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Reaching for the Moon

Naive or not, NASA's next shot at landing on the Moon can succeed only if it is launched as a genuinely international collaboration.

In 2018, according to a timetable announced last month, the United States will send astronauts to the Moon for the first time since 1972. Four people would stay on the lunar surface for up to a week, having arrived in a new lander attached to a new crew transport launched by rockets derived from the space shuttle. Eventually they would live for six months at a time in Antarctica-style outposts.

The estimated price tag to develop all this new hardware is $104 billion between now and the first landing. Or rather, the seventh lunar landing as NASA likes to call it, to emphasize continuity with the past. The goal this time is not just flags and footprints, not just beating the Russians, but the beginning of humanity's permanent expansion into the Solar System. To even talk in such terms implies a particular view of human progress that some find inspiring and others dismiss as almost childish. In a time of war, hurricanes and soaring energy prices, is shooting for the Moon optimism or hubris? Either way, NASA seems to be set on this particular course.

Given that public opinion is divided on the subject, and that there's no real rush to return to the Moon, the space agency has a responsibility to execute the idea with as little waste as possible. That will require a major change of tack at NASA, as well as bold new approaches to both domestic and international politics.

On the domestic front, Congress needs to back off from the parochial meddling that has long contributed to NASA's inefficiency. Senators from Texas and Florida, where key NASA centres are located, are already trying to fend off cuts to the space shuttle and space station that are needed to pay for the Moon missions. NASA administrator Mike Griffin, who has an engineer's instinct for efficiency, has said that NASA's workforce will remain about the same size as it is today. But the agency may need skills in new areas, and the jobs may be in different congressional districts. Griffin needs the freedom to make these decisions based on his practical needs, not on political considerations.

Nor should the United States try to go it alone to the Moon. Japan and India are taking their own first (robotic) steps in the same direction in 2007, with scientific missions sent to lunar orbit. So is China, which is also building up a modest capability to launch people into space. Europe and Russia are making their own cautious plans for lunar exploration as they watch NASA's plans unfold.

All these partners are interested in building up their own domestic capabilities in space, so a certain amount of duplication of effort is inevitable. But to every extent possible, the construction of a lunar base should be an international venture that takes advantage of each partner's strengths and interests. Canada and Japan might emphasize robotics, for example. Russia builds reliable spacecraft and rockets. A lunar programme should include no more overlap than is required to ensure a back-up for essential technologies.

The International Space Station has hardly been an inspiring model for such an enterprise. So far the coalition that is building it has held together — but NASA's partners in Europe, Japan and Canada are still nervous over whether the United States will renege on its commitment to launch their modules. It is unclear, to put it mildly, that any of the partners will get their money's worth.

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Building a permanent human presence away from Earth is a far more daunting venture, and can't be handled in the same way, with a single memorandum of understanding between the international partners. The collaboration will take place in many shapes and forms over decades, and must, therefore, be truly collaborative in both spirit and practice, in a way that the US-led space station has never been.

If we are to accept the high-minded premise that humanity is poised to take its next evolutionary step, then the politics of the Moon programme should be high-minded too. The alternative is to admit that this is just another pork-barrel project. The onus remains on Griffin, the Bush administration and their prospective international partners to show that it will be any more than that. ■

In need of rehab

The reputation of one of the world's most respected regulatory agencies is on the wane.

The US Food and Drug Administration (FDA) is in trouble. Last month's abrupt resignation of its commissioner, Lester Crawford, leaves the agency again bereft of leadership as it struggles to absorb the aftermath of last year's traumatic withdrawal of the painkiller Vioxx.

The Vioxx episode has left the agency in crisis, facing immense, conflicting pressures from watchdog groups and the pharmaceutical industry on how it should handle drug approvals. In these circumstances, the agency needs a commissioner who can rise above the political fray and convince the public that the FDA is in safe hands, while taking a sophisticated and innovative approach to drug approval. Unfortunately, there is little sign that it's going to get one.

The reasons for Crawford's departure, only two months after his confirmation in the position by the Senate, remain murky. The timing of the announcement — on a Friday afternoon as Hurricane Rita bore down on the Gulf coast — bore all the hallmarks of an effort by the Bush administration to bury the event (see *Nature* 437, 606; 2005).

To the surprise of the agency's supporters and detractors alike, the

Bush administration announced that Crawford would be replaced on an acting basis by Andrew von Eschenbach — who would also continue to serve as director of the National Cancer Institute (NCI), a massive research agency with a stake in some of the FDA's toughest regulatory decisions. Last Friday, von Eschenbach admitted that this would be impossible, and said he would temporarily shelve his daily duties at the NCI and excuse himself from some cancer-related activities at the FDA (see page 802).

