Newsletter

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Dear readers,

An interesting year has passed, with stable economy in Germany, obviously not very much affected by the increasing protectionism trends worldwide. Prospering economies open options, and perhaps they can be used to address also the climate issues that become more and more urgent. The UN Climate Change Conference in Bonn in November 2017 has, hopefully, set signals in the right direction.

Also, ITPL works on sustainability and energy aspects since years. I am, e.g., active in an ASIM working group that discusses aspects of energy in simulation, which has published an overview of research in this direction in September 2017. Our contribution to the European U-Turn project also seeks ways to reduce CO_2 emissions, but also considers other sustainability aspects that arise especially in urban traffic (see below for details). Furthermore, we could welcome Jorge Luis Chicaiza last autumn, sponsored by DAAD a scholarship for at least three years, contributing to eco-efficiency simulation and optimization models for urban freight transport.

With respect to our own research activities, we proudly report the first finalized PhD procedure completely conducted at ITPL. This thesis is the starting point of a series "Proceedings in IT in Production and Logistics", published by Cuvillier in Göttingen. We look forward to the extension with a number of additional volumes in the very next years.

Further PhD finalizations are in the pipeline, but also three new researchers have started in 2017 (they introduce themselves later in this newsletter) and further three are planned for early 2018, forming a critical mass within our core fields of research. We are especially proud that next year we will have three running positions at the industry-financed Graduate School of Logistics, documenting the close relationship of our work with logistics applications.

Several scientific papers could be published. As a guest editor and advisory board member of the Journal of Simulation (JOS), I could finalize a special issue on Simulation in Production and Logistics early 2017, and the next issue (based on selected papers from the ASIM Conference in Kassel, September 2017) is in preparation for the issue 1/2019.

The upcoming year will bring new challenges. Our focus will be the Winter Simulation Conference in Gothenburg (December 2018), for the second time taking place outside the United States. I will have the honor to serve as Lead Proceedings Editor and also as a chair of the Logistics track, which will bring busy and exciting times this spring and summer.

For now, we hope that you enjoy reading this little newsletter and wish you success in the New Year!

Markus Rabe

PhD Thesis published

Dr.-Ing. Dipl.-Inform. *Anne Antonia Scheidler* has been a research assistant since 2012 at the ITPL. In 2016 she moved within TU Dortmund and is now responsible for accreditation of study programs within our faculty. She graduated in 2017 as first doctoral candidate of ITPL.

Her thesis focuses on the development of a method for data pattern extraction in Supply Chains (SCs). A procedure model for discovery in transaction data of SCs is an essential element of this method. Knowledge can be discovered in logistical transactions by applying the developed procedure model. In particular, the method provides procedures for taking into account contextual knowledge of the SC in the different stages given by the procedure model. For the first-time, integration of verification and validation in all model stages of data mining is a key aspect of the developed method. Based on a novel use of the simulation, the results of the existing verification options of data mining have been improved. A further objective is the integration of a transaction generation concept which enables to use the method even if no proper data base exists. This concept adapts techniques of data farming for use in SC knowledge discovery. The practical use of the developed method is demonstrated in two fields of application. The first field shows the model execution using transaction data of a producer of small electronic devices. The procedure model and the knowledge gained from model execution are exploited to design the basic concept for a company data dashboard. The second field of application presents a simulation model for farming transaction data.

The thesis has been published as volume 1 in the ITPL book series and can be bought in every book store or www.cuvillier.de/de/shop/publications/7613-methode-zur-erschliessung-von-wissen-aus-datenmustern-in-supply-chain-datenbanken.

Visiting Professors at ITPL

Prof. *David Goldsman* from Georgia Institute of Technology (GeorgiaTech, Atlanta, USA) stayed at ITPL, partially funded by a Gambrinus fellowship grant, from May 2nd until May 16th, 2017.

Prof. Goldsman, famous for his work in the fields of computer simulation and statistics, held a public speech on the topic "Containing Pandemic Influenza and why the Supply Chain Matters". There was an intense discussion after his speech.

In addition, Prof. Goldsman held a Research Colloquium with our PhD candidates and guests. With respect to teaching, he conducted two lectures on specific statistics issues in the master course "Material Flow Simulation".

The stay of Dave Goldsman was used for intense research discussions. All members of ITPL and some of neighbouring chairs have used the chance to discuss their research in detail.

