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Making an impact with Data Science and Operations Research

by Ronald Buitenhek at 3:28 PM in [CoE Analytics](#), [CoE Optimization](#), [CoE Supply Chain Excellence](#), [Blog posts](#), [Best Practices](#)

Last week, Tim van Luxemburg and I joined some of our OOT and Products colleagues to the EURO2018 OR-conference in Valencia. Obviously, not a bad place to be, although a bit hot in this time of the year.

Participating participants

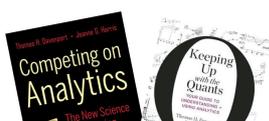
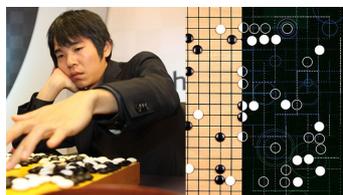
What were we doing there, you may wonder? Well, we were persuaded by Joaquim Gromicho to host a workshop on "Making an impact with Data Science and Operations Research". It was a very nice workshop with all participants really participating. We invited them to stand up and move to that side of the class room that corresponded to their opinion about the presented propositions like "Focus in data driven decision support must be on (a) gathering all kinds of relevant data or on (b) finding out which decisions are most relevant". This dynamic setting encouraged many participants to join in the discussion and let their view on the matter be heard.

Before starting the active group discussions, we presented our ORTEC view on this. I like to use this blogpost to give you the highlights of that. Please, react and let me know what you think!!

Operations Research and Data Science: a popularity contest

We are ORTEC and, for insiders, the first two letters of our company name clearly give away where we came from: **Operations Research**. We have been doing projects ever since 1981 from the perspective that quantitative models from Operations Research are a powerful tool for decision support in companies. And we have been successful in supporting companies to improve. The stable company growth over the years is a proof of that.

But then, there was **Data Science**. In 2011, IBM created a text mining and machine learning based computer program that won the television show Jeopardy. And in 2017, Google DeepMind's AlphaGo beat the world champion at Go using deep reinforcement learning. And they went on to beat the best chess computer (that already was a lot better than any human) using the same algorithm. These successes were picked up by a larger audience or at least by journalists. Suddenly, the word "algorithm" can be regularly found in normal newspapers.



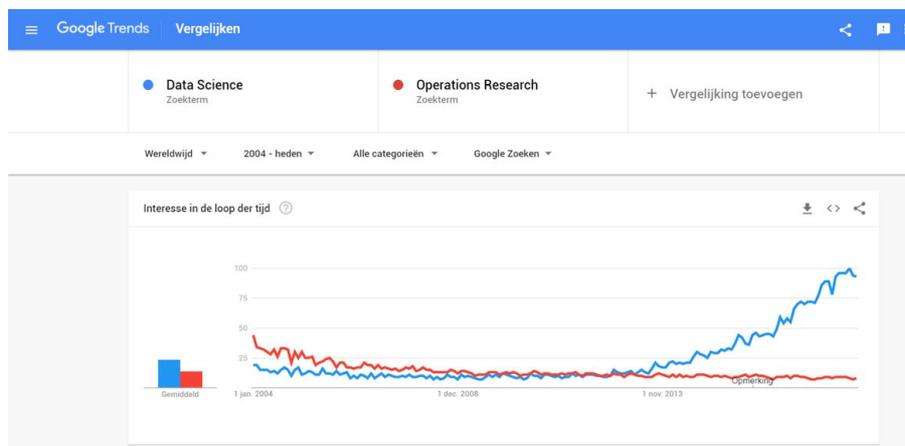


Even before these popular successes, the consulting world had already started popularizing new buzzwords like **Analytics**. And it was Tom Davenport who popularized the idea of quantitative modeling for business improvements among business managers with his books "Competing with Analytics" (2007), "Analytics at Work" (2010), and "Keeping up with the Quants" (2013).

The good news for ORTEC and Operations Research was that Davenport's much cited *Maturity curve* puts optimization on top. Company's should start getting their data organized. Then explore the data to understand what is going on. Next, create **predictive models** to benefit from knowing what will happen. And finally, create the holy grail of **prescriptive models** to automatically calculate decisions for an optimized future. Exactly what we had already been doing ever since 1981! No worries at all. We are on top!



