



Space scientist: John Zarnecki
Huygens Space Probe landing

The most important event in my research career, which happened while I was here at the Open University, was January the 14th, 2005. On that day our space probe, the Huygens probe, built with the European Space Agency, landed on the surface on Titan, Saturn's largest moon. For me that was the culmination of fifteen years of work. Our instruments that we'd designed, built, tested ourselves with – I was leading an international consortium so there were colleagues from many countries involved – it landed as part of the space probe on the surface on Titan and amazingly not only did it take measurements as the probe descended under the parachute, the probe survived the impact with the surface and this instrument, which I knew so well, it was as if it was part of my family, I'd spent fifteen years so closely connected to it, it was hard to believe that there it was one and a half billion kilometres away from us, sitting there, taking measurements, measuring the temperature of the surface of Titan, measuring the speed of sound, measuring the hardness of the surface, and sending this data back in real time to us on Earth. We found an amazing place, the only moon in the solar system that has an atmosphere, we found lakes, rivers, mountains, a remarkably earth-like environment, but made of very different materials, the surface of Titan is made of ice, and the rivers and lakes don't have water, but they have liquid methane, so a most bizarre place. I mean that was, that was absolutely the highlight of my research career and I think it will never be surpassed. Space is part of the infrastructure of the world. In fact it would be fascinating if we could turn space off for a week. I think that after a couple of days we'd amazed at how things would change, I mean there are the obvious things like communications, navigation, so much of that depends on space, but there are things which are not quite so obvious. I mean for example, many of the financial transactions that are carried out every minute of the day between banks, between companies, between governments and institutions, they're actually time-tagged, it's very important to get the exact timing in the sequence right with so many transactions going on all the time, and this time-tagging comes from GPS satellites, and navigation satellites, which carry extremely accurate clocks and which essentially are delivered throughout the world. So this is something that goes on without most of us appreciating it. And then, of course, very practical is the whole business of weather forecasting, something that we take for granted, I mean many of us, particularly in the UK, we're always complaining about the weather and weather forecasting. Actually, it's remarkable accurate these days. I mean that has enormous implications for whether we take an umbrella when we go out, has tremendous implications for business and commerce, but also the humanitarian aspect. I mean I would say with great confidence that the fact that we're able to forecast pretty accurately has saved thousands, in fact tens of thousands of lives. Okay, we might not be able to change the weather, but knowing about extreme weather in advance is invaluable. I mean there's a wonderful example which I always remember. In the year 1900 a cyclone came out of the Gulf of Mexico and hit the coast of the United States, it hit Galveston, the city of Galveston. Six thousand people drowned in the flooding that resulted from the surge. Now, we all know about Katrina, Hurricane Katrina, which struck a similar area in New Orleans. Although it caused the devastation the fact that eighty or ninety percent of the inhabitants of New Orleans were evacuated saved a vast number of lives. I mean I know that there was a significant loss of life, a thousand people, but just imagine what it would have been like if we hadn't known, and we knew almost exclusively from satellite observations that this hurricane was coming, and there are examples like this on a smaller scale happening all of the time. There's still a lot of discussion, even disagreement, about the details but our ability to understand it and therefore to mitigate against it, depends critically on observations, observations and modelling. Now, if you just realise that something like seventy percent of globe is covered by oceans, you know, you could only have very sparse measurements on the ocean, so really the only way of getting a large scale and a comprehensive in terms of time, not just in terms of space, coverage of the very complex weather system, and we know it's a system of course, is through observations from above by satellite, absolutely inconceivable that we could make

any progress. It's hard enough as it is, even with the tremendous coverage that we do have, but that's another area where, where as I say, life is difficult with the situation we have. It would be inconceivable to make any progress without the information the satellites give us. There are very obvious ones like navigation, commonly referred to as GPS, you know many people drive around with 'sat nav' boxes in their car that tell them to within, you know, ten metres where they are. Now clearly that is based on a constellation of satellites with transmitters, clearly that wouldn't be possible without space. Communication, the communication infrastructure, the fact that we're able to receive pictures in real time from any part of the world instantly, I mean I can remember when I was young that just didn't happen. If you were interested in a sports event in Australia or Japan, and you were in the United Kingdom, you would literally have to wait thirty-six hours until the canister of film arrived back in London and could be shown on the television. But there are all sorts of indirect benefits. To build reliable spacecraft we've had to develop very, very rugged small electronics, for example, which finds all sorts of applications in consumer electronics, for example. Materials, materials have to be developed, very specialised materials for space, but then it's found that they have applications on the Earth in the medical field and many, many others. So there are many applications such as that, which perhaps would have happened without space research, but it would have been fifty years before that had happened. The whole process is accelerated because of the needs of the space program.