IOT in construction: How the digital transformation will reshape the industry

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The Internet of Things (IOT) refers to the interconnectivity of wearable devices, machines, people, and sensors sharing information and data within a network, IOT networks can be augmented and improved by deep learning systems. “Deep Learning” refers to any artificial intelligence system that is capable of genuine learning. This kind of system can take raw and unorganized data from multiple sources, analyze and organize that data, direct subsequent actions, and even adapt its inputs and outputs without human intervention or prompts. Accordingly, deep learning technology can enhance an IOT network in directing action. Deep learning can also monitor data arriving from the IOT network, trouble-shooting deficiencies or changes in data. Deep learning will therefore enable and increase the usefulness of any IOT network, including IOT in construction.

Practical implications

IOT is already transforming areas of the defence and health care industries, particularly those that depend on significant human labour to complete tasks that can be dangerous, dull, repetitive, or dirty. Likewise, deep learning is already enhancing the usefulness of those industries’ applications of IOT. These changes are rapidly transforming industries and practices. Used separately or together, these resources can have benefits to industries including:

- reducing human labour requirements;
- reducing human error;
- enhancing site safety and security;
- improving the speed at which data is processed and information is shared; and
- cutting costs.

Whether the function of traditional approaches, upfront costs, or change-adverse behaviour, the construction industry has not experienced the same level of transformation as its industry-peers with similar human labour demands. IOT and deep learning are forces of innovation with real potential for increased safety, efficiency, and profit. While there is little consensus as to when IOT and deep learning will become commonplace within the construction industry, research industry experts, and scientists

agree that IOT and deep learning are showing tremendous potential to transform the sector in significant ways.

For example, and in the IOT in construction context, wearable devices, which monitor location or fatigue, can assist in worksite security and safety. Integrating systems which permit remote monitoring and management can improve information exchange and management control of a project, particularly where projects are located far from the construction company's main base of resources. Devices monitoring equipment and machine performance or wear can assist in logistics and prevention of incidents that halt productivity.

Likewise, a primary focus of any construction manager and project execution team is achieving and maintaining optimal productivity rates while avoiding unnecessary expenditures. One key factor in maintaining productivity is ensuring the information is disseminated widely and quickly. Informational asymmetry, where information does not reach the parties it needs to reach in a timely manner, can lead to delays, reduce safety, and impact productivity. IOT systems can provide a means of eliminating informational asymmetry while increasing project safety. IOT systems can also increase safety and security of worksites, preventing incidents that could affect project schedules and budgets.

Legal implications

IOT networks and deep learning systems will give rise to novel legal issues. While monitoring employee or contractor fatigue levels can improve safety, the storage or potential unintended uses of that data could trigger privacy law issues. Data gathered and information developed from these networks and systems will have value, and how parties agree to the ownership or use of that data and information will be crucial to consider and negotiate. Where these networks and systems are used, demarcation of responsibility and liability must also be considered. Parties will have to consider who is responsible for the setup, maintenance, use, and inevitable removal of these systems. Parties will also have to consider whom will be responsible should systems fail to be employed properly, or should they fail outright. When the network or system fails from use, it could give rise to negligence claims. Where the network or system fails from design issues, it could give rise to product liability claims. Finally, whether construction companies are employing their own IOT and deep learning resources, or contracting with third parties to adopt these resources, will add further complication to these considerations.

As briefly mentioned above, existing legislation, such as privacy regulations under the *Personal Information Protection and Electronic Documents Act* (PIPEDA) may apply to IOT networks. The Office of the Privacy Commissioner of Canada has released guidelines for manufacturers of IOT devices that collect, uses or discloses personal data in the course of commercial activity. Additional provincial laws may apply depending on the locations of your business. However, given the rapid advancements in IOT technology in the last decade, it would be prudent for Canadian lawmakers to enact more IOT specific legislation to clarify legal uncertainties surrounding IOT devices before they become mainstream. Further, there has been little judicial consideration of IOT specific issues. As the use of IOT devices become more prevalent, so does the commercial and legal need for clarity on legal implications of its development and use. To hedge against these risks, industry actors in both the construction and technology

sector should take proactive steps to reassess and revise existing contracts as these agreements may not fully contemplate or insulate against the types of risks and opportunities that IOT and deep learning will generate in the construction industry.

Some IOT-specific laws have been developed in the United States. For instance, California recently adopted a privacy legislation pertaining specifically to IOT devices. Congress also recently passed an *Internet of Things Cybersecurity Improvement Act of 2020*, designed to regulate the cybersecurity of IOT devices. Similar enactments have not yet been made in Canada.

That said, the pace of innovation within IOT and deep learning spaces will likely only continue to accelerate. As a result, existing legislation and even proposed legislation may not adequately cover the myriad of potential legal ramifications that may arise as these types of networks become more and more prevalent in society and on construction sites more specifically.

Conclusion

The pace of innovation in IOT and deep learning will only accelerate. Devices will get smaller, cheaper, more user-friendly, and more prevalent. IOT networks and deep learning systems will get smarter and more capable. This convergence of industry-changing technology will create disruption. Its effective employment by early moving parties could lead to clients demanding it from others. In order to mitigate and embrace this disruption construction firms, IOT suppliers, regulators, and owners must adopt flexible and creative approaches to assessing risk and identifying value. Doing so will require early involvement from experienced legal counsel and a willingness to consider unconventional approaches and legal arrangements.

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