Issue Date:	**2022-11-08**	**CEN-CLC/FGQT**	**N317**
Deadline:	**2022-11-10**	**Supersedes:**	**–**
Status:	FOR APPROVAL		

TITLE	**Are digital computers already old-fashioned?**
PROJECT	FGQT Roadmap
REFERRING TO	Roadmap draft, N270 (Version “L”)
SOURCE	Rob F.M. van den Brink (Delft Circuits, The Netherlands), Rob.vandenBrink@Delft-Circuits.com

ABSTRACT

The present version of the Roadmap document is misusing the word “classical” at several places, as if it is already out-dated technology. However it is more likely that they remain in use for the next 100 years, or even to the end of mankind

This should be solved, and can be solved in an easy way

This contribution proposes alternative wording in the Roadmap document

1. Discussion

The present version of the Roadmap document is misusing the words “classical” and “conventional” in relation to computing and networking at several places, as if it is already out-dated technology. However it is more likely that they remain in use for the next 100 year, or even to the end of mankind.

The problem with words like "classical" and "conventional" is that they expresses something that expires after a while; something that is/becomes old-fashioned. Those words refer to a specific ***implementation***, but not to a specific computing ***principle***.

1.1 Terminology

There are much better ways to express what kind of computer ***principle*** we are referring to.

- an analogue computer
- a digital computer
- a quantum computer
- a mechanical computer
- an abacus
- etcetera

Yes, "mechanical computer" were really computers. These were heavy hardware types (>2000 kg) that were used in 2nd world-war war-ships to calculate the shooting angle of a gun!!

The principle of a digital computer will never get outdated, but the different ways a digital computer has been ***implemented*** can become old-fashioned. Good examples of that are implementations with relays, vacuum tubes, discrete-transistors, TTL integrated-circuits, etc

So if we speak about a **classical computer,** we are refer to the way those machines were implemented, for instance with vacuum-tubes or discrete transistors. However those implementations followed the same principles as todays digital computers; they only had lower computing power and were a bit bulky.
Therefore it is fully wrong to use words like **classical** if we are referring to a digital computer or a digital network, and we propose to replace it with proper terminology.

The same applies for network protocols. Classical network protocols do exist. RS232 is getting outdated, and USBv1 as well. But the roadmap isn’t referring to that. So if the distinction has to be made between quantum and non-quantum network protocols, call them *digital network protocols.*

1.2 Where does it go wrong in the text?

"Classical"

- sect 3.2, p23 classical computer (2x)
- sect 7.2, p65 classical digital communication network
- sect 7.11.5, p75 classical communications systems
- sect 8.3.2, p85 classic digital computers
- sect 8.3.6, p86 digital classical logic
- sect 8.3.7, p86 hybrid quantum-classical programs
- sect 8.3.8, p87 digital classical and quantum message
- sect 10.4.2, p98 classical bits
- sect 10.4.2, p98 classical communication channel
- sect 10.4.3, p99 classical communication (2x)
- sect 10.4.3, p99 classical information
- sect 10.4.3, p99 classical channels
- sect 10.4.3, p99 classical network protocols
- sect 10, p100 classical computing

"conventional"

- sect 3.3, p23 conventional classical measurement strategies ?????
- sect 5.2.1.2, p38, conventional classical signals ????
- sect 9.1.1 p88, conventional classical measurement strategies ????

The word classical is misused in other places as well, which sometimes result in very weird expressions: For instance

- p14 QCDM Quantum Classical Division Multiplexing ?????
- p38 Quantum Classical Division Multiplexing ?????

What is classical on that????

2. Proposed solution

First replace wording as suggested below

- sect 3.2, p23 ~~classical~~ *digital* computer (2x)
- sect 7.2, p65 ~~classical~~ digital communication network
- sect 7.11.5, p75 ~~classical~~ *digital* communications systems
- sect 8.3.2, p85 ~~classic~~ digital computers
- sect 8.3.6, p86 digital ~~classical~~ logic
- sect 8.3.7, p86 hybrid quantum-~~classical~~ *digital* programs
- sect 8.3.8, p87 digital ~~classical~~ and quantum message
- sect 10.4.2, p98 ~~classical~~ *(digital)* bits
- sect 10.4.2, p98 ~~classical~~ *digital* communication channel
- sect 10.4.3, p99 ~~classical~~ *digital* communication (2x)
- sect 10.4.3, p99 ~~classical~~ *digital* information
- sect 10.4.3, p99 ~~classical~~ *digital* channels
- sect 10.4.3, p99 ~~classical~~ *digital* network protocols
- sect 10, p100 ~~classical~~ *digital* computing

Secondly, lets have a discussion on what to do with weird phrases like, since I have no specific solution

- conventional classical measurement strategies
- conventional classical signals
- QCDM Quantum Classical Division Multiplexing

And at last check the entire text on “classical”. It is used more often in another context, so that may be wrong as well.