economy. This also gives to schools, universities and training companies more incentives to teach FOSS. Promoting these positive effects on economy should also be an integral part of the government FOSS campaign.

Funding for such transition comes from transition itself – savings from proprietary software licenses will balance the costs (Wheeler, 2007). Also economic effect gives additional resources and also next 8th European Framework Programme "Horizon" during 2014-2020 would be one source (8th FP, 2013).

CONCLUSION

In near future, Estonian schools will face a serious challenge as the inexpensive software from the MS School Agreement will be unavailable after July 2014. Even in the unlikely case of receiving continuing discounts from the company, this would continue the lock-in and produce graduates who, being unable to use alternatives, will be forced to invest heavily into Microsoft infrastructure for full price.

The study shows that the readiness to move over to FOSS is emerging in Estonia, but the process could be greatly stimulated by a relevant information and training campaign from the government, to alleviate prejudices and assure users that they will not be left 'out to the cold' when building their IT skills on FOSS. A possibility is to build such a campaign around the international Software Freedom Day (SFD, 2013) celebrated yearly in mid-September.

While Estonian government has launched five FOSS-related state procurements, it still lacks good strategies for their implementation. This should be a prime target for future efforts.

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Biographies



Edmund Laugasson is PhD student at the Tallinn University, Institute of Informatics. My main focus of research is based on a free and open-source software, but also other ethical and social issues of ICT (interoperability, information society, e-safety, licensing, etc).



Silver Püvi is development manager at Arvuti Traumapunkt Ltd. His main focus of research and teaching has been on a wide range of ethical and social issues of IT (IT security, free and open-source software, licensing, hacker culture etc) and teaching (active learning methods, ICT teaching, outdoor education etc).



Kaido Kikkas is an Associate Professor at Estonian Information Technology College and an Associate Professor of Social and Free Software at Tallinn University. His main focus of research and teaching has been on a wide range of ethical and social issues of IT (information society, free and open-source software, licensing, e-safety, hacker culture etc).

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