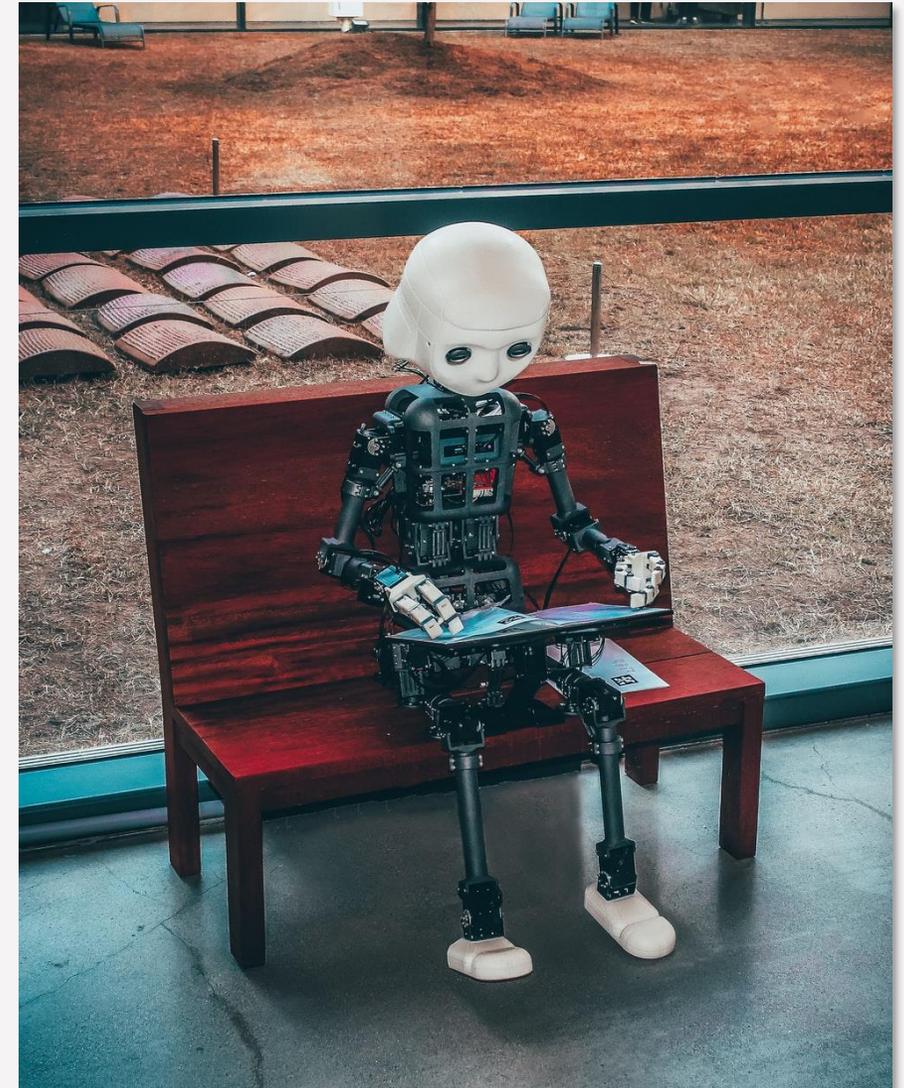


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ADVANCED MADE SIMPLE

The evolution of the planning decision

From human to artificial intelligence



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The evolution of the planning decision

Preface

The world is changing. In fact, this change is going faster than ever before. Born in 1985 I grew up without cell phones and internet. I had to go past my friends after school to see if they were home to play with me. It could take up the whole afternoon to find someone who was available to entertain me. Thinking back I can only conclude that I wasted tons of time on that age. 36 years later we talk about Big data, Internet of Things and Artificial Intelligence. I do not even have to call my friends to see if they are available, a green indicator will tell me. In 35 years time life became fast, accessible, connected, but also a bit stressful. Our minds are struggling to catch up with the speed of change.

Also in business this rapid change is felt. Supply chain and logistics planning was done manually 40-50 years ago. Planners used planning boards and Gantt charts on pieces of paper to determine the most efficient transport, production or inventory planning. Vast resources and time were required when the scope of products increased. With the rise of the personal computers in the 70's and the internet coming up in the 80's planning of operations became more efficient. But still people were involved to compute the right planning. With Artificial Intelligence we take a new leap in technology. Planning can now be automated based on tons of meta data. It even results in situations¹ where the algorithm becomes smarter than the human brain.

The question now rises: is this the finish line or are we overcompensating with our technology?

Advanced made simple

Combine human and artificial intelligence

My name is Stijn Wouters and I am the product manager of Lanza. We provide organizations with a digital software solution and service that plans and optimizes spare parts inventories.

