LOS

Warehouse-optimization-System
Artificial Intelligence

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The problem

Nowadays' processes in logistics are static. This means that due to snap-shots of the material flow and average values, like for example order-position-structure, logistics processes are planned only once and are implemented exactly like this. These processes only remain good as long as the planned state is kept. If the status quo changes the implemented process does not lead to the best result and it needs to be adapted.

And the status quo changes permanently:

The market changes, more exceptions have to be handled, the variety of articles increases and the relation between small and large orders turns out to be more and more volatile. Nonetheless the quality in customer service has to be kept high which leads to frequent re-priorization of customer orders and thus to manual interceptions. Also physical disruptions of automated machines or spontaneous shortfall of workforce are factors that might block the supply chain.

This permanently leads to new processes that need to be planned and implemented in order to keep the logistics competitive. However, the continuing adaptations are very time-consuming and costly, as three parties have to be dealt with:

- IT Team
- Process Manager
- Distributor of ERP / WMS

Starting position 1

"Static processes have to be adapted cost-intensively because the market and the customer behavior changes."


"Imagine a world in which your company can adapt to any customer."

The solution

We offer a self-learning software that analyzes, assesses and automatically includes the dynamics customer behavior. In this way the IT landscape does not have to be adapted over and over again.

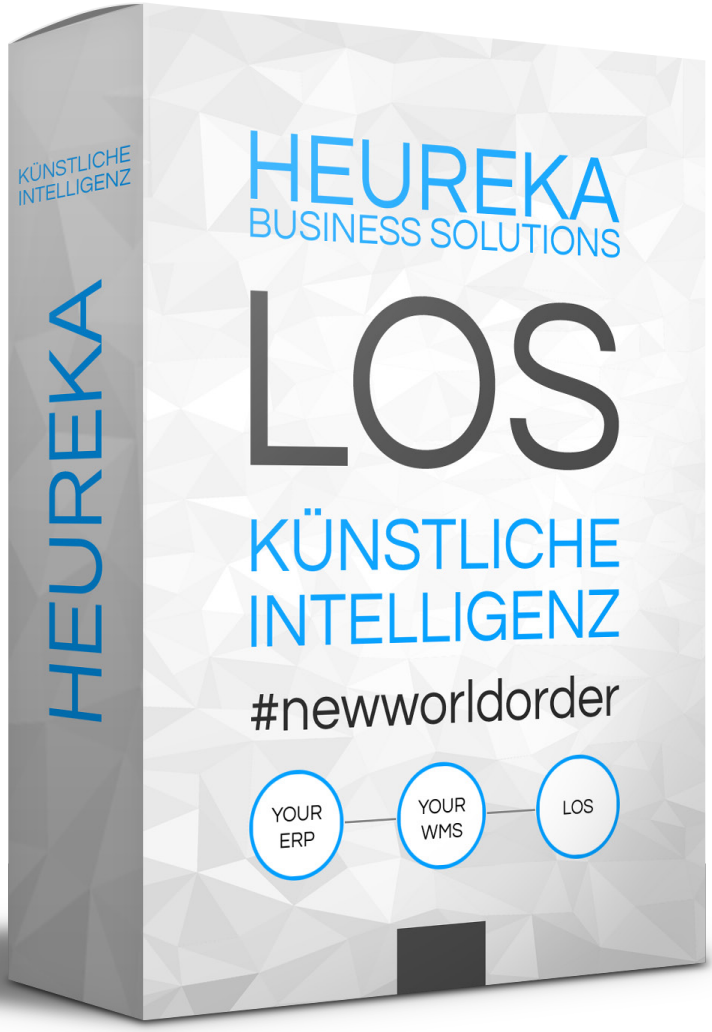
LOS: Warehouse optimization software
With this software, which does not only offer one or two processes for order processing but which choses in real-time the best among hundreds of possible processes, the logistics performance remains always high—independent on the changing daily business.

Our intelligent software is able to work along your goals. Necessary changes in the logistics strategy to optimize commissioning and consolidation as well as adaption of functional units are autonomously analyzed, assessed and integrated by our software. New customer requirements, market fluctuations, changes in product sortiments, or seasonal requirements are taken into account for an optimal and intelligent warehouse control.

