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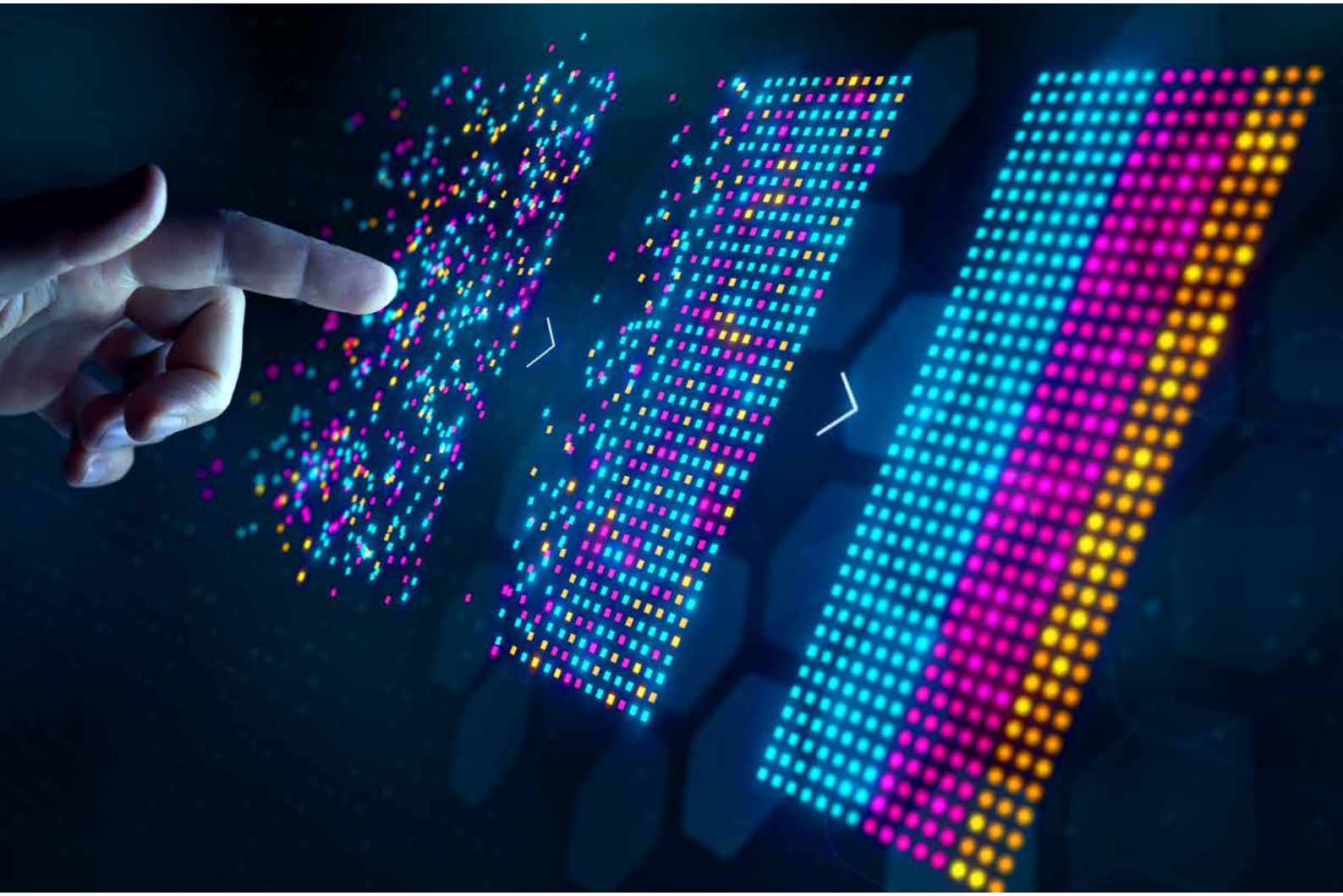
PRODUCTION manager

Magazine for production & logistics



In 3 steps to AI-based business process optimization with the Qualicision AI Framework

Label. Recognize. Optimize.

