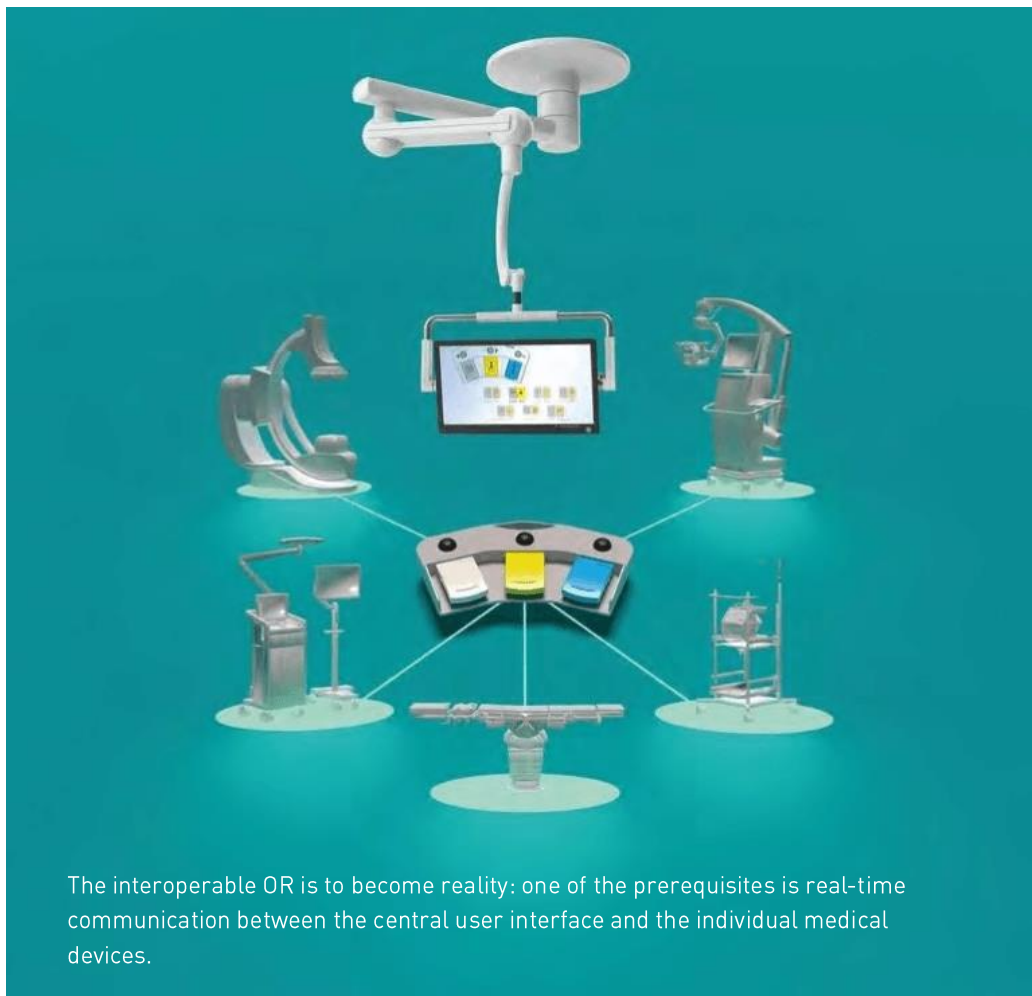Technical article, published on the website of medizin&technik (10/2023)

Standard SDC for medical devices

OR.NET: for integration in the OR – SDC also with real-time data transmission

The interoperable OR is to become reality: one of the prerequisites is real-time communication between the central user interface and the individual medical devices.

Some tasks in the OR require a real-time link between interoperable medical devices. Corresponding extensions to the SDC standard compiled by OR.NET are in preparation. At the Medica 2023, these extensions will be shown at the steute Meditec booth.

Multiple medical devices are controlled by a single user interface. This is the goal of the SDC (Service-oriented Device Connectivity) standard developed by OR.NET, making medical devices in the OR "interoperable". However, at least in some applications – for example HF surgery – communication must be in real time. At the Medica 2023, steute
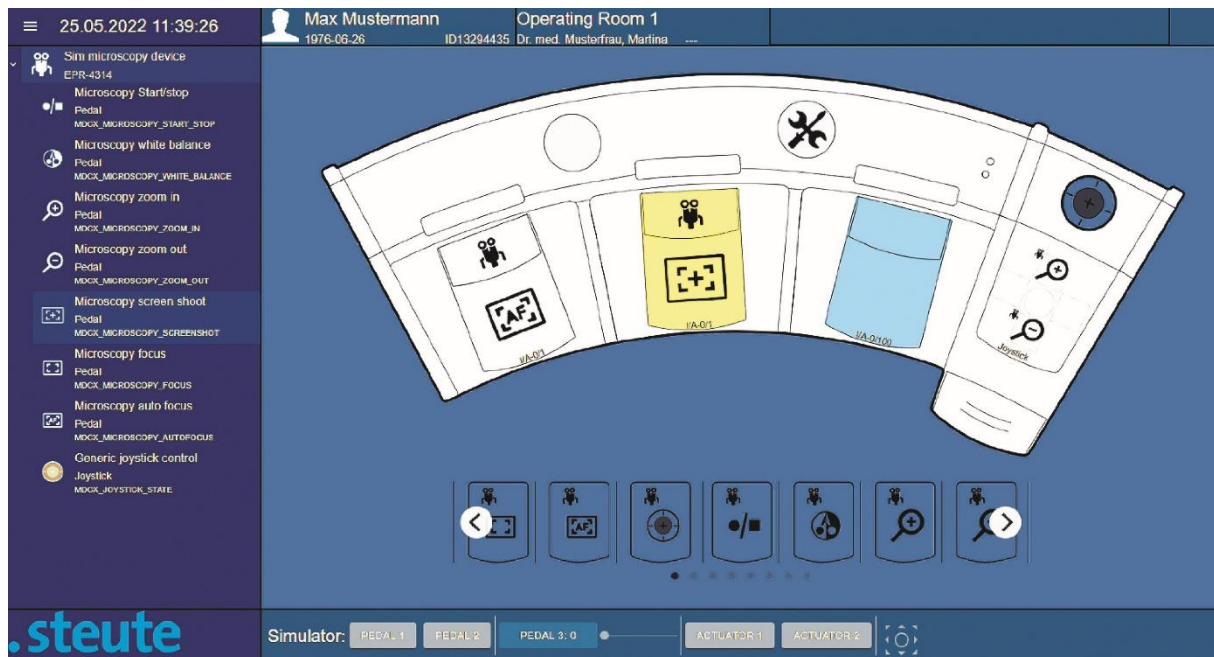
Via a central user interface (foot switch and screen or keypad), multiple medical devices can be selected and operated.