Our software which plans and controls the material flow is successfully used in large warehouse.

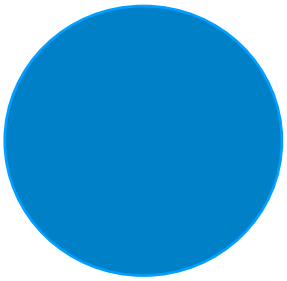
- We reduce costs per square meter and per order.
- LOS plans when and by whom an order has to be processed.
- In this way we obtain ratio potential in operative business and in middle management.

"Today your company has to adapt to your processes. But with an intelligent software the processes adapt to your company."



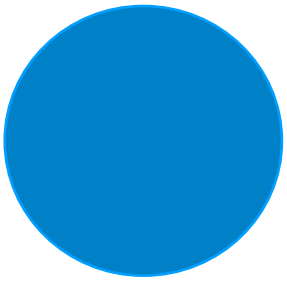
BE

BETTER



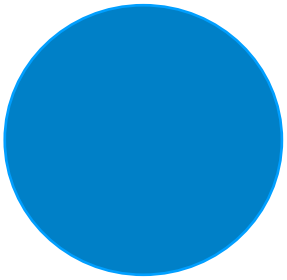
Customer’s ordering behavior

Customer’s ordering behavior includes factors like order-position-structure, article combinations, number of pieces, batch size, and many more. We have developed top-notch highly-efficient algorithms based on artificial intelligence and mathematical optimization in order to analyze this variety of factors, to detect patterns and to adjust the material flow to the customer’s ordering behavior at hand.



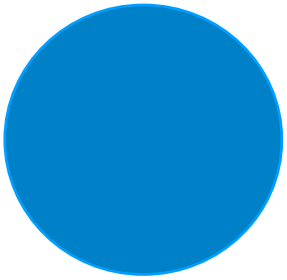
Process simulation in real-time

In order to find the optimal process for the current customer ordering behavior, current inventory, and many more individual factors, hundreds of different processes are simulated in real-time and their results are compared. The optimal process is then used and optimal takes into account fluctuations in orders or order structure, shortfall of workforce or seasonal effects.



Artificial intelligence

Our warehouse optimization software LOS is based on methods from artificial intelligence. In this way, a large number of variables can be analyzed in real-time. Based on this, LOS contains self-adjustable processes so that probabilities and empirical values can be autonomously assessed and used for process optimization. Moreover, a real-time re-organization of batches using new orders and taking into account unexpected disruption is included.



Company function

With this system it is possible to assess processes based on quantitative analyses. This means that by simulating a variety of process strategies we know the implications on the material flow and we can put them into numbers. Thus, planning and strategies are revision-safe and controlling can be supported by real performance numbers per position, per warehouse area etc.

2 Benefit

BE

INTELLIGENT

Realtime Analyzing
+30,1 % increased performance

At Kaut-Bullinger we were able to increase worker performance by more than 30% through real-time disposition with batch-reorganization and optimal order assignment.

Combined strategies:
-71,8 % Invest

At Simon Hegele we have reduced required investments by over 70% by integration of combined commissioning strategies. Goal was to half the throughput times per order.

Customer ordering behavior:
-66,2 % throughput time

At Siemens we helped planning a digital factory leading to a reduction of throughput times per order by more than 60%

