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Welcome and start

Welcome to my article "**Opportunities and risks of digitalization for the cable car industry**". My name is **Marco Zraggen** and I am the **Managing Director of Sisag AG**. We build **complex process control systems in the mobility sector, especially for ropeways**.

Initial situation

From Industry 1.0 to Industrie 4.0

The **division** of technological development into **individual phases** is often associated with the **Industrial Revolution**, which, like every revolution, not only comes with a **renewal of the world of work**, but also means a **massive change in society**. And like every change, it also comes with **people's fears and hopes**.

This was already the case during the **first industrial revolution** at the end of the 18th century with the **invention** of the **steam engine and mechanization**. **Human labor was replaced by machines**. Existing **jobs were lost**, new ones were created.

The **second industrial revolution** at the beginning of the 20th century, **triggered** by the discovery of **electricity** and the development of **motors**, enabled much more **efficient production**, which led to the **invention of assembly line work**. This change had a massive impact to the working environment and the **nature of jobs**.

The **third industrial revolution** from around 1970 came along with the **invention of the computer** and thus the **automation of work processes**. The use of **manpower was reduced** to a minimum. From now on, **data was recorded** and used for the **continuous optimization** of the manufacturing process.

Today, we are in the middle of the **fourth industrial revolution**, which in general involves the **networking** of what were previously rather local, but highly automated processes. This **operational data** is now being linked to **increasingly digitalized work processes**, enabling a further step in development. Whether this is really a **revolution or just an evolution** is still being discussed.

Digitalization

Digitalization, as part of Industry 4.0, not only **affects** our private environment, but increasingly also **our working world and, in particular, the cable car industry**. A wide variety of **digital tools** are already being used to operate and maintain the infrastructure:

- **Visualization** and operation of the cablecar
- **Logbooks** and recording **operational data**
- Work and safety **instructions**
- **Maintenance documentation**
- **Planning tools** for operation, maintenance, and business management
- **Diagnostic systems**, remote maintenance, and remote control
- **Guest information** and guest **guidance**
- Complete mapping of the **customer journey**

Added to this is the **networking of systems** with each other and therefore the **exchange of data across system and competence boundaries**.

Digitalization offers countless opportunities for optimizing operations in terms of costs, schedules, function, efficiency, availability, and safety of our systems. However, it is also changing our work processes and creating completely new job profiles, while existing ones are increasingly disappearing. Networking is also creating areas of attack from the outside.

Analysis

Some of the opportunities and threats will be discussed in more detail in the following foils based on **existing megatrends in the cable car industry**.

Megatrend 1: Paperless documentation

Use Case:

The **planning and documentation of maintenance work** is now only carried out **digitally**. Thanks to **horizontal digitalization**, the maintenance specifications from the manufacturer and authorities can be **adopted in digital form and mapped in a suitable system**. Thanks to the **mobile** working method, the **required data is recorded on site** and supplemented with important information on the condition of the system. The data is **analyzed** in the **expert system**, measures are planned and also documented. In this way, it is possible to provide evidence of properly carried out maintenance in a very structured and comprehensible manner.

Here, too, there are already **a number of products on the market**, such as the **Sambesi maintenance software**. With the introduction of maintenance software, an actual **maintenance concept** is usually also introduced, which takes the possibilities of digitalization into account accordingly. With Sambesi, this is the **workflow: Define - Plan - Execute - Check - Analyze**.

Analysis:

A good maintenance concept together with the digitalization of information enables you to **standardize the processes** in your company and allow information to flow across internal and external interfaces.

The **test results** are **traceable** and the recording allows trending, which is an important prerequisite for **condition-based maintenance** in particular.

It seems very important to me that the **know-how about the system is retained**. This is an important advantage, especially in view of the **increased fluctuation in personnel** and an actual erosion of expertise at the plants on site.

In addition, **fact- and data-based communication**, both **internally** between the technical staff and the decision-makers of a company **and externally** with manufacturers and the authorities, is always better than communication based on emotions and assumptions.

Of course, all statements are only as valuable as the data that is collected. True to the motto "**shit in, shit out**". And we encounter **system dependency** again here.

Checklists and maintenance specifications are an important tool, but must also be created with the **necessary common sense** and the amount of tasks to be completed should not lead to **misconduct**, so



that, for example, the **"check" behind the task** becomes more important than actually **looking at and assessing** the system component.

Human sensors such as **eyes and ears** are very difficult to replace for **maintenance**. Often an inconsistency has to be detected on a system, which **cannot be found on any checklist**.

Megatrend 2: IoT-Applications

Use Case:

Networking the systems and consolidating data in a cloud enables higher-level, **centralized control of operation and maintenance**. To this end, the **data** from the **individual subsystems** is queried time based via **standardized interfaces** and stored in a cloud for further **data consolidation**. A user-friendly and standardized presentation of the data now makes it possible to **monitor a larger area** from a **central location** and make **fact-based**, good **decisions** in the event of incidents or malfunctions.

Examples of existing IoT applications in the cable car industry include:

- **SisControl Cockpit**, Clair, SKADII

Analysis:

The **opportunities** arising from this networking and centralized data processing are obvious. You make **better decisions** because all **information is immediately available** and clearly presented in one place. Centralization also allows you to **react faster** and **more precise** to events and malfunctions, what leads into **increasing availability**.

Thanks to data recording over a **longer period of time** and by **linking data** from different applications, you can **preserve** a large part of your **operational know-how** and keep it ready for later analysis.

In **combination** with **fully automated systems**, they can also **save on operating personnel** by **centralizing and professionalizing monitoring functions**. There are further **synergy effects**, especially if the IoT application is used in a control center for an entire destination.

