"I think you need a pioneering spirit in society, a frontier spirit."

Professor David Southwood is the Director of Science in ESA, a post he has had for almost two years. During these two years he has made his mark through the Cosmic Vision, engaging in finding new ways to explore space within ESA.

Nordic Space Activities met David Southwood at ESTEC early this April, and asked him:

Today you talked about the Cosmic Vision, the new way to go for European space research. Are the large resources that have been used for space research necessary to secure the future development of society on earth?

" I believe that any society that does not look outwards, particularly a rich, educated and developed society that does not look outwards, is in danger. I think you need a pioneering spirit in society, a frontier spirit. I think a very natural way to do that is through space exploration, because we do not only look outwards, we are looking back to where we came from. We all came out of cosmos. So I feel it is fundamental for a rich cultural society that is going to continue, and I believe that a society that does not look outwards is in a dangerous state, and will likely atrophy. The resources are large only in some sense. My programme is large if you explain that it is one million EUROS a day, but not if you divide that by the number of people who live in the countries that contribute. There are four million people at least in European space agency member states, so it is less than a EURO a year per person. I somehow feel that if I gave you one EURO, you would not feel I had given you very much. Would you?"

"But in Europe as a whole, I think we should stand on our own feet and everywhere, collectively, be capable of dealing with all aspects of space science."

Space research consists of several different fields such as astronomy, astrophysics, and the search for life in outer space thorough space investigation. How can you as a leader balance between the different interest groups?

"There is a limit to how far I should, personally, because I feel like I am a general advancing on a wide front, and there is nothing that tells me that I should advance first on one front. I have got to advance on many fronts. As a result, the organised way to do it, like a general, is to advance your forces on one front, make sure they have got the resources and backup, and then advance on other fronts, consolidating, and so on. In other words, we cannot advance on all fronts at the same time. But by having a plan we can advance on all fronts in time. I think there is nothing that can tell me there is one branch of science in need of Europe's attention entirely. Europe is too big a collection of counties to simply say it does only one kind of space science. It should cover the frontier."

The space research budgets have steadily decreased the last few years. Are the trends the same when it comes to the national budgets?

" Yes, in fact the national budgets are really quite a concern to me. I repeat my remarks about the society that cannot spend a small amount of the national budget on, let us say, looking outwards and around itself. I just feel that a farmer who does not keep his fences in the long run, and for me, a farmer who does not pay for maintenance of the fences does not keep his farm in the long run. It is the one Euro per person. It is not going to break anyone's bank. I think is some sense it is intellectually wise keeping the fences monitored and in a good state."

For several decades Europe has worked to develop its own independent space research community, and thus comes across as the leader in some fields, successfully I might add. Is this position threatened now due to the future decreasing budgets?

"Yes, of course. I think Europe has, by having a long term plan, been able to advance on a wide front, but in a phased manner. I think if you cut the budget too much you end up doing nothing well and certainly losing leadership we have seized in certain areas. There are certain areas where we simply are better than the Americans. That is because we have invested recently and effectively. So I think it is perhaps different if you come from a small country like Norway, where clearly Norway is a relatively

small country, be it rich as it is, it can specialise because scientists who need to work with scientists in other areas can just cross the border or fly across the Baltic and find the expertise in the community of Europe. But in Europe as a whole, I think we should stand on our own feet and everywhere, collectively, be capable of dealing with all aspects of space science."

The Rosetta Mission has been postponed at least for two years. Does that leave you with a sort of resigned atmosphere within the scientific community?

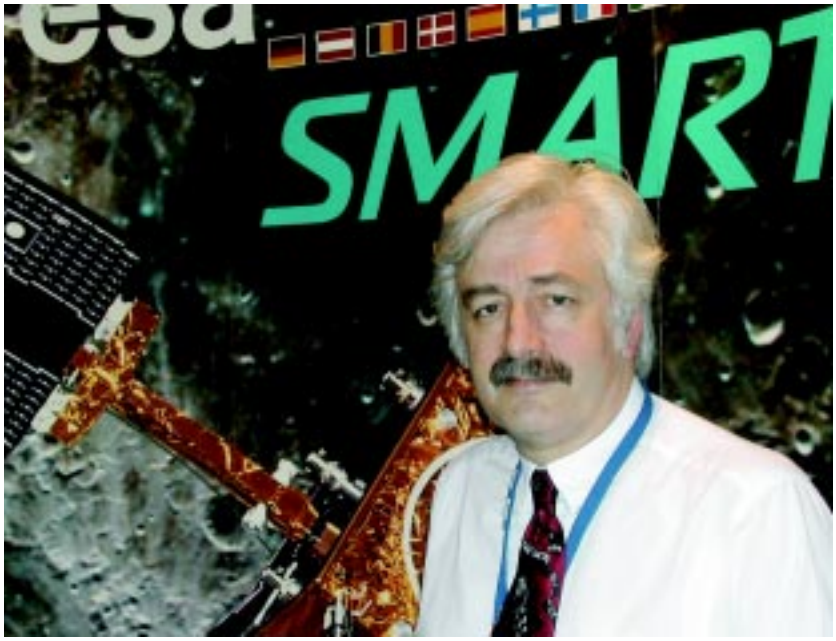
" I do not think you could describe the state of the Rosetta community as resigned, I would describe it as more heated. Some people are angry that we cancelled the launch. They would have taken a bigger risk. Other people applaud me for the decision not to send the Rosetta. Resigned is not the right word. They are re-doubling their efforts to make sure they get the science. Wirtanen was the best possible target we could choose, so we are setting ourselves impossible targets to achieve the same science, otherwise we would have chosen a different target before. This means any backup is going to have some disadvantages. The question is how we mitigate the disadvantages, and that is galvanising the community. Resigned is not the right word."

Space research is a very long-term enterprise, and many of the people who come up with proposals at the start of the programme cannot conduct a proper follow-up in the end. The interest for a special field can also be changed. How can the scientific community maintain the enthusiasm in the programmes?

"How far do I see us going? How different will it be? If I just think of space science twenty to thirty years from now I think we might see radically new things. In the last thirty years we have pushed to the edge of the physical universe so to speak. We see back to the big bang and the ripples of the big bang. My feeling is that the next twenty to thirty years in space science will push new questions from chemistry and biology, linking to physics about the universe evolved, and how human beings for example came out of that extreme physical environment. We have already spotted the stars outside the solar system, which have planets going around them. We are discovering more and more planets. The question whether there is life on those planets, for me that is a scientific question, but I would say it is also a human question. That is because I am a human being, not only because I am a scientist. How we collectively evolved from the out of the universe is the challenge of the future and it is a challenge where space sciences can provide information. There is no other way to get it to decide whether we have got the story correct. That is to me the grand challenge the next thirty years."

If future projects are kept smaller and carried out much faster, will that make it easier to keep the interest for space on top?

" It is part of the way to go. It is doing things better. It is always a good motive. I am a strong believer, and a small mission like SMART 1 has lots of new steps in technology, and small in part because some of its instruments are very small. That means in the future we can send better instruments and spacecrafts to more distant environments and learn more in one go than we could in the past. On the



David Southwood

It was in May 2001 David Southwood took up his post as Director of Science (D/SCI), in charge of the ESA Science Programme.

David Southwood is a space physicist who has spent most of his career teaching and carrying out research. He decided to pursue his career in academia and after graduating in 1966 he went to Imperial College London, UK where he obtained a PhD in Physics.

He then went as a postdoctoral student to the University of California Los Angeles (UCLA), a university with which he maintained his connection as he later returned as a visiting professor. In 1971 he went back to Imperial College London, eventually becoming head of the Blackett Laboratory from 1994 until 1997.

Over the past 35 years he has published more than 200 publications and scientific articles, and has worked on a variety of space missions. One of his most challenging tasks was to head the team that built the magnetometer for the Cassini Saturn orbiter of the NASA/ESA Cassini-Huygens mission. He began working in ESA in 1977 as head of Earth observation strategy where he introduced a new programme in Earth science, The Living Planet.

In 1999 he returned to academia to become Regent's Professor at UCLA and then at Imperial College, London. It was in May 2001 that he was invited back to ESA to lead the space science programme.

David Southwood has chaired a number of committees associated with space science in Europe. These include the head of the ESA Space Science Advisory Committee from 1990 to 1993 and the ESA Science Programme Committee between 1993 and 1996.

"I think it will be a catastrophe in many respects, not just the technical catastrophe."

"We cannot be in the forefront of everything, at all times. You can expect that when we do something, it should be at the forefront."

other hand, it is not the only way in which space science will evolve, and advance. Going smaller as a rule is not the only rule we should follow."

Arianespace is in a very difficult period just now, and the result might be that the European launcher programme will be cancelled. If it comes to that what are the consequences?

"I think it will be a catastrophe in many respects, not just the technical catastrophe. That is not the problem. Far more important is the political constraint it imposes on Europe. Europe collectively needs to have an independent launch capability, because by buying the cheapest launcher will leave you ultimately unable to buy a launcher because the person who wishes to sell the launcher can decide not to sell you the launcher. I am a great believer in competition in markets, but at the same time I am a great believer in having, if you can afford it, your own part in the competition, your own horse in the race. Even if the horse does not win every race I feel it is very important. You cannot regard something as strategic as space, and it is not just for space science, it is for independent capabilities in space. Using space like navigations systems, monitoring our environment, and we need telecommunication capabilities, even controlling our broadcasting, all these new things. It does not matter if we buy them from foreign countries, but we should always have our own capability, or we could never rely on having free access to all our own capabilities. I think it is very important. It is a matter of independence. I think in a small country like Norway you have to get together with your neighbours in Europe, and you can operate on the world scale. If Norway were on its own, clearly it would always be of the behest of larger countries that could make decisions on Norway's part. I think Europe is coming together because of these kinds of considerations. Having its own independent access to space is a very critical element in that. "

Small countries are more dependent on ESA keeping a strong position within space research than larger countries. Are small countries important for ESA as well?

" I think that everybody that works for ESA is aware of this. All countries are in ESA more or less because they have to be. In fact, because the other countries are in ESA, a country like Norway is in ESA. As an agency as a whole, we have to bear that in mind. We have to make sure those small countries get their aspirations listened to, and that we act on these aspirations to the degree that we can. I mean, that the aspirations are reasonable. Norway is 1% of my budget, but I certainly give it more than 1% of my thought."

ESA and the European Union will in the future co-operate more closely on many levels, covering many fields. How will it influence the space activities?

" Well, I hope it does not stop ESA being as effective as it has been. In particular, I think you have to realise that the EU is a collective political animal, and it has its administration through the European Commission. It has needs for space data; equally well it regulates large-scale activities in Europe that can use space. Navigation is an example, and environmental monitoring is another. Even in the telecom market. The structure industry in Europe is a concern for the Union and the Commission as the administrative branch of the Union. Nonetheless the agency is an agency for implementing things, doing things that no European nation could do on their own. As a result it is a fine example of all of Europe coming together to do more than Europe could on its own, and for me it is a fine example that the EU can work. I believe in the strength of ESA. Two of our member states, Norway and Switzerland, ate not full members of the Union and I have absolutely no wish to see them disadvantaged in any way. They joined ESA to join the ESA, not the EU. That is a political decision for its citizens, and that should not become an issue for their continued use of ESA."

At last, the Cosmic Vision will be the guiding star for ESA for many years. Will that ensure a Europe still at the forefront in space research?

" If it does not lead to that it would have failed, but I think you can see that in certain areas we have already done it. To give you three examples; we have come closer to Haley's Comet in 1986 than any other agencies space-crafted, and no doubt got to set the scientific agenda for cometry science. Hipparcos, the first astrometry mission that everybody said was not worth doing, except Europe, has proven as a new discipline space astrometry, counting the stars in our galaxy and watching them move. Finally, the infra red observatory, people said it was too difficult to do but we did it, it is finished, it flew. And the American mission that was started at the same time will only be launched this year . That is a matter of European pride. We cannot be in the forefront of everything, at all times. You can expect that when we do something, it should be at the forefront. The American budget for space science is very much bigger than ours. We can certainly be more efficient. Nonetheless, there is a limit as how far efficiency can go. I am an optimist by nature. I suggest anyone who works in the space business is an optimist. I do not think a pessimist gets on too well. So for me, I cannot help it, it is the way I was born."

