

Sustaining a software ecosystem with FLOSS: skills and local economic growth

7th Asia Open Source Symposium

Kuala Lumpur, Malaysia, March 7, 2006

Rishab Aiyer Ghosh

rishab@dxm.org

UNU-MERIT, The Netherlands

This presentation is based on research from the FLOSSPOLs and FLOSSWorld projects, funded by the European Union's Sixth Framework Research Programme/IST.



Software in society

“Access [to ICTs] is not enough, it is the ability to create, to add value, that is important”

Felipe Gonzalez

former Spanish Prime Minister,

Speaking at Open Source conference in Málaga, Spain, 18/2/04



Economic transactions

- Monetary markets
 - I give you money, you give me a fish
- Barter
 - I give you potatoes, you give me a fish
 - We still have potatoes and fish separately
 - We still have to decide how many potatoes a fish is worth



Cooking-pot

- Cooking-pot
 - I put my potatoes and you put your fish into a “cooking-pot” - we share the resulting stew
- In a *real* cooking-pot...
 - We still need to decide who gets how much
- In a *virtual* cooking-pot...
 - “problem of infinity” - information copying
 - We each get our own copy of the whole pot!

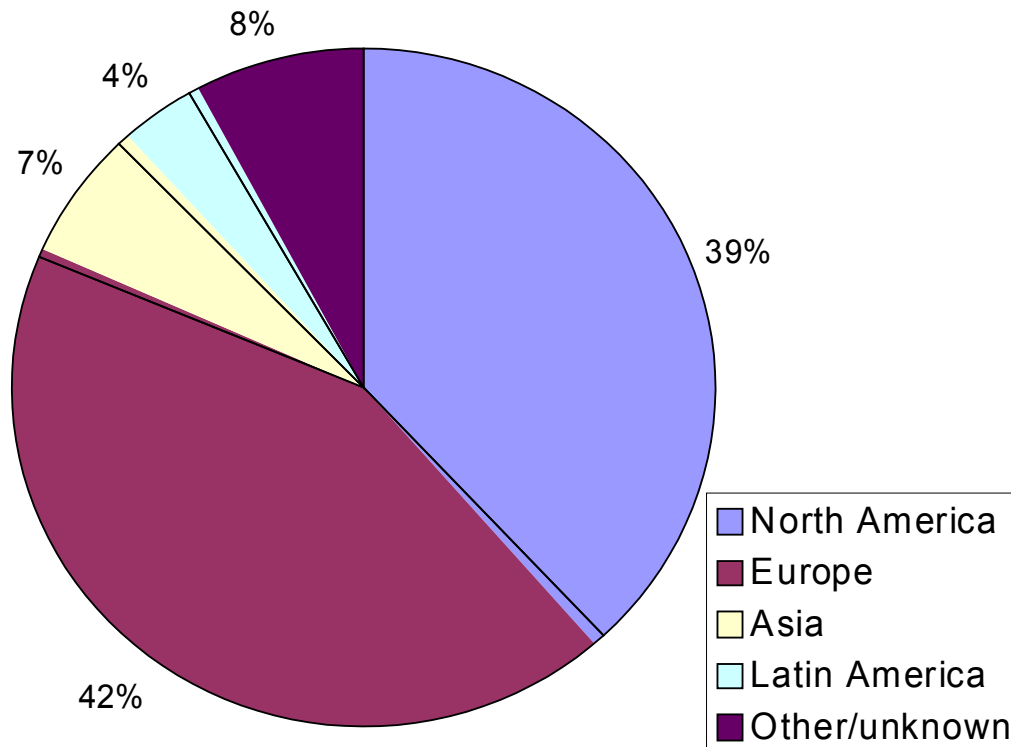


Cooking-pot: sustaining economics

- Implicit transactions, implicit trade:
 - 1-time cost of creating an intellectual work, 0 cost of duplication
 - 1-time cost of creation implicitly traded for valuable access to your own copy of millions of other creations
- Sustainance:
 - As long as someone somewhere contributes, for whatever reason, everyone benefits