Interview

Karl Tröger talks about digitalization hurdles for SMEs
Trend Towards Low-Code and No-Code Platforms

Page 6

User report

PSImetals in use 24/7 at the ultra-modern Smart Factory of AMAG Rolling GmbH
Digitalization: Opportunity for Aluminum Production

Page 8

User report

Optimized material flows at Weiss Chemie + Technik with PSIwms
Investment-Proof Warehouse Management System

Page 10

PSI

EDITORIAL

Dear readers,

With our core message „Industrial Software with Built-in Qualicision AI“, we are expressing the fact that the Qualicision AI technology is already productively used in industrial applications in a range of PSI software products in various sectors. With Industrial Artificial Intelligence, the PSI Group is focusing on the important combination of AI methods with learning processes to optimize industrial processes. This is where business process data becomes information and the raw material of the future.

In this issue, we would like to inform you in the lead article about how you can create value-adding AI-based business process optimization with the Qualicision AI Framework in three steps and prepare your business process data for all user groups involved in the process in an understandable form using Qualitative Labeling, recognize conflicting interactions such as bottlenecks and delays at an early stage, optimize them using machine learning and derive measures for improving your business processes.

We also report on current developments in the various business units of PSI‘s Production segment. For example, you can find out what opportunities digitalization offers for aluminum production in terms of operating a highly efficient smart factory. Other articles from the manufacturing, logistics and metal industries report on current exciting customer experiences and associated new trends.

I hope you enjoy reading this issue and look forward to your feedback.

Yours sincerely,

Dr. Rudolf Felix
Managing Director
PSI FLS
Fuzzy Logik & Neuro Systeme GmbH

CONTENTS

TITLE STORY

In 3 steps to AI-based business process optimization with the Qualicision AI Framework 3

INTERVIEW

Karl Tröger talks about digitalization hurdles for SMEs 6

USER REPORTS

PSImetals in use 24/7 at the ultra-modern Smart Factory of AMAG Rolling GmbH 8
Optimized material flows at Weiss Chemie + Technik with PSIwms 10

PRODUCT REPORTS

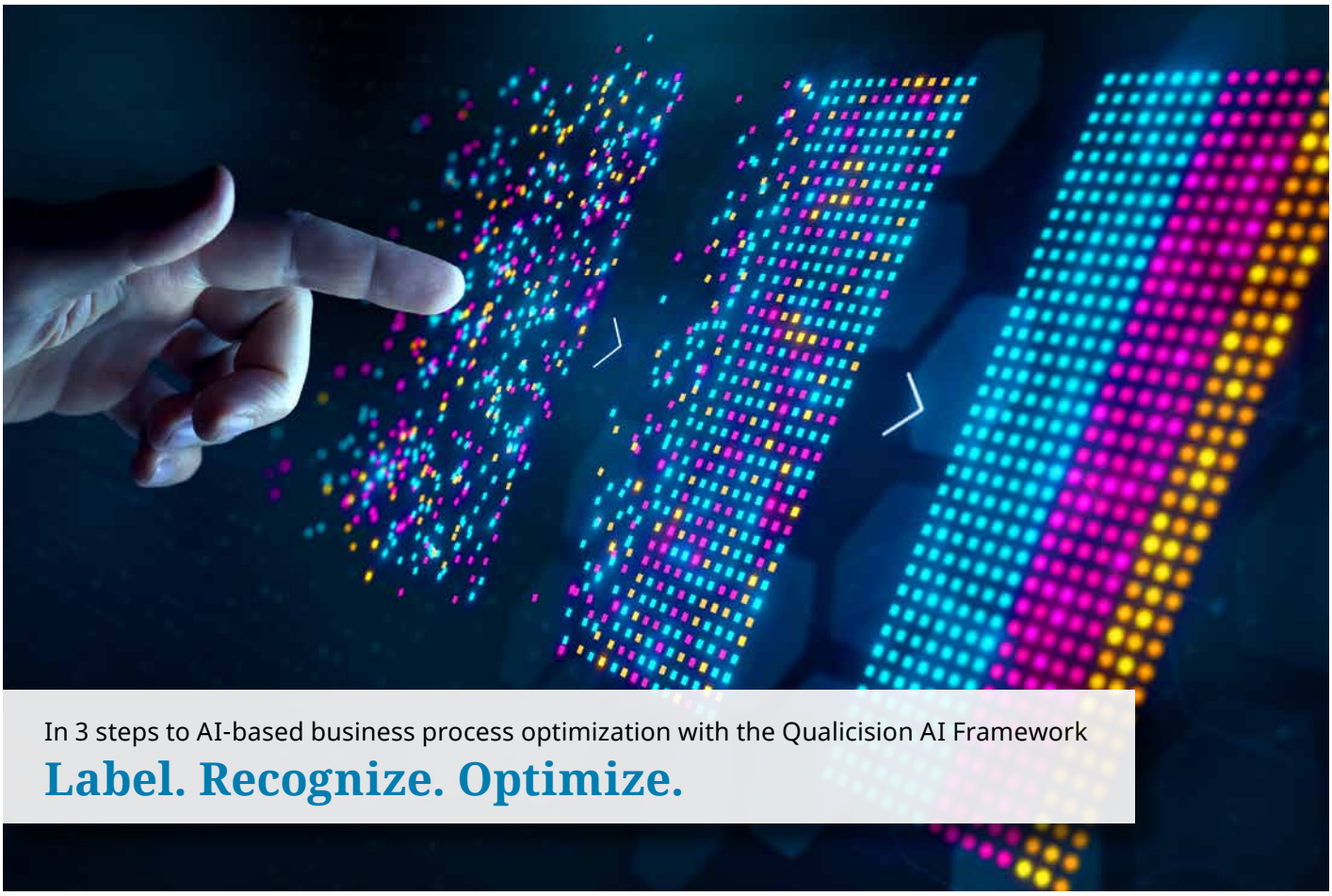
Easily retrieve and report production data 12
PSImetals Release 5.26 supports the path to decarbonization 14