In the follow-up, a book chapter on "Decision Making using Simulation Methods in Sustainable Transportation" has been submitted by Prof. Goldsman and Prof. Rabe. It contributes to an Elsevier book to appear in 2018 on Sustainable Transportation and Smart Logistics, edited by J. Faulin, S. Grasman, A. Juan, and P. Hirsch – also partially enabled by a Gambrinus fellowship, as Prof. Angel Juan has been a Gambrinus fellow at TU Dortmund in 2016.

Furthermore, we have successfully applied for a fellowship for innovation digital teaching in Germany, where, with the support of both Prof. Angel Juan and Prof. Dave Goldsman, an international, digitally supported master course on modelling and simulation will be developed in 2018.

We are very glad about these opportunities for intense scientific exchange and thank Gambrinus for the fruitful opportunity facilitating this great cooperation.

We can happily report that we could win again a Gambrinus Fellowship for 2018. *Prof. Suman Niranjan* (Savannah State University, Atlanta) will visit us in May for teaching, a public talk and intense research discussions. Prof. Niranjan has been awarded the Presidents Faculty Award for Innovation & Excellence in 2017 and the Excellence in Teaching Award in 2015 by his university.

Graduate School of Logistics

The Graduate School of Logistics (GSofLog) at TU Dortmund is a fully privately funded PhD school that offers their scholars a three year grant in narrow cooperation with sponsors from industry. This schema is nationwide unique, with companies, scientists and scholars being in constant exchange sharing expertise.

A first scholarship has been implemented with thyssenkrupp as sponsor from 2013 to 2016. A further scholarship sponsored by thyssenkrupp on methods for the formal description of change activities in discrete event simulation models, to be applied in materials trading networks, is currently active. In 2018, two more scholarships are confirmed to be started, sponsored by thyssenkrupp and by Vorwerk. Since 2015, Prof. Markus Rabe is also member of the board of the GSofLog. Please visit www.gsoflog.lfo.tu-dortmund.de.

Winter Simulation Conference 2018

The highly acknowledged Winter Simulation Conference (WSC), the largest conference worldwide on Simulation of non-continuous systems, will take place in Europe in 2018 for the second time in its life span since its commencement in 1967. The first time outside the USA has been in 2012, happening in Berlin with Prof. Markus Rabe as the Local Chair. In 2018, the WSC will take place in Gothenburg (Sweden), December 9th-12th. Prof. Rabe will serve as Lead

Proceedings Chair and also (together with Prof. Dave Goldsman) as the Track Chair for Logistics, SCM, and Transportation. Paper submissions are still possible with the deadline being April 6th, 2018. More information can be found at www.wintersim.org.

Update: New Model for Urban Food Transportation

The European project "Reducing impacts and costs of freight and service trips in urban areas" (U-TURN) aims to identify new models for urban food transportation in order to cope with major challenges in urban food logistics: population growth, congestion, environmental damage along with the increased use of convenience stores and home delivery of goods purchased online.

TU Dortmund University, represented by the ITPL and the Institute of Transport Logistics (ITL), is responsible for the work package "Simulation Modelling and Experimentation". The ITPL developed a mechanism for processing real business data of partners in Athens. These data are used to model a supply chain network with a discrete event supply chain simulation tool developed by the project partner SimPlan AG in Hanau (Germany) called SimChain, a class library for Siemens' underlying simulation tool Plant Simulation. With SimChain, it is possible to analyze different transport and sourcing alternatives, location options, article allocations, or planning algorithms and evaluate them with the help of standard logistics key figures. The main goal is to investigate collaboration strategies of 3PL and retailer companies by considering an Urban Consolidation Center (UCC). In our simulation scenarios, selected sites from the different companies send their goods in trucks to the UCC and then consolidated deliveries to the end customers are carried out by the UCC operator.

In the retailer case, it is possible to decrease the total distance and the CO_2 emission accordingly. However, more (shorter) trips are necessary which leads to an increase of overall transport costs as the costs are mainly calculated as costs per trip.

In the 3PL case, collaboration shows positive impacts. Incidentally, it was found out that a change of the route planning results in an increase in transport loading efficiency through full truck load and a reduction in the number of trucks, trips, distances and transport costs.

In 2018, we will try to confirm those results by simulating bigger, updated data records. The project is going to close in May. The final results will be probably presented at the Winter Simulation Conference 2018 in Gothenburg, Sweden.