The other side of the coin is an increased **requirement for IT security** at all levels. Both at the **individual data suppliers** and in the IoT application and **cloud infrastructure**. Cybercrime is omnipresent and, one way or another, will **keep our industry very busy** and increasingly so.

Of course, **data protection** must also be taken into account. Although it is mostly technical data about the infrastructure, evaluations of guest behavior are increasingly being used or **video images** are being used for monitoring. Last but not least, as a company you may not want to make all **information accessible to everyone**, whether internally for your employees or for third parties involved in your value chain.

And as with **all digitalization topics**, you are entering a **system dependency** that requires emergency scenarios and other **organizational concepts** in the **event of a failure**.

Megatrend 3: Artificial intelligence

Use Case:

Intelligent systems provide us with **additional bases for decision-making** or take the decisions on operation and maintenance **off our hands entirely**. **Forecasting systems** in particular, usually **based on machine learning** algorithm, allow us to plan operations better, mostly from a business perspective but also due to personal safety. With the **guest-prediction Software Cassandra**, for example, you **receive a forecast** for the expected number of guests over the next few days and thus a basis for **adjusting your personnel planning** accordingly. Weather forecasts and, in particular, **wind forecasts** are a great advantage when it comes to early closure. And in the area of **predictive maintenance**, we are only at the very beginning of the possibilities. This is demonstrated by the **existing applications** for **engine and gearbox monitoring**.

But developments in **image processing** and **3D sensor technology** are also making huge progress. Today, a **video stream analysis** is already used to decide whether an **empty ride** in a cabin needs to be **prevented**, how many **seats are still free** in a cable car cabin or whether **the bar on a chairlift has been properly closed**.

Humans are increasingly being **replaced** as the monitoring and operating authority **by intelligent systems**. The current state of technology allows us to say that the **systems can react** to dangerous situations at least **as well** and probably **even faster than a person** in the control room. **Attention** is **permanently guaranteed** and, unlike humans, the **technology does not get tired** and availability can be ensured more easily.

Analysis:

This already mentions some of the obvious opportunities in this category: These include **dynamic pricing**, **predictive maintenance** and **assistance systems** for troubleshooting.

Thanks to the machine processing of **very large volumes of data**, **rational decisions can be made independently of the emotions or hierarchy** in a company. These are also usually available **more quickly** than if a person has to carry out an analysis first.

Unmanned ropeway systems allow **operating times to be extended**. Particularly in the case of feeder systems in urban areas, transportation can also be offered at **off-peak times** when the number of guests is lower, without compromising profitability due to the **high personnel costs**.

However, **operating costs can also be reduced** during **regular operation**, as the staff on the system do not have to be assigned to permanent monitoring in the control room. It is only necessary to **intervene if a fault occurs**, which frees up cablecar staff to carry out other activities during operation, such as **maintenance work** or **looking after guests**. The bottom line is that **fewer staff** are needed **directly on the installation**.

However, there is still an **uneasy feeling about completely trusting a machine**. The world's **regulators** are still struggling to find **rules** for the **use of AI** in order to protect us from misuse. For example, I think it's very important to simply **identify** whether a **human or a machine** is behind a statement. The integration of social and sustainable responsibility is also an unsolved problem.

As with every industrial revolution to date, **job profiles are changing** dramatically. The cable car **operator is disappearing** and more and **more specialists** are needed to build and maintain the systems. The shortage of **technically skilled personnel** is very noticeable, at least in our areas.

It is also clear that the more machines determine our actions in the future, the more the **know-how** about the actual **process will be lost**, which will further increase our **dependence on the systems**. **Critically questioning** an answer or information, especially from systems such as ChatGPT, seems very important to me and is **preferable to blind trust**.

Summary

In my opinion, the **overview of the opportunities and threats identified** on the basis of these use cases shows that there is **certainly reason to hope** that **benefits** will arise from digitalization and that the **fears of change** are **not exactly unfounded, but can be overcome**. Combined with the knowledge of the **own strengths and weaknesses**, this can be used to map out the **strategy for the company**.

The **above assessment** is based on the **experience** of a **human being (namely me)**.

Conclusion

Let's give it a try and ask **ChatGPT**. Here's what **AI is currently telling us about the question**: "What are the opportunities and threats of digitalization in the ropeway industry?"

Answer from ChatGPT:

Digitalization offers the cable car industry both opportunities and threats. Here are some of them:

Opportunities:

1. improved efficiency: *By using digital technologies, cable car companies can optimize their operating processes and increase efficiency. For example, automated systems can improve ticket sales and the monitoring of installations.*

2. customer experience: *Digitalization enables ropeway operators to offer personalized services that improve the customer experience. This ranges from simple ticket purchasing via mobile apps to the provision of real-time information on waiting times and weather conditions.*

3. data analysis: *By collecting and analyzing data, cable car operators can gain insights into user behavior and demand. This information can be used to adapt marketing strategies, optimize system maintenance and better plan capacities.*

Threats:

1. cybersecurity: *As digitalization increases, so does the risk of cyberattacks. The ropeway industry must therefore increasingly focus on the security of its digital infrastructure and the protection of sensitive data in order to minimize potential threats.*

2. dependence on technology: *The introduction of digital technologies also means greater dependence on these systems. For example, if a technical failure or network disruption occurs, this can lead to business disruption and impact the customer experience.*

3. managing change: *Digitalization often requires adapting work processes and developing the skills of employees. It can be a challenge to successfully implement these changes and ensure that staff have the necessary skills.*



Overall, digitalization offers the cable car industry many opportunities, but it is important to consider the risks and challenges associated with it and take appropriate measures to make the most of the benefits.

Thanks

With these **concluding answers from an AI**, the **human Marco Zraggen** would like to **thank you for your attention** and wish you a **successful and interesting conference**. See you.