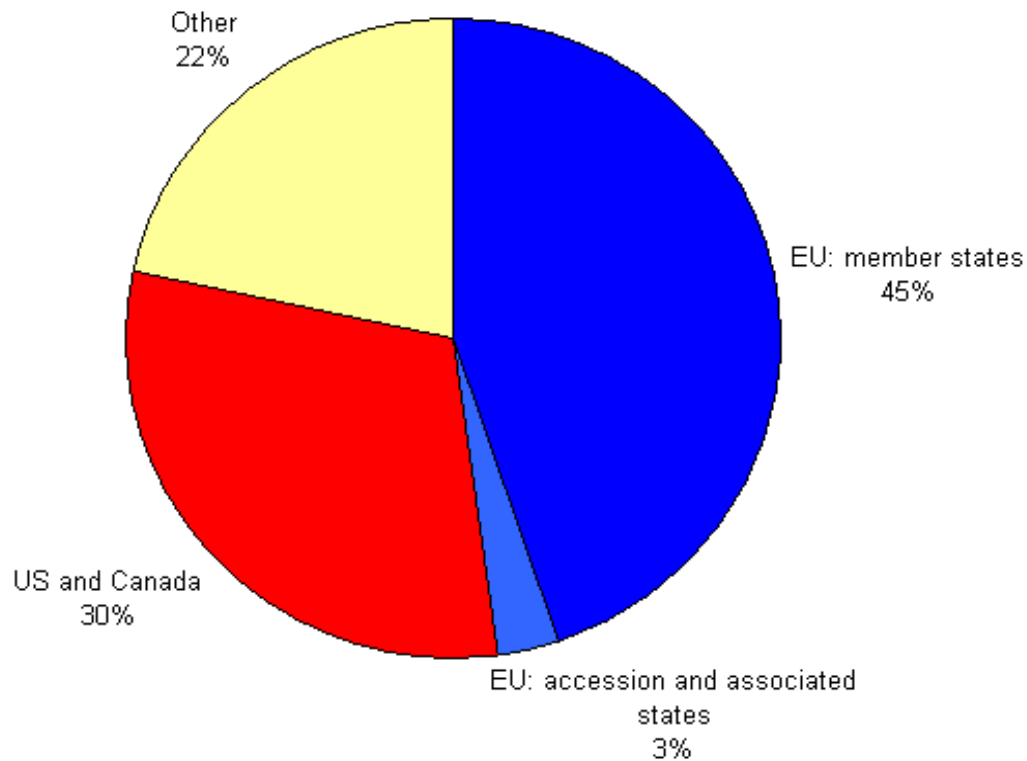
FLOSS contributions

Geographical distribution of developers on Sourceforge



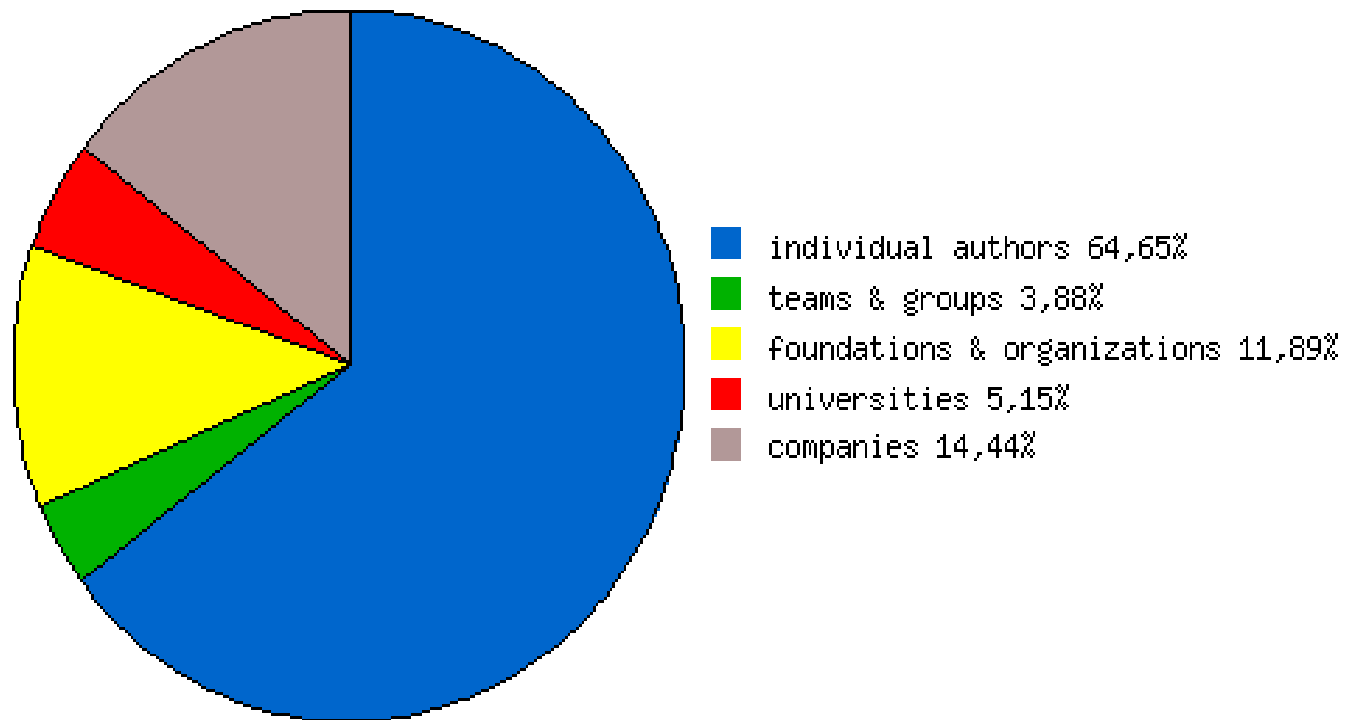
FLOSS contributions

Geographical distribution of Debian project leaders



FLOSS contributions

Distribution of code productivity



Copyright © 2005 URJC. Shows code contribution share for Debian in 2002.



Costs, skills and economic growth

- **Costs**

Windows Office, US\$560, is 14.5 months of average income in India, equivalent to US\$ 42 725 in the US, and 1.8 months of income in Malaysia, equivalent to US\$ 5 341 in the US. Cost does matter.

- **Skills development: “the ability to create”**

FLOSS is a training environment that increases the earning capacity of community participants without any explicit investment in training: a novel form of technology transfer

- **Economic growth: “ability to add value”**

FLOSS allows local entrepreneurs to provide a greater share of total value added, thus retaining a greater share of profits within the local economy



Skills and economic growth

- **Skills development: “the ability to create”**
FLOSS is a training environment that increases the earning capacity of community participants without any explicit investment in training: a novel form of technology transfer
- **Economic growth: “ability to add value”**
FLOSS allows local entrepreneurs to provide a greater share of total value added, thus retaining a greater share of profits within the local economy



Local value addition: proprietary

- **Building over a platform**

This applies equally to any platform, which is simply used as a (non-modifiable) base on which new services or software are built: 100% of the added value is local

- **Sales commissions**

Something which is rarely possible with free software, but also represents little value. Only the commission is retained locally, which is a small part of the total value.

- **Support, integration, customisation...**

Local value addition limited, as “deep” (high-value) services require “deep” access – only the proprietor has it.



Local value addition: FLOSS

- **Building over a platform**

As with proprietary software, free software platforms can be used as a (*modifiable!*) base on which new services or software are built: 100% of the added value is local

- **Sales commissions**

Rarely possible with free software, but also represents little value. However, the entire “sale price” can be retained locally, as no proprietor has to be paid a royalty or licence.

- **Support, integration, customisation...**

Local value addition extensive, as “deep” access is available. 100% of such services can be provided locally, retaining 100% of the value locally.



“Deep” support, more local value

- Local companies are limited in the integration and support services they can provide for proprietary software
- Deep support: fixing software bugs, customising it to user requirements, or integrating extensively with other software requires deep access.



