The Role of Universities in the "Open" World [1]

by Peter Slaets (Group T/K.U.Leuven) and Herman Bruyninckx (K.U.Leuven, Belgium)

Universities are still the major place in society where, worldwide, millions of people create, process, use, adapt and distribute knowledge, in various forms and types. In their mission statements universities often underline their public role in terms of the responsibility for active knowledge sharing between academics and the dissemination of knowledge to the society in general. The 'public' role of the university can also be connected to its being a kind of "refuge" for research and education (K.U.Leuven speaks about *vrijplaats*) which obviously refers to its particular (academic) *freedom*. In this contribution, however, *public* refers to the *open* character of generated knowledge and technology, though one could argue that current policies at the K.U.Leuven also limit academic freedom and the notion of *public* that is implied.

Our aim is to focus on the tension between the overall ambition of an increased number of universities for active knowledge sharing and the fact that their concrete policy practices rather discourage knowledge sharing, even encourage knowledge privatization. This tension will be illustrated by focusing on some concrete policy practices of the K.U.Leuven. More in particular we will clarify that the performance indicators that are formulated by the K.U.Leuven encourages researchers to generate knowledge and technology only under proprietary licenses, that is, licensed under exclusive legal right of the copyright holder. In opposition to this, we will elaborate in the second part of our contribution on several methods to publish knowledge and technology under open-source licenses [2] and open standards.[3] These methods are not valorized and, as a result, discouraged by current policy practices at the K.U.Leuven.

Performance Indicators

In order for an organization to valorize its performance, the K.U. Leuven underlines that performance indicators are required. These indicators are formulated for the different functions the university has, such as research, academic service, education, internationalization. We focus here on the first two elements: research and academic service (*wetenschappelijke dienstverlening*).

K.U.Leuven performance indicators for research are:
- Number of publications
- Impact factor
- Number of citations

It is important to underline that the K.U.Leuven, by taking the number of published papers together with their impact factor and number of citations as indicators for the valorization of research performance, imposes a policy that discourages active knowledge sharing. Researchers are stimulated to distribute their work in journals that come with high impact factors, yet include proprietary licenses. Open knowledge sharing through open software,[4] open content[5] or the development of open standards (see below) simply do not count as publications, and hence there is no valorization. Most Open Access journals for instance, being only recently set up, are hardly valorized. Taking the citations of the last two to five years into account, these journals come with a very low impact factor. As a consequence, these journals do not attract the best articles and there the viscous circle starts. In other words, the use of the K.U.Leuven performance indicators discourages people to openly exchange knowledge and technology and actually cultivates its privatization. This might sound strange in the context of a *publication* policy.

K.U.Leuven performance indicators for academic service are:
- Number of generated patents
- Number of generated spin-offs
- Industrial revenue

In view of academic service, the universities takes for instance the number of generated patents or spin-offs as performance indicators. Again, this policy actually discourages active knowledge sharing and supports knowledge privatization. Indeed, in view of the expectation to maximize patenting opportunities, researchers are stimulated to generate knowledge and technology under proprietary licenses. A case in point in view of this policy, is that the university has set up a technology transfer office (TTO): *K.U.Leuven Research & Development* (LRD). This office supports researchers in their interaction with industry and society (covering contract and collaborative research, patenting and licensing, and spin-off creation) and in the valorization of their research results. In a similar way, the third indicator 'industrial revenue' discourages researchers to use open source software, that is mainly free, as they are actually rewarded for spending a lot of money, for example on software licenses.

In short, the current performance valorization policy at the K.U. Leuven stimulates researchers to protect or privatize collected knowledge and technology. Nonetheless, it would be possible to reverse this tendency if only the university would develop policies that valorize open knowledge construction and, as such, encourage everyone to share knowledge or to make knowledge public. In what follows we will focus in more detail on the use of open licenses and open standards in order to stimulate active knowledge sharing.

Open licenses and open standards

In this short exploration of active knowledge sharing and open knowledge construction, we make a distinction between open software, open content, open access and open standards.

