Dr. Fuquan (Frank) Zhao

Chairman of FISITA and Director of the Tsinghua University Automotive Strategy Research Institute (TASRI), China

As Head of the International Federation of Automotive Engineering Societies (FISITA) since October 2018, there is not the least doubt that Prof. Frank Zhao has a particularly keen eye on the current state of the world automotive industry and on the challenges already causing a major disruption in it. His research at Tsinghua University has also put him in the position of an eminent observer of the world's leading automotive market, China. He explains his vision of the automotive industry of the future and the program covered by his two-year term of office as President of FISITA to Ingénieurs de l'Auto magazine.

"There is no doubt about the determination of the Chinese government regarding electrification"

Dr. Fuquan (Frank) Zhao - Background

Graduate of Hiroshima University in Japan in 1992, Frank Zhao has a doctorate in engineering. He is a professor at and the director of TASRI at Tsinghua University, China where he leads a strategic research group working on the orientations of the automotive industry, company governance and technological strategies. Before joining Tsinghua University in May 2013, he accumulated years of experience in three continents. He has held several positions at Zhejiang Geely Holding Group: vice-president, president of the R&D centre and the Engineering Institute. Before that, he worked for Daimler-Chrysler as engineering expert and research executive for the Group's Technical Affairs division. He then held the post of VP and managing director of the R&D centre at Shenyang Brilliance JinBei Automobile Company Limited. His experience at these manufacturers resulted in leading the development of some twenty passenger cars and SUVs, and more than ten powertrains. He published eight books in Chinese and English and more than three hundred technical papers in English, Japanese and Chinese.

Tell us about your roadmap as President of FISITA until 2020

Dr.F.Z.: *I will encapsulate the priorities of my term of office as President in three words: quality, engagement and recognition. The cornerstone of my presidency is the premium operation of the organization. We are pleased to see that member countries and companies are increasingly committed and proactive in many different activity areas. We also encourage our members to take better advantage of the contributions made by the more influential of us, with due recognition and with the benefit of our excellent supporting means.*

What key events will be happening at FISITA under your presidency?

Dr.F.Z.: *There will be the FISITA Summit which, based on current and future automotive technology developments, will bring together top line technological, economic and political decision-makers and renowned representatives of the academic institutions.*
Meanwhile the FISITA world congress will be conducted in 2020. Another particularly important event will be the Intelligent Safety Conference which will be organized jointly with the Chinese Society of Automotive Engineers (China-SAE), a leading global conference on the subject. The FISITA Mobility Engineering 2030 collaborative initiative is being prepared: its role will be to define clearly tomorrow's automotive industry and the trends that accompany the development of the mobility industry. Also, we have just set up the FISITA Academy of Technical Leadership programme which rewards people who make a distinctive contribution worldwide in the development of automotive technologies.

Are there any workshops and/or events being organized jointly by FISITA and SIA?

Dr.F.Z.: *FISITA is interested in many events organized by SIA. We may consider supporting them with an "Endorsed by FISITA" label. The FISITA world congress, the FISITA Summit, FISITA Plus*

and the Intelligent Safety Conference in China are outstanding get-togethers in which I hope that SIA and its experts will be participating. FISITA is also cooperating with China-SAE to define international standards for engineering diplomas. For this purpose, SIA could be involved in providing French engineers with validation for their acquired knowledge in terms of international engineer certification coverage.
Finally, there are historical connections between FISITA and France because FISITA was founded in Paris in 1948. We will be celebrating our seventieth anniversary there at the Mondial de l'Auto where I will be handing over my responsibilities to Nadine Leclair who is what we refer to as the President elect. The organization of our World Summit 2020 will be delegated to SIA .

What are the most important missions of China-SAE ?
Dr.F.Z.: *China-SAE is a major factor in the Chinese automotive industry for the dissemination and promotion of new ideas and sharing of new technologies. It is also an important link between the Chinese and international automotive industries. It is committed to the furthering of the technical breakthroughs and knowledge of our industry and in training new talents. It also passes on the automotive culture and welcomes scientists and engineers to its venues.*

Strong ties with the Chinese government easing the way for exchanges between the State and the Industry