For further information please visit the projects' official website http://www.u-turn-project.eu. This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 635773.

Research Link: Simulation, Verification & Validation, and Data Mining

Markus Rabe and Anne Antonia Scheidler will continue their research work in 2018. They closed the year 2017 submitting a research paper dealing with verification and validation (V&V) categories in data mining. This year, they will focus on the automation potential of V&V in the knowledge discovery area and on the background of real-time requirements in the data mining application area. This topic will also be the base of an upcoming joint research proposal. The aim of the proposal is to investigate the limits of the application of simulation in data mining. One of the highlights in the proposal work packages will be the V&V of knowledge discovery output. There will be a new approach for V&V techniques using simulation techniques. In addition, they will mutually supervise a new doctoral scholarship at the Graduate School of Logistics. The topic of the doctoral scholarship is an intelligent distribution mechanism for supply networks under specific constraints. The call has been issued, for more information refer to the positions section at the German part of our homepage.

Dynamic Data Mining Models

Reza Jalali Sousanabady (Dipl.-Inf.) is external PhD student at ITPL and currently working as a business IT consultant for Senacor Technologies.

The current era of emerging technologies has created a rapidly changing environment for companies and demands a high level of adaptability. For manufacturing and logistics companies, increased competition, reduced time to market as well as high product and process complexity created the necessity of using new techniques to achieve a higher excellence level. One set of such techniques are data mining practices which identify critical knowledge through data analysis and detect patterns, extract correlations and features. However, for the correct application, specific strategies for data collection, analysis, sampling and research design are crucial. Additionally, the procedures of data preparation and model development are very time-consuming. The reusability of the developed models remains limited and the high amount of required resources for modification of the existing models is another critical factor that can prevent effective use of these techniques.

Dynamic data mining models can be used for specific application domains to create instances for a variety of challenges. They enable reutilization of models and, hence, help addressing the aforementioned challenges effectively. This solution consists of two major steps: First, creation of a generalized meta-model for a sub-domain of problems and then customizing it according to the use case at hand. In the current research, ITPL's main focus is on proposing a novel hyper-heuristic approach to address these challenges in the domain of supply chains. The proposed methodology would introduce a new approach for domain-based generalization of data mining models to develop meta-models and

utilize hyper-heuristic to create problem-specific solutions. Lastly, by means of this approach more robust models with dynamic adaptability are expected.

Decision Support for Logistics Networks Combining Simulation with Deep Reinforcement Learning

Felix Dross (M.Sc. Software Engineering) was a member of the Graduate School of Logistics in Dortmund. He is doing his PhD at the ITPL in cooperation with thyssenkrupp. As of March 2017 he is working as a specialist for predictive analytics at thyssenkrupp besides his PhD.

Large logistics networks are very complex systems. Even nowadays, with analytical insights into supply chain situations with the help of data warehouse technology, the management of logistics networks remains a challenge. In order to cope with the complexity, companies have built specific logistics departments, dedicated to provide their managers with accurate business reports and the background information they need to decide about the right adjustments in their network. Specific performance measurement systems with key performance indicators (KPIs) as well as catalogues with possible actions for certain network situations have been developed in the past. Examples for such actions could be the relocation of stock from one site to another or the adjustment of transport relations within the network.

Unfortunately though, the effects of all the actions in the catalogues and their interdependencies are very hard to predict for the managers. In many situations, they are uncertain about the right actions to take. The task becomes even harder if the managers try to predict the consequences of all the possible actions regarding multiple KPIs at once, including the temporal development of the network. Therefore, especially trading businesses are demanding for better solutions to plan their actions in the logistics networks.

ITPL is facing this challenge by developing a decision support system which uses a discrete-event simulation model to predict the consequences of possible actions in the logistics network. For this, methods to automatically apply possible actions to the simulation model and to measure real world data warehouse KPIs on the simulation data have been developed.

Furthermore, the discrete-event model of the logistics network is tied to a deep reinforcement learning agent, which teaches itself the best combinations of actions. The agent can automatically apply actions to the simulation model and then learn from these interactions. A convolutional neural network is trained and finally the system is able to recommend the best combinations of actions for many different logistics network situations.

