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# 5 Experts on Business Digitization Strategies Based on Semantic AI and Machine Learning.

Statements of five international economists and researchers speaking at SEMANTiCS 2018 who reveal their most crucial learnings about how digitization develops and what trends will hit companies over the next years.

**W**ith the digitalization of various business processes, the value-adding part of IT in companies is increasing. More and more data is being produced, collected, classified, analyzed and finally provided as a useful and valuable resource for our businesses. One of the key challenges for any organization today is the implementation of a working digitization strategy. This presupposes excellence in machine learning, artificial intelligence and semantic technologies.

## Key Learnings and Trends

With the digitalization of various business processes, the value-adding part of IT in companies is increasing. More and more data is being produced, collected, classified, analyzed and finally provided as a useful and valuable resource for our businesses. One of the key challenges for any organization today is the implementation of a working digitization strategy. This presupposes excellence in machine learning, artificial intelligence and semantic technologies. Five international economists and researchers speaking at SEMANTiCS 2018 conference reveal their most crucial learnings about how digitization develops and what trends will hit companies over the next years.

*Alan Morrison, Senior Research Fellow at PwC*

## 2. Key Learning

Many times, the biggest challenge isn't the technology—it's changing the organization and the process in a humanistic, sustainable way. It turns out that the most successful companies are those which use knowledge-based decision making in an iterative development process and do not follow the herd. They're creative, non-linear thinkers. They take the trouble to understand the problem deeply first. They often diagnose problems correctly and know enough to explore new tools when crafting a solution. If they run into trouble, they revisit their thinking and make corrections and refinements. They're agile in their thinking as well as their actions. They infuse their thinking into the organizational culture.

## Effect on Companies

Organizational boundaries are becoming more porous, and there's more and more collaboration between

organizations. We've also seen the rise of the gig economy—freelancers or contractors are more in evidence. In some cases, the bulk of the entire organization consists of contractors. In general, we're just seeing a more fluid environment. IDC describes the online working environment as the Innovation Graph. Companies will need to consider how to position themselves in new roles in this Graph. Companies can morph into new roles this way and do their own boundary crossing in the process.

## Next trend

The future belongs to dynamic, continually evolving organizations, organizations with more fluid business models, and a fluid workforce that adapts to the ever changing tasks and challenges at hand. To get to scale and business model agility, companies need to create a semantic graph foundation for AI. I'm a big fan of semantic graphs

as the parent data structure that can manage all the children, because they allow full contextualization of disparate data types and machine readable articulation of the rich relationships that need to be mined in any organization. Relationship, not relational, data is what allows us to disambiguate and describe each context. Just ask a social media company—what's more powerful than a graph to describe and better articulate customer relationships and all the segments and subsegments of the markets serving those customers?

*Andreas Blumauer, Co-Founder and CEO of Semantic Web Company*

## 3. Key learning

A broader acceptance for AI technologies can only be developed when results are good enough to either automate an existing process step or when whole new processes can be established due to the higher level of automatization, which is only made possible through AI. This challenge is strongly related to HR and the skills of people involved, who usually come from different departments starting to work on AI projects. AI is not at all a technological issue only! Bootstrapping AI projects in companies means on one side to develop various skills, on the other side a strategy must be developed that tackles the fundamental question "make, buy, or outsource?"

**IIA's analytics maturity research is designed to examine industry leaders in terms of size, brand, innovation, and analytics capabilities.**

Obviously little steps with many iterations at the beginning of an AI initiative will overcome this challenge.

### Effect on companies

AI has developed into two main branches, which are 'Symbolic AI' and 'Statistical AI'. Semantic Web is based on the approach mentioned first, while most ML techniques such as Deep Learning are based on the second version. Over the past months we have seen promising developments into a new kind of AI that we call 'Semantic AI'. Recently a team of researchers at Free University of Amsterdam has published a paper that will guide us the way towards a fully developed 'Semantic AI': The Knowledge Graph as the Default Data Model for Machine Learning. The main idea is not to use single and isolated input data, typically a CSV file, to feed the ML algorithms, instead using an integrated and linked data set based on a more expressive semantic data model.