“Deep” support, more local value

- Deep access to proprietary software is controlled by the proprietor (limits access or requires royalties, diminishing value retained locally)
- Deep access to free software is available to anyone – limited only by their skills. This allows every provider to potentially provide deep support services, and retain 100% of the value.



The importance of customisation...

- Custom or in-house software represents about 67% of total software produced (in the US; more elsewhere)
- If based on free software, custom solutions greatly benefit the solutions provider who captures 100% of the total value, not just the value added locally – no royalties/licences paid



Code re-use, higher service levels

- Free software allows providers to reuse code rather than build from scratch, and to reuse a huge base of code written by others
- Re-using (and modifying) allows the creation of much better end-user solutions for the same effort than writing from scratch
- Put together, this provides better value for money for customers and better profit margins for local service providers



Skills and economic growth

- **Skills development: “the ability to create”**
FLOSS is a training environment that increases the earning capacity of community participants without any explicit investment in training: a novel form of technology transfer
- **Economic growth: “ability to add value”**
FLOSS allows local entrepreneurs to provide a greater share of total value added, thus retaining a greater share of profits within the local economy



FLOSS develops local skills

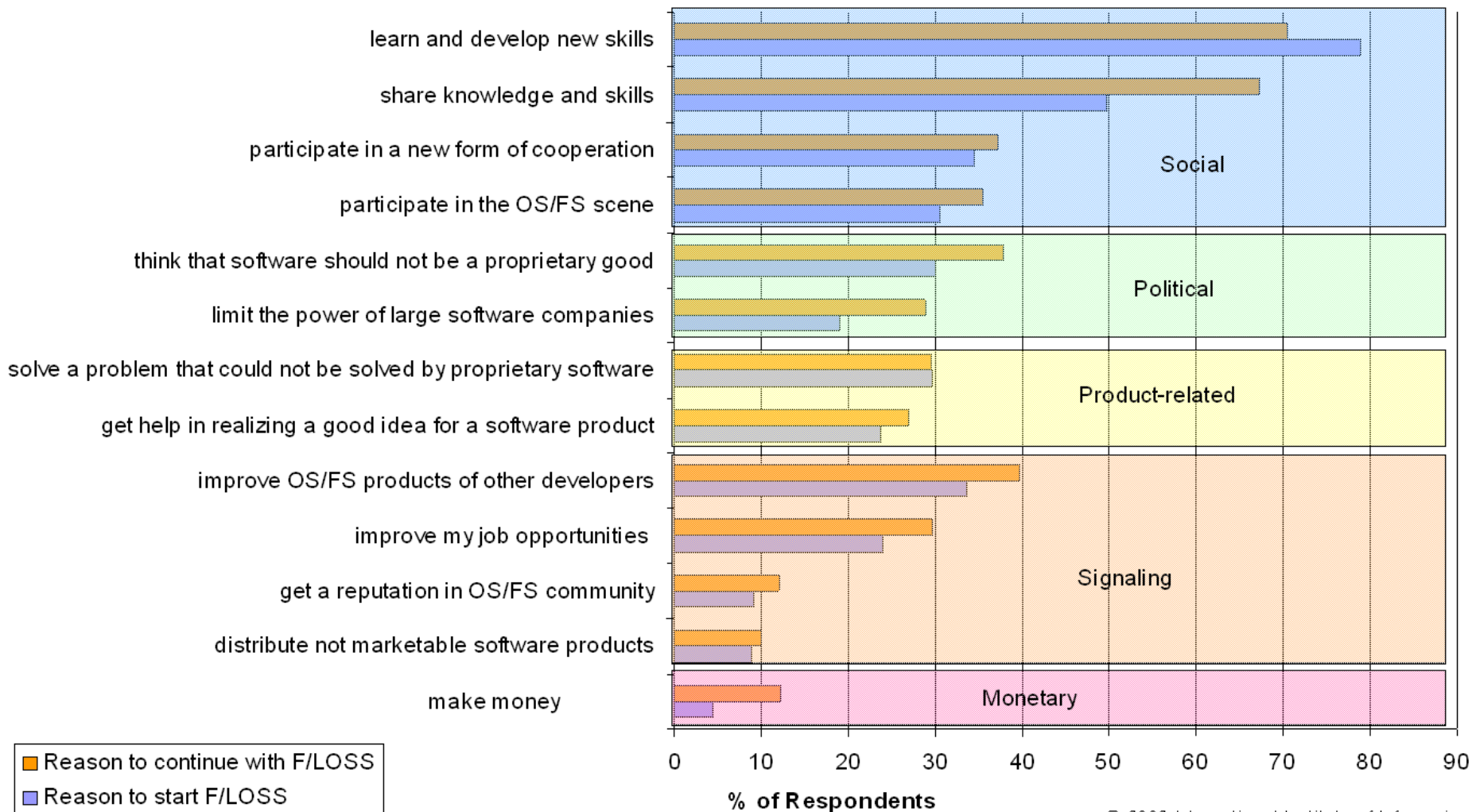
- FLOSS encourages not only passive “use” but active participation in the creative process
- FLOSS provides a very low barrier to entry for creativity – you don’t *have* to be creative but if you want to, you easily *can*



But do we all want to program?

- How will we know, unless we can try?
- HTML is a programming language – the web only took off because it was open, so people could learn to write their own sites just by “viewing source”, copying and modifying other websites
- “Programming” covers a very broad range of skills from HTML to C; FLOSS allows entry at any degree with little investment in time or effort

Why develop FLOSS?



(Source: "FLOSS Final report", Ghosh et al)



FLOSSPOLLS Skills Survey

- How is learning organised in the FLOSS community?
- What mechanisms and patterns can be observed?
- For which purposes do community members learn?
- What is the impact of skills learnt on employment potential?



