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GOR-AG:  
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GOR-AG: Praxis der  
Mathematischen  
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Herewith, we invite you to the 105<sup>th</sup> meeting of the GOR working group “Real World Optimization” jointly with the GOR working group “Project management and Scheduling” and hosted by Hilti Global Logistics. This meeting is planned to be held in person (or virtually if circumstances enforce) with the topic

## The logistics of value chains in the 21st century: Digital, sustainable and optimized

The workshop takes place on September 9<sup>th</sup> & 10<sup>th</sup>, 2021 on Thursday and Friday in Schaan, Liechtenstein. We plan for virtual presentation and on-site participation as well. The working language will be preferably English as some speakers are expected from abroad.

Note that the participation in a GOR-AG-Workshop for non-members is subject to a registration fee, unless you are a speaker or a host. Given the uncertainty of Covid, travel restrictions, company policies, we strongly advise to book and prepare your stay accordingly. Cancellation of the on-site event may occur on short notice, and the organizers will not provide any refunds.

Please, register via <https://www.redseat.de/pmo105/> before end of August.

The latest information on the meeting is available on the homepage of the GOR (<http://www.gor-ev.de/arbeitsgruppen/praxis-der-mathematischen-optimierung>).

Yours sincerely,

Jens Schulz, Julia Kallrath, Josef Kallrath  
(GOR AG)

Markus Frey  
(Hilti Corp.)

Dirk Briskorn  
(GOR AG)

# The logistics of value chains in the 21st century: Digital, sustainable and optimized

## Specific aims

This event is dedicated to all professionals and parties interested in advanced analytical methods. We aim to offer a discussion and exchange platform for experts in academia and industry applying advanced technologies or/and methodologies like mathematical optimization or machine learning to transform logistic processes into the digital century.

Delivering an ordered good, in the right amount, at the right time to the customer with the lowest costs are the challenges within an E2E logistics value chain. While time, speed, costs, reliability, availability, productivity and efficiency have always been major key drivers, environmental aspects, e.g. the reduction of the CO<sub>2</sub> footprint, must also be considered to take responsibility for our society and future generations. Only by leveraging data in combination with digital technologies and state-of-the-art methodologies, companies will be able to manage and balance those key drivers in a highly competitive and demanding environment.

We welcome talks that present success stories, and even more learnings and ambitions highlighting how digitalization helps to make the logistics value chain optimized and sustainable to be ready for 21<sup>st</sup> century.

## About Hilti

The Hilti AG providing leading power tools for almost 80 years developed a stand-alone business model with an end-to-end value chain covering the manufacturing of, e.g. a drill, up to the delivery to the customer's door. To manage the complexity of the logistic processes satisfying all kind of business aspects while meeting a high customer service level, a data driven, holistic and integrated planning is key breaking the functional silos. By adding real-time data, e.g. by using *RFID* chips to track products, an automated sense-and-response approach provides the right answers to obtain the highest customers' service level. Advanced methods, like mathematical optimization, is thereby one of the foundations to achieve the most accurate and most robust solutions.

Hilti Global Logistics takes up the challenges of the revolutionary digital journey. Its ambition is thereby not only to be a user of the digital technologies, but to shape the transformation process for their customers and for the future.

In talks of 25+5min or 40+5min duration, experts from practice and research will share their knowledge and learnings.

If you are willing to contribute a talk, please feel free to contact one of the organizers.

Dirk Briskorn ([briskorn@uni-wuppertal.de](mailto:briskorn@uni-wuppertal.de))

Markus Frey ([markus.frey@hilti.com](mailto:markus.frey@hilti.com))

Jens Schulz ([schulz-gor@at.gmx.net](mailto:schulz-gor@at.gmx.net))

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### Vorstand

Prof. Dr. Alf Kimms (Vorsitz)  
Prof. Dr. Alexander Martin (Arbeitsgruppen)  
Dr. Jens Schulz (Finanzen)  
Prof. Dr. Peter Letmathe (Tagungen)

### Kontakt

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## The Venue

Hilti AG, in Schaan, Liechtenstein.

