



## Futuristic design lands in Nottingham

**THE next phase of the expansion of The University of Nottingham's increasingly futuristic Jubilee Campus is set to begin at the end of October 2008.**

East Midlands Development Agency, *emda* are investing £9million in a state-of-the-art building for the GNSS Research and Applications Centre of Excellence (GRACE). This will be built on on development land off Triumph Road, close to the new Gateway Building.

GRACE will focus on the commercial exploitation of research, training and new application development based on satellite navigation and positioning systems such as the American Global Positioning System (GPS) and Europe's Galileo system.

GPS is already familiar throughout the world and, like the Russian GLONASS satellite system, was originally devised for military uses. Its European counterpart Galileo aims to have 30 navigation satellites in orbit, with a ground support infrastructure, and give Europe its own independent satellite navigation system. The system is planned to be fully operational by 2013.



Part of the inspiring new Jubilee Campus



A computer illustration of how the new GRACE building will look

The GRACE building should capitalise on the growing and increasingly important Global Navigation Satellite Systems (GNSS) technology sector which, according to *emda*, already generates 120,000 related jobs in the East Midlands. As a national centre of excellence, GRACE will also further enhance Nottingham's reputation as a key centre for scientific research and stimulate the creation of new companies and employment.

The three-storey, 2,100m<sup>2</sup> structure is being designed by Nottingham architects Maber – unlike the other three new buildings and the Aspire sculpture on the University's new Innovation Park – these were designed by Make Architects.

However, like all the buildings on The University of Nottingham Innovation

Park, GRACE will be designed using sustainable technologies to give it a low carbon footprint.

Richard Wigginton, Capital Projects Officer in The University of Nottingham's Estates office, told *Wavelength* that GRACE's outward appearance would be distinctive utilising silver and black zinc cladding similar to that of the Gateway Building.

He added: "The city has brought in the Merton Rule so that ten per cent of the building's energy must come from renewable sources, irrespective of the University's own expectations on the subject [the Merton Rule was first introduced by the London borough of Merton]. It means the building will be thermally efficient, with low energy demands, and will use a biomass boiler."

# New Science Park ignites interest

**THE first tenant businesses should be preparing to move into the new No.1 Nottingham Science Park by November, according to award-winning regeneration agency Blueprint.**

“We hope that by November we will have signed someone up – our lawyers should be drawing up contracts by then,” said John Long, a development director at Blueprint, which has built the £50m sustainable complex opposite Highfields Park as an extension to the original Nottingham Science Park.

He described the latest developments to *Wavelength* at Picnic in the Park, a celebratory opening event for the new science park held in September which featured a speech by MP Phil Hope, the minister for the East Midlands.

Mr Long said “about half a dozen” science and innovation companies were in discussion about taking up space in the new building. They work in areas such as IT, health research and high-tech engineering.

“They are not household names,” he said. “They are SMEs looking for move-on space, each after between five and ten thousand feet.”

However, two large well-known companies are also looking at building new offices on the vacant land adjacent to the No.1 building.

“Both the parties are household



L to R: Nick Ebbs, CEO of Blueprint; Minister for the East Midlands Phil Hope; Jeff Moore, CEO of *emda* and chairman of Blueprint; Sylvia Hargreaves, Blueprint project director for the new science park



Guests enjoying Picnic in the Park at Nottingham Science Park

names,” said Mr Long. “If both deals go through there will be space for a third. But we might get neither.”

Earlier, No.1 Nottingham Science Park was officially opened to the applause of around 250 guests.

Minister Phil Hope was joined at the speaker’s lectern by Blueprint CEO Nick Ebbs and Jeff Moore, CEO of *emda* and chairman of Blueprint.

Mr Moore said that the 42,000 sq ft No.1 building, with the Toyota Centre and Highfields Castle College Automotive & Engineering Training Centre – which share the science park site – would support the regional economy and, “help Nottingham to consolidate its designation as a Science City.”

This was reiterated by Mr Hope, who is MP for Corby. He said the new science park, which he had not seen before, had the “wow” factor. And, taking a lead from No.1’s low carbon footprint, he challenged local business leaders, developers and local authorities to work together to make the East Midlands a leader in energy efficient technologies.

Commercial buildings accounted for 17% of the UK’s carbon emissions, he added – the equivalent of 90 million car journeys.

Speaking afterwards to *Wavelength*, Mr Hope said what impressed him most about the new science park was its “cleverness.”