FLOSSPOL Skills Survey

- Aim: to study both skills learnt and impact on employability.
- Separate questionnaires sent to:
 - developers (worldwide)
 - employers (EU)



Findings

- Technical skills
 - New participants learn various skills
 - Experienced participants should learn too
- Management skills
 - New and experienced participants should learn teamwork, coordination and management skills



Findings

- Legal skills
 - Participants should learn legal skills, more than in formal (non-legal) courses
- General skills
 - Non-English speakers improve their English



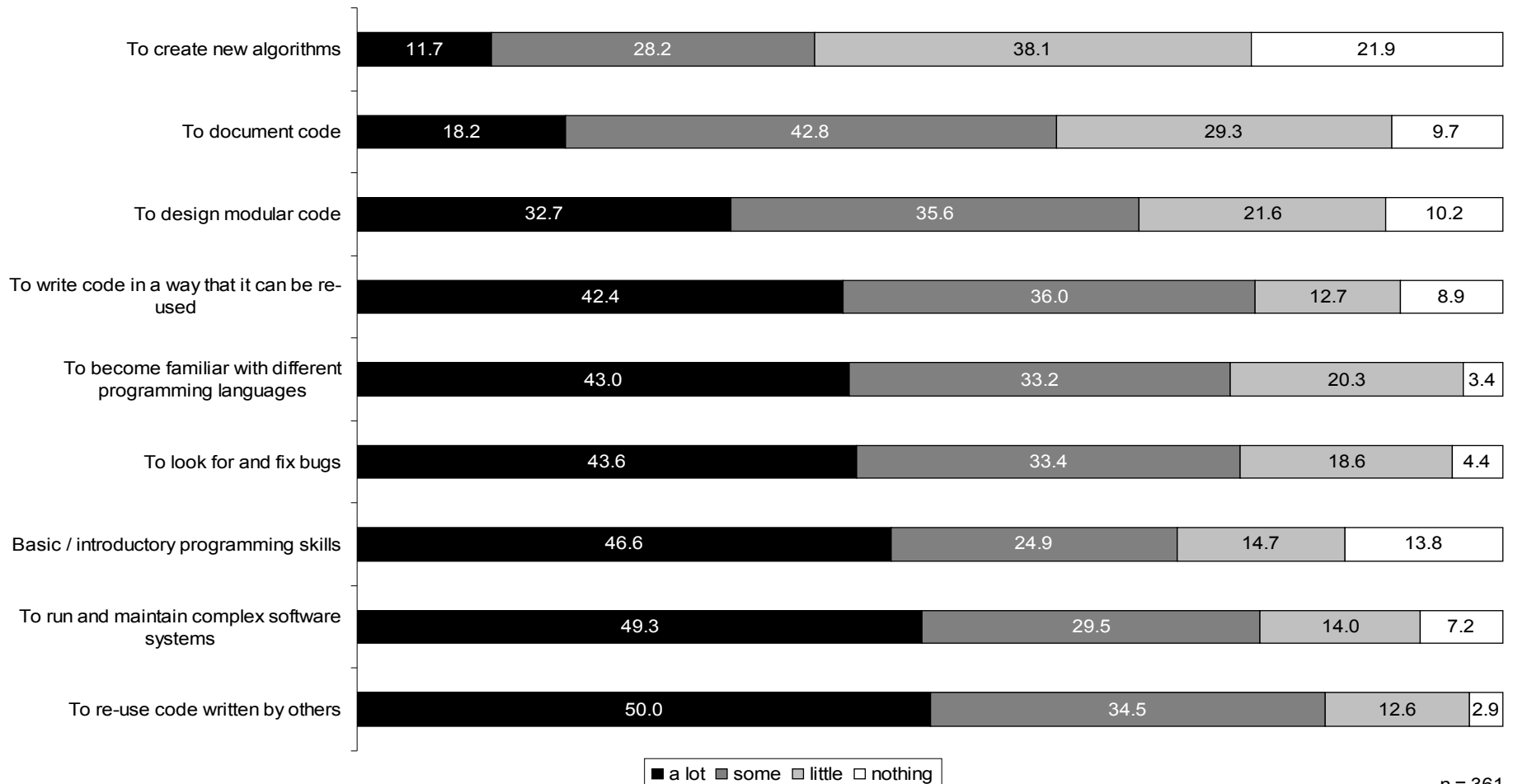
Findings: formal learning

In comparison with formal ICT courses:

- FLOSS provides a better, practical learning environment for many technical skills:
 - Writing re-usable code & debugging
 - Working with code written by others
- FLOSS provides a better learning environment for most legal and teamwork skills, which are rarely taught in formal ICT courses

