WHITE PAPER

Wake up! Construction 4.0 Is Here and Embraces Safety Innovation

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Advances in technology are transforming how construction sites operate. Handheld mobile devices, drones, sensors, robotics, wearables and more enable companies to interconnect every facet of their projects while collecting and analyzing relevant data, "the new gold." Moreover, no matter the scope of the work at hand, technology can be adapted, reducing exposure and boosting efficiency. When driven by a new understanding of credible leadership and commitment, this change can lead the industry into a new era of resilient, reliable and safe construction projects.

With Innovative Digital Solutions, Safety Drives Success

In our digital age, tech solutions intertwine safety, cost, quality and time as essential drivers of construction site success. For example, when adopted thoughtfully and applied appropriately, technology enables the collection of quality data so that decision makers can assess and prioritize risk, allocate resources sensibly, communicate quickly and effectively and supervise processes for quality control. The opportunities are seemingly endless, applicable to construction sites of all sizes and within reach of even small budgets—the secret is understanding how to adapt the available technology to suit the needs of a particular project.

> Technology supports projects in delivering on cost, quality and time and has the potential to elevate safety without sacrificing performance in any of these areas.

Future-Oriented Technology Bridges Gaps

Without technological support, construction project oversight is awash in e-mails, tables, lists and even a lot paperwork. From reports to permit applications and much, much more. With connecting people, infrastructure, and equipment in real time, the distance between office and construction collapses. The day-to-day job becomes much faster and efficient. Phones and tablets allow users to tackle multiple jobs in one go, and multi-tenant systems mean that everyone, regardless of location, stays up-to-date. To illustrate, a conventional permit to work process involves requesting, reviewing, authorizing and documenting high-hazard tasks (welding, work at height, work with stored energy, etc.) and includes the input of external specialists. When all the key players are linked digitally, the time investment is reduced to a fraction of its analog version, eliminating delays and keeping processes lean.

Technology not only links people, but equipment as well. The Internet of Things allows equipment, machines or sensors to be monitored or even controlled remotely and therefore enable construction sites to gain from efficient and effective maintenance processes and increase availability and safety. Increasingly used on **construction sites**, sensors connected to the system can provide feedback or track location, for instance, when integrated into a

safety harness, gas sensor, emergency sensor, or other PPE. Another concrete example are sensors that detect and monitor wind and weather conditions in combination with automated weather forecast evaluation to trigger safety relevant activities, such as securing cranes or work areas. Drones and UAVs, familiar to many in a recreational context, are especially helpful when carrying out inspections of hard-to-reach places or creating highly accurate 3D models. Less common so far are advanced robotics and 3D printing applications, which might pave the way to "local factories" that manufacture and assemble materials near the site. All of these developments, set to revolutionize construction, can be integrated into tech-based oversight systems.

Data for Visionaries: Access to Analyses, Trends and Insights

The web of connectivity that defines Construction 4.0 is a font of valuable data, and new methods of data capture, such as reality computing, are on the rise. Reality computing refers to the process of capturing real-world data through 3D scanning and sensor technology and then processing it into a useable 3D digital model.

First and foremost, the type of quality data collection made possible by technology innovations is key for good decision-making in many areas. It can help contractors choose the right sub-contractors to work with and guide companies as to when and where to invest additional resources. Through analysis, tracking trends and highlighting insights, problems can be identified early, risks assessed and oversight maintained.

Mobile devices

Now commonplace in the construction industry, mobile devices can be a nexus of information and communication, streamlining tasks and providing data.

Connectivity and the cloud

Investment in stronger internet connections is becoming a priority, linking sites with offices and other stakeholders.

Drones and UAVs

Widely used to help with inspections in hard-to-reach areas, they also enable the creation of accurate 3D models.

Reality computing

Linking physical reality with digital models, this technology is becoming more affordable with innovative data capture methods and lower hardware costs.

Wearables

Sensor technology, embedded in safety harnesses or other PPE, for example, has great potential. Already, the conversation has shifted from "why?" to "how?"

The Internet of Things

Once rare, sensor technology in buildings, for instance, is now embedded in the design of many projects.

Big data

Big Data is the gold standard for reliably measuring critical factors, forecasting and identifying problems early.

3D printing

This method of manufacturing on site could change how building materials and infrastructure are delivered in the future.

Advanced robotics

There is a surge in interest in this technology for construction, with forerunners seen in bricklaying and bridge building.

Figure 1: New technologies gradually gain a foothold on construction sites

Enhanced Communication, Enhanced Safety

Technology platforms enhance communication and integrate safety measures in ways that render them less cumbersome, time consuming and costly. Previously, safety induction training was conducted onsite, meaning workers could not actually start their tasks until the induction was completed and documented. A tech-based induction, including any necessary documentation, can take place prior to the workers' arrival, so that once on-site, work begins without delay. The same is possible for any other relevant activity, such as prior risk assessments, definition of safety measures, and so on without delay.