Or at least, that is what we like to think. But, our daily consulting practice proves differently. Customers do know about Jeopardy and AlphaGo. They suddenly use the word algorithm and have never heard of Operations Research. Just look up both Data Science and Operations Research on Google Trends and you will be shocked by the fast-growing popularity of Data Science and the slow and stable decreasing popularity of our pet science.



Operations Research and Data Science: joined forces for optimal success

Is the popularity of Data Science worrying for ORTEC? Of course not. It is a fantastic opportunity. Finally, the entire world around us is ready to absorb quantitative modelling. We just need to extend our propositions or, in some cases, just reframe them. Data Science and Operations Research together will bring the real success to our customers and hence to us. Let me try to show why this is true

why this is true.

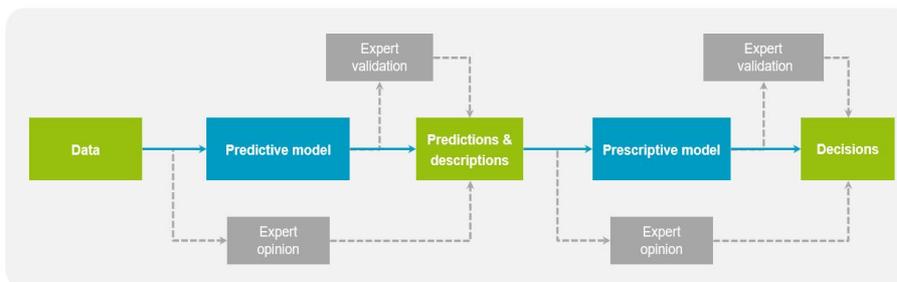
Data Science feeds data to quantitative models that produce predictions. These data can be structured data stored in databases or unstructured data like text or images. The predictions can be the future demand for a product, the number of passengers on a flight, the risk of water damage, the churn probability of a customer, the probability of a machine breaking down in the next month. All things that you may find useful to know. But on the other hand, if you do not base any decisions on this knowledge, it is not going to help you in any way. A prediction alone is not going to change anything. And the same holds for insight. Unused insight and predictions are useless.



On the other hand, Operations Research calculates optimal decisions based on an assumed future. For example, it optimizes a network design, sets inventory levels, fixes a production schedule, determines marketing actions, sets price levels and decides on a maintenance plan. Exactly what companies need to improve their business. But the relevance of the suggested decisions heavily depends on the information that the model uses to come up with its optimal decisions. Without this information, the calculated optimal decision is only optimal in a fictitious world.



This is where Data Science and Operations Research meet and join forces. Data Science starts with the data to come up with predictions and situation descriptions. Operations Research picks up this information and comes up with optimal decisions. Together, **they base decisions on (historical) data.**



But that's exactly what we have been doing all the time – or not?

Is that all? We have been doing that all the time already! We have been integrating forecasting and optimization in our workforce planning solutions (OWP), and in our inventory management solutions (OIR), and in our Pricing and Revenue Management solutions in the Aviation, Travel, and Leisure market.

True. But we can do more. And we must do more.

We must keep on improving our forecasting models and benefit from the learnings in machine learning. And we must broaden our horizon and identify new ways to create value for our customers with machine learning techniques. Perhaps a new way is to predict optimal routes like Wouter Kool is exploring in his PhD research. Maybe, the application of deep learning models for anomaly detection is the most logical extension of our supply chain optimization proposition. And very probably, there is some application out there waiting to be discovered by one of you, that I cannot think of yet.

But this all just techniques. Business modelling is much more important

No consulting story is complete without a soft side. In this blogpost, we have made the case for joined Data Science and Operations Research forces. That is a very technological view to data driven decision support. Of course, there is much more to it – on both sides of the spectrum. On the data side: what is all the data that can be used? On the decision side: what decisions do really contribute to a company's performance? And also, do you always need a model to do the job? But these are separate topics that deserve a complete blogpost on their own. For now, I like to leave you with an optimistic view on ORTEC's future which will be full of wonderful Data Science and Operations Research models to improve our customer's business.

Your view and participation

Although I have not made you stand-up and move through the room, like Tim and I did with the workshop participants, I hope with this blogpost to have inspired you to be enthusiastic about applying both data science and operations research models for the benefit of your customers. And if you want to speak up and share your opinion, please do! Leave your comment. Make your suggestions. It is not about competition. It is about joining forces!

Which of the two makes most impact?



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0 comments

There are no comments for this post.