A solid architecture and a corresponding prototype have been developed in the last years. First experiments have been conducted with a small simulation model of a segment of a larger logistics network. It is now under research whether the agent can learn in extended systems and generate useful recommenddations from there. Furthermore, it is investigated how the system would scale when used for larger logistics networks.

Modular Modelling for Changeable Production Systems

Maik Deininger (Dipl.-Geoinf.) is research assistant at ITPL since 2011 and investigates the applicability of modular simulation models for simulating and optimizing production systems.

In the industrialized countries, production environments become more and more dynamic. Customers expect individual products, high quality and short delivery times. As a result, the product variety has exploded and manufacturers are faced with high numbers of individual orders. In order to determine whether an order can be fulfilled and whether the production will be economically beneficial, a system is necessary that is able to schedule every order with respect to existing and future resources and constraints. Such a system requires a proper model of the considered production system. Therefore, timed hierarchical object-related nets, a special Petri net type, have been utilized to modularly represent a production system. Each module represents a dedicated part of the production system and can be combined with other modules that contain the right ports. This enables the use of metaheuristic optimization in order to find a combination of modules that is capable of fulfilling all existing and known future orders. Furthermore, with modules representing new machines that are available after specific time, it can be determined if and when to purchase these new machines. Combined with scheduling, a plan can be composed that contains production sequences and time slots for purchasing new machines or other resources.

Simulation Paradigms and Required Data

Astrid Klüter (M.Sc.) is research assistant at ITPL since 2016. She is still involved in the European research project U-TURN, which is running until May 2018 (see above). Her research interests include simulation paradigms (Discrete Event simulation, System Dynamics, spreadsheets) and their application to real-life problem settings related to supply chains and city logistics.

With the help of a simulation model, results of various scenarios can be investigated. This allows us for assessing which approaches promise a positive balance and keep losses low. In this context the data which are necessary for any kind of simulation also need to be taken into account. Sometimes, only aggregated data are available and we would like to know some probability. Or, the other way around, very detailed data are

available (best case), but very high-level questions must be solved. Then, it is important to recognize that simulation is not always the right solution. In some situations, rough estimations are sufficient, and sometimes detailed results with the help of a simulation model are necessary. The question is, when it is more effective to use simulation on which dimension and which data set would fit these different dimensions and, moreover, which are the relationships between the aggregation levels? In this context, Astrid focuses on transaction data at several aggregation levels from different types of supply chains.

Creating Customized Actions to Change the Simulation Model of Logistics Networks

Dominik Schmitt (Dipl.-Inf.) is member of the Graduate School of Logistics in Dortmund. In cooperation with thyssenkrupp, he is doing his PhD at the ITPL.

Managers of logistics networks have the complex task of continuously maintaining their network in good operating conditions under a changing environment. Thus, they need to identify promising actions to adapt and improve the logistics network. Such actions could be the relocation of stock or the adjustment of transport relations.

In order to support the managers, ITPL has developed a decision support system (DSS) that suggests promising actions for a given logistics network (see above). This DSS addresses different logistic areas of the network and chooses the best integrated action sets from a given catalogue of actions to be applied while respecting their interdependencies.

Unfortunately, these suggested actions are typically predefined within the simulation program. To increase the flexibility and usability of the DSS, an approach for modeling, integrating and executing user-generated actions is required.

ITPL is addressing this challenge by creating a domain-specific language (DSL) for describing actions in logistics networks. The goal is to abstract the corresponding changes of an action to the simulation model from a very technical level into a more intuitive way. On this abstraction level, it is possible for the user to modify or create new actions by accessing constructs of the DSL through a feasible user interface, e.g. a graphical editor.

A method to generate and apply user-generated actions and a usage concept for integrating these actions have been developed in the last year. Furthermore, requirements for the proposed DSL and a first version of the language have been implemented. Research is now ongoing on whether all actions can be modeled by combining the identified language constructs.

Meta-heuristic Techniques for Multi-echelon Distribution Networks

Majsa Ammouriova (M. Sc.) is funded by the German-Jordanian University and currently does her PhD at the ITPL.

In complex logistics networks, the decision makers have a huge number of possible actions to select from to reduce cost or increase customer satisfaction. Due to the size of logistics distribution networks and the wide range of possible actions, decision makers face an increasing challenge to find the appropriate actions to improve the performance.