## Travel

We recommend in most cases travelling by train or plane to Feldkirch where the hotels are located. Daily travel to the conference venue is best via public transport, car rental and car sharing. We are investigating whether a shuttle service can be offered.

## Hotel

We have negotiated rates for this event that can be booked using the code "GOR-Hilti 2021".

We recommend the Best Western Hotel in Feldkirch, Austria. Price per night and single person in double room is 95€, and 135€ for two people in double room.

On top comes a "Gasttaxe" of 1,20€ per night and person, and optional breakfast for 18,50€/day and person.

Another option is to stay in B-Smart Hotel in Bendern (Liechtenstein) or in any other close by. We plan to have the conference dinner in or near Feldkirch.

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## The following speakers are confirmed:

**Roeland Baaijens (Hilti)**

Tba / Hilti and resilient supply chain

**Curt Cramer (Lidl) and Aljoscha Gruler (Lidl Analytics)**

Optimization in the Lidl Supply Chain: Challenges and Opportunities

**Ton De Kok (CWI)**

Lost-sales or backlogging? That is the question

**Torsten Gellert (Zalando)**

Large Scale Discount Optimization with Business Targets

**Josef Kallrath**

Mathematical problems in Modeling and Optimizing Supply Chain

**Baris Cem Sal (Deutsche Post DHL)**

Data Analytics & Operations Research to support DHL Mission 2050: Zero Emissions

**Jesper Touboel (LEGO, VP LEGO Operations)**

Digital Twins - potentials and mobile enabled production

**Stephan Westphal (TU Clausthal)**

tba / Digitalization in the bread supply chain

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## Speaker CVs

**Torsten Gellert** is a Senior Applied Scientist at Zalando, one of the largest fashion e-retailers of Europe. For the last two years, he has been developing algorithmic solutions for the Pricing and Forecasting Department. Prior, he was working for three years in the Logistics Department on efficient handling of customer orders in and between warehouses. Torsten is interested in complexity theory as well as practical heuristics for real world problems.

**Ton de Kok** received an MSc in Mathematics from Leiden University and a PhD in Mathematics from Vrije Universiteit in Amsterdam. He worked as an Operations research professional at Philips Electronics from 1985-1992. Since 1992 he is professor in Quantitative Analysis of Operational Processes at the Department of Industrial Engineering and Innovation Sciences at Eindhoven University of Technology. End of 2020 he was appointed as General Director of CWI, the Centre for Mathematics and Computer Science. Ton has published over 100 papers in international scientific journals on subjects like queuing theory, inventory theory, hierarchical planning, and vehicle routing.

**Baris Cem Sal** is the Lead Data Scientist for Operations Research in Deutsche Post DHL Group Data Analytics Center of Excellence. Baris holds a BS degree in Industrial Engineering from Bilkent University/Turkey. Working in IT, consulting and logistics, he has brought multiple Machine Learning and Operations Research use cases to production, focusing on topics like forecasting, pricing, inventory optimization, network design, and routing.

**Jesper Toubøel** is the head of one of LEGO moulding sites and qualification factories which include both advanced mass manufacturing and maturing of new emerging technologies. Jesper has furthermore delivered organizational footprint and technology strategies within Product Design and Equipment (Manufacturing) - establishing Engineering centers in LEGO manufacturing sites in Singapore, Mexico and Denmark. During his work Jesper has profound focus on how IoT can support his visions and enable the future – a true IOT-technology evangelist.

**Curt Cramer** is Global Head of Analytics and working for Lidl since 2019. Before he held positions at Roland Berger, Thomas Cook and Adello. He holds a PhD from University of Karlsruhe with a specialization in database systems, computer networking, distributed systems, and mathematical optimization.

**Aljoscha Gruler** holds a PhD in Network and Information Technologies from Universitat Oberta de Catalunya. He is employed as Advanced Analytics Consultant at Lidl Analytics and before that worked at Accenture as Data Science Consultant.