Meditec will be presenting the latest SDC findings and developments from its ongoing projects.

The foundations for the "interoperable OR" were partly laid over the last few years by participants in the joint OR.NET project. Following its conclusion, this project reorganised itself to form the registered association OR.NET e.V., providing a solid basis both technically and normatively.

First products working with this standard are already available or nearly ready to launch. The SDC family of standards is being continually expanded and further developed, step by step. First demonstrators and pilots, as well as exciting projects for further developing the SDC concept in line with practical needs, are also up and running. In addition, some complex topics are currently being scrutinised – for example the ability to work in real time, which is not provided by the "classic" SDC standard.

OR.NET continues its work: where real-time communication in the OR is a must

Real-time communication is not required in all cases. But it does play a role in many OR applications – for example the HF devices frequently used in electrosurgery. The reason: when a surgeon applies an HF device or switches it off, a time delay cannot be tolerated. And the reaction time between giving the command via the user interface and implementation of that command, for example switching off the device, must be independent of the current load of the wireless network. Also for communication between devices, for example in closed loops, it can be imperative for actions to occur in real time.

The standards for the applications in question clearly stipulate the permitted reaction times, which must also include signal transmission durations. The goal is thus clearly defined.

The majority of user interfaces produced by steute Meditec communicate wirelessly with their corresponding medical devices.

Achieve real-time capability with RT-SDC based on TSN

This raises the question: which communication standard can fulfil the requirement for real-time communication? A solution which initially seems an obvious choice because it is widespread throughout industry – Ethernet in combination with SDC – is not an option because the SDC standard does not encompass real-time capability.

The developers from steute Meditec have researched all the options and found an efficient solution which fulfils all the normative and application-relevant requirements. Here, the SDC IEEE 11073 family of standards has been combined with the benefits of Ethernet-based Time Sensitive Networking (TSN) to IEEE 802.1.

The result, called Real-Time SDC or RT-SDC, achieves the same level of interoperability as the conventional SDC communication standard. At the same time, RT-SDC also fulfils complex real-time requirements – even when the network is at full load.

Wireless communication with Real-Time SDC at two levels

In practice, a user interface in the interoperable OR will communicate via both SDC and RT-SDC. Time-critical and safety-critical functions, such as adjusting the rotational speed of a control module or driving an HF electrosurgical device, will be performed using RT-SDC.

Less critical functions – such as the zooming of a camera – can be actuated using standard SDC, as well as less dynamic functions, such as device descriptions (Medical Data Information Base, MDIB). Pedals are assigned different functions using a control device (graphic user interface, GUI) or directly at the foot switch.

Future scenario: a complete wireless solution with 5G?

This concept has already been realised by steute Meditec. At the hardware level, an SDC connector developed by the same manufacturer is able to integrate the user interfaces in the SDC and RT-SDC network. This connector is currently still linked to the network by cable. An additional research project, called Klinet-5G, will investigate the extent to which a 5G network could be an option for this task in the future. Then the complete real-time SDC system could be realised without cables, as a wireless solution.

Successful job-sharing – and up to ten times faster

The RT-SDC functionality is thus to be viewed as a real-time addition to the SDC family of standards, facilitating control of critical functions, such as the querying and setting of parameters.

How "fast" is RT-SDC compared to communication in the conventional SDC infrastructure? When command or control devices are actuated via SDC, the reaction or round-trip time is between 10 and 20 ms – depending on the hardware used and the network load. For RT-SDC, the performance is between 1 and 3 ms – also depending on the hardware, but independently of the network load. The difference is thus significant, and "job-sharing" guarantees that the requirements for real-time operation are fulfilled.

RT-SDC development status will be presented at the Medica

The successful use of new communication protocols is always dependent on whether they

- are, firstly, accepted by their users
- and, secondly, develop to become standards, (ideally) being included in the international standardisation process.

Here, RT-SDC as developed by steute Meditec is making good progress. Within the OR.NET e.V. RT-SDC group, the next steps are currently being discussed to facilitate widespread use of wireless-based real-time communication in the OR.

At the Medica 2023 (Hall 10, Booth E39), visitors will have the opportunity to inform themselves first-hand about the current real-time SDC research and cooperation projects by talking to the SDC experts from steute Meditec.

Further information
About the work of the OR.Net association and the SDC standard
https://ornet.org/en/

This article was published on the website of **medizin&technik** on 04.10.2023 / URL:
https://medizin-und-technik.industrie.de/digitalisierung/or-net-fuer-vernetzung-im-op-sdc-auch-mit-echtzeit-datenuebertragung/

Author:

Julia Mönks
Research and Innovation Manager
steute Technologies

Images: steute Technologies GmbH & Co. KG