For supporting the decision makers, ITPL has developed a decision support system based on a simheuristic approach for searching for the most promising action set. Discrete event simulation is used in the evaluation of the suggested selected actions set, and a heuristic is used to guide the selection of actions.

Research is conducted in utilizing additional information about actions, such as their previous impact on the performance, to improve the heuristic unit search, and hence increase search efficiency. This information can be gained from a previously noted impact of the action on the performance or learned by evaluating the action's effect on the network performance. Enabling the system to learn and build experience will enable the decision support system to recommend actions for newly evolved states based on the gained experience.

Secret Company Data in Multi-organisational Supply-Chain-Applications

Bastian Schulten (M. Sc.) is external PhD student at ITPL and currently working as research assistant at the Ostfalia University of Applied Sciences.

Nowadays multi-organisational supply chain applications are a method to analyse and optimise the distribution networks of companies. These applications have the great advantage that the dependencies from suppliers and customers are incorporated. On the other hand, such systems use data of all involved companies, which should be secret to other participants (e.g.: transport costs). A primitive approach to solve the problem is that every participant defines secret data, which nobody else is able to read. If no one can see the resulting data of the supply-chain and aggregated statistics, only little information will be accessible for all participants. Because of this it is important to research methods to publish more information without unfolding the secret data. A first idea in this scope was to show only relative changes in results. But, in some cases, this is not enough to secure company secrets. Therefore, the results must be shown less exactly. This can be reached by classifying the relative results (e.g.: less, similar, greater). With the information about traceability of secret data, there is the possibility to create rules to show data in results on the most exact level possible without unfolding secrets. Moreover, the rules should be the base of an expert system for controlling the visibility of data in

multi-organisational supply-chain-applications.

Eco-Efficiency Simulation and Optimization for Urban Freight Transport

Jorge Luis Chicaiza (M. Sc.) is financed by a DAAD Scholarship and currently does his PhD in the field of Eco-Efficiency Simulation and Optimization Models for Urban Freight Transport at ITPL.

Transportation is based on fossil fuels, which has become a source of urban and regional pollution of greenhouse gases that vary according to the type of transportation. Consequently, the transportation industry must go through a transformation to provide sustainable mobility, reducing the consumption of fossil fuels, aggressively introducing the use of new technologies and boosting energy efficiency by optimizing its consumption in the various supply chains. According to the latest Transport Outlook (OECD/ITF, 2017) transport currently accounts for 27% of global energy related CO_2 emissions and continues to grow rapidly.

"The freight sector is rapidly growing and will soon overtake passenger transport. Structural change, re-thinking infrastructure and moving to alternative forms of fuels are some of the actions necessary to de-carbonize the sector". This argument was told at a meeting on transport as part of the Lima Paris Action Agenda at Climate Change Conference Paris 2015 COP21 and ratified at the COP23 meeting in Bonn, in November 2017.

The eco-efficiency is a more general expression of the concept of resource efficiency minimizing the resources used in producing a unit of output. Eco-efficiency is achieved by the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts.

The main objective of this research is to develop a model that contributes to economical sustainability for the companies and at the same time to reduce the emissions and negative environmental issues in urban freight transport operations.

Process Modeling in Intralogistics

Felix Stadler (M.Sc. Maschinenbau) is an external PhD student working at ITPL.

It is well known that digitization has great potential and significance, especially in the environment of intralogistics.

As a result, in addition to designing efficient processes, the identification of digitization potentials is increaseingly coming to the fore. In this context, it is of particular interest to consider the requirements and characteristics of IT and assistance systems when designing local processes.

Regarding the design of processes, there are various proven and prepared tools that can be utilized. Therefore, the aim is to further develop such a tool into a modeling method that is adapted to the constraints of intralogistics and supports the mapping of these processes in IT systems such as warehouse management systems.

To achieve these objectives, it is first necessary to adjust the properties of the tool to the tasks of the focused environment. Furthermore, IT system requirements for process design must be determined. Both must be reconciled in the form of a modeling method for uniform mapping and further use, for example, for the migration of new IT systems or simulation tasks.

Sustainability in Transportation – a Growing Challenge

Joachim Hunker (M.Sc.) is a research assistant at ITPL since 2017.

Continuously growing trade volumes are raising various challenges for the multimodal transportation of goods in globalized supply chain networks. One of the most important factors nowadays, and especially in future, is sustainability, considering environmental (e.g. use of natural resources), economical (e.g. economic efficiency) and social (e.g. human health) factors.