Crawford's record as acting and then permanent head of the FDA was underwhelming. He had little public visibility and seemed reluctant to back up his own scientific advisers when their advice ran counter to Bush administration doctrine, for example to make Plan B, the morning-after contraceptive, available over-the-counter from pharmacists (see *Nature* **437**, 179; 2005). Now his departure is being left wholly unexplained, prompting reports of financial conflicts, as well as a bipartisan congressional investigation.

It is not clear that von Eschenbach can do much better. The 63-year-old urology surgeon has exasperated NCI researchers by making it a goal to end suffering and death from cancer by 2015 — an improbable aim he describes as "within our grasp". His public commitment to more rapid approval of experimental cancer treatments also deserves close examination in the light of several drug withdrawals, for safety reasons, in the past year alone.

In his three years at the NCI, he has become known as a hands-off manager who leaves the workings of bureaucracies under him largely to subordinates. This is not the prescription for an agency that has been rocked by serious crises and that now needs a leader with a firm grasp of policy details that ultimately affect millions of lives.

Yet if past inattention is any indication, it seems likely that the White House will leave von Eschenbach — a Bush family friend — holding the fort at the FDA while it is preoccupied elsewhere. That would leave an agency that has lacked a permanent head for most of Bush's presidency in limbo yet again. Three years ago, a government survey of 400 FDA scientists found 18% of them reporting that they "have been pressured to approve or recommend approval" for a drug "despite reservations about the safety, efficacy or quality of the drug". In the absence of firm leadership, scientists at the FDA's headquarters in the Washington DC suburbs will be left to do battle with ideologues such as Scott Gottlieb, a 33-year-old physician and former Wall Street tipster who was appointed in July as deputy commissioner for medical and scientific affairs at the agency.

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Perhaps the most worrying prospect is that of an agency left to drift and further neglect under a stop-gap commissioner for another three years, until Bush has served out his term. His administration needs to find a well-qualified, permanent FDA commissioner — and soon. ■

Welcome *Nature Physics*

The launch of a new *Nature* journal comes at an exciting time for physics.

People have stopped talking about 'physics envy'. Time was when other sciences were jealous of the prestige and funds attracted by physics, and also of its success in capturing the imagination, as it uncovered revolutionary ways of thinking about, and predicting, the constituents and governing principles of the Universe.

Nowadays, thanks to the allure of biology's progress and benefits, physics is just another discipline. But its decline in prominence should not mislead. The next generation of particle accelerators promises insights as deep as any of their predecessors, in particular in understanding the origins of mass and the symmetries underlying the laws of nature. The enduring conjugal relationship between physics and mathematics continues to stimulate both. Understanding the behaviour of electrons and light within condensed matter continues to yield not only surprises in understanding but also new technologies. And physicists' habit of thinking about the underlying questions leads them still to speculate beyond the current limits of experiment. Where does quantum mechanics fail? Is information a more fundamental quantity than hitherto realized?

It is with the enduring enticement of these challenges in mind that we welcome the launch this month of our sister publication *Nature Physics* (www.nature.com/naturephysics). It is also an indicator of success. After the Second World War, *Nature* ceased to be a vehicle for the physics community. It was only after the advent of high-temperature superconductivity that physicists began to rediscover the journal's value. Over the succeeding two decades or so, *Nature* has re-established itself as a prime physics outlet.

At the same time, the publishing habits of physicists have also evolved. Preprint servers are now commonplace for some branches of the subject, without damaging journals. The number of papers published has grown by 3% per year, but there have been significant shifts in regional output. Between 1981 and 2001, US research output in physics fell by 1.5% (to 19,500 papers per year), Western Europe saw research output grow by 56% (to 29,100 papers), and output in Asia grew by 120% (to 22,500 papers). Within Asia, China saw its output grow from 500 articles to 5,500, Japan's grew by 67% to 11,000 and India saw a 40% increase to 2,100 papers.

Perhaps the most significant shifts are in the distribution of the physics community over that period, with the number of PhDs in physics declining markedly in the United States and Europe but increasing dramatically in Asia. *Nature* and its related journals have always had internationalism as a key ingredient, and have reflected regional growths in strength.

"Experience has shown that launching sibling research journals strengthens *Nature*. More importantly, it stimulates the discipline."

Experience has shown that launching sibling research journals strengthens, rather than weakens, *Nature*. More importantly, it stimulates the discipline by providing greater exposure thanks to our media and web strengths, and, above all, by providing healthy competition to established journals, to the benefit of authors and readers everywhere. *Nature Physics* is set to follow this tradition. ■