Ladies and Gentlemen, dear Erol, good morning, boreda as we said in Wales when I was a boy in Monmouthshire and Glamorgan.

It is a great honor and pleasure to attend this symposium honouring Professor Erol Gelenbe and to deliver a message from the French academy of engineering, NATF, the National Academy of Technologies of France, in presence of six of our Fellows, among whom we are pleased to have Erol as an active member.

I just flew back from Champaign, Iowa (USA), as a member of the technological international innovation council of a major world equipment supplier for agriculture and construction, and I can tell you that technology has been the key word in our discussions during the whole week. And you may be surprised if I brought back some mid-western American expressions...

As Erol asked me to deliver a VISION, I will definitely not forget technology in that vision, and I shall try to explain which were our goals when we created our
engineering academy fifteen years ago, and how our concept was and still is very different from an academy of sciences.

The word IMPERIAL is still used and appreciated in the United Kingdom, so I shall start by an old French advertisement one could see when I was a boy during the war: the word Empire was then politically correct, and you will notice that technique appeared to be more emphasized than science. Were we influenced by this image?

In fact, the French academy of sciences was the initiator.
To meet this academy, you just need to cross the Pont des Arts. Many of you have been in contact with its former president, Jacques-Louis Lions, who also happened to be my key scientific adviser when I was CTO of Elf Aquitaine.

Many of you have known Hubert Curien, who was also a key actor in the launching of our Academy: both were members of CADAS, which was a Council created by the Academy of Sciences, in 1982, with a membership comprising an equal number of scientists and of technologists from industry, mainly CTOs of
major industrial French companies, meeting at Quai Conti, at the Academy’s working place.

Cadas was active during 18 years, producing useful reports, and we ended up with the proposal, in the year 2000, to create an independent academy, as it had been done already in most developed countries, since 1919 in Sweden, in 1964 in the USA with NAE, or in 1976 in the UK with the Royal Academy of Engineering.

France was late, due to a predominant image of basic science since the creation of the French academy of sciences in 1666, and due to the belief that fundamental research would be enough to do the job.

Curiously, Germany was last to create their Acatech, academy of science and engineering, one year after us, in 2001, but this late arrival is easily explained by the fact that they already had existing structures in the Länder.

In France, such areas as computer science were not eligible to the academy of sciences, where a chemical engineering inventor was only elected after obtaining a Nobel Prize. The initiator of a significant innovation (wavelets) was never recognized, as he was merely a geophysicist in my oil company. And Benoit Mandelbrot and his fractals went across the same experience.
Not so long ago, public research was not inclined to talk to industry, and it took (and will take) time and political pressure to change this attitude.

So CADAS prepared the launch of an independent academy of engineering and the “straight line concept” somehow changed.

In my first chapter, I shall explain what was our ambition, a major project, summarized in the booklet “Une académie des technologies pour la France”, and my second chapter will try to tell you how far we are, after 15 years: did we readjust our vision?

First of all, we had many debates about a definition of technology, and about the name of the new academy, during which one could discuss the words: engineers, ingénieurs, ingénierie, techniques, technologies, with different meanings in different countries. Indeed, the word ingénieur stands at a higher level than the word engineer, which in USA can designate a train driver. There is a saying that the word engineering comes from engine, whereas the word ingénieur comes from genius... as were, indeed the likes of Gustave Eiffel, André Citroën, Louis Blériot or Edouard Michelin. Finally we preferred
“technologie” to ingénierie, “technology” to engineering, and we ended with the English version: National Academy of Technologies of France.

The initial project stressed a significant difference with our new sister Académie des sciences... (indeed, the daughter was becoming a sister: a biologist might call this a binary scission). We had the clear idea that our members should also be of the same high level, although not in the same field, as fundamental scientists. Our members had to be those more connected to economy and human needs, and we would have no room for fundamental scientists unless already elected by the AS.

We intended to elect a majority of engineers, industry CTO’s, economists, MDs, innovators, creators, and to associate many diverse profiles, all independent from any lobbies. The election process had to imply a competition between candidates proposed by the Fellows. In addition, our working groups should be supported by a number of experts, who would make themselves available to contribute to the discussions and to the preparation of reports.
Our goal was definitely not to promote technology in itself, but to study its beneficial use for mankind.

