

Editorial

AI: The Growing Extent of Intelligence

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We gathered our first experiences with Artificial Intelligence (AI) 33 years ago as a small (science) kernel of a large-scale B2B application of Lufthansa with respect to optimizing the cargo by-loading on passenger airplanes (background: Lufthansa was (and still is) the world's largest air cargo carrier). Weight goods (like lead) were charged by their actual weight; voluminous goods (e.g., flowers) by a higher kilogram rate. Ideally, the airplane's cargo capacity, which is restricted by both weight and volume upper limits, is used by a ground layer of lead complemented by a thick layer of flowers, resulting in a relative increase of freight revenues of, ideally, close to the factor two. However, qualified air-freight requests do not only comprise "lead and flower" transportation and they arrive in continuous streams. The task of the AI was to properly select out of the incoming stream of airfreight applications those that substantially and sustainably raised the relative revenue over one.

We recall these "ancient" experiences because of two important take-aways: the first is that one needs a sufficiently resilient (business-) func-

tional specification, i.e., a professional concept (here: of air-freight dispatching). In German this means: "Fachkonzept" (interestingly, there is no nice word for it in English). It tells us that, independent of the underlying IT concept, under specific circumstances (in our case for instance: enough "population" in the incoming stream of airfreight applications with varying specific weights) some minimum business advancements will be realized with some probability. The application success of such an AI system is measured against the professional understanding of responsible humans.

In modern times (three decades later), massive increases in compute power and data storage capabilities open new ways of AI application. We train AI systems with historical real-world data on, e.g., multidimensional decision circumstances and success or failure of the respectively resulting decisions. They are systematized in a way to reversely calculate the (yet to unveil) inherent professional concept. This procedure is more a systematic business-functional disclosure – or even further: a scientific exploration



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process – to detect more efficient combinations of building blocks of a solution than (as in the old times) a mere extension of the human calculation and data storage capabilities.

Two examples underpin the necessity to evaluate the professional concept options, i.e., the calculations that AI systems offer (and this is the announced second take-away) also in modern times: the responsible human must understand the permanent superiority of the professional concept, not only for a handful of application cases but for a large number of different cases (which also bear some variety of input parameter combinations).

So, first, how far can we move forward by just "extending" data of the past? For instance, we see highly interesting literature on "pay attention to hidden societal discrimination in historical data", e.g., in the insurance business. In general: when business environments change quickly (as they also did in the airfreight business), we cannot only rely on what an AI system has nicely calculated based on history.

Second: today's business cases are often more complex than a lot of historical cases. Ergo: yes, the "intelligence" of AI systems increased and improves further. But also the human business intelligence increases. Apparently, both develop in a kind of lockstep – with a sustained supremacy on the human side – in particular with respect to the permanent professional concept.

A final note on what happened to our Lufthansa case: The system worked nicely as expected and was integrated in an extensive process. But our AI module was nevertheless abandoned after only eight weeks in operation: The freight dispatchers had not been properly involved in the system development, and they just refused to employ our module. Our suspicion: they used the findings via their human system interface.

More than three decades of AI progress and applications, including 20 years of efl advancements, teach us that the human (as for instance user, developer, and business manager) is the narrowest bottleneck in applied information technology.