Software libero: economia e impatto
Teoria e pratica

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15 Maggio 2018
Chi sono

Professore ordinario di Informatica, Parigi (SNS 1986, Erdos #: 3)

- 30 anni di ricerca e insegnamento
- 20 anni di contribuzione al Software Libero
- 10 anni di direzione di strutture di interesse pubblico

1998 *Hold up planétaire* – best seller sui monopoli informatici
1999 *DemoLinux* – prima distribuzione live GNU/Linux
2007 *GTLL Systematic* 150 membri 40 progetti 200Me
2010 *IRILL* [www.irill.org](http://www.irill.org)
2015 *Software Heritage* [www.softwareheritage.org](http://www.softwareheritage.org)

Software Heritage

THE GREAT LIBRARY OF SOURCE CODE
Software is everywhere
Software is eating the world...

**Business**

*Why Software Is Eating The World*

*By Marc Andreessen*

August 20, 2011

This week, Hewlett-Packard (where I am on the board) announced that it is exploring jettisoning its struggling PC business in favor of investing more heavily in software, where it sees better potential for growth. Meanwhile, Google plans to buy up the cellphone handset maker Motorola Mobility. Both moves surprised the tech world. But both moves are also in line with a trend I’ve observed, one that makes me optimistic about the future.

Marc Andreessen, 2011

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**Technology**

*Software Defined Everything*

Hardware gets commoditised

Software becomes the new value!
Open Source is eating the Software World

Tracking the explosive growth of open-source software

Top 40 Open-Source Projects by Category & Sample of Related Companies
Free Software

Software that offers to *its users* the freedom to:

0. use the software
1. study and adapt the software
2. distribute software copies
3. distribute modified copies

Free Software has changed the way software is:

- developed
- tested
- deployed
- maintained
- marketed
- sold
- designed
- taught
- . . .
### Three Main Phases:

#### First 15 years, 1984-1998
- **early movement**
- **focus**: freedom for users and developers
- **keyword**: free software

#### Second 15 years, 1999-2014
- **progressive industry adoption**
- **focus**: software quality and cost
- **keyword**: open source

#### Today, 2015-...
- **mainstream use**
- **focus**: community and governance
- **keyword**: governance
Going mainstream

Today, everybody loves Free Software, even ancient opponents

“Microsoft loves Linux”

Satya Nadella, October 2014

Just in May 2018

- Facebook releases OpenGo (AI)
- Google releases Asylo (Containers) and Seurat (3D)

Today, knowing and using Open Source is ... just table stakes!

Myths, misunderstandings, hype, ... are all around us.

Let’s dispel some of this.
Myths surrounding free software

Anarchic development ("Bazaar", "Wisdom of software crowds")

Software is a technical object.

A mass of random coders does not create beautiful software.

Software Quality and Free Software

*With enough eyeballs, all bugs are shallow*

— Eric Raymond

That’s a *logical implication*!

You need enough eyeballs first.
Myths surrounding free software

The community will take care of it

Making software available is necessary.

But not sufficient to create a community that curates it.

Free software and cost

Creating and maintaining beautiful software has a cost that must be paid for.

The fact that you do not pay for a software licence is a detail.
Understanding (Software) Economy

Back to the basics

**economics**: the study of how society chooses to allocate *scarce* resources to produce, exchange, and consume goods and services.

*Ruffin, Gregory, “Principles of Economics”, 1990*

Without *scarcity*, there is no *economy*. 
45 years of proprietary software economy

Started in 1969, with the *IBM Unbundling of software and services*

Based on the *artificial* “scarcity” of *verbatim copies* of an *existing* piece of software!

Adopts a *push* approach

- identify a market
- develop a “one size fits all” software solution
- sell licences to a lot of users, ... if you can
- make sure the users will need new versions, *often*...
free software ... removes the “scarcity” of copies it may surprise actors used to the old world, but... ... creates value!

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>CAGR 17/21</th>
<th>17/18</th>
<th>18/19</th>
<th>19/20</th>
<th>20/21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logiciels Open Source</td>
<td>278</td>
<td>316</td>
<td>355</td>
<td>399</td>
<td>447</td>
<td>12,6%</td>
<td>13,7%</td>
<td>12,3%</td>
<td>12,4%</td>
<td>12,0%</td>
</tr>
<tr>
<td>Services IT liés à l’Open Source</td>
<td>4 184</td>
<td>4 517</td>
<td>4 878</td>
<td>5 252</td>
<td>5 645</td>
<td>7,8%</td>
<td>8,0%</td>
<td>8,0%</td>
<td>7,7%</td>
<td>7,5%</td>
</tr>
<tr>
<td>Total Marché Open Source FR (Logiciels + Services IT liés)</td>
<td>4 462</td>
<td>4 833</td>
<td>5 233</td>
<td>5 651</td>
<td>6 092</td>
<td>8,1%</td>
<td>8,3%</td>
<td>8,3%</td>
<td>8,0%</td>
<td>7,8%</td>
</tr>
</tbody>
</table>

© Source : PAC-CXP Novembre 2017
Economic models of free software...