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## Abstracts

**Speakers: Roeland Baajens (Hilti)****Title: Towards a resilient supply chain at Hilti**

Taking responsibility for the whole supply chain, from the production of products to the delivery to the end-customer is a challenging task. To ensure not only outstanding products but also a high customer service, Hilti takes up this challenge with this end-to-end view of the supply chain. One crucial aspect is thereby to leverage potentials by means of data and state-of-the-art methodologies and technologies.

Hilti Global Logistics further strengthened its digital and analytical competences by founding a team of experts in digitalization including also the sub-team Global Logistics Advanced Business Analytics. By applying advanced analytical methods this team supports different functions in getting new insights into their data and process leading to improved decisions making. As data knows no functional border, Hilti Logistics seeks for holistic solutions which are applied and used cross-functional.

In this talk, we will give an overview about major topics Hilti Logistics initiated so far in the area of advanced analytics and digitalization. We thereby discuss targets, ambitions and opportunities but also show organizational, operational and technological challenges by going the digital and analytical path.

**Speakers: Curt Cramer (Lidl) and Aljoscha Gruler (Lidl Analytics)****Title: Optimization in the Lidl Supply Chain: Challenges and Opportunities**

Over the last few years, Lidl has rapidly expanded across Europe. This growth is represented by a large supply chain network combining over 11.000 stores in 28 European countries.

Hereby, Optimization plays an important role in the creation of competitive and sustainable transportation & logistics activities. This talk highlights the specific challenges and opportunities faced by Lidl Analytics and other relevant stakeholders in the development and integration of Optimization methods in the Lidl Supply Chain network.

**Speaker: Ton de Kok (CWI)****Title: Lost-sales or backlogging? That is the question**

In this presentation we discuss the similarities and differences between periodic review backlogging and lost-sales models in inventory management regarding optimal policies and optimal parameters for classes of policies. We present a new optimality condition for multi-item multi-echelon models under lost-sales that can be used for control parameter optimization. We discuss the performance of the lost-sales control policy that orders every period such that the non-stockout probability is equal to a fixed fractile: the P3-policy. We present an efficient procedure that accurately determines the order quantity every period under this control policy and a heuristic that performs very well in comparison to optimal policies for the lost-sales model. Finally, we discuss some managerial insights derived under the P3-policy and its implications for multi-item multi-echelon systems under lost-sales.

**Speaker: Torsten Gellert (Zalando SE)****Title: Large Scale Discount Optimization with Business Targets**

Discount decisions play a central role in Zalando's financial lifecycle. They significantly contributed to the achieved GMV of 2.455 billion Euro in Q3 of 2020 and are central for supporting the ambitious YoY Zalando growth. Over 600.000 articles offered in 17 countries require

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constantly updated prices. They directly impact important aspects like customers perception, revenue growth and overstock at the end of a season.

The scale of the problem imposes strict requirements on the efficiency of the optimization framework as it must be executed as a weekly or even daily routine. The implementation of this process in the past has been a hybrid of an automated optimization process and a manual selection of appropriate discount recommendations.

We built a fully automated system that will be able to provide discounts - reaching financial goals without human intervention. It aims to reach the business targets for all markets and guarantees close to optimal decisions.

The central piece of our solution is a Lagrangian Decomposition approach which was developed in collaboration with Prof. David Simchi-Levi and the Institute for Data, Systems, and Society (IDSS) of the MIT. We combine big data engineering approaches (massive parallelization with spark) and classical Operations Research tooling in order to cope with the high dimensional optimization problem. To this end, we rely on the sales forecast, based on a machine learning model.

**Speaker: Stephan Westphal (TU Clausthal)**  
**Title: tba / Digitalization in the bread supply chain**

**Speaker: Baris Cem Sal (Deutsche Post DHL)**  
**Title: Data Analytics & Operations Research to support DHL Mission 2050: Zero Emissions**

**Speaker: Josef Kallrath**  
**Title: Mathematical problems in Modeling and Optimizing Supply Chain**

**Speaker: Jesper Touboel (LEGO)**  
**Title: Digital Twins - potentials and mobile enabled production**