1. Open software licenses

In contrast to proprietary software licenses that imply that certain rights regarding the software – inspection of code, modification and distribution – are reserved by the software publisher, open software licenses[6] make software free for inspection of its code,

modification, and distribution. This implies that it provides the source code, which is a collection of human-readable text files (example shown below).

```
/**
 *  Simple HelloButton()  method.
 *  @version 1.8
 *  @author  john doe  <doe.j@example.com>
 */
HelloButton()
{
   JButton hello = new JButton(  “Hello, wor
   hello.addActionListener(  new HelloBtnList

   //  use the JFrame type until support for t
   //  new component is finished
   JFrame frame = new JFRame( “Hello Button”
   Container pane = frame.getContentPane();
   pane.add(  hello  );
   frame.pack();
}  frame.show();              //  display the fra
```

The source code is usually (in closed source software) converted into an executable file, which is a human-unreadable file consisting of a collection hardware specific encoded computer instructions. This executable file is the only file the computer needs to start up the program. By providing the source code, an open software licensed program allows inspection, modification and distribution or alteration at source code level (in contrast to closed source software). These initiatives have the intention to maximize the distribution of knowledge that is collected in the software code. We will focus here on three distinct types of software licenses: a. GPL (*GNU General Public License*),[7] b. BSD license (*Berkeley Software Distribution*)[8], c. Lesser GPL or LGPL.

Currently only a limited amount of open licensed software projects are maintained at K.U.Leuven. Especially within OPTEC, a Center of Excellence on Optimization in Engineering, a big group of open software licensed projects are developed: Acado Toolkit, qpOASES, lssvmlab, timeopt, glas, rdp, Orocos, SCPCVX.

a) GPL (GNU General Public License)

Apart from being open software, that is, open/free for inspection of its code, modification and redistribution, the GPL uses *copyleft*[9] (a play on the word copyright). Copyleft means that users are obliged to ensure that freedoms are preserved, even when the work is changed or added to. In other words, derived works need to be distributed under the same (open) license terms. Under these conditions the notion viral license[10] is used and refers to a kind of license spread from work to work.

b) BSD license (Berkeley Software Distribution)