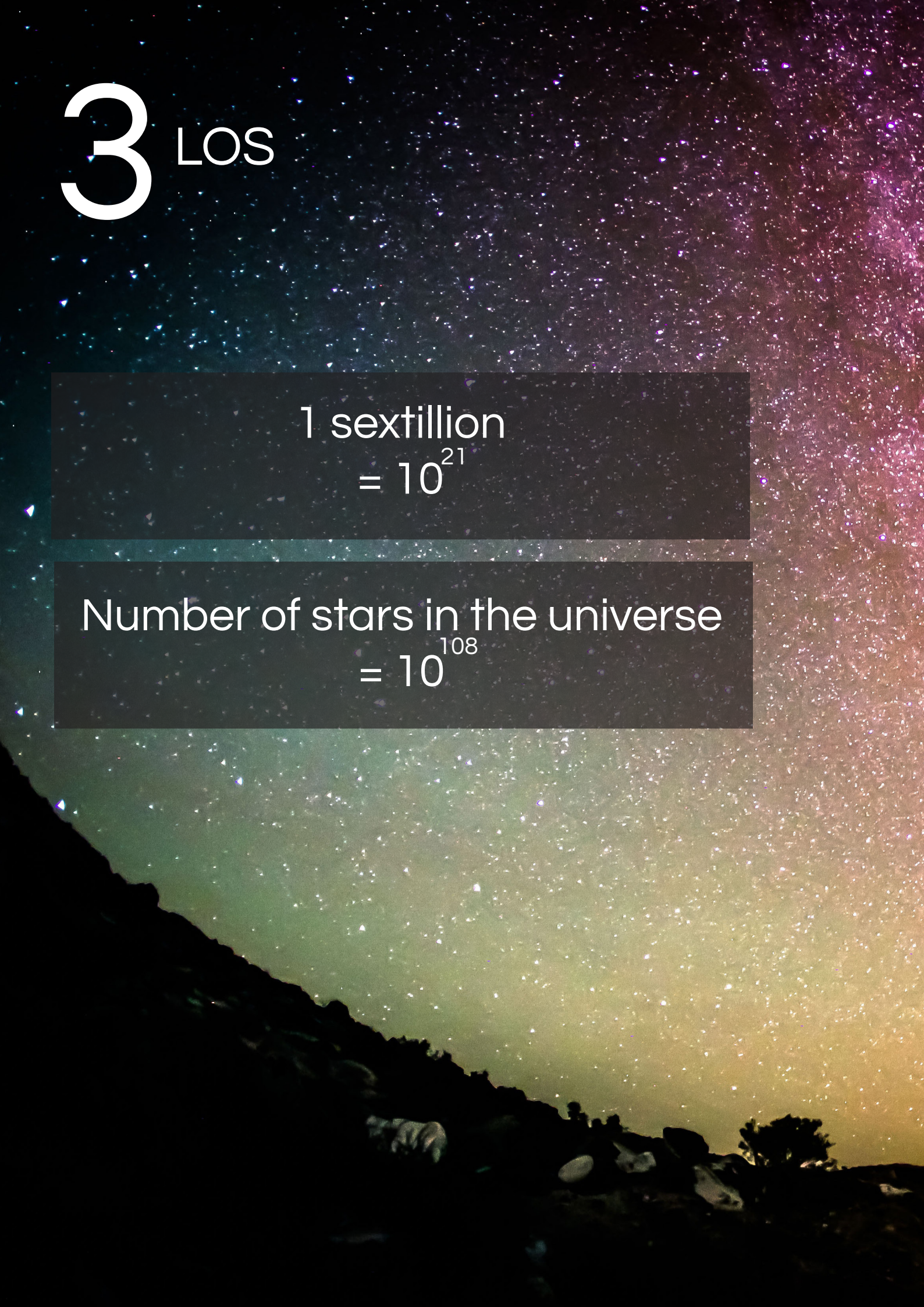
Article combinations:
+15,3 % increased performance