Lanza invests a lot in state-of-the-art forecasting and inventory models and smart AI applications. But at the end of the line it is about the best planning decision for a planner to take. At the end of the line we do not believe in full AI automation as gut feel and creative expertise are crucial and can only be added by a human planner. Combining the two is for us the winning formula.



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Manual planning decisions

From planning boards to Gantt charts

“Software?”

Back in 1960 my dad worked at the sales department of a chicken slaughter factory in the Netherlands. When asking him “what software did you use to do your demand and supply planning?” his answer was: “Software?”

During these years the first mainframes were introduced but in the case of this factory only for accounting purposes. Demand and supply planning was done manually. For a large extent this was still doable due to the limited scope compared to complex operations and product assortments today.

Also the quality of the outcome was not a big issue. Since a lot of data was not available the outcome was trusted when the process was followed. A process where the company experts had their say.



Planning boards

Great asset with limited scope

But also in the 60's companies had to earn money and be profitable, so having a proper planning was of the essence. Back then planning boards were used that kept track of the status of a product, purchase orders that were made or client backorders that were outstanding. Due to the limited scope there was still some overview.

Also the first Gantt charts were introduced to create project planning schedules. A way to identify critical paths and to improve business processes.



Logistics engineers

The outcome is as good as the process that is followed



The most important ingredient for a proper planning decision was the contribution of the expert. Fact based calculations were not there, at least not in a large scale. Organizations leaned on their business experts when deciding when to buy and what to buy. The quality of the outcome was qualified 'good' if the process was followed and the required experts had their say.

In arrears missed potential could not be calculated either, so the business model was never of debate. And to be honest, I trust that the actual planning decisions were in fact spot on as the scope was often limited and people dedicated their career for just that 1 company.

Fact based planning decisions

Personal computers and data

The personal computer

Crunching numbers

Luckily in the early 70's the first personal computers were introduced. Although you would have been a pioneer if you had one back then it rapidly added value to businesses.

Despite having some internal memory and CPU which is nothing compared to PC specs today these machines were able to calculate numbers faster than human planners could do. Soon the logistics planning and inventory planning as well as all financials were calculated and stored on these PC's which enabled businesses to increase their scope.

Production lines expanded and variety of product assortments increased. Opportunities were endless.



Fact based performance

Challenging the business experts

With this computing power and storage possibilities businesses were also able to calculate their performance behind the fact. Using field data these organisations could now measure their service levels, lead times, etc.

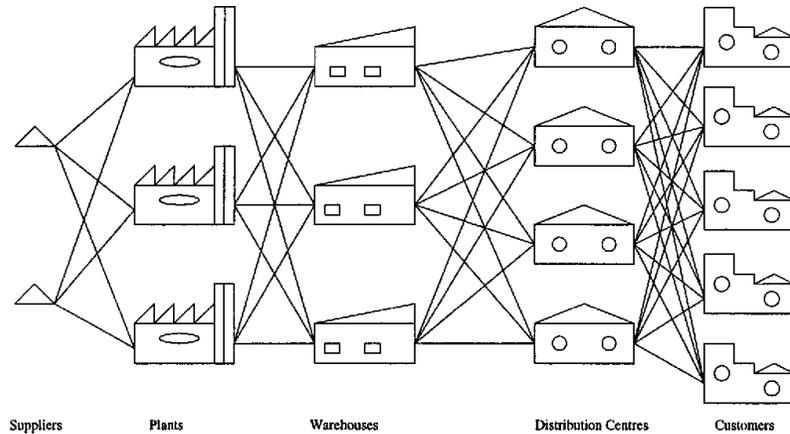
As if all blind people could see again, a lot of organisations were confronted with the 'real' performance instead of their trusted belief. Although this ability enabled organisations to steer their processes and people better, this also challenged the advice and expertise of the business experts directly.

Soon the engineers and buyers were not dictating the end result but rather populating assumptions for the computer models to work properly. A huge culture change which is still not adopted by many organisations.



Tackling complex problems

Deploying computing power



Not only the business scope grew, but also the complexity increased of the problems to solve. Organisations more and more acting global, which resulted in complex networks to manage. Decisions that were made for 1 site could have an impact for other sites and vice versa.

As organisations could now make use of computing power smart mathematical algorithms could now be considered to come up with the best possible planning decisions. Think of the traveling salesman problem, where a number of points or sites must be visited with the least possible distance or time. A typical logistics problem. Until today this problem can only be solved by hard number crunching and not with an easy formula.

More on inventory optimization, calculating the right inventory quantities in a big network can be done with the so-called METRIC algorithm. An algorithm that was invented already in 1968 but only found its way when the computers were able to calculate the outcomes of the algorithm within a convenient timeframe.

