Opinion

Dilemma of the Artificial Intelligence Regulatory Landscape

Navigating the complex and varying AI regulatory landscape.

When legal regulations get ahead of technological developments, the progress of society may be constrained. Conversely, when technological developments run ahead of legal regulations, unregulated new technologies may harm society, defying technological development’s fundamental purpose.

This is exactly what has happened in the world in the past decade, as technological developments have far outpaced legal regulations. Worse, traditional legal frameworks focus on the relationship between people, whereas we must develop a legal framework to regulate relations between people and intelligent machines in the current era. Integrating AI technologies into human society imposes unique legal challenges without any precedent.

For the first time in history, AI has the potential to generate solutions superior to what a human would expect. However, today AI is not bound by ethics, and decisions made by AI may be considered out of line with standards and ethics generally accepted by human society. The unforeseeable superiority and the problem of ethical control may create chaos in the AI regulatory landscape. If AI is not adequately regulated, such problems will further exacerbate unforeseen social issues the current legal framework is unprepared for.

As an autonomous driving start-up founded in 2016, we launched commercial autonomous driving operations in the U.S., Europe, Japan, and China to find the most promising market. It has been a treacherous journey filled with regulatory roadblocks and land mines. Such a problem is not unique to autonomous driving but universal to all AI applications. Here, we share our firsthand experiences tackling regulatory requirements and attempting to reduce the friction between innovative technologies and regulatory requirements to advance human society with properly regulated AI technologies.

Our Global Commercial Deployment Experiences

Our business model is to provide turnkey solutions to customers. The solution includes hardware such as drive-by-wire chassis and computing units, a full stack of autonomous driving software such as perception and localization, and a user interface. In the past four years, when we per-
formed commercial deployments in different regions worldwide, we encountered a broad spectrum of regulatory rules across countries or regions within a country. This lack of regulation standardization has become unhealthy as companies in the AI sector, mostly start-ups, spend a significant amount of budget, time, and effort dealing with different regulatory measures. Our firsthand experiences in working with authorities worldwide are described here.

**Deployments in China.** In 2017, autonomous driving test permits in China were virtually nonexistent. Only a few governmental documents stated high-level goals and principles in some pilot cities such as Shanghai. The absence of test permit certification pushed start-ups in this field to test their vehicles wildly on highways, where the traffic was more predictable and less complicated, or in rural areas where the population is scarce, both posing fatal risks to the general public.

To minimize compliance and safety risks, we chose to carry out autonomous driving projects in restricted areas, such as factories and school campuses. Since these areas are private, the test pod could go on the roads once approved by the property management. In addition, we set the speed limit at 20mph to cope with safety risks and designed several redundant perception systems to avoid accidents.7

Having accumulated 1.5 months of testing data and different driving scenarios, our company was invited to join an autonomous driving pilot program in Shenzhen, China’s Silicon Valley. We were selected to present the latest autonomous driving technology and global trends in this field in a seminar hosted by the local government, where we seized the opportunity to emphasize the urgency and importance of regulated test drives. After six months, our voice was heard, and we could file our first test permit application. In this case, the whole regulatory process lagged behind the actual technological development, pushing companies to play wild first and file applications later. Furthermore, if a company goes to another city for a new autonomous driving project, the whole process will start from zero.

**Deployments in European Union.** In late 2018, we were invited to carry out autonomous driving operations in a European city. It took us more than seven months to complete the application process and launch commercial deployment. The first three months focused on technical specifications such as communication bandwidth requirements and visual perception response time. The latter four months focused on functional specifications in more than 40 scenarios, from recognizing an unexpected object in the test field to

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approach for deployments in the U.S. The local governments are responsible for inner-city transportation, and these local governments have the authority to grant autonomous driving operation permits. Since the state and federal governments had limited guidance on the deployment of autonomous driving services, we had to deal with each city individually to expand our operation, which is an inefficient and costly process given the regulatory differences among cities. In our cases in the U.S., the test data and safety assurance plans in California did not give us privileges when we applied for the test permit in Indiana. Although such an arrangement may be adequate to mitigate people’s safety risk in different states with different traffic densities, there could be room to improve process standardization and transparency, which would save AI start-ups’ resources and, in turn, help advance the technology.

The Dilemma

The accompanying figure summarizes the basic process of autonomous driving deployment in the four areas discussed previously. The deployment process consisted of four essential parts: Application filing to initiate conversations, national-level approval, local-level approval, and commercial deployment. There were no explicit instructions to follow, and it imposed a significant financial burden on autonomous driving start-ups, which are already constrained on budget and race against time for growth. In a way, the complex and varying regulatory processes across different regions subtly give advantage to well-established and resourceful technology firms over resource-constrained start-ups.