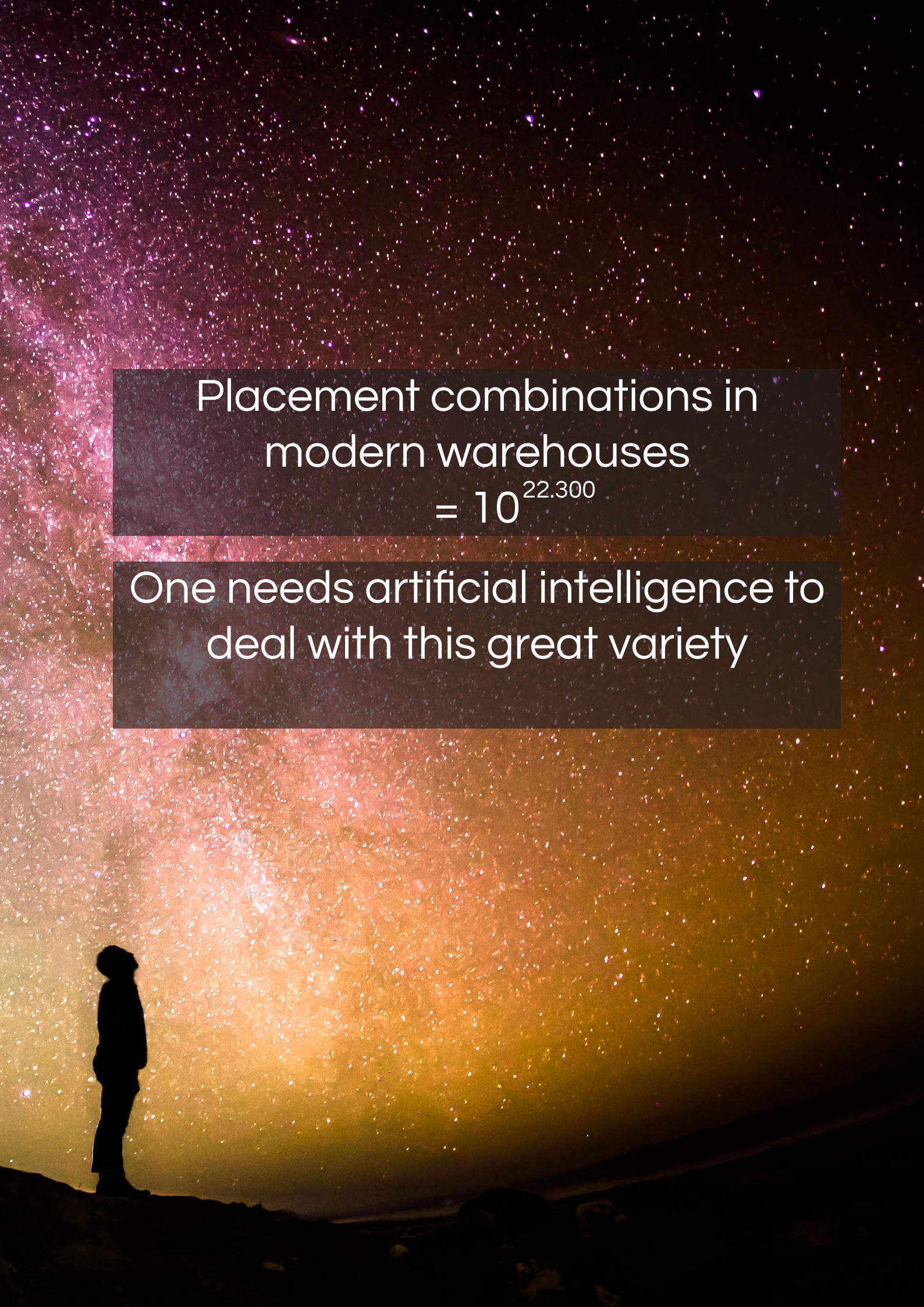
The Paul Lange Group is one of the largest European sellers of sports articles. The optimization of article placements led to an increase in the commissioning performance by over 15%.

3 LOS

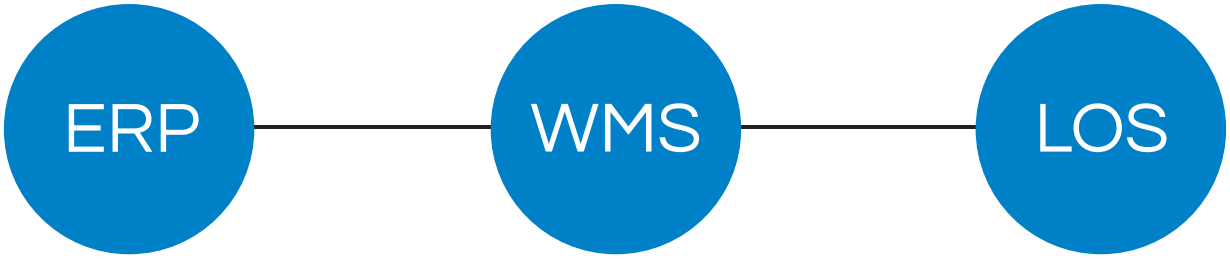
1 sextillion
$= 10^{21}$

Number of stars in the universe
$= 10^{108}$




Placement combinations in modern warehouses
= $10^{22.300}$
One needs artificial intelligence to deal with this great variety

How does LOS work?