Our keywords should be: innovation, creation, the economy, growth, added value, not only patents but applied patents, not only paper publications but “publications appearing in the landscape”, on land, seas and air (such as plants, bridges, buildings, cars, planes, innovative products or equipments). We were not impressed by the size of R&D budgets but by their visible results....

Another difference with the Academy of Sciences was the priority given to trans-disciplinary and multidisciplinary work on selected global themes of interest for the 21st century, and not within disciplinary divisions (such as mathematics, chemistry, biology...): specialists of different fields would combine their expertise for a common goal, focusing on a systemic approach.

We chose a motto to stress our difference, “pour un progrès raisonné choisi et partagé”, “for a reasoned, chosen and shared progress”, insisting on the benefit for mankind and its planet, not even mentioning the word technology...

Our funding was to come from the Ministry of research, but many other contributions were expected from organizations offering experts, meeting rooms, technical visits, or even financial support on specific studies...

A logo was also designed, symbolizing the fruitful handshake of technology and mankind. And a medal, combining Florentine bronze and crystal, was attributed to members, or occasionally to recognized innovators, as the one awarded to one of our next keynote speakers, Louis Pouzin.

We intended to develop a technological intelligent network, combining our diverse origins.
Starting as a modest association, we clearly had the objective to become soon a national structure, advising the highest authorities in France. We intended to reach a more international membership. There should not be so called foreign members, but foreigners should become part of our unique category of members.

We insisted on an active presence in international technological debates, through various European structures: many of us had been members of ESTA,
the European Science and Technology Assembly, or IRDAC, which have now disappeared.

Those were our ideas and intentions, when we were officially created at the end of 2000, in the very impressive meeting room of the French Academy of Sciences, by the minister of research Gérard Roger Schwartzenberg (Jacques Chirac being President and Lionel Jospin Prime Minister).

Soon, we became part of a strong international network of engineering academies: Cadas had already been an active member of Eurocase, with headquarters in Paris, which was now located within the NATF offices.

The Eurocase Board is now chaired by the German Acatech President, here shown with its Board members, representing a force of 6000 Fellows.
In addition, our academy is also a member of a larger group of 26 world academies, CAETS, including Japan, Corea, China, Australia, Canada, USA, in addition to Europeans, with headquarters in Washington DC.
I shall now tell you about our fellows, our projects, and our vision.

In 2007, we became a public entity, and we were officially established as such by Prime Minister Dominique de Villepin.
Here is another view of our assembly, the same day, under the dome of the Palais de la Découverte.

We now have our headquarters in the Grand Palais, in the center of Paris, an iconic location that also houses a renowned exhibition Hall of Science and Technology.
We still have a reasonably small number of Fellows, preferring quality to quantity, but our average profile has changed since the year 2000.

Starting from 166 founding members, we had a 79% increase to nearly 300, a slow growth rate of 4% per year; currently 164 fellows are below the age of 70 while 133 are above, with no rush to reach the official objective of 250 fellows below the age of 70, in addition to a large number of emeriti having reached the age of 70.

Unfortunately, and sadly, in 15 years, 47 members have already passed away.

Fundamentalist scientists, who initially constituted half of our members, still represent one fourth of the company: three Nobel prize winners, one Fields medalist, one Tokyo prize, many medals of CNRS, top representatives of the Academy of Sciences, have been among our Fellows. Now we have a more diverse profile including architects, sociologists, venture capitalists, SMF, philosophers, a few CEOs (Thalès, Smith and Nephew, Roquette).

We enjoy more cooperation with other academies, trying to express common views, although our own message is not always “let us spend more money on research”… we have been used to measure the value of research results. In my industrial life, I have seen a few top companies, very active in R&D, acquired by companies less involved in R&D: the larger R&D budget does not necessarily win.

The participation of women, with 29 members, is now higher, as you can see from this picture: starting from less than 3%, they are now 10 % of the company, 14% if you do not include emeriti, a percentage steadily growing, in parallel with their increased participation in industrial operations and R&D. You
would be more (but wrongly) impressed, if I showed you this restricted view... another proof that images can be adjusted to mask reality.... In fact, I must say there were less women among the rough-necks I met in my career in the oil and chemical industry....

