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HOW ANALYTICS AND OR ARE HELPING TO ACHIEVE SUSTAINABLE DEVELOPMENT GOALS

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One of the strengths of Analytics and Operational Research is that they enable analysts to solve highly diverse problems by mathematically identical models. The message of this article is that there is so much value to be created from such models, not only to businesses across the world but also in particular from applying analytics to the **Sustainable Development Goals**, (SDGs), which are “a call to action to end poverty and inequality, protect the planet and ensure that all people enjoy health, justice and prosperity”. To help meet these goals, we initiated, with the University of Amsterdam and ORTEC (the non-profit institute “[Analytics for a Better World](#)”, ABW) in 2022.

Analytics for a Better World (ABW)

The first author coined the term ABW about five years ago when he was reading the book “Weapons of Math Destruction” (2016). This book discusses analytics and data science and its perilous dangers. In our view it is a very important book that had to be written, but its one-sidedness does let it down, failing to discuss the positive aspects of data science until the last chapter. As a counter to WMD, the term ABW was coined. Analytics have proven their worth in creating value for

in purpose and meaning in their job instead of high salaries, and are becoming ever more

enthusiastic to contribute to a better world.

It is all about impact

Many scientific papers have been written about analytics and its role in boosting humanitarian endeavours, but it is rarely applied in practice. We see several reasons for this. First, academics, after all, are judged solely on their publications, and that is the reason that for most academics the final goal is a publication and not real impact. Second, unfortunately many academics have no experience in turning theory into practice. Third, to build something real that has a sustainable impact, you need organizational implementation and software skills: you have to create user-friendly software and maintain it too. That is why at ABW we collaborate with professional Analytics companies who support us by bringing the added value of analytics to the users within nonprofit organisations.



SUSTAINABLE DEVELOPMENT GOALS



business, and the brightest minds are now harnessed to make more profit. There is nothing inherently wrong with that, but there is so much value to be created by applying analytics to the SDGs. Companies have already cottoned on to the value of data, investing heavily in analytics. Not for profit and Non-Government Organisations (NGOs) have not reached that point yet, due in part to the high salaries that experts can earn in the private sector. That is a shame. In a recent report (data.org 2022) it is estimated that in the coming 10 years around 3.5 million data experts are needed in the low- and middle-income countries. Fortunately, we see a positive trend that, especially young people, are more and more interested

Yes, we can...

When faced with all the misery in the world, there are two ways to respond. One way is to say: why do anything when nothing will really help, and many people tend to take this view. Still, it is a clear fact that we have made major strides in, e.g., combating world hunger over the past 50 years (pre-corona figures). In our opinion, it is a proof that all our efforts have not been in vain, which fills us with energy and inspires us to continue. Our contributions may be small, but the World Food Programme affects millions of people. In this respect we very much like the book and much-viewed

TED talks of physician Hans Rosling, in which he uses statistics to show how much progress we have made, as opposed to most people's expectations. Let us not squander our Analytics gifts and talents on, e.g., selling more products, but use them to benefit mankind. Below we briefly describe four of our impactful projects.

Optimizing food supply chain for the World Food Programme

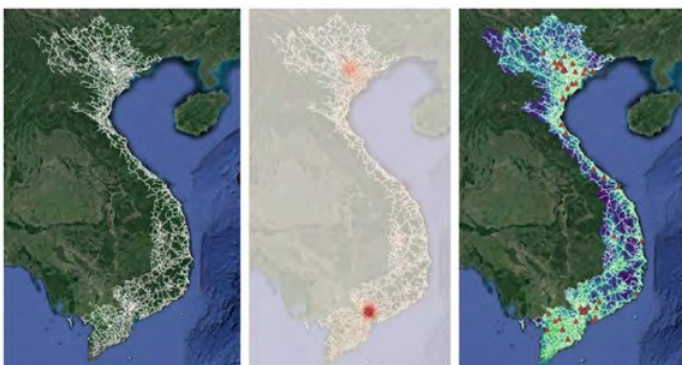
Some 820 million people worldwide go hungry, and the World Food Programme helps 10% of them with meals. But what should a daily meal for, e.g., people in Syria look like. >>

You have to consider nutritional values and put together a comprehensive package while minimizing overall costs - ingredients, transport, etc. - to help as many people as possible. It's a tricky puzzle that the human mind can't solve on its own, which is why Tilburg's Zero Hunger Lab developed a mixed linear optimization model (Peters et al., 2021,2022). This model is used in every new operation of the World Food Programme, and due to that model millions more people can be fed. By the way, it costs less than 40 US cents for WFP to feed someone for a day.