NEWS

PSI delivers ERP System to technology innovator Trailer Dynamics 13
PSI Logistics and DEICHMANN SE agree on strategic cooperation 16
bilstein group Models Logistics Network with PSIglobal 17
New ERP system for RAHLMEYER Maschinenbau 18

EVENTS

Review of the PSImetals Release Days and the UserGroup 2023 15
This year’s 37th IPA Annual Conference in Stuttgart was a great success 18
Events 19



In 3 steps to AI-based business process optimization with the Qualicision AI Framework

Label. Recognize. Optimize.

As part of the PSI Framework for Industrial Artificial Intelligence, the Qualitative Labeling in the Qualicision AI Framework prepares raw business process data in an understandable form for all user groups participating in the process. This is done by qualitatively evaluating directly measurable data in the business processes with KPIs and learning their interactions automatically. With this approach, insights are automatically generated from the raw data, through which the organizational measures of the business processes can be optimized, and key performance indicators (KPIs) can be achieved in the best possible way. In addition, the use of Qualicision A2 (Qualicision Ask & Answer is the context-related conversational documentation used in the software modules) enables the explainability and comprehensibility of AI decisions and ensures sovereignty over the company's own business process data.

The Qualicision AI Framework is both cloud- and web-enabled and includes a machine learning and decision-making process based on the automated detection of KPI goal conflicts. It works with both input data and business process data generated by machine learning. This makes it very easy for companies, even small and medium-sized ones, to get started in the world of AI methods.

The KPI interaction analysis automatically supports the classification of business process data in such a way that interactions are derived from raw data which enable the further use of business process data by AI methods in a way that can be explained and understood by humans, right through to business process optimization. In just three steps, the Qualicision AI Framework makes it possible to go from raw business process data to a value-adding and comprehensible optimization of business processes.

Key figure-oriented Qualitative Labeling of business process data

First and foremost is the Qualitative Labeling of business process data with KPI evaluations. The input for the software essentially consists of two main components: Firstly, data streams of the business process to be analyzed are recorded and automatically converted into time series with the help of time stamps. Secondly, key performance indicators (KPIs) are agreed with the process

owner and used to analyze the relevant business process.

In addition, the value ranges of the KPIs are divided into favored and unfavored value ranges. If, for example, the capacity utilization of the plant and the set-up times are considered as KPIs for a plant in a manufacturing company, a percentage value greater than 85 percent can be defined as favorable and positive for capacity utilization. Values below 85 percent, on the other hand, are negative and the further downwards from this minimum target value are considered increasingly unfavorable. Similarly, the proportion of set-up time below 10 percent can be regarded as positive and above 10 percent as not worth pursuing and therefore negative (see info box). A process owner can carry out this evaluation of positive and not desirable areas even without in-depth AI knowledge, as this corresponds to their everyday evaluation of the process sequences (see Figure 1).