With action plans and safety measure management options, software designed for construction sites simplifies oversight. Decision makers can access information and share it in real time in order to take prompt action. Front line workers are empowered to share feedback and submit reports on digital platforms in ways that promote transparency and allow for rapid troubleshooting. Technology can also eliminate language barriers and combat silo mentalities among multiple on-site companies.

Visionary, Innovative and Future-oriented Solutions

Perhaps the biggest mistakes companies make when considering whether and which technology to adopt have to do with faulty assumptions. Decision makers may assume technology solutions are only for large companies and complex construction sites, ignoring the reality that technology can be scaled up or down and customized to fit the circumstances of specific projects. Another stumbling block is the assumption that technology in and of itself is enough, forgetting that human mindsets, toolsets and skillsets have an enormous impact on how well technology solutions deliver on their promises.

The experts at DEKRA leverage their experience and expertise to help construction companies, contractors, sub-contractors and other stakeholders optimize efficiency and safety on construction sites through both technology and human factors. On the technology side, we've developed the DEKRA Safety Platform, a cloud-based mobile and web app designed especially for construction sites that can be tailored to the needs of our partners. It collects data, performs analyses, identifies trends and blind spots, facilitates action planning, manages safety measures and implementations and improves communication. To ensure that the organizations we support are prepared to adopt and use technology effectively, our consultants also provide a wide range of services on topics such as digital readiness, organizational and safety culture and leadership, to name just a few.

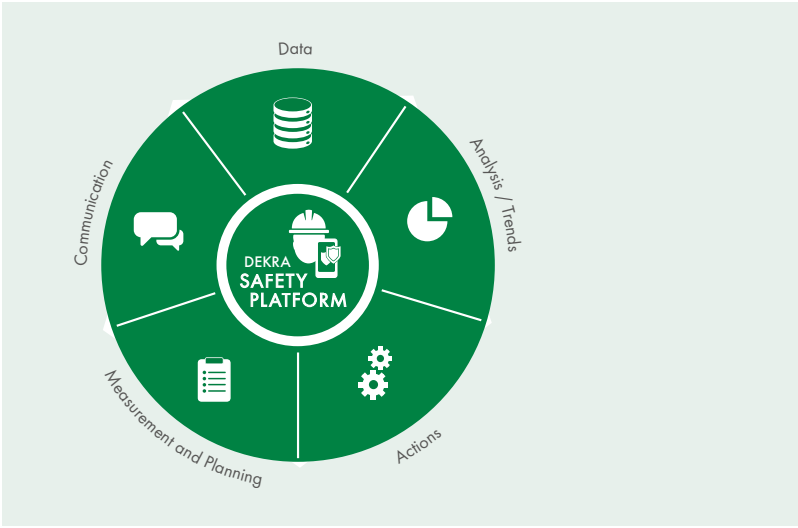

Figure 2: Technology is the key to transforming the construction process

Technology has enormous potential to improve construction site safety and efficiency. The best and most effective way of creating measurable improvements and safer construction sites is always in combination with a change in mindset and culture. Technology will enable leadership and executives to make the new way of working reality, but the most important driver behind these changes will always be credible and accountable leadership and a high level of personal commitment that involves all relevant stakeholders in a construction project. There is a high potential for improvement and a great future for the construction industry. It´s time for the industry to recognize it.

SEBASTIAN BARTELS

Sebastian Bartels serves as SVP and Head of the global Business Line HSE & Sustainability at DEKRA. He is an experienced business leader, change manager, innovator, expert and consultant, who helps organizations to achieve their business, culture and HSE related goals. Previously he has worked in several leading positions within the DEKRA Group and was Head of Quality and Safety Strategy at a global leading Mobility & Logistics corporation with over 300,000 employees. Sebastian was member of the ISO 9001 and ISO 45001 standardization bodies and Chairman of the Technical Commission Health & Safety at the Confédération Européenne des Organismes de Contrôle (CEOC). He represents the DEKRA vision and mission to be the global partner for safety at work internationally towards organizations, industries, authorities, and other external stakeholders.

DEKRA Consulting

DEKRA Consulting combines evidence-based science, cutting-edge technology, and internationally renowned expertise to create innovative safety solutions for today and tomorrow. We aim to lead safety transformation at the workplace and business practices, within operations and processes as well as in the dynamic and rapidly changing digital era.

Since organizations require diverse approaches to protect their operational business environment, data, people and processes, we designed our services as multi-faceted as your needs to support you in any safety issue.

For more information, visit **www.dekra.com/consulting**

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