Deployments in Japan. With autonomous driving cases launched in China and Europe, we entered the Japanese market and directly worked with Japan’s Ministry of Land, Infrastructure, Transport, and Tourism (MLIT) to deploy a driverless vehicle. The experience in Japan was a combination of China and Europe. We could negotiate with authorities to start from the most straightforward scenarios and reduce paperwork. Meanwhile, the authority closely reviewed technical specifications and risk-mitigation plans in those scenarios.

The application and endorsement process is top-down. We had to work with the national government to gain approval and then with local governments to carry out the operation. We first ran the test operation in a park in Fukuoka under the supervision of MLIT. The operation data was then used to go through a basic safety check to assess the risk of our autonomous driving operations. After the procedure was completed, we were allowed to continue our operation at the new site in a historic park in Nara. The whole operation scale-up process took more than 12 months, and it was worthwhile since we did not have to repeat the initial certification process once we received endorsements from MLIT.

Deployments in the U.S. In contrast to Japan, we had to take a bottom-up approach for deployments in the U.S. The local governments are responsible for inner-city transportation, and these local governments have the authority to grant autonomous driving operation permits. Since the state and federal governments had limited guidance on the deployment of autonomous driving services, we had to deal with each city individually to expand our operation, which is an inefficient and costly process given the regulatory differences among cities. In our cases in the U.S., the test data and safety assurance plans in California did not give us privileges when we applied for the test permit in Indiana. Although such an arrangement may be adequate to mitigate people’s safety risk in different states with different traffic densities, there could be room to improve process standardization and transparency, which would save AI start-ups’ resources and, in turn, help advance the technology.

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Association for Computing Machinery
Without a properly regulated environment, AI companies cannot thrive and transform their latest technology into successful products.

Our firsthand experiences of dealing with a broad spectrum of regulatory requirements highlight the dilemma of the AI regulatory landscape today. We have provided some practical recommendations for AI start-ups to work efficiently and effectively within the regulatory framework to address this problem. We hope these recommendations make AI start-ups more adaptable to the regulatory landscape and hope for standardization in the AI regulatory process, which will make the AI industry much more efficient and effective.

Recommendations for AI Start-Ups

Our lessons can help AI companies, especially start-ups with limited resources, navigate through various regulatory barriers. While the specific questions being asked by regulators varied from time to time, we have found the key to settling concerns is to clearly convey the message that potential benefits outweigh relevant risks. These recommendations have been proven effective in our own deployment projects across multiple countries.

First, cross-function communication and information sharing are critical to unifying the team to deal with external complexities, as complex regulatory requirements often cause chaos within an organization. For instance, as we carried out deployment projects, our field engineers often needed to work directly with regulators to demonstrate technical progress, fix deployment problems, and address their concerns. Engineers with cross-functional experiences tend to outperform those without, as the former ones are capable of communicating effectively with regulators who have limited technical background.

Second, show strong evidence to support the benefits of the project. Most regulators welcome innovations, and they are eager to integrate innovative technologies into their economies. They look for strong evidence that the technology indeed works, and they look for evidence from credible sources, such as publications from leading journals in the field or reports released by leading research institutes. Hence, we suggest AI start-up companies collaborate with academic partners to perform scientific research to verify the project’s benefits. Industry-academia collaboration is essential to foster the AI industry more than ever before.

Third, present a concrete risk mitigation plan to regulators. Most regulatory actions are designed to mitigate risks. The local authority will often carry the blame if an innovative project goes wrong. Therefore, regulators would try their best to mitigate risks. Presenting a clear risk-mitigation plan and success stories of deployment case studies elsewhere will undoubtedly improve the regulator’s confidence in the project. While in our own experiences, presenting the cases in China and Europe helped us obtain approval for operation in Japan. For instance, development and awareness of technical standards, such as Safety of the Intended Functional Region (SOTIF) for Autonomous Driving, is an effective method to improve product credibility and to boost regulators’ confidence.

Conclusion

Our recommendations for AI start-ups to work efficiently and effectively within the regulatory framework to address this problem. We hope these recommendations make AI start-ups more adaptable to the regulatory landscape and hope for standardization in the AI regulatory process, which will make the AI industry much more efficient and effective.

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Shaoshan Liu (shaoshan.liu@perceptin.io) is the chief executive officer of PerceptIn, Santa Clara, CA, USA.

Shaoshan Liu (shaoshan.liu@perceptin.io) is the chief executive officer of PerceptIn, Santa Clara, CA, USA.