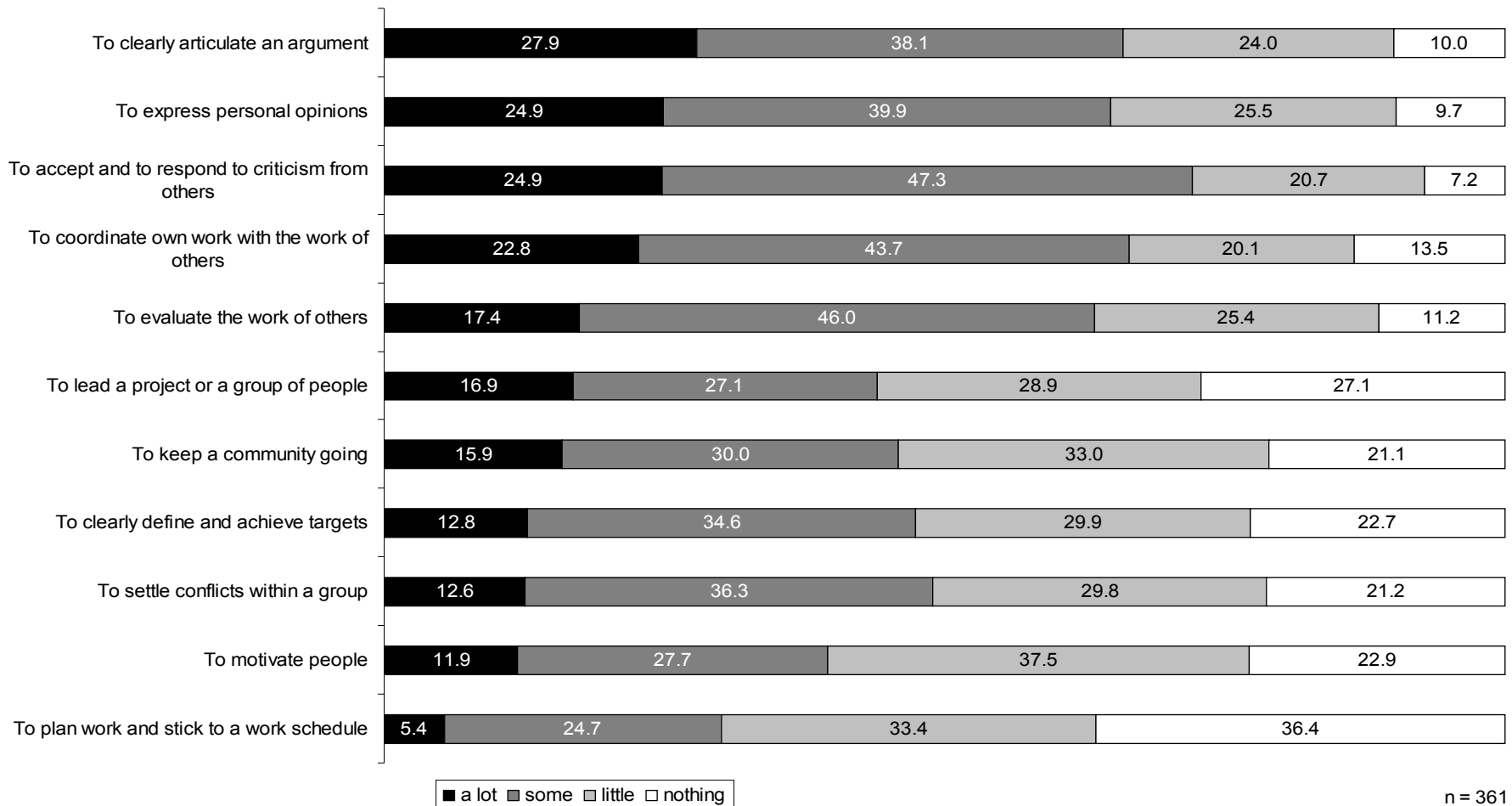
Skills learnt: technical

Improvement of technical skills through participation in the FLOSS community



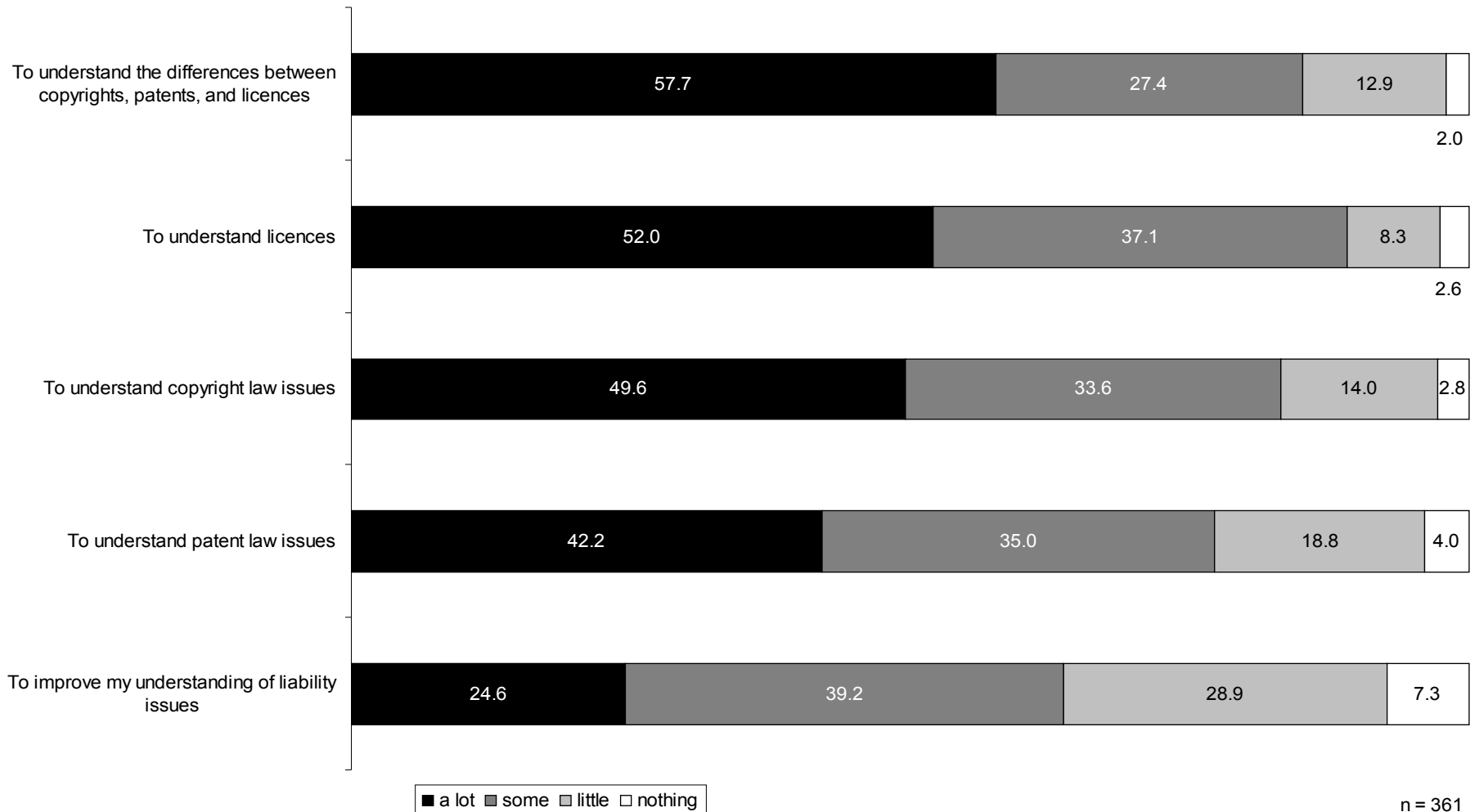
Skills learnt: management

Improvement of managerial skills through participation in the FLOSS community



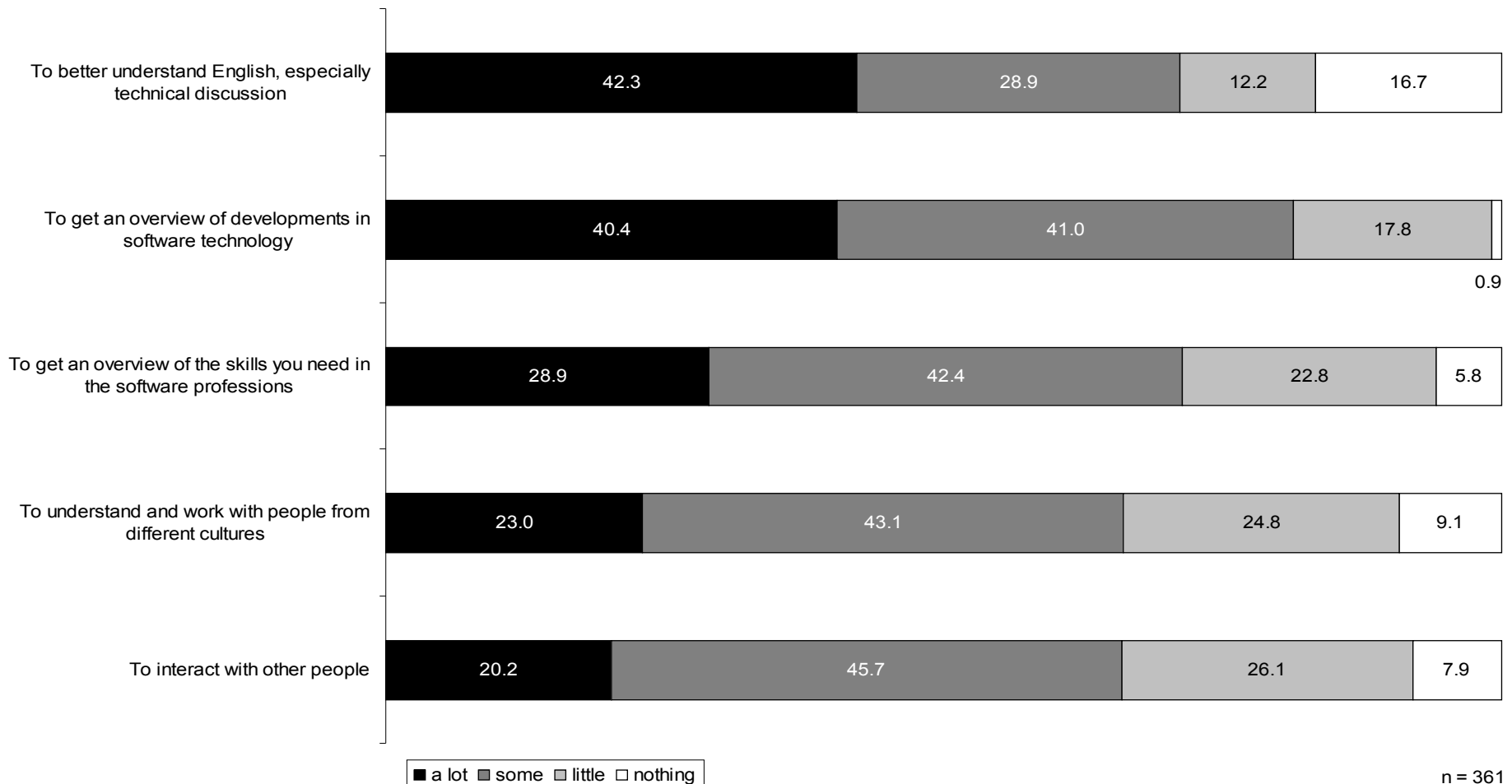
