NATIONAL SPACE CENTRE

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"A science centre can do so much more than entertain, but it must be entertaining".

Richard Attenborough said that; not actually about science centres, but about films. It seems to fit though, doesn't it? A science centre is likely to be run as a charity and have strict charitable objectives, but unless it attracts a mass audience it isn't going to last very long.

The National Space Centre is one of a raft of science centres launched with Millennium Commission funding with the express purpose of inspiring the next generation of scientists and engineers. Leicester doesn't appear an obvious location for such a project until one hears of the brilliance of the University of Leicester's Space Research Centre and its work on missions to Mars, to Mercury, to Jupiter and to look back at Earth.

How are these Millennium centres doing fifteen years on?

... 'Visitor numbers' is the most obvious metric ...

Whatever your measure, the answer is "pretty well". 'Visitor numbers' is the most obvious metric and the most likely determining factor as to whether or not costs are covered. It is also a good indicator of one's worth to society: of the 265,000 visitors to the National Space Centre in 2014, 77,000 were children in school groups led by teachers looking to supplement their classroom teaching with exciting context. It is the same at the Centre for Life in Newcastle, @Bristol, Think Tank in Birmingham and Glasgow Science Centre to single out four of the 60 operations that make up the Association of Science & Discovery Centre network: all striving to meet curriculum needs whilst providing an enjoyable day out.

Most will tell you that visitor numbers are growing, and that the past three years have seen ever-increasing pressure on capacity. Most will say that their ancillary business activities that make best use of their assets are flourishing and adding vital surpluses to the bottom line. All will say that getting hands on capital funding is tough. The really successful ones have cash reserves and some ability to invest their own money, but not enough to build new classrooms, corporate facilities and new exhibition space to welcome ever more people through their doors. The National Space Centre is a case in point, turning away much-prized school and corporate business and regularly running out of car parking space. It has a £3m expansion plan and is able to stump up £1m itself, but doesn't have a dedicated grant funding body to approach for support as do others in the arts, heritage and museum sectors. This sounds like a grizzle and it really isn't: we all recognise how fortunate we have been with our lottery-injected starts in life. There does, however, seem to be a great opportunity to build on success and offer more places to more people. There is employment in it too: 165 people work on site, with a further 25 teachers seconded from their schools for 25 days a year to help deliver National Space Academy programmes across the UK.

So why the growth in volume: is it the economy? Is it space? Probably both. Certainly the three year growth trend mirrors the UK's climb out of recession. The subject of space may be the trump card. Suddenly, it is front page news. First we had Rosetta and the audacious landing of its Philae probe on Comet 67P, "throwing a hammer in the air in London and hitting a nail in Beijing" as Andrew Miller MP recently quoted one scientist putting it. Next came the Americans and their test launch of Orion: the successor to the Space Shuttle with a deliberate nod – in its splash down, trailing red and white striped parachutes – to the iconic Apollo programme. Then we had Beagle 2: the glorious affirmation of correct maths and brilliant engineering combining to land a tiny probe on a distant, hostile planet. We didn't know this on Christmas Day 2003: a terrible misfortune for Prof Colin Pillinger and his team who had put years of their lives into a project that was

... a great opportunity to build on success ...

ultimately let down by a malfunctioning solar panel. It was a bitter-sweet moment for Prof Mark Sims to present images of Beagle 2 from the surface of Mars to a packed press conference eleven years later. Every single box in the most complicated of missions could be ticked. It just didn't transmit.

The image of the UK Space Sector suffered in the original aftermath of Beagle 2: a gross injustice for such a vital contributor to UK plc that leads the world on so many fronts. Its work in planetary exploration, Earth observation, satellite navigation and telecommunications is worth £13bn a year and employs 30,000 people in hi-tech jobs. It has ambitious growth plans and, later this year, supports the first UK national to travel with the European Space Agency to the International Space Station for a six month stint. In Major Tim Peake it has chosen the perfect role model: a helicopter test pilot with the ability to speak and the urge to tweet: a winning combination for somebody already in hot demand to inspire the next generation of scientists and engineers.

... Bringing down the cost of satellite launch ...

Quite how many scientists and engineers we need is an interesting question. 100,000 by 2030 for the space sector alone is the UK Space Agency figure, fuelled by an expectation of a plethora of start-ups capable of taking data from space and turning it into applications useful to all industry sectors and in all walks of life. Telecommunications, banking, public transport, driving, running, cycling, playing golf, looking after the Earth, responding to natural disasters, finding oil, keeping an eye on the kids, keeping an eye on people you want to keep an eye on: all these are already established. Farming, insurance, town planning: locked and loaded. It should be an easy sell and yet, to many, 'space applications' remain unknown, unexplained and seemingly irrelevant. There is a big communications job to be done, led by the Satellite Applications Catapult in Harwell, Oxfordshire. Bringing down the cost of satellite launch will help, and this is where the UK is leading the way with pioneering projects to miniaturise satellites and create reusable space planes. A UK spaceport could soon be built at one of four short-listed sites: not to lift us up for a sub-orbital flight (although that will come) but to launch a myriad small satellites.

This all needs skilled engineers. In 1983 we had 55,000* A level physics students in the UK. Today it is around 35,000 a year; growing from 27,000 in 2006 but still a long way short of where we need to be. Space can help. It may be optimistic to argue that a happy day out at the National Space Centre leads directly to an engineering career, but a recognition that "space exploration" is a great moving factor in teaching the science curriculum. This led to the launch of the National Space Academy in 2011 following a three year pilot programme in the East Midlands. Now, there is a two year student commitment, and this is providing increasing evidence of "impact". Of the eleven guinea pigs who started the post-16 course in Space Engineering (run jointly with Loughborough College and comprising A levels in physics and maths and a BTEC level 3 in engineering), six had no family history of higher education. Nine of the eleven got the grades needed to go to their first choice university and one took an apprenticeship with Airbus. The eleventh hopes for an apprenticeship with Rolls-Royce. Cohorts two and three appear to be heading in the same general direction and similar full-time courses have been started in Banbury, Birmingham, Salford and Twickenham. 500 students will be taught this way by 2016 and other colleges are asking to join the affiliation. A further 5,000 students and 1,000 teachers a year take part in half and full day master classes. A post-18 Higher Apprenticeship in Space Engineering is just under way.

... land a tiny probe on a distant, hostile planet ...

With high fixed costs and an innate desire to keep costs affordable for families, science centres have developed highly creative ways of generating additional income. Some rent out space for office use or events, some have ice rinks at Christmas and some create exhibits for purchase or hire. The National Space Centre has NSC Creative: an animated film production company that makes planetarium and simulator shows for clients worldwide. With shows currently playing in over 400 planetaria in 30 countries, it employs 30 full-time, highly creative individuals who are also masters of story-telling: vital if you are to entertain a diverse audience with a great range of age and understanding.

**numbers from the Institute of Physics*