Optimizing geospatial accessibility for healthcare in developing countries

The World Bank provides loans to developing countries to improve their infrastructure. Timor-Leste for instance, has been granted loans to improve medical care. The UN's target is for 95% of the world's population to have access to a primary healthcare centre. The first question is: How many people have access to medical help now? And how many healthcare centres should be added and where? In Vietnam, there is a similar demand for so-called stroke illness centres. For these types of problems a lot of data is needed: population, roads, existing and potential locations of healthcare centres. We modelled this problem as a classical Facility Location model (Krishnan, 2021). We implemented new heuristics to be able to solve the resulting huge-scale problems. The results are included in a World Bank report (World Bank, 2021) for the Timor-Leste government. That government recently asked for several alternative optimization scenarios to be run. The examples above deal with hospitals and stroke centres, but the same principles apply to schools, ambulances, fire stations and so on. There are lots of real-world situations in which our model can have great value.



Optimizing cattle feed for small farmers

One project we have been involved in on a small scale is the Feed Calculator: a mobile phone app for smallholder farmers

in Asia and Africa to optimize their livestock feed blends. The farmer enters which ingredients she/he can purchase, for which price. The app then minimizes the cost such that all kinds of nutritional requirements for the cattle are satisfied. This is a direct application of the classical diet problem, and in the app a linear optimization solver is implemented to solve this problem. It is now used by thousands of farmers and has garnered testimonials such as: "Since we started using this formula, our costs have gone down, our cattle has gotten healthier and we have been able to send our daughter to school."



Faster cleaning of the ocean by Optimization

There are five hotspots in the world with a high density of plastic. The Ocean Cleanup (Rotterdam, The Netherlands) tries to remove the plastic in the Great Pacific Garbage Patch by applying a system as in the picture below. Given predictions of the plastic densities at many points in the hotspot, the question is how to steer the system such that in a given amount of time, the maximal amount of plastic is collected.

Besides plastic density predictions, also weather predictions, and predictions on the current and waves are used. We have developed a dynamic programming technique (Pauphilet, 2023) to solve this problem and the results show 30-90% more yield than the method currently used by The Ocean Cleanup. The software for this new technique is now being embedded in The Ocean Cleanup's software, and will be used for the daily operations of the cleaning system.



Reflections

Nowadays Analytics significantly contributes to the success of companies. Analytics has the same potential to contribute to humanitarian and societal challenges. The applications discussed in this article demonstrate that analytics can significantly contribute to the Sustainable Development Goals.

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TAKEAWAYS FROM THE 2023 INFORMS BUSINESS ANALYTICS CONFERENCE

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The [2023 INFORMS Business Analytics Conference](#) in Aurora, Colorado, brought together hundreds of leading analytics, AI, ML and data science professionals and industry experts to discover new mathematical solutions to problems, networking strategies for career advancement, and recognized individual and team efforts with the most prestigious awards in analytics and operations research.

The insight gained and connections made at the *2023 conference* will continue to grow in the months and years ahead and *INFORMS* looks forward to seeing the attendees again – and new attendees! – at the [2024 INFORMS Business Analytics Conference](#) in Orlando.

Here's what you may have missed in Colorado: [Meeting coverage](#). Check out recaps of the two keynote speakers, [Hilary Mason](#), co-founder and CEO of Hidden Door, and [Chris Tonas](#), chief technology officer, Pluralsight, as well as the reprise session of this year's [Franz Edelman Award](#) winner - Walmart!



▲ Congratulations to all the winners recognized at the *2023 Edelman Gala*, including the *Franz Edelman Award* winners from Walmart.

[Edelman Gala](#). The *Edelman Gala* awards four *INFORMS*-level prizes over the course of an elegant evening: The [Franz Edelman Award](#), emphasizing beneficial impact; *INFORMS Prize*, emphasizing long-term, multi-project success; *Daniel H. Wagner Prize*, emphasizing innovative methods and clear exposition; and *UPS George D. Smith Prize*, emphasizing effective academic preparation.

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▲ Participants in the *INFORMS Meeting of Analytics Program Directors (MAPD)* make lasting connections during the event.

ECPN and MAPD. In a one-day event, the [Early Career Professionals' Network \(ECPN\)](#) provided real-world career guidance to practice-oriented early-career professionals. The [INFORMS Meeting of Analytics Program Directors \(MAPD\)](#) is the premier event for Analytics Program Directors from around the globe to connect and collaborate with colleagues in the field to tackle the issues that impact their programs.