Interview With Prof.dr.ir. Wil van der Aalst, Lehrstuhl für Informatik 9 - Process and Data Science, RWTH Aachen University

What are the main changes in the process mining space?

"The adoption of process mining continues to increase. In countries like Germany and The Netherlands, most of the larger companies are already using process mining. Each year the process mining market increases by 50% or more. There are currently around 40 process mining vendors. At the same time, there were some mergers. For example, SAP acquired Signavio, IBM acquired myInvenio, and Appian acquired Lana Labs. This shows that many of the larger software vendors now see the importance of process mining. With process mining being integrated into different platforms, the threshold to use process mining gets much lower. For example, there are at least five process mining tools that build on Power BI. In terms of process mining capabilities, the focus is shifting from discovering simple Directly Follows Graphs (DFGs) to more advanced capabilities like conformance checking, prediction, and simulation using richer languages like the Business Process Model and Notation (BPMN). An important development is also the integration of process mining and automation platforms. By using process mining, execution gaps are identified while automatically triggering corrective workflows. This is a natural development. Process mining provides the X-rays to spot performance and compliance problems. However, after diagnosing these problems, one also needs to "operate", i.e., take the actions to address the execution gaps uncovered. Therefore, process modeling, process analysis, and process execution need to be integrated. The attention for topics like hyperautomation and execution management illustrates this."

What are examples of new process mining capabilities that will become important in the next couple of years?

"Although process mining vendors already offer Machine Learning (ML) capabilities and often refer to Artificial Intelligence (AI), the actual practical use is very limited. This has two reasons. The first reason is that, in many organizations, there is so much collective debt that ML and AI approaches are not needed and also do not work. As long as organizations have data integration problems, they should not start with ML/AI. Traditional process mining approaches like process discovery and conformance checking will reveal many improvement opportunities. Sophisticated forward-looking process mining techniques (e.g., using ML to predict delays and deviations) only make sense after taking care of the obvious. Moreover, these techniques only work if there are enough data and processes are in steady-state. I often advocate Hybrid Intelligence (HI) as the more realistic alternative. Hence, I'm skeptical about fully automated ML/AI.

For me, a much more exciting development is the emergence of Object-Centric Process Mining (OCPM). This is more down-to-earth, but very important for future process mining applications. Most process mining tools still assume that there is a single case identifier. However, one event may refer to multiple objects (e.g., an order, a customer, multiple items, and a location). Picking a particular case notion quickly leads to convergence and divergence problems, and the connection between objects gets lost. Take, for example, a look at the database tables used to analyze Purchase-to-Pay (P2P) or Order-to-Cash (O2C) processes. These tables are connected through foreign keys showing that one order may have multiple items and that a delivery may contain items of multiple orders. As the field matures, OCPM will become more important. Organizations do not want to spend efforts on the repeated extraction of events to answer specific questions."

How did the COVID pandemic influence the adoption of process mining?

"Due to the COVID pandemic, many organizations cut budgets for innovation and people were busy keeping the daily operational processes up and running. However, COVID-19 was also an enabler of digitalization initiatives. Many decisions that would normally take years took place in a matter of weeks, e.g., replacing paper forms with electronic forms. The pandemic exposed inefficiencies and outdated work practices. In the long run, these experiences will be a catalyst for process mining adoption. The pandemic also showed the limitations of mainstream ML/AI technologies. In times of disruption, "training data" are not representative of the actual behavior of people and organizations. However, process mining can still provide valuable insights when things change dramatically. Moreover, the resilience of processes will be a topic in the boardrooms of most organizations."

How many process-mining vendors will there be in 2025?

"The number of process mining vendors has been steadily growing. Now there are around 40 commercial process-mining tools. Some of the current vendors will be acquired by larger vendors and their process mining capabilities will be added to existing platforms and systems. Basic process mining capabilities (e.g., creating a DFG with frequency and time information) will be added to existing systems (e.g., RPA and BPM software). Also new, domain specific, vendors (e.g., targeting production or healthcare) will emerge. However, it will be increasingly difficult to compete with the leading vendors of the high-end process mining tools that are able to deal with billions of events. Hence, it is difficult to estimate the exact number of process mining vendors in 2025. However, it is clear that the market will continue to grow, and the diversity of tools supporting process mining will increase."

Can you tell more about hybrid intelligence?

"Hybrid Intelligence (HI), sometimes also called Augmented Intelligence, emphasizes the assistive role of new data-driven technologies. For example, deep neural nets are there to enhance human intelligence rather than to replace it (just like telescopes are there to enhance human vision). HI aims to combine human and artificial intelligence, thereby reaching superior results to those each of them could have accomplished separately while learning continuously. HI aims to combine the best of both worlds. The spectacular developments in ML have extended the reach of software and hardware robots. Once a robot is able to perform a repetitive task at a similar level of quality, it is often also more cost-effective. However, humans still have unique capabilities. Consider, for example, disruptive events like the COVID-19 pandemic, where one is confronted with completely new challenges that require flexibility, creativity, and intuition. People have the ability to transfer experiences from one problem domain to another. Moreover, empathy (i.e., the capacity to understand or feel what another person is experiencing) and ethics (i.e., reasoning about moral concepts such as good and evil, right and wrong, virtue and vice, justice and crime) require HI.

HI also plays a key role in Action-Oriented Process Mining (AOPM), which focuses on automated corrective actions based on process mining diagnostics. AOPM turns observed events into management actions when needed. The goal is not to support the operational process itself (that already exists in some form), but to support the management of the process. Obviously, HI will play a significant role in AOPM. Humans need to be in the loop when confronted with unprecedented situations. For example, it may be beneficial to be non-compliant when novel problems emerge. This is what we have learned in the last two years."