Is its governance different from that of other Automotive Engineering Societies, especially French and European?
Dr.F.Z.: *China-SAE was founded in 1963. It is a national association comprising various players from the Chinese automotive industry and includes University graduates and engineers. As a member of the Chinese Association for Science and Technology, it is a non-profit organization. For the time being, there are 39 regional delegations across the country with ties to provincial automotive engineering societies. China-SAE has more than 100,000 members and 595 entities, including all the top automotive manufacturers and suppliers. What differentiates China-SAE from other automotive engineering societies around the world are its particularly strong ties with the Chinese government, which foster interactions between the State and industry.*

What are the next meeting dates for the automobile industry in China?
Dr.F.Z.: *In May of this year, the 6th International Technologies Congress for Intelligent and Connected Vehicles will be held. And in July the 2019 World Congress for New Energies for Transport will be staged with the aim of becoming the major get-together for electric cars. In September we will be hosting the 4th International Hydrogen Fuel Cell Vehicle Congress, and the following month we will be organizing our own Congress.*

What are the priority subjects of discussion among Chinese automotive engineers?
Dr.F.Z.: *Primarily, they talk about new energies, intelligent connectivity, batteries, Big Data, Artificial Intelligence, car-sharing and new mobility methods, intelligent factories, intelligent transport, infrastructure, and newcomers to automotive manufacturing.*

Mobility tomorrow will be Smart to the power of 4

Could you explain the "4S Rule" which is the baseline for mobility by the year 2030?
Dr.F.Z.: *The 4S's stand for "Smart City, Smart Transportation, Smart Energy, Smart Vehicle". It involves carrying out coordinated development and efficient exchanges of information between several sectors in the future: mobility, infrastructure and transport, energy specialists and information systems.*

5 KEY FIGURES
about the Chinese market

1. **The number of vehicles per 1 000 inhabitants has grown almost fivefold in 10 years (172 in 2018 and forecast close to 300 in 2030), while the Chinese population has increased by only 5% over the same period.**
2. **Total car sales were more than 28 million units in 2018, of which more than 23.7 million were private cars (4.1% down from 2017)**
3. **Almost 10 million SUVs were sold in 2018**
4. **Electric vehicle sales came to 1.256 million units in 2018, a growth of almost 62% over one year**
5. **These sales comprise the following: 62.7% private battery-powered electric vehicles, 21.1% rechargeable hybrid private cars, 15.6% battery-powered commercial EV's and 0.6% rechargeable hybrid commercial vehicles**

Do you believe that everyone in the Chinese car industry is involved in this "4S rule"?
Dr.F.Z.: *The greening of the economy will bring the segmenting of tasks to an end, opening the way to integrated development in tomorrow's industry. All parties will have to help build an ecosystem, to the advantage of a model that brings together automotive manufacturers and equipment manufacturers, IT technological companies and the States. Every possible input will be essential. A win-win cooperation is only possible through efficient integration. All the Chinese automotive industry players are involved in the 4S model at one level or another.*
In China, what are the pillars of the strategy in terms of mobility? From the standpoint of industrial strategy, intelligent and connected cars will play an increasingly important role to benefit the emergence of industries and the sustainable development of transport, energy, cities and society. China also considers that it is essential to work jointly on developing smart connectivity and new energies. In addition, ITS's like car-road communication are the only way making intelligent and connected vehicles a success in China. The four points of Smart City, Smart Transportation, Smart Energy and Smart Vehicle are indispensable.

Would you say that the electrification of the Chinese market is irreversible?
Dr.F.Z.: *China has made electric vehicles a matter of national strategy. There is no doubt about the determination of the Chinese government regarding electrification*

Is there any debate over hydrogen technologies versus battery-powered electric cars?
Dr.F.Z.: *Different application scenarios suggest different choices for electric vehicle technologies. Battery-powered electric cars and hydrogen cars will come to complement each other. Industrial vehicles, which require greater range and larger energy storage capacities, like buses and trucks, will mostly go the hydrogen route. That is why the hydrogen fuel cell will be applied to city buses, trucks, specialized vehicles etc. In the more distant future, it will also be used in HGV's for long-distance trips.*

IC engines still have a bright future ahead of them

Is there any future for the internal combustion engine in China?
Dr.F.Z.: *With the automotive industry now entering an era of energy diversification, powerplants will develop in several different ways in parallel and the internal combustion engine will maintain an important position for a long time to come. The development of internal combustion engines in the future will be focused on efficiency, simplified structures, lower costs and closer integration between the batteries and the engine. I think that the internal combustion engine still has a bright future ahead of it.*

