

It may turn out to be a great opportunity for Europe in space – providing they don't blow it. Ministers of the 18 countries of the European Space Agency will be meeting in a few days in The Hague to decide the Agency's policy (and budget) for the next three years. Italy will be in the chair. All space powers will be looking on: from China, going strong for the Moon; to ever-mysterious Russia; to India, growing at a vertiginous rate; to Japan and more. Above all, NASA, will be paying attention.

The opportunity for Europe could lie precisely in the timing of this meeting. The US Administration of Barack Obama will not have yet cast in iron a new NASA policy. It could feel freer than before to take the European position into account. A new dimension of collaboration could then be launched between the two most powerful Unions of the world. This is why it is imperative for European ministers to think big. What's at stake is not just a *new deal* with NASA - it is a meaningful presence on the current and future world space scene. If the ministers lose this opportunity through their usual self-serving bickering, there won't be another chance for three years. At that point the rest of the world will have moved on, relegating Europe to the backwaters of space.

Think big in a time of financial crisis? Yes, that's just the thing to do. Back in 1656, Pope Alexander VII Chigi had a hard time convincing his cardinals to finance the Bernini colonnade to crown St. Peter's Square. Bernini's was the most beautiful, grandiose and daring of all the submitted proposals. But it was also, of course, the most expensive. "We're in a deep economical crisis," the cardinals kept saying, and they were right. They faced the equivalent of a plummeting Rome stock exchange. But Pope Chigi (by chance, the seat of the Italian prime minister is called Palazzo Chigi...) had the vision it took and, no doubt with help from the Holy Ghost, convinced his stingy cardinals that a grandiose project was exactly what was called for in a crisis. Besides being beautiful, all those columns needed a lot of workmanship, ideal for stimulating the economy. So today, entering St. Peter square, we stand in awe and look back in gratitude to a daring Pope.

Europe and ESA should be proud of their recent successes. From cracking the origin of antimatter in the centre of our Galaxy, to imaging the dynamics of the Venusian atmosphere, to monitoring the Earth with the biggest ever dedicated satellite, from docking the first European vehicle to the International Space Station, to the Columbus laboratory on the ISS, to starting Galileo, Europe's navigation programme, ESA can look back to some of the best years in its 33-year lifetime as a space power.

Meanwhile NASA, our big brother, has done even more. Think of the stunning robotic exploration of the surface of Mars, of bringing home pristine cometary dust, of the launch of Fermi, the most powerful ever gamma-ray observatory. And all whilst pursuing undauntedly the completion of the ISS and trying, with stiff upper lip, to flesh out Bush's 2004 'return-to-the-moon vision'. True, NASA is encountering some momentous cash-flow problems in tackling such an effort. Still, one Nation, one programme, half a century in space, way to go!

Old Europe, on the other hand, is still far from being one nation. When Roman playwright Terentius wrote “Quot homines, tot sententiae” (so many men, as many opinions ...) he wasn't thinking it could be applied to individual nations trying to peddle their own space agendas. ESA represents 16 of the European Union's 27 states, plus Switzerland and Norway which are not in the EU - twenty-odd centuries of history, twenty-odd languages and a demanding heritage. In this cultural diversity lies the first challenge: “How shall we find the concord of this discord?” asks Theseus in *Midsummer Night's Dream*, and so, no doubt, will our Ministers.

But, at least for science, Europeans have a lot of experience in finding concordance. Think of CERN, the European physics laboratory, started on the ruins of a devastating war and now a world leader. European space scientists have spelled out together their Cosmic Vision, which presents Europe's priorities while offering opportunities for collaborations with NASA and other agencies. This should give ministers a sense of security: science has its act together, and good use is guaranteed for that small fraction (about 12%) of ESA's budget that goes to it. Hail to the founding fathers of European space, who secured a niche for the science programme by rendering it compulsory for all members. They knew how essential it is as a rock bottom for all applications.

European space, however, is a lot more than science: some joke that ESA stands for Exploration, Science, Applications. The ugly head of discordance could rear up in Exploration, robotic and human.

Europe has so far been showing its worth in exploring our Solar System. ESA visited all planetary atmospheres and a European robot is due for the first-ever landing on a comet. But unless it thinks big, and in unity, ESA stands to lose the first three-dimensional movable robotic exploration of Mars, capable of soil drilling down to two meters, a mission now within its grasp. That mission, Exomars, has a personality that is as strong as the problems it experiences in financing and scheduling as an *à la carte* programme. Exomars will be a godsend in terms of technological innovation, particularly for Italian space industry, leading the project. A solution to its dramatic cost overruns simply must be found: failure is not an option. Deeper collaboration with NASA (experiencing similar problems with its own Mars missions) and Russia may be the answer.

Exploration means also humans in space, first on the ISS. But with NASA's Shuttle being phased out, we all have a problem. Access becomes tricky, waiting for the Godot of a new NASA transport system. And let us not, please, be led into the temptation of thinking that the 'private sector' can provide transport to the Station. Thank God, *Slava Bogu*, for our Russian friends and their Soyuz/Progress transporters (for a price).

And Europe? Yes, we already contribute a powerful launcher, a cargo transport and a lively astronaut corps, eager to cavort on the Station. Yes, we're all set for human exploration. All it takes, roughly, is to screw some seats into the cargo capsule – they can do that in Bremen - and, of course, plan a smoother re-entry than burning in the atmosphere. Not to carry ones' own

people into space limits a proud, space-faring Continent, especially so tantalisingly close to it. And any long term, post-ISS vision simply cries out for a better collaboration with NASA. The goalpost is set by China and India, and by how much they are obviously investing in exploration of all kinds, even at the expense of much-needed applications. We Europeans should take a look at their writing on the wall, and at least start studying beyond-Earth technologies.

Last in E-S-A, but by no means least, a set of Applications programmes, also *à la carte*, absorbing the majority of ESA's budget. They are to serve Europe's public policy objectives, based on the needs of industry and the quality of life of individual citizens (whose intellectual needs are served by the science and exploration programmes). The topics are obvious: from global monitoring of our environment, to meteorology, to navigation technologies complementing Galileo, to telecommunications. A lively debate, typically European, is now taking place between ESA and the EU. The former thinks that the EU should take some of this burden off its shoulders, given the political importance of space applications, and that ESA should finance R&D while the Union all the rest. The Union is, essentially, still thinking about it. Meanwhile, ESA should seize the initiative. Go for the start, or strengthening, of such projects as the Global Monitoring for Environment and Security or the European Data Relay Satellite, where there's room for innovation. Think of integrating space applications with terrestrial systems, and of better educating potential users.

Of course, when you add up all the E+S+A described above (plus some negligible overheads...) you get a bill that throws European finance ministers into a fit, in a time of crisis. It's more than ten billion euros over three years. But ministers should go for it precisely because there is a crisis. It will have a lasting benefit for global economy, it will contribute to that knowledge-based society which is at the base of the EU, while making future Europe a lasting protagonist of technology and innovation. May those beautiful and eternal Bernini columns inspire our space Ministers: we, today's scientists, cannot, alas, call on the Holy Ghost for help.

G. Bignami