

Technologists are also not the enemy (though they might once have been)

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As Professor Sasse famously pointed out, “Users are not the enemy!” [2]. As technologists involved in building some of the systems that Professor Sasse’s work shone light on, we would like to claim that “Technologists are not the Enemy” either.

The context for our work at the time was less the security work, for which Professor Sasse has perhaps made even more significant contributions, but rather the area of Quality of Service (QoS).

QoS is something that many of us technologists have also claimed is not a thing [3,4,5,7], and particularly not in the Internet. However, the origin of the cult of QoS – itself as good an example of “tech solutionism” as any others – might consist of the following. . .

Quality of Service, perhaps more accurately termed as Quantity of Service, refers to network performance guarantees concerning measurable parameters – throughput, latency, availability, and so on. As these parameters are quantifiable, one naive use would be to re-purpose them for use in billing. This sort of idea dates back a long way in communications systems, perhaps even as far back as the parcel post where differential charges for carriage could be applied based on parcel weight, distance to destination, and even delivery latency; first class post targeting delivery by this afternoon for example. Subsequently telephone calls were charged by duration and distance, which latter factor the Internet has largely eliminated, particularly post-COVID.

And then we, the technologists, met the users, and they were not the enemy [1,2].

Around this time the multimedia research community took note to some extent, and reframed the discussion from QoS to the perspective of Quality of Experience (QoE). However, QoE still involved *purely objective metrics*, e.g., re-purposing signal-to-noise ideas from radio channel conditions to describe audio and video in terms of resolution, frame rate, bandwidth (in its original technical sense of range between the lowest and highest frequencies carried of, say, sound), and so on.

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At some point, I¹ recall working with British Telecom Researchers from Martlesham Heath who claimed that you could not ever make real-time audio-visual communication work over a packet switched network like the Internet, because QoS, QoE, etc. All while we were engaged in the Multimedia Internet Research for Europe (MICE) EU project, regularly running cross Europe and occasionally UK-US video-conferences to replace many long-haul flights. It was a long time ago; perhaps we were all suffering from a mass collective hallucination. In any case, the project went pretty well, ultimately receiving very high scores from the EU reviewers, as well as from Mick Jagger after we² transmitted one Rolling Stones concert on the Internet, as captured by Sky TV.

Professor Sasse, with several of her excellent PhD students, took a very different tack, based on the observation and experience that things kind of worked but also, sometimes, didn't. What did "things worked" really mean?

Tasks Could you get on with the job at hand?

Stress Did you want to avoid using the system?

These turned out – perhaps obviously, having now the benefit of the work of Professor Sasse and others – not to be simple things easily quantified by computer- or engineering-based technical measurements. Rather, they revolved around actually talking to people, the users who are indeed not the enemy.

Unfortunately, this reductionist approach remains all too common: the "language of infrastructure" is considered to be largely, if not wholly, captured by standard quantitative measures such as latency, throughput, loss sp that these quantitative measures are sometimes treated overly simplistically when considering *hardware*.

However, evaluation of designs of low-level *software* such as an operating system kernel have always involved considerations captured by words such as elegance, simplicity, extensibility (the so-called "-ilities"). A long (and in some ways, problematic) list is captured on Wikipedia;³ while Ricki et al [6] provides a more considered treatment. In fact, treating any measure *simplistically* in a system design is simply poor systems design.

This is particularly true when designers fail to recognise that the measure is itself a gross simplification of a set of complex phenomena. And the everyday systems of today with which we are all now familiar, for online meetings or consuming entertainment, are all large, complex software systems. So we would like to claim that along with users not being the enemy, neither are (all) technologists!

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¹ Prof. Crowcroft; Prof. Mortier is too young for this bit.

² ...still Prof. Crowcroft and colleagues in MICE; Prof. Mortier remains too young for this bit.

³ https://en.wikipedia.org/wiki/List_of_system_quality_attributes

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