“It startles you, it makes you think,” he said, also forecasting that the park would attract companies from overseas. But Mr Hope is not a total stranger to Nottingham’s science property offer, having visited BioCity earlier in the summer.

Mr Hope was speaking a few days after news of the latest turmoil on Wall Street. Amid such dire economic news, did he think that the new science park would have gone ahead if the idea was suggested today?

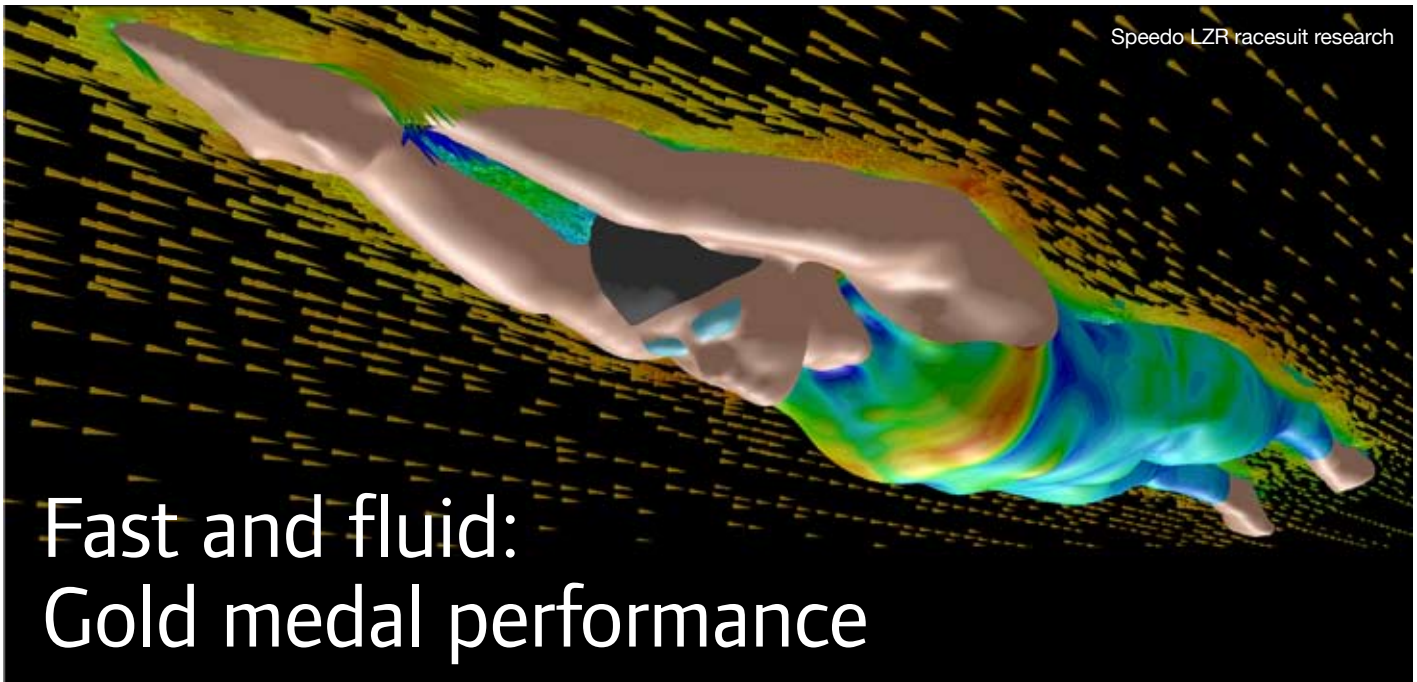
Yes – it was exactly at times like this that such investment was needed.

“It becomes even more necessary at times of economic pressure; that’s when these platforms become critical to ensure economic success.”

Would there be any more government money to support awareness of the Science Cities?

Mr Hope said government already put money into agencies such as *emda* for that very purpose.

Picnic in the Park was also marked by the presentation of a good design award to Blueprint by Nottingham Civic Society. In September, Blueprint was named ‘Developer of the Year’ at Property Week’s Midlands Property Awards while No.1 Nottingham Science Park itself, designed by Studio Egret West and Hawkins Brown, won ‘Design-led Project of the Year.’



Speedo LZR racesuit research

# Fast and fluid: Gold medal performance

## NASA. Computational Fluid Dynamics. Mansfield. Spot the connection?

The missing link is Rebecca Adlington, the young swimmer who returned home to Mansfield from Beijing a hero this summer with two Gold medals for winning the women's 400m and 800m freestyles.