Automatic data mining and recognition of interactions and optimizations

If data streams and the associated KPIs are now time-stamped and continuously stored along the business process value chain, time series are created that are evaluated directly by the Qualicision AI Framework in such a way that positive and negative interactions in terms of the KPIs are recognized and learned. These can be made available to the process owner in a form that is directly understandable for humans. Examples of positive interactions can be characteristics of orders that are particularly well suited to the capabilities of the production process. Conflicting interactions can be, for example, the reasons for delays compared to planned deadlines or classes of order characteristics that increasingly lead to bottlenecks in the business process. Insights of this kind can be directly considered and used by the process owner to initiate organizational measures, for example (see Figure 2 left).

Figure 1: Qualicision AI Framework—Web GUI with Qualicision AI labeling function and impact matrix.

If, for example, deadline violations accumulate for certain variant combinations of order characteristics or if the capacity utilization of the systems decreases, orders with these characteristics can be handled differently in a targeted manner. At the same time, the KPIs can be used to precisely assess the improvement potential that the measures to be introduced will entail in monetary terms. The security that accompanies the introduction of the measures is immediate, as the measures are derived directly from the business process data using the Qualicision AI Framework (see Figure 2, right).

Machine-learning optimization

The automated derivation of qualitative insights is enriched by learning interactions from the raw business process data with information about KPIs of the business process. The resulting insights are not only useful for the respective business process. Rather, the method prepares companies for the subsequent application of further AI methods to optimize their business processes. Each newly acquired in-

Qualitative Labeling of business process data with Qualicision AI

Learning AI methods for the optimization of business processes and real-time decision support require automatically processed data. This means that it must be assigned a meaning before the learning process. This is because, unlike speech recognition or image recognition, new data patterns are constantly being created that need to be continuously relearned. This can only be done automatically by software.

Qualitative Labeling is one such method. It can be used to automatically identify interactions in historicized and current data by means of goal conflict analysis—in the form of self-calculated classes of data patterns. These are presented to users for confirmation or correction. Qualitatively labeled data thus builds a bridge between data patterns in the raw data and their meaning in the real world of the relevant process. In this way, they create the conditions for continuous process improvement in combination with qualitative, optimization-based AI methods (Qualicision AI).

Figure 2: Qualicision AI Framework—Sequencing with order property distribution and scheduling with 3D KPI relationship matrix, KPI viewer, KPI preference settings.

teraction is potentially the basis for a further key figure that can be incorporated as a KPI in the Qualicision AI analysis as feedback. In this way, companies can not only control their business processes in a targeted manner but also gradually transform them into self-optimizing control loops. Based on the business process data, this makes it much easier to cope with the increasing process dynamics.

Figure 3: Qualicision AI Framework—Generative AI with Qualicision A2 ask-answer dialog.

With Qualicision A2 (see Figure 3), the Qualicision AI Framework also includes a generative component that, when switched on, adds any information available in text form, such as product manuals or other documents, to an existing application in a learning manner. This creates the requirements for equipping software tools and applications with an explanatory component that enables a context-based ask-and-answer dialog with software modules or the associated PSI software tool. The learning analysis process described above can be initiated again and again on a rolling basis.

KPI-oriented labeling, recognition, optimization

Due to the general validity of the software, any existing PSI software based on the handling of KPIs can be used as a KPI analysis engine. This means that a PSI application can be expanded to include self-learning analysis and text-based ask-answer dialog capabilities that systematically prepare the introduction of further AI functionalities.

The Qualicision AI Framework is connected to the PSI Framework for Industrial Intelligence (CII Framework) via the Java-based PSIbus technology, among other things. In this way, an AI-based architecture of an analysis and usage logic is gradually being created which, starting with the raw business process data, provides the recognition of process interactions through the Qualitative Labeling of data using KPIs and machine learning. In this way, the machine-learning optimization of your own business processes is made possible in a value-adding, comprehensible and resource-saving manner.

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