In this context, estimating the impact of decisions, planning and forecasting in transportation networks, especially in maritime transport chains, plays an utmost significant role. Gathering, connecting and evaluating data creates the basis for deploying different techniques, for example methods of optimization to investigate the best application of decisions, means of simulation to assess different scenarios or the combination of both (simheuristics). In particular, the rapid development of new techniques due to technical advances in IT (e.g. machine learning) and their adaption to answer logistical questions regarding sustainability are in the research focus.

Smart Supply Chain Transformation with Track and Trace

Henrik Körsgen (M.Sc. Supply Chain Management) is an external PhD Student working at ITPL.

In my work I am reflecting upon the prerequisites of designing a supply chain which is not "simply" digital but can be labelled smart. The difference is that digitizing a supply chain rather means that the supply chain information is exchanged in a digital format. However, exchanging data virtually doesn't make a supply chain necessarily smart. For this purpose, tracking and tracing offers a means to add value to processes beyond just digitizing them.

In the past year I have studied the technical and organizational criteria necessary to benefit from traceability. I have determined that traceability is placed second on the four-step ladder of Industry 4.0 maturity. Prior to traceability and implementing its underlying track and trace solutions, an organization needs to assure that

it possesses a full insight in each of its supply chain process steps. In practice, track and trace solutions consist of three main steps identifying the item, receiving the status and triggering the follow-up action. At the moment, I work on track and trace use cases and their applicability. The main research questions are: what is the value added through traceability in supply chain operations, which are the fundamental parts of track and trace solutions, and how can they be integrated in current processes. Concerning the latter research question the entire digital architecture is considered. It includes business, technology and supply chain network topics. Once use cases and their underlying applications are checked across these three dynamics, the research offers a holistic map about the main drivers of track and trace solutions.

Lectures

The following lectures are given in German by our department:

Bachelor

- Informatics for Mechanical Engineers
- IT-Systems in Industrial Production
- Foundations of simulation in production and logistics

Master

- Information Exchange of Producing Companies
- IT Design in Production and Logistics
- IT Technologies for Engineering and Logistics
- Material Flow Simulation
- Lab IT for Plant automation
- Lab Business Process Modelling

Contributions to Bodies

Association of German Engineers (VDI)

- VDI GPL Fachausschuss 204 Modellierung und Simulation; Member Markus Rabe
- VDI International Gremium Digital Information (IGDT), Member Markus Rabe
- VDI Richtlinienausschuss (Guideline Committee) 3633.10 „Geschäftsprozessmodellierung“ (Business Process Modelling); Chairman Markus Rabe; Member Joachim Hunker
- VDI Richtlinienausschuss (Guideline Committee) 3633.13 „Verifikation und Validierung“ (Verification and Validation); Chairman Markus Rabe; Member Maik Deininger
- VDI-Richtlinienausschuss (Guideline Committee) 3633.3 „Experimentplanung“ (Experiment Planning); Member Markus Rabe and Anne Antonia Scheidler
- VDI Richtlinienausschuss (Guideline Committee) 4465.1 „Modellbildungsprozesse“ (Model Building Processes); Member Markus Rabe

German Simulation Society (ASIM)

- Working Group „Simulation in Production und Logistics" (SPL); Deputy Chairman Markus Rabe
- Expert Group “Dedicated Conferences”; Chairman Markus Rabe
- Expert Group „Consideration of Energetic Impact Factors in SPL“; Member Markus Rabe

Conference Organization

- ASIM Dedicated Conference „Simulation in Produktion und Logistik“; Chairman Markus Rabe 1998, 2000, 2004, 2008, 2015
- ASIM Dedicated Conference “Simulation in Produktion und Logistik”; Program Committee Markus Rabe 1993-2019
- Winter Simulation Conference; Local Chair Markus Rabe 2012 (Berlin)
- Winter Simulation Conference; Lead Proceedings Chair Markus Rabe 2018, Proceedings Chair Markus Rabe 2019
- Winter Simulation Conference; Track Chair Markus Rabe 2012, 2013, 2014, 2016, 2017, 2018, 2019

Board memberships

- Graduate School of Logistics; Board Member Markus Rabe

Journals

- Advisory Board Journal of Simulation (Taylor & Francis); Member Markus Rabe

Publications 2017

Clausen, U.; Rabe, M.; Wenzel, S.: Guest Editorial - Special Issue Simulation in Production and Logistics. Journal of Simulation 11 (2017) 1, p. 1.