Focused planning decisions

Manage by exception and with business knowledge

The best of both worlds

Enriching the algorithm with business knowledge

Crunching numbers and adding more computer power to calculate the right inventory quantities and planning decisions was not enough and even incomplete. Although the algorithms were becoming more powerful they heavily depended on assumptions. The outcome was as good as the parameters you entered.

In fact, moving away from the business experts and adopting a lot of these algorithms was in fact a matter of overcompensating. And that is what we still see in organisations.

We believe that the best way to approach these problems is to combine the power of the algorithms with the expertise of the business experts. An algorithm can tell you what safety stock you should carry but the experience the planner has with the supplier or the typical demand quantity that is used is something the algorithm cannot cover.



Creating focus

Apply by management by exception



As the scope of businesses and the assortments of parts continued to grow it became impossible for planners to judge everything. Manual planning decisions were made impossible due to the lack of time, but also combining fact based planning decisions with business knowledge is a challenge.

The trick is to manage by exception. When you know what elements drive your operations you know exactly what to judge and what you can ignore. Or where to add business knowledge and where to leave it to the algorithm.

For instance, calculating inventory quantities for thousands of parts is easily done by a smart application. But a planner must intervene when exceptional things happen, such as peak demands or when supplier lead times are unreliable. Only spending effort on these cases results in time better spent. In fact, this gets the most out of the algorithm and the most out of the business expert. A happy marriage.

Intuitive user interfaces

Less is more

Management by exception creates focus. And focus is what you need when you are managing thousands of parts or orders. In this era of big data and huge software possibilities you find yourself easily trapped in busy screens, buttons, tables and reports. This comes from the fact that people are eager to share information where they can. The risk of creating information overloads is often forgotten, also in a lot of ERP systems or add-on software these days.

In the end it is about the planner taking the best planning decision. And this planning decision must be taken with only the relevant information that is required. That means that everything else should be omitted. Less is more, or **advanced made simple** we call that.