LOS is a software module that connects to arbitrary warehouse managing system (WMS) and supports them.

Orders and data about the daily business are transferred to LOS. LOS monitors the performance of the various operative units and coordinates dispatching of orders, batches and workers.

More than a hundred factors are monitored and connected in order to control the material flow optimally. LOS balances different goals such as the service degree, cut-off times, worker performance, or economic efficiency.

Over an interface orders are re-transmitted to the WMS so that they can be dealt with. Alternatively, orders can also be commissioned directly via LOS, if the client wishes so.

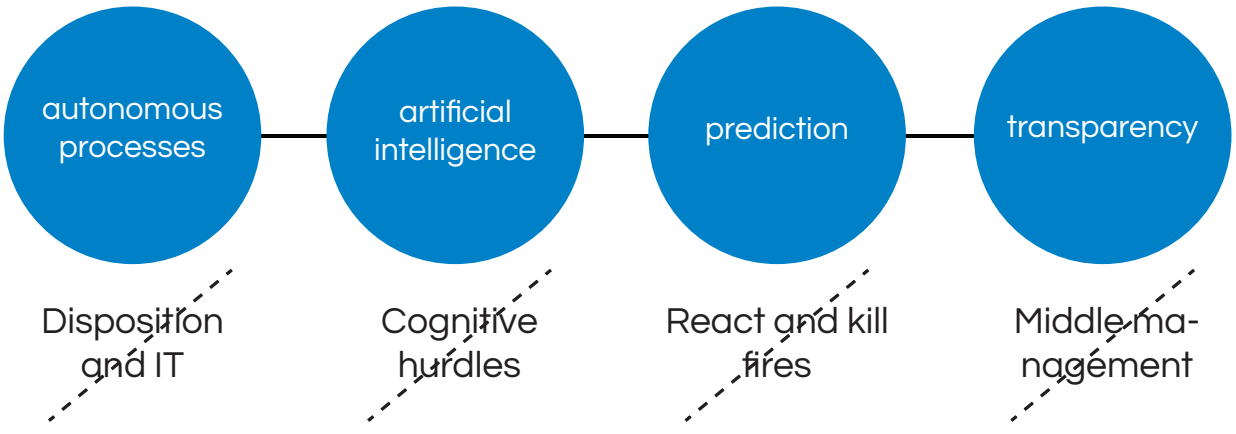
Moreover, besides optimal dispatching of orders for commissioning, LOS coordinates storage of incoming goods, relocations and replenishments and it manages commissioning carts and industrial trucks all the way to the packing area.

„The goal is the acquisition of knowledge out of the company's data for the autonomous implementation of optimized processes."

In order to compute and to implement the optimal material flow at any time in real-time, methods from artificial intelligence and top-notch algorithms are used. Here we use the tools and methods developed by our strong Munich based team of mathematicians.

In order to deliver the necessary transparency for your daily business, we do not use standard tools. In doing so, we can explain which factors have what impact on your material flow which enables you to react accordingly.

By this, LOS can realize ratio potential in the operative and middle management:



Extend and improve your strengths while we take care of the rest.

LOS Module

STORAGE INTELLIGENCE
(= data analytics & machine learning)

Heart of the LOS for the execution of the most complex szenarios and for the computation of commissioning tours and predictions.

ANALYTICS
(= deep learning)

Analysis environment with self-learning functions to detect trends, patterns and deviations as well as prediction platform.

DISPOSITION
(= material flow control)

Control of the material flow, creation of transport orders and monitoring of capacity usage of functional units.

CONTROLLING
(= cost control)

Control of economics and costs based on an agreed framework for monitoring and optimizing of costs for execution.

WAREHOUSING
(= operative)

Management system for stock and transports to coordinate factors of influence to your logistics such as availability of articles, stockpiling, replenishments, or clarifications.