Skills learnt: legal

Improvement of legal skills through participation in the FLOSS community



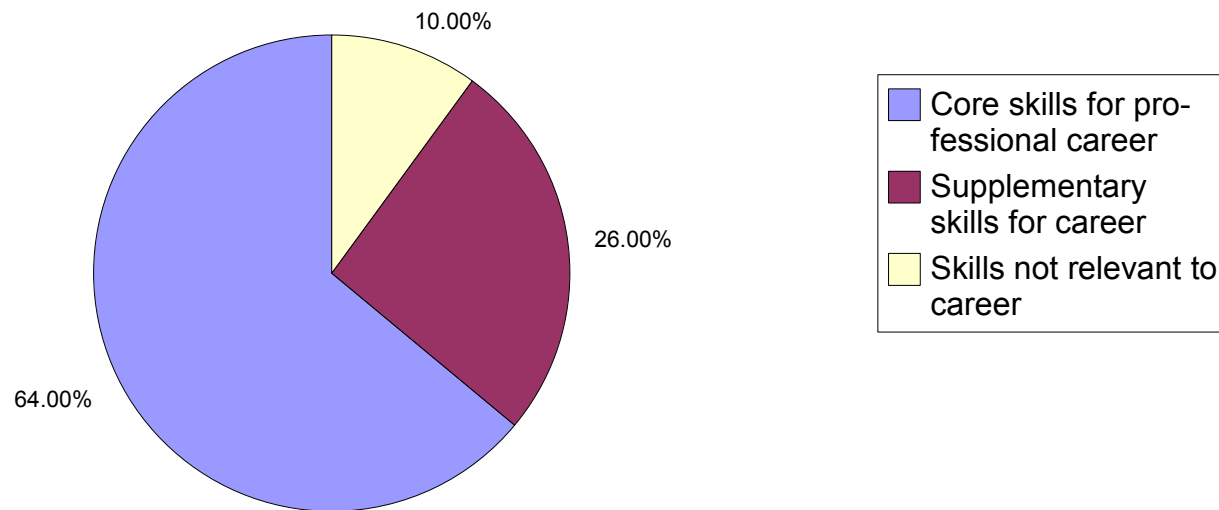
Skills learnt: general

Improvement of general skills through participation in the FLOSS community



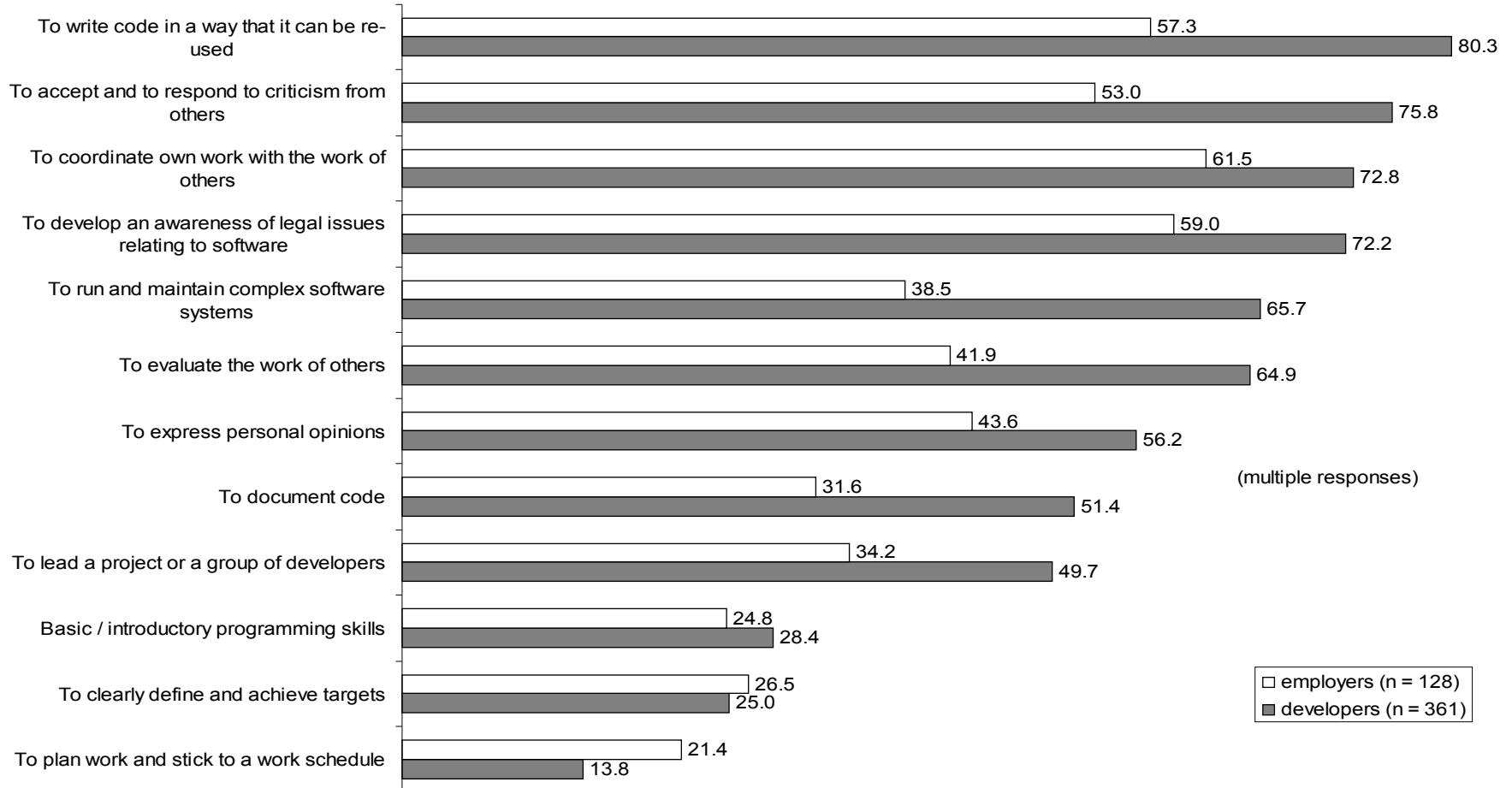
Importance of skills learnt

