Total to Develop Artificial Intelligence Solutions with Google Cloud

Paris, April 24, 2018 – Total and Google Cloud have signed an agreement to jointly develop artificial intelligence (A.I.) solutions applied to subsurface data analysis for oil and gas exploration and production.

The agreement focuses on the development of A.I. programs that will make it possible to interpret subsurface images, notably from seismic studies (using Computer Vision technology) and automate the analysis of technical documents (using Natural Language Processing technology). These programs will allow Total's geologists, geophysicists, reservoir and geo-information engineers to explore and assess oil & gas fields faster and more effectively.

Under this partnership, Total geoscientists will work side-by-side with Google Cloud's machine learning experts within the same project team based in Google Cloud's Advanced Solutions Lab in California.

"Total is convinced that applying artificial intelligence in the oil and gas industry is a promising avenue to be explored for optimizing our performance, particularly in subsurface data interpretation. We are excited to work with Google Cloud towards this goal. This builds on the strategy being developed at Total, where A.I. is already used, for example, in predictive maintenance at facilities," said Marie-Noëlle Semeria, Senior Vice President, Group CTO at Total.

"We believe that the combination of Total's geoscience expertise and Google's artificial intelligence skills will ensure the project's success. Our ambition is to give our geoscience engineers an A.I. personal assistant in the next few years that will free them up to focus on high value-added tasks." said Kevin McLachlan, Senior Vice President Exploration for Exploration & Production at Total.

"We are thrilled to welcome Total in our Advanced Solutions Labs for the development of A.I. solutions," said Paul-Henri Ferrand, President of Global Customer Operations Google Cloud. *"We are keen to engage our best A.I. engineers to work with Total's geosciences' experts."*

Artificial Intelligence Applied to Exploration & Production at Total

- Total started applying artificial intelligence to characterize oil & gas fields using machine learning algorithms in the 1990s.

- In 2013, Total used machine learning algorithms to implement predictive maintenance for turbines, pumps and compressors at its industrial facilities, thus generating savings of several hundred million dollars.

- Today, Total teams are exploring multiple machine learning and deep learning applications such as production profile forecasting, automated analysis of satellite images or analysis of rock sample images.

About Total

Total is a global integrated energy producer and provider, a leading international oil and gas company, a major player in low-carbon energies. Our 98,000 employees are committed to better energy that is safer, cleaner, more efficient, more innovative and accessible to as many people as possible. As a responsible corporate citizen, we focus on ensuring that our operations in more than 130 countries worldwide consistently deliver economic, social and environmental benefits.

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Cautionary note