Exploiting space with low-cost satellites

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At a time when European science budgets are increasingly under pressure UK academia and industry representatives met in London (24th January 2007) to look at opportunities for exploiting space using low cost satellites.

UK industry and academia has developed a unique partnership in designing and building compact and extremely cost effective satellites packed with innovative technology including miniaturised instrumentation, robotics, software and autonomous systems. Such small spacecraft can make a real contribution to scientific research, environmental monitoring, navigation and communications, alongside more traditional larger missions."

Through the European Space Agency's (ESA) Cosmic Vision programme, which looks at an exploration programme for the time period of 2015-2025, there will inevitably be great opportunities for UK industry and academia to provide lead roles in medium and large missions. Ahead of this it is anticipated that there will be several precursor technology demonstrator missions within ESA's Aurora programme which will need lower cost technologies developed over a shorter timescale, and this is where the UK could exploit its expertise in small satellites.

Professor Keith Mason, Chief Executive of the Particle Physics and Astronomy Research Council (PPARC) said, "Whilst it is recognised that some space missions can only be achieved using larger platforms frontier science can be obtained by smaller, more defined satellites.

Bigger doesn't necessarily mean better."

He adds, "The miniaturised instrumentation produced for missions such as Rosetta and in development for ExoMars alongside the recent feasibility study for two lunar missions demonstrate the knowledge and expertise we have here in the UK. There is huge potential for industry and academia to work closer together to take this forward for future missions opportunities."

The advantages of producing small satellites are multiple. Not only can they be produced over a shorter time scale but they cost significantly less – allowing more regular opportunities for the launch of missions. It can also be argued that small satellites allow for more optimised missions by carrying a single primary instrument. This means that there are no compromise issues which often occur on larger missions carrying a diverse payload.

A further factor, particularly with regard to earth observation programmes, is that there is a great need for continuity of data. The technology exists to obtain data but when a large mission comes to an end inevitably there will be gaps in the data sets – which could be critical when looking at earth monitoring studies. This particular need could be addressed through greater use of numerous small satellites.

Nathan Hill, from PPARC's KITE Club Innovation Advisory Service and coordinator of the UK ESA Knowledge Transfer Programme said, "Through the production of small satellites there will no doubt be increased knowledge transfer benefits from the technology which will impact on society. As well as looking for 'spin outs' from science we are also encouraging 'spin in' whereby industry bring some of their novel technology into the playing field. Technologies are developed further for use in space, value added, and then the resulting technology is spun out again for a different application."

One example illustrating how technologies from other industries can have influence on space technologies comes from the oil and gas sector. Instrumentation developed for shallow and remote drilling in oil fields on Earth have many of the same requirements as drilling and penetration instruments on the Moon – in terms of robustness and autonomy. By working together both sectors can benefit from advances in the technologies used.

The workshop brought together representatives of the space industry, instrumentation, aerospace and defence suppliers with technologies to offer in low cost space satellites and miniaturised instrumentation plus the space science, earth observation, space exploration and fundamental physics academic communities – with interests in space based experimental platforms.

Source: Particle Physics & Astronomy Research Council