Do you agree with Didier Leroy, No. 2 at Toyota, who considers that energy issues are part of the automotive industry and engineering world?
Dr.F.Z.: *The energy revolution is one of the three factors that are having an impact on the development of the automotive industry. Combining and extending the core technologies of the car will lead to revolutionary change. New technologies (batteries, engine and electronic management of the power systems) and new charging infrastructure will encourage the introduction of new automotive products (mobility solutions, energy storage and other devices). Batteries are one of the technologies at the heart of electric vehicles. Automakers are making enormous R&D efforts in the world of the battery, particularly in new materials and technologies for controlling the battery packs. As to whether they need to produce their own battery cells, the skills, ideas and approaches vary. But we have to acknowledge the fact that battery cells are now an important part of original car equipment.*

What is the biggest challenge facing the self-driving car? Legal liability in the case of an accident?

Dr.F.Z.: *Self-driving faces a variety of challenges, not all of them technical. The biggest challenges come from regulations and the industrialization of self-driving and driverless cars. Accordingly, industry and the public authorities are continuously required to improve standards and regulations. They have to supply relevant platforms to promote the development of self-driving cars as quickly as possible. From my point of view, companies that deal directly with the end consumer will be affected by the question of liability.*

What could be done to prevent self-driving cars and connected cars being hacked?

Dr.F.Z.: *Tools capable of guaranteeing the total security of intelligent car systems do not exist. It is a systematic problem for vehicles and also for the outside environment. It needs to be tackled in terms of how terminals, communication channels and, in the future, the cloud, are integrated.*

The acceptance of self-driving is a gradual process

How confident are you about the safety of level 4 and 5 self-driving cars?

Dr.F.Z.: *The first promise made by intelligent and connected vehicles is safety, but as far as self-driving is concerned, the process will undoubtedly be more gradual. Self-driving will only be accepted when it is safer than human driving. It would be incongruous to liberate drivers if levels 4 and 5 self-driving are no better than the most experienced drivers, familiar with using the road. Naturally, there is no such thing as a zero risk in terms of safety. The final hierarchy in terms of self-driving cars will be defined by products offering acceptable safety.*

At the FISITA 2018 Congress held in India last October, you said that "collaboration is one of the keys to the future." How does FISITA manage new players in the mobility world, for instance start-ups and governments?

Dr.F.Z.: *The upheavals taking place in the automotive industry are making the boundaries much less clear. For the time being, no country or company has all the resources necessary for this restructuring. In a context like this, an organization like FISITA can play a key role now and even more in the future. It will attract companies from other industries, such as battery producers, ICT companies and so on. Start-ups, non-auto societies and government organizations will be joining us and we also love to work together with them to face the revolutionary change of the industry. Together we will discuss the characteristics of this industrial disruption and will create opportunities for cooperation.*

Do you think that the traditional manufacturers will keep up with the revolution, towards a new economic model which considers the use rather than the ownership, the importance of data?

Dr.F.Z.: *Yes, I am confident about this point. However, traditional automotive manufacturers need to transform their conventional way of producing vehicles for the sole purpose of selling them. They will need to make the new Internet technologies their own and really change their culture to develop in digital technologies in an intelligent way. One way or another, there will be favourable opportunities for them. If they do not change like this, traditional automakers will not survive.*

The new IT technologies are opportunities for the automobile industry

Are the new sectors (AI, blockchain, data analysis) challenging automobile technology?

Dr.F.Z.: *The development of the intelligent and connected car industry is closely linked to that of emerging industries, as strategic as Big Data, Cloud, connectivity, artificial intelligence, processors, new energies, new materials, and the factory of the future. These new technologies not only lead to the challenging of the traditional automotive industry (especially when we do not have one before), they are also opportunities. But the automobile or mobility factories will have to change accordingly, in other words more intelligently.*

What are the main challenges that the automobile industry will be facing in 2025?

Dr.F.Z.: *The development of battery technologies, charging technologies and charging networks, economic business models for intelligent and connected vehicles, and the construction of communicating road networks.*

Do you agree with the concept that today's car engineers are tomorrow's mobility engineers?

Dr.F.Z.: *Yes. The industrial boundaries are increasingly fuzzy, little by little leading to definitions of the types of skills that are equally fuzzy. The concept of the mobility engineer needs to cover a wider field, not only limited to that of the original automotive engineer but also encompassing many other areas like IT, chemistry, materials and many more*

Interview by Ali Hammami