In distinction to viral licenses, BSD licenses are open source, that is, they allow inspection of source code in order to improve unlimited redistribution, yet, there is no obligation of distribution under copyleft terms. One of the initial BSD licenses is shown below.

```
Copyright (c) <year> <copyright holder>.
All rights reserved.

Redistribution and use in source and binary forms are per-
mitted provided that the above copyright notice and this
paragraph are duplicated in all such forms and that any
documentation, advertising materials, and other materials
related to such distribution and use acknowledge that the
software was developed by the <organization>. The name
of the University may not be used to endorse or promote
products derived from this software without specific prior
written permission. THIS SOFTWARE IS PROVIDED “AS
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IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTIBILITY AND FITNESS FOR A PARTICULAR PURPOSE.

c) Lesser GPL or LGPL

Lesser GPL or LGPL is a compromise between the strong copyleft GPL and the permissive character of BSD licenses. The LGPL places copyleft-restrictions on the program itself but does not apply these restrictions to the other software that is linked with the program. The main difference between the GPL and the LGPL is that the latter can be related to a non-(L)GPLed program, regardless of whether it is open software [11] or proprietary software.[12] This non-(L)GPLed program can be distributed under any chosen terms if it is not a derivative work. Whether a work that uses an LGPL program is a derivative work or not is a legal issue.

2. Open Content Licenses (OPL)

Open content involves any kind of creative work, or content, published under an open content license [13] (OPL) that explicitly allows copying and / or modification of the information by anyone. Hence, it includes the right to modify the work. Open content therefore is an alternative paradigm to the use of copyright that ultimately creates a monopoly over the knowledge. The largest open content project is Wikipedia.[14]

It is interesting to notice that the K.U.Leuven runs a WikiServer that provides WikiSpace for educational purposes. Yet, the open character is lost because one needs to log in using the Blackboard Toledo [15] platform (a digital learning platform) in order to get access.

3. Open access (publishing)

Open access (OA) refers to unrestricted online access to (mainly) peer-reviewed scholarly journal articles. While in scholarly publishing it is common to keep an article's content intact and to associate it with a fixed author, open access (publishing) [16] mostly offers access to the material and defines a set of use (or re-use) rights, included in *Creative Commons Licenses*.[17] These Licenses replace the model of 'all rights reserved' of copyright with the more flexible model of 'some rights reserved'. In other words, through a *Creative Commons License* creators communicate which rights they reserve and which rights they waive for the benefit of recipients or other creators (in order to make the material open content). Different models for financing OA journals exist. Some charge publication fees (paid by authors or by their funding agencies or employers) and some do not. Some of the no-fee journals have institutional subsidies, where others do not.

An example of open access (publishing) is *Open Course Ware* (OCW). This is a collection of high quality course materials in a virtual learning environment created by universities (Berkeley, MIT, Yale, Notre Dame, Michigan, Delft, Stanford, …) and shared freely with the world via the internet.

In addition to that, there are several open access journals.[18] We mentioned earlier that the problem with this type of journals is that their impact factor, based on the number of citations to articles published during the two to five preceding years, is initially very low. However, there are some well-known examples of open access journals, which are mainly to be found in the medical sciences, such as: *BioMed Central* (BMC), *MedKnow Publications*, *National Institute of Health Public Access* (NIH) and *Public Library of science* (PloS). Many open access academic publication platforms (with participation of K.U.Leuven academics) can be found within a wide variety of scientific fields: the field of Software Engineering for Robotics,[19] the BioMedical and Scientific field,[20] chemistry,[21] Molecular Imaging,[22] etc.

4. Open standards

Open standards [23] are certain specifications of technologies that are publicly available. They are meant to facilitate interoperability and

data exchange among different products or services and are intended for widespread adoption. Some examples of open standards are: *Open Document Format* (ODF) used by Open Office, *Portable Network Graphics* (PNG) images, *Portable Document Format* (PDF/X) designed by Adobe Systems.

Although current policies actually discourage knowledge sharing, and in fact encourage knowledge privatization, our short overview of initiatives and methods should clarify that it is possible to 'open up' knowledge production and distribution within universities. Perhaps it is important to start validating and supporting these initiatives and methods – as part of the public role of the university, and in order to make real their mission statements.

FOOTNOTES

1. http://en.wikiversity.org/wiki/The_role_of_universities_in_the_"open_content"_world
2. http://en.wikipedia.org/wiki/Open-source_license
3. http://en.wikipedia.org/wiki/Open_standard
4. http://en.wikipedia.org/wiki/Open_source_software
5. http://en.wikipedia.org/wiki/Open_content
6. http://en.wikipedia.org/wiki/Open_Software_License
7. GNU is a recursive acronym for "GNU's Not Unix"
8. http://en.wikipedia.org/wiki/BSD_licence
9. http://en.wikipedia.org/wiki/Copyleft
10. http://en.wikipedia.org/wiki/Viral_license
11. http://en.wikipedia.org/wiki/Free_software
12. http://en.wikipedia.org/wiki/Proprietary_software
13. http://en.wikipedia.org/wiki/Open_content_license
14. http://en.wikipedia.org/wiki/Wikipedia
15. http://toledo.kuleuven.be/
16. http://en.wikipedia.org/wiki/Open_access_%28publishing%29
17. http://en.wikipedia.org/wiki/Creative_Commons_licenses
18. http://en.wikipedia.org/wiki/Open_access_journal
19. http://www.joser.org/
20. http://www.dovepress.com/open-access-journal-of-urology-journal
21. http://www.jsystchem.com/
22. http://www.hindawi.com/journals/ijmi/
23. http://en.wikipedia.org/wiki/Open_standard