As many Olympic viewers cannot fail to have heard, Adlington, and a great many other swimmers, competed in China while wearing a new Speedo swimsuit called the LZR Racer.

What most worldwide Olympic watchers will not have heard is the detail of the scientific research which went into the suit, which was deemed so successful that Speedo was ordered to make it available to all athletes who wanted one. Speedo took 3,000 of the suits to Beijing.

The suit was designed in Nottingham by Speedo AQUALAB, in Aspley, with expertise and technology borrowed from a wide variety of sources including NASA and the University of Nottingham's School of Mechanical, Materials and Manufacturing Engineering.

In essence, a world-wide research team came up with a swimsuit which streamlines swimmer's profiles and places low friction fabrics at key positions in the suit to minimise drag.

One element of this was analysis of drag reduction using Computational Fluid Dynamics, a computer modelling of fluid dynamics which is used for analysis in

fields such as engineering, aeronautics, energy and biomedicine. The specialist software was provided by ANSYS' Sheffield office and US company Optimal Solutions.

Dr Herve Morvan, a lecturer in fluid mechanics at the University of Nottingham who joined the AQUALAB team in 2007, was one of the experts who worked with Speedo to produce the design for the suit.

And, yes, he's already beginning work with Speedo to help improve the suit still further for the 2012 London Olympics. Which leads one to ask: how do you make human beings move even faster through the water?

"I don't want to talk about it too much because it's very early days but work has started which aims to try and make the suit even better," says Dr Morvan. "We certainly have ideas that we'll be exploring but of course we first need to know whether those ideas are feasible. But Speedo is working from a solid base."

So, one has to wonder, did Dr Morvan watch the Beijing Olympic swimming coverage and quietly say to himself 'ah, there goes my work!'

"Certainly, I looked at the competition with a different eye because I was involved in the project. There were feelings of pride but I didn't think it was 'my work' because it was such a big team effort led by Speedo AQUALAB" he says.

But Dr Morvan stresses that, sadly,

simply wearing a LZR Racer suit won't make champion swimmers out of most of us.

"It's all about fine-tuning. The suit obviously helps athletes optimise their already excellent performances. You, or most people, won't become a champion simply by wearing the suit. It comes from 80 years of swimming expertise at Speedo and is about helping people who are at the top of their game."

NASA's contribution was the provision of wind tunnel tests to measure the drag, or friction, of various materials. What Speedo was after was a material that reduced friction drag as much as possible. But this material had to dovetail with many other complex aspects of the overall suit design.

"The fluid analysis is only one aspect of it. You have to come up with a fabric and design that work globally and that involves not only expertise in hydrodynamics and fabric but also suit design; it involves the athletes, the coaches and tests at the Australian Institute of Sport. It's a vast spider's web of engineering and sport expertise.

"Then there are the biomechanics and physiological aspects – because the suit has to work in terms of swimming mechanics and efficiency. It also helps recovery in the sense that while it optimises an athlete's performance it also prepares them for the next one. It's quite phenomenal really – really exciting stuff."

# 'Green chemistry' begins to grow

## CLINICAL TRIALS to test improved forms of drug delivery designed in Nottingham with 'green chemistry' processes should be completed in 2009.

The delivery device involves embedding a drug inside a degradable 'polymer' (plastic) which should extend the length of time a drug remains active inside a patient's body. This would allow patients to reduce the number of injections they receive to treat conditions such as growth abnormalities.

"The reason this is exciting is that if you ask a patient do you want to have an injection every two weeks or have to come to hospital for an injection every day, what answer do you think they give?" said Steve Howdle, a Professor from the School of Chemistry at The University of Nottingham — an expert on the applications of supercritical fluids (SCFs).

SCFs can be formed from common substances such as carbon dioxide when subjected to high pressure. They have multiple applications in chemical processes and best of all do not produce any harmful wastes. They can replace the use of toxic materials such as benzene or chlorinated solvents; hence their importance to 'green chemistry.'

Professor Howdle described his research findings at an evening seminar held at BioCity titled "What is Green Chemistry and How Can It Protect Our Environment?"

He was joined by Professor Martyn

"The reason this is exciting is that if you ask a patient do you want to have an injection every two weeks or have to come to hospital for an injection every day, what answer do you think they give?"

Steve Howdle, School of Chemistry  
The University of Nottingham

Poliakoff CBE, FRS, a world leader in green chemistry, who helps lead the Driving