### Next trend

In the immediate future, I cannot see anything on top of that but rather a fusion of all of that. This also means that the focus will be set on the whole data life cycle. Organisations will develop greater awareness that the often-quoted data-driven business can only succeed if data and information management can be established as a core process rather than an annoying appendage to the 'actual business processes'.

*Elena Simperl, Professor of Computer Science at University of Southampton*

### 4.Key Learning

AI is an opportunity. However, if we have learned anything from the discussions around monopolies on the internet, data silos, breaches of privacy, and the ways that these big platforms can be misused it is that it is never too early to think about potential threats. AI is already in the marketplace in many areas. In finance, algorithms are making many decisions for a decade probably. We really need to think carefully and study the problems and implications technologies can have in the marketplace. Research has to provide evidence and recommendations for what can be done.

### Effect on companies

Artificial Intelligence, Machine Learning and semantic technologies complement each other. Semantics is as much part of AI as machine learning. Semantic technologies have been part of AI since the very beginning. One of the reasons AI has not been so successful so far was because there was a lot of investment and effort put in trying to capture the world in very complex knowledge systems. It was impossible with the technology and the systems we had in the the 60s and 70s though. Now we face a completely different situation: Everyone has their devices and access to the web. There is the Internet of Things. We are living in a world of networks and it is much easier to capture the data. You can work with really powerful knowledge based systems that would not just learn without understanding the results but provide the user an interpretation of what is

learned, and use knowledge that they have about their surroundings to enrich the results of machine learning.

Next trend The "fairness of algorithms" is getting some attention recently. People are now more aware of the biases in the way algorithms work. The quality of data that is used to train an algorithm plays a really important role in how those algorithms work and make decisions. Currently, there is not enough data and evidence to come up with a solution for that. In this area we really need empirical evidence, studies and multidisciplinary theories to make algorithms more transparent and fair. At the same time, there are many other organizations that don't even have enough data available to make substantial progress with machine learning. The relationship between training data used in machine learning algorithms and the performance of these algorithms is crucial.

*Harald Sack, Professor for Information Services Engineering at FIZ Karlsruhe and AIFB*

**5.Key Learning** To obtain maximum benefit, data has to be linked to other data, i.e. other data must also be able to link to your data. This is easily achieved, as long as data is provided as open data. Proprietary data can of course also be linked to other data, but how should I know that it is there and that it would also benefit from being externally linked and reused. However, I know that data also might be an asset and therefore your business case demands your data to be proprietary. Nevertheless, in research we should demand to keep our research data open to ensure reproducibility of our research results. Otherwise, research progress will be limited.

### Effect on companies

One of my favourite application areas is exploratory search, i.e. searching where you don't know exactly where the search process might lead you to. Sometimes you might not be able to explicitly phrase your search intention. Probably because you lack the vocabulary or you might not be an expert in the domain in which you are looking for information. Then, first you have to gather information about your domain before you might be able to perform pinpoint retrieval. This process can be supported by intelligent recommender systems, extending your scope, leading you through the vast search space on dedicated paths towards your preferred direction. This is something that current search engines are not capable of.

**Next trend** "It's tough to make predictions, especially about the future", as physicist Niels Bohr is quoted to have said. One thing for sure will change the world as we know it today, and this is the rise of autonomous systems. I would expect major progress in the synthesis of symbolic logic as for (explicit) knowledge representation in combination with (implicit) deep neural networks. This development will lead to autonomous systems that learn while interacting with their environment, that are able to generalize, to draw deductions, and to adapt to new, previously unknown situations.

*Christian Dirschl, Chief Content Architect at Wolters Kluwer Germany*