Self learning planning decisions

Artificial and human intelligence



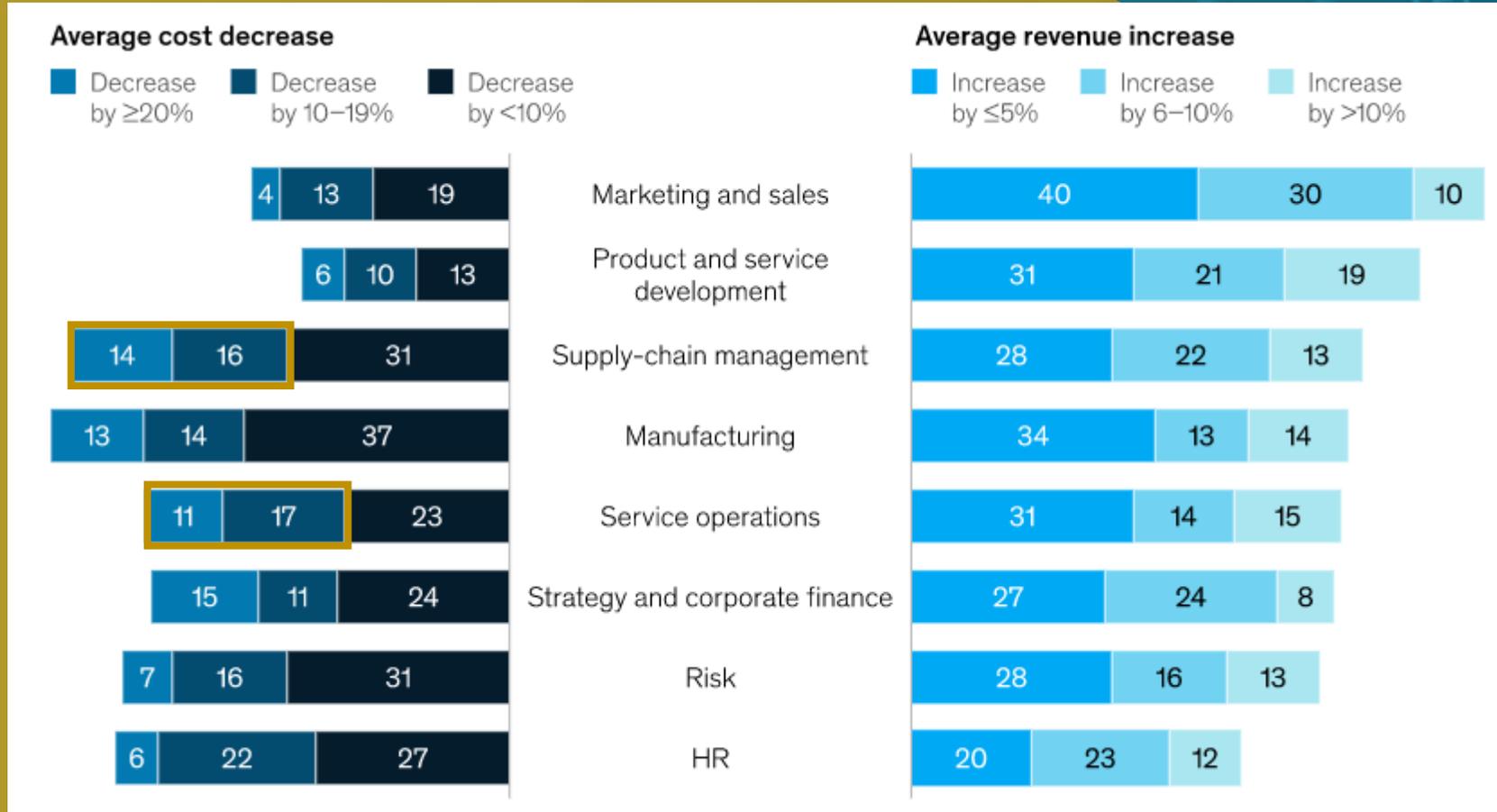
Machine learning

From human to artificial intelligence

In the first decades of the 21st century a new player came on the podium: Artificial Intelligence, or more precise: machine learning as the concrete method within AI. With this new technology it was now possible to literally replace human brains and intelligence with artificial intelligence. As long as the amount of data was large and relevant enough and there was time to learn, machine learning algorithms could in fact take away a lot of human brain power.

This also holds for supply chain management and inventory management where planning decisions must be made based on formulas but also based on business knowledge. With machine learning this business knowledge could now be captured into neural networks and hence be applied on those planning decisions. Moreover, these machine learning algorithms could process planning decisions much faster than human planners could, making the value add even bigger.

Cost decrease and revenue increase from AI adoption, by function



In supply chain management and in the broader service operations the most substantial¹ cost decreases are achieved by adopting AI algorithms.

¹ substantial being at least 29% of the respondents reporting cost decreases of at least 10%.

Source: McKinsey - Global AI Survey: AI proves its worth, but few scale impact (Nov 22, 2019)

Be careful...

What about creativity, gut feel and expertise?

Although machine learning has some great advantages and can be of great help in terms of quality and speed of a planning decision, there will always be practical elements that cannot be covered by these algorithms. Simple things like creativity, gut feel, and expertise are elements that only humans have. And this expertise or gut feel is sometimes crucial when concluding to put a big motor of 1 million USD on stock or not.

Albeit a self-learning mechanism these machine learning methods can only learn from past events and data that is available. Hence, ringfenced by itself.



AI assist

AI suggests, the planner decides



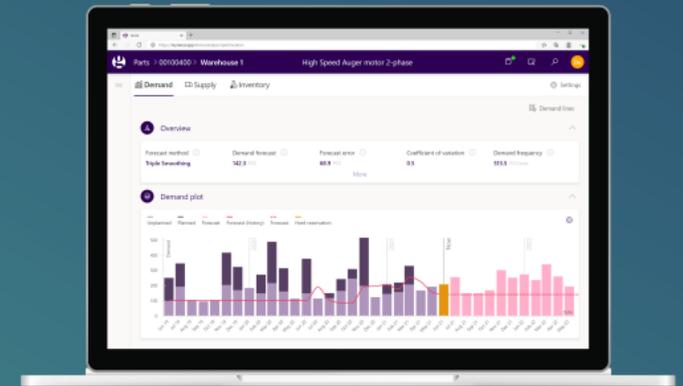
Lanza believes in AI assistance. In fact we believe in a combination of analytical formulas, AI assistance and human expertise to include relevant business knowledge.

Providing clients with state-of-the-art spare parts planning software we think that planners must be lead through its parts to plan. In the end the planner has the final say. Through this journey he will get suggestions from the AI assist, but he is able to approve those suggestions or not. “Consider buying 4 pieces” or “Consider excluding this demand line” could be suggestions the planner receives. By answering those suggestions (applying his business knowledge) the AI assist is trained and future suggestions are implicitly improved. In fact we are continuously improving the recipe going forward. In the end, the quality and the efficiency of the planning decision is the winner.

We believe that this will be the planning in the future. Are you with us?

This insight paper was written by Stijn Wouters, Product Manager of Lanza. Lanza provides clients an 'advanced made simple' web-based spare parts planning solution which is hosted as a cloud solution. As this insight paper also reveals Lanza is clear on its future developments. We want to embrace AI and machine learning but always to empower the planner to make the right planning decisions.

Supporting various clients with our software all over the world today, we want to support even more companies with our new technology to come. Embedding a professional AI assist in the software is definitely one of the features.



Are you interested in a demo, or do you want to start calculating your improvement potential?

Visit www.lanza-solutions.com to learn more.



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