Ethical Aspects of Using, Writing, and Distributing Software

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Shaping the Digital Future of ErUM Research, Aachen, 2025-07-31

0: Freedom to Use

Run software when and where you want.

Violations of that Freedom:

- Restricting access (in the extreme: "App Store")
- Unnecessarily limiting the platform (e.g., no source)
- Supplier veto (license server, unreplaceable server compontents)
- Controlling other people's execution environments ("cloud")

It will become a lot harder to **build upon your research** if people cannot run the software you used.

Non-Freedom-0 software invites **extortion of the public**: "Your documents will be garbled unless you pay the Microsoft tax"; "You can't reduce instrument X's data unless you buy IDL licenses".

Letting you choose the platform can avoid much **unneccessary hardware obsolenscence**.

0a: Freedom to Emigrate

This is not an "official" one, but it's becoming more important by the day.

You can use your data in whatever form you like

Violations of that Freedom:

- Proprietary and/or crazy file formats ("Office Open XML")
- Code coupled to storage you don't control without export options (most apps)

If you feed data into a company's write-only servers (think Google maps), it becomes private property and can **disappear at any time** – or, worse, be used for extortion.

Locked-away data cannot be publicly archived: You are stealing from the **legacy of humanity**.

0b: Freedom to Not Use

This is another inofficial one that probably did not seem as urgent in the 1980ies:

If you would rather not use some piece of software or infrastructure, you can replace it

Violations of that freedom:

- Using server-side components employing proprietary protocols.
- Using services forcing a vendor's infrastructure (e.g., zoom, slack)

With open standards, anyone can implement against them and use client or server compontents that do not infringe upon their freedom ("Aw, **wouldn't it be nice** if I could use this cute RiscV machinelet) or choices ("no Google id").

In all likelihood, other people may well already have written **malleable components**.

1: Freedom to Study

**Study the software, its behaviour and its intended behaviour
(i.e., its source code) to your heart's desire.**

Violations of that Freedom:

- Binary-only distribution
- NDAs
- DMCA restrictions

Ethics of Studying

Understanding what one does is central to science; you cannot do that if you employ unstudyable software.

If you cannot study code, you **cannot debug or extend** it. Unstudyable software is thus a dead end waiting to be reached, with all the implications for wasting scarce resource and people's lives.

2: Freedom to Share

Pass on the software to whomever you want

Violations of that Freedom:

- Nasty licenses
- Software keyed to certain machines

Ethics of Sharing

Cooperation is is key to most of modern science; if you cannot freely share, the software provider **controls who you can cooperate with**.

Re-usability of research artefacts ("**sharing over time**"): With source code, there is a chance it will still work in 10 years. Without source code *you can pass on*, the best you can hope for is the huge black box that is an archived container with Gigabytes of ununderstandable goo.

Level playing field: when you cannot share gratis, re-using your work becomes an issue of funds, often excluding researchers with tight funds (because they are young or come from poor countries – or because they are considered weird).

3: Freedom to Improve

You can modify the software and pass on modified copies.

Violations of that freedom:

- Nasty licenses (remember pine?)
- Export restrictions

Ethics of Improving

Incremental improvements to a standing body of knowledge is what science is about. When you cannot distribute improved copies of your research software, that continuous process of improving our tools and methods is broken, to everyone's detriment.

Grant these Freedoms!

- Release early, release often
- Public version control is a clear benefit
- Avoid proprietary dependencies
- Choose free licenses (they have *nothing* to do with citations)

Don't take these Freedoms!

Far beyond software development, when organising your research:

- Avoid requiring forced-proprietary hardware (e.g., Apps only available with a Google or Apple id)

- Avoid proprietary services (Google Docs, large parts of AWS, slack, github, things that don't speak publicly defined protocols, walled gardens)

- Avoid proprietary, non-replaceable components (e.g., think of all the ancient IDL scripts that nobody can run any more)

Public Money, Public Code

All of us are funded by public money. This means that we have a
particular responsibilty to give back to the society that feeds us.

Publishing our results counts; but it's as important to code and
data such that it is easy to build upon it – both within science and
outside of it.

Scared?

Yes: Much of what most people do in IT these days infringes on the four freedoms.

And it's become quite a bit worse since both the "Web2" thing of 2003f and the iPhone moment of 2007.

But: **Every little bit helps.** Still.

Ethics is almost never black and white. *Someone* will be grateful for every pixel you move left in this figure: