

## Point of View

---

### **Why crappy programmers cost the world \$450 billion per year**

Did you know that roughly 10% of the world's energy consumption originates from the ICT sector? This means that ICT consumption corresponds to yearly expenditures of at least \$600 billion, based on the global expenditures in 2011.

Why we feel strongly about this is that ICT is enabled by software in general, and the operating systems in particular. Software determines the efficiency of data centers, smartphones, Internet of Things, navigation systems, etc...

Every new generation of operating systems adds new functionality and more modern esthetics with the basic assumption that Moore's Law will continue to generate ever more powerful hardware. Modern programmers learn to quickly add new functions by coding in Java or C++, and object-oriented programming techniques enable large development teams to be coordinated. Programmers do not have an incentive to optimize the quality and efficiency of their code, and very few understand how their code interacts with the hardware.

The core of the software, i.e. the code that communicates with the computer's processor chip, is never touched. It is not very comforting to realize that the vast majority of our smartphones, tablets, laptops and even data centers run on software that was written in 1969, the birth date of the original UNIX kernel. Although the virtual world in 1969 may resemble the virtual world of 2015, the use of physical hardware has changed dramatically. The heart of your flashy new Android phone was written before the Internet, color screens, gaming, email and browsing. The new stuff has been added on top of the old stuff.

We have the luxury of being able to compare.

Depending on the tasks, we know that an operating system that runs in harmony with the hardware executes the tasks at least four times faster than any version of Linux, Android or Windows. In some cases, it performs multitudes faster. Therefore an ICT system can execute its tasks at least four times faster, which translates to a possible reduction in power consumption of at least four times. The current global energy consumption in ICT could therefore potentially be reduced by at least 75%. If the software were optimal.

This is why crappy programming results in an enormous waste of energy. The global cost is at least 75% of \$600 billion, or \$450 billion.

September 4<sup>th</sup>, 2015