A lot of interest

- GNU Manifesto, early vision of Richard Stallman, circa 1985
- Chris Hecker: Setting up shop, 2000
- John Koenig: Seven open source business strategies for competitive advantage, 2004
- Gasperoni, Comar: Open Source in Dependable Systems
- Livre blanc Aful, 2007
- Livre blanc April, 2007
- Livre bleu du GTLL, 2015...

A common starting point

selling “licences” is gone; one needs other scarce resources
Free software exposes the *truly scarce* resources...
- know-how
- commit rights
- community connection
- infrastructure
- process, industrialization
- customization, qualification

... and changes the cost structure
- advertising
- adoption
- evolutive maintenance
- human resources
- partnerships
- mutualization

Looking for a (free) software business model?
Start by looking for a resource that is *scarce*
and valuable to *a group of users*
Building a *successful* FOSS project

Martin Michlmayr (former Debian project leader) studied successful FOSS projects (see [http://opensource.mit.edu](http://opensource.mit.edu)).

They all show a similar pattern of evolution.

<table>
<thead>
<tr>
<th>Cathedral phase</th>
<th>Transition phase</th>
<th>Bazaar phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original “idea”</td>
<td>”Interest”</td>
<td>Distributed development environment</td>
</tr>
<tr>
<td>Project Author</td>
<td>Prototype</td>
<td>Community</td>
</tr>
<tr>
<td>Core developers</td>
<td>Modular design</td>
<td>Parallel perfective and corrective maintenance</td>
</tr>
<tr>
<td>Unix philosophy</td>
<td></td>
<td>Peer reviews</td>
</tr>
</tbody>
</table>

The transition does not come for free!
Basic principles for free software success

In other words

- identify a need
- develop a software prototype
- build a community
- set up an ecosystem, with:
  - users
  - developers
  - architects
  - service providers...

_all working together_, and playing by the rules

The first two phases are the less difficult to get right.

The challenge is in the second two.
Economia della conoscenza

- competenze, talenti
- connessione, adesione
- mindshare

Osservazione essenziale

*L’infrastruttura di collaborazione* è il nuovo differenziatore
## Missione

Favorire l’emergenza di un ecosistema attraverso progetti di R/D collaborativa

- emergenza di progetti: polo di competitività
- selezione di progetti: esperti al ministero dell’Industria
- finanziamento pubblico: 1/3 stato, 1/3 regione, 1/3 dipartimenti
- almeno 2 imprese e un partner accademico
- 100% costi accademici, parziale per i privati

## Qualche data chiave

- 2005, creazione (fondi della privatizzazione delle autorstrade)
- 2007, creazione del Gruppo Tematico Software Libero

## Qualche data chiave

Un video è disponibile: [https://youtu.be/syb1EegMZJI](https://youtu.be/syb1EegMZJI)
Le GTLL a 10 ans!
145 partenaires en réseau

- 16 grandes entreprises
- 41 labos
- PME/ETI 88
- 6 nouveaux membres cette année

Ils nous ont rejoints depuis début 2016 :
- Appcraft
- Estimancy
- Containous
- VSC Technology
- Sensio
- Hypra
- Minij
Les projets du GT (depuis 2007)

60 projets de R&D
16 ANR
38 FUI-Feder-FSN
6 H2020/Eureka

197 millions d’€ d’effort R&D

82 millions d’€ d’aide publique

57 des 163 produits du book 2016
L’ÉQUIPE
DU COMITÉ DE PILOTAGE

12 industriels & 7 académiques

Président : Stéfane FERMIGIER, ABILIAN

Vice-président : Roberto DI COSMO, IRILL, Inria, Université Paris-Diderot

Maria-Virginia APONTE, CNAM
Emmanuel CHAILLOUX, UPMC
Fabrice LE FESSANT, INRIA (& OCAMLPRO)
Patrick MOREAU, CNRS
Jérémy PAPPALARDO, Ecole Polytechnique
Laure PETRUCCI, UNIVERSITE PARIS 13
François PELLEGRINI, Labri / Aquinetec (membre invité)