Our international profile has also progressed slowly, with only 14 foreign members, coming from Marocco, Belgium, Switzerland, Quebec, China, USA, but we also have 29 French members holding significant positions abroad.

I shall now give you a few examples of realizations of our fellows: in electricity and turbines of Alstom, chemical engineering of Arkema, impressive progressive lenses of Essilor, magnificent bridges like in Millau, off shore oil platforms of Total, we also have an explorer, an astronaut, a Formula One top manager, also jet fighter designers from Dassault, nuclear plant builders from EDF. We could add a TGV designer, a high tech surgeon, a few former Ministers and one former European commissioner... an impressive and diverse group, able to tackle many subjects...
Once, we even had a debate about the applied physics in French cuisine! And we can say that the making of this mayonnaise was a success.

If we are still a young academy, on its learning curve, we are increasingly recognized as a natural partner for government and economic circles in France. Questions are regularly addressed to us by government and public organizations, and since 2013 we are placed under the protection of the President of the French republic.

We play a benchmark role for questions related to technologies and the impact of progress on society, and act as a mediator between policy decision makers, public opinion, the research communities and socio economic actors.

We have followed our initial ambition not to deliver a top down Parisian view advising the rest or the country, and we had many occasions to meet in most regions of France, where people work, creating technology, wealth and growth.
We learned much from experiences and innovation processes in Bordeaux, Toulouse, Marseilles, Nice, Brest, Lyon and smaller locations.

We hold public debates, inform parliament members, and one of our honorary presidents is now VP of the European Institute of Innovation and Technology in Budapest. The financing has slowly increased, yet our budget is still far lower than those of other National (or Royal) sister engineering academies in Europe: under a strong financial pressure, we have to demonstrate our value for money: we know that success will only come from the quality and originality and added value of our messages.

A “partners network” has also contributed to an additional financing from the economic world. More recently a special fund regarding “technology for mankind” engages actions following some academic reports, such as medical help at home, new transportation schemes, educational experiences, or fab labs... Our annual reports and our internet site have progressed, we initiated a TV magazine Future mag, another way to reach our objective: a « sharing reasoned chosen progress»: perhaps a dream, but in any case a wonderful ambition.

To reach our status, we have published, not yet enough in English, many significant reports on major 21st century challenges. Here are a few examples of reports, those published in English, energy transition, energy savings in buildings, energy vectors, freight, robots, large socio-technical systems,
But we produced many others, in French, which are about … chemicals, medicine, education, assessment of societal and technological risks, the precautionary principle, metrology, metallurgy. Erol will tell you that electricity and electronics have been also very present. Now among challenges ahead we have:

- Societal impact of ICT, Big data, life expectancy of digitized information, computer science.
- Industrial biotechnologies, synthetic biology, pharmaceuticals start-ups, GMO’s
- Technical Education, training for industrial jobs
- Innovation and SMES creation, adaptation of the French R&T organization, reindustrialization, start-ups
- Urbanism, land planning and mobility: connected cities, impact of digital technologies, future transport systems
- Risks and their public perception on nuclear, antennas, nanoparticles, chemicals …
- Ethics and Progress
Many projects which are of major interest to the members of NATF: for us, it is indeed a chance and an opportunity, while often getting close to the age of retirement, to start a second life and career, in which we feel that we are able to have an impact, at a more global societal level than in previous assignments, meeting not only engineers and scientists who had activities similar to ours- yet in different fields – but also high level colleagues coming from a different world such as the University: this was the case with Erol.

Erol joined us in 2008, and since last August 22, has entered our emeriti category but he is not going to relax on the riverside: my experience, being 10% older, is that he his probably entering the most productive period in his career...a new start for which we congratulate him and wish him a continued success.

In a few months, the COP 21 climate change conference will take place in Paris, and we are actively preparing a position paper, obviously not on climate change itself or on IPCC debates - which are the field of the academies of sciences - but on how to use technology to fight against global warming and how to prepare its remediation.
Tremendous challenges lie ahead, and we hope we can contribute, and cooperate internationally with other think tanks, academies, organizations, acting for a better world.

From this last photograph, you will understand that Erol is ready to build “une Académie des technologies not only pour la France, but also for mankind”!

Thank you all for your kind attention and interest.

_Pierre Castillon_