Gruler, A.; Juan, A.A.; Klüter, A.; Rabe, M.: A Simulation-Optimization Approach for the Two-Echelon Location Routing Problem Arising in the Creation of Urban Consolidation Centres. In: Wenzel, S.; Peter, T. (eds.): Simulation in Produktion und Logistik 2017. Kassel: kassel university press 2017, pp. 129-138.

Gruler, A.; Panadero, J.; de Armas, J.; Moreno Pérez, J.A.; Rabe, M.: A Simulation-Optimization Approach for the Single-Period Inventory Routing Problem with Stochastic Demands: A Statistical-based Approach. In: Duarte, A.; Juan, A.A.; Mélian, B.; Ramalhinho, H. (eds.): Metaheuristics: Proceeding of the MIC and MAEB 2017 Conferences, Barcelona, July 4th-7th, 2017, pp. 762-764.

Gutenschwager, K.; Rabe, M.; Spieckermann, S.; Wenzel, S.: Simulation in Produktion und Logistik - Grundlagen und Anwendungen. Berlin: Springer Vieweg, 2017.

Rabe, M.; Deininger, M.; Juan, A.A.: Setting the Number of Simulation Runs in a Simheuristic Algorithm: A statistical-based approach. In: Duarte, A.; Juan, A.A.; Mélian, B.; Ramalhinho, H. (eds.): Metaheuristics: Proceeding of the MIC and MAEB 2017 Conferences, Barcelona, July 4th-7th, 2017, pp. 402-410.

Rabe, M.; Dross, F.; Schmitt, D.; Ammouriova, M.; Ipsen, C.: Decision Support for Logistics Networks in Materials Trading Using a Simheuristic Framework and User-generated Action Types. In: Wenzel, S.; Peter, T. (eds.): Simulation in Produktion und Logistik 2017. Kassel: kassel university press 2017, pp. 109-118.

Rabe, M.; Dross, F.; Wuttke, A: Combining a Discrete-event Simulation Model of a Logistics Network with Deep Reinforcement Learning. In: Duarte, A.; Juan, A.A.; Mélian, B.; Ramalhinho, H. (eds.): Metaheuristics: Proceeding of the MIC and MAEB 2017 Conferences, Barcelona, July 4th-7th, 2017, pp. 765-774.

Rabe, M.; Klueter, A.; Tietze, S.: Comparing Different Distance Metrics for Calculating Distances in Urban Areas with a Supply Chain Simulation Tool. In: Wenzel, S.; Peter, T. (eds.): Simulation in Produktion und Logistik 2017. Kassel: kassel university press 2017, pp. 119-128.

Rabe, M.; Schmitt, D., Dross, F.: Method to Model Actions for Discrete-event Simulations of Logistics Networks. In: Chan, W.K.V.; D'Ambrogio, A.; Zacharewicz,G.; Mustafee,N.; Wainer, G.; Page, E (eds.): Proceedings of the 2017 Winter Simulation Conference. Picataway: IEEE 2017, pp. 3370-3381.

Scheidler, A.A.: Methode zur Erschließung von Wissen aus Datenmustern in Supply-Chain-Datenbanken. Series "Fortschritte in der IT in Produktion und Logistik", Vol 1. Göttingen: Cuvillier 2017.

Wenzel, S.; Peter, T.; Stoldt, J.; Schlegel, A.; Groß, G.; Pitsch, H.; Rabe, M.; Seewaldt, M.: Betrachtungen energetischer Einflussfaktoren in der Simulation in Produktion und Logistik: Eine Literaturanalyse. In: Wenzel, S.; Peter, T. (eds.): Simulation in Produktion und Logistik 2017. Kassel: kassel university press 2017, pp. 9-18.

Theses 2017

Akpinar, F.: Untersuchung von Materialflusskonzepten mit Hilfe einer Simulationsstudie am Beispiel der Lagerung elektromechanischer Antriebskomponenten. Master thesis, 2017.

Alic, D.; Junusov, A.: Ant-Colony-Optimierung zur Variation modular modellierter Produktionssysteme und zum Scheduling von Auftragsreihenfolgen. Bachelor thesis, 2017.

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