Yannick MOY, ADACORE
Philippe CARRE, NOKIA, Bell Labs
Gilles LEHMANN, C-S
Frédéric LEPIED, eNOVANCE/RED HAT
Véronique DELEBARRE, SAFE RIVER
Philippe MONTARGES, ALTER WAY
Camille MOULIN (suppl. Benjamin JEAN), INN03
Pierre FICHEUX, OPEN WIDE
Grégory BECUE, SMILE
Florent ZARA, HENIX
Cédric THOMAS, OW2

Responsable du Groupe thématique : Muriel SHAN SEI FAN
A few success stories for R&D into FOSS

Focus on publicly funded R&D projects

Quite different from the usual FOSS success stories:

- research dimension (long to medium term)
- high technology focus
- transfer from Academia
- public funding through grants
- users are *too often* an afterthought
The Hilite success story


Goals: Formal methods tooling for high-integrity software.
Funding: 1.4Me French funding, over 4.1Me project cost
Duration: 3 years (may 2010/may 2013)
Cluster: Free Software thematic group (GTLL) in Paris

Project partners

Leader: AdaCore (SME)
Academia: CEA-LIST, Inria
Industry:
- Altran
- Astrium Space Transportation
- Thales Communications
The Hilite success story

### Scientific and technical Results

<table>
<thead>
<tr>
<th>SPARK 2014</th>
<th>new version of high integrity Ada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why 3</td>
<td>new version of the proof platform</td>
</tr>
<tr>
<td>E-ACSL</td>
<td>new annotation language for C</td>
</tr>
</tbody>
</table>

### Adoption, Community, Business

<table>
<thead>
<tr>
<th>embedded.com</th>
<th>Next-generation of SPARK static verification toolset released, Bernard Cole, May 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>lists/forge</td>
<td>69 members, thousands of mails exchanged</td>
</tr>
<tr>
<td>collaborations</td>
<td>joint AdaCore/Inria lab, CNAM and Kansas State University, Mitsubishi Electric...</td>
</tr>
<tr>
<td>SPARK Pro 15</td>
<td>professional edition, with new clients and upgrades of old clients</td>
</tr>
</tbody>
</table>
The Hilite success story

### Key success factors: consortium

- **leadership**: active editor of a Free Software solution, *SME*
- **academia**: strong partners with *development* background
- **users**: big companies onboard *are real potential users*

The focus was on *the product*, from the start.

### Key success factors: community

- **insiders**: core community *inside* the project from the start
- **academia**: partnerships established through conferences and collaboration
- **outsiders**: precise focus on the industry sector that *uses* the technology

The *community* does not need to be *large*...

...it must be *pertinent* and *active*
The Squash success story


**Goals:** Unified approach to Functional Testing
**Funding:** 1.3Me French funding, over 3Me project cost
**Duration:** 2 years (March 2011/June 2013)
**Cluster:** Free Software thematic group (GTLL) in Paris

### Project partners

**Leader:** Henix (SME)

**Academia:**
- University Paris 8
- Loria

**Industry:**
- GDF Suez
- Kalis
The Squash success story

**Scientific and technical Results**

Two new OSS products

Squash TM : test management

Squash TA : test automation

**Adoption, Community, Business**

downloads : more than 1.000 downloads per month, including many big companies

user base : large international market (RTBF, for example...)

contributions : no contribution good enough to deserve inclusion, but...

service : enabler for a healthy service activity that ensured a real, full Free Software editor strategy (no freemium/open-core, etc.)
The Squash success story

### Key success factors: consortium

- **leadership**: active *editor* of an Free Software solution, *SME*
- **users**: big companies onboard *are real potential users*

The focus was on *the product*, from the start.

### Key success factors: community

- **insiders**: core community *inside* the project from the start
- **outsiders**: a healthy community of *users* of the technology, despite no real community of contributors to the code maintained through traditional marketing

Again: *access to the code is not enough!*

There is not necessarily an *external community* of developers
Lessons learned

users a key success factor
- must be in the project from the start
- in large companies business units may help more than R&D departments

community necessary to ensure sustainability
- must be in the project from the start
- may be a developer or a user community, or both

leadership coordination by a free software editor is a real plus

ecosystem is essential
- a clear effort is needed to build it
Collect, preserve and share the source code of all the software

Preserving our heritage, enabling better software and better science for all

Reference catalog
reference all source code

Universal archive
preserve all source code

Research Infrastructure
analyse all source code

4+ billion files, 1+ billion commits, 80+ million projects!
Conclusione

Open Source, Software Libero

complesso richiede oggi grande professionalismo

opportunità se ben usato, crea valore e riapre mercati

indispensabile necessario in ogni campo

- adottato dai grandi attori internazionali
- crea ecosistema e mindshare
- grosso rischio per chi ne resta escluso

Domande ?