Relationship between skills learnt from FLOSS and professional career



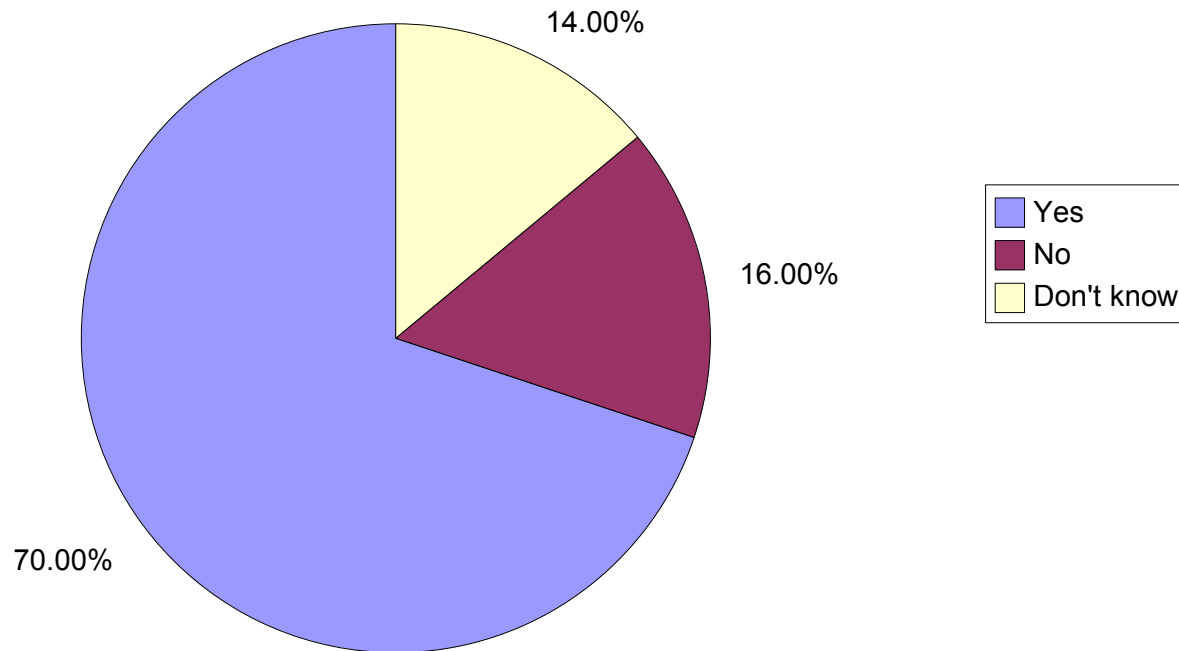
Learning compared to formal course

"Which of the following skills can be better learnt within the FLOSS community as compared to a formal computer science course?" - Developers' and employers' view