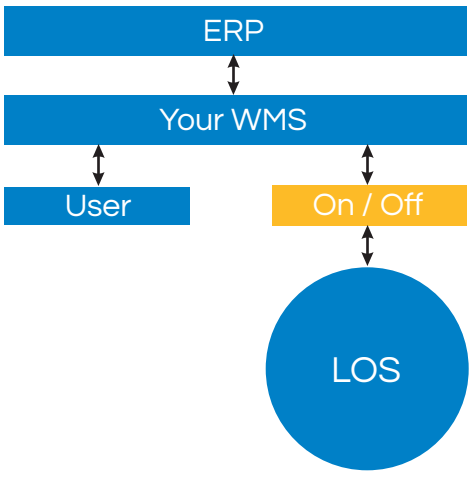
LIVE DASHBOARD
(= management)

Live dashboard for the visualization of KPIs, heatmaps, capacities and more individual parameters which are presented in our software LOS+.

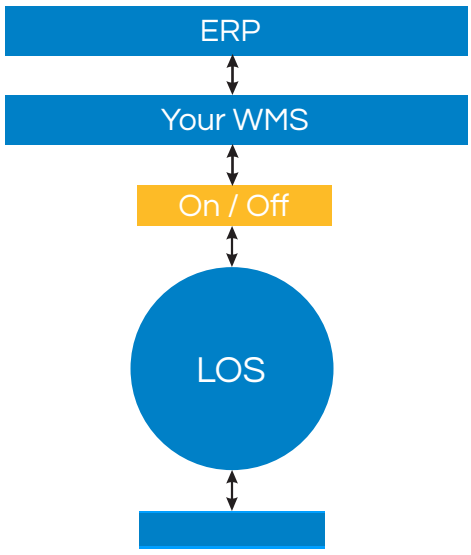
Interface

Our system contains update-safe standard interfaces via .idoc, .xml or .csv. Adaptations to your interfaces are provides by us so that you can work with your known standards as far as possible and thus save on your ressources.

Moreover, we provide an on/off-switch so that you can return to your current system at any time which, besides our own internal safety processes, reduces your risk in case of disruptions.



LOS as extending system to the WMS



LOS as operating system for the WMS


We understand ourselves and
our clients as one team

4 LOS app

Prediction and highest transparency

Nowadays you can only react to unevenly used functional units, unexpected order structures or deviations from the forecast. That is, you act only when a situation has already occurred. Then you kill fires instead on removing the cause of the fire.

LOS is able to tell you potential problems ahead of time. For this, we use available data to show you when which changes should be done before negative effects happen.

Information

LOS plans the next hours ahead and can act in case of deviations from daily goals. In case of such deviations from the target state you are informed and can act ahead of time.

Messaging

Via the LOS app you have access to your warehouse. Via the in-app messaging system you are informed about deviations and can inform colleagues or clients about trends.

Individual

The LOS app allows different user roles, such as for warehouse managers, operating managers or runners, who have available the information relevant to their respective work. Here, we can include arbitrary KPIs from LOS+ into the LOS app. Moreover, we can integrate different clients and different warehouse

Finally act instead of react

The prediction environment gives information of what to expect for the next few days and helps to plan the material flow for the next couple hours.

In this was your management can react ahead to deviations from the plan.

The annual costs for a Formula 1 team are about 300 Mio €. If the mechanics exchanging the tires is a few seconds to slow, the race is lost

We take care that the “mechanics” is there exactly when he is needed.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customer relations

The Simon Hegele Group uses LOS since 2016 in several Departments for planning and controlling material-flows.
Next to an individual service for customers, Simon Hegele is deep in Digitization with

- Augemented and virtual reality
- Set up of digital twins to reduce risk of implementation
- 3D simulation

Simon Hegele
Healthcare Solutions

contact 5

PD Dr. Raymond Hemmecke

CEO

2016	Founder of Heureka Business Solutions GmbH
2009-2014	Professor for Combinatorial Optimization
2008-2009	Professor for Algorithmic Discrete Mathematics

Richard Lessau

CEO

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2011-2015	Senior consultant logistics planning
2006-2011	Analyst: capital expenditure planning

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