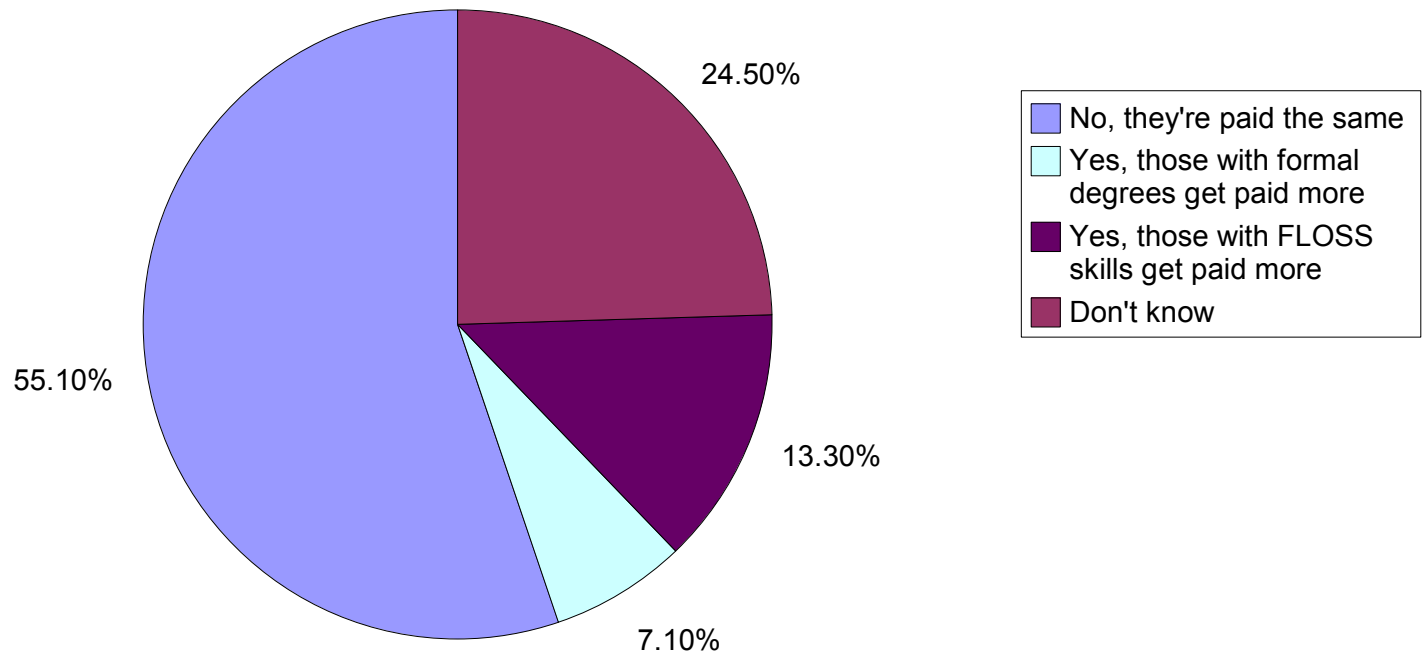
Compensation for no formal degree?

Do you think that proven participation in the FLOSS community can compensate for the lack of formal degrees, like certificates or university degrees?



Compensation for no formal degree?

Employers' perspective: Do you offer prospective employees with FLOSS experience different pay than those with a formal degree?:





In conclusion

- Skills are learnt in FLOSS community
- Learnt skills not just technical, indeed legal skills are learnt “a lot”
- Those with prior skills learn new ones, especially relating to bug-fixing, writing reusable code
- Wide variety of learning strategies
- Even those taking formal courses rate it relatively poorly as a learning environment



In conclusion

- Several skills are learnt better than in formal courses (learn-by-doing skills – reusable code, bug-fixing, teamwork and coordination)
- Proven FLOSS experience can compensate for lack of formal degrees in order to get a job
- But developers feel those with proprietary experience often get paid more
- Employers seem to agree, though awareness of FLOSS among employers increases their perceived value of skills learnt from FLOSS.



Skills and economic growth

- **Skills development: “the ability to create”**
FLOSS is a training environment that increases the earning capacity of community participants without any explicit investment in training: a novel form of technology transfer
- **Economic growth: “ability to add value”**
FLOSS allows local entrepreneurs to provide a greater share of total value added, thus retaining a greater share of profits within the local economy



Building *local* ICT competencies

- Be passive users of “black-box” software or active participants in global ICT?
- Being active requires being able to create, locally – and choose with the least barriers the level of creativity
- Skills development requires access to the ability to create – you don’t have to be a programmer, but you *should* have the choice.
- Relative local value addition is much higher with free software, as compared to proprietary (where the vendor controls and provides the most value)



FLOSSWorld: global research

- EU-funded project to conduct similar research, on skills, employment, education, government use of FLOSS in non-EU countries
- Led by MERIT, Netherlands
- Funded partners in Bulgaria, China, Croatia, India, Malaysia (MIMOS), South Africa and Argentina
- May 2005 to April 2007



More information

- FLOSSPOLS: <http://flosspols.org>
- FLOSS Project report (2002)
<http://flossproject.org/report/>
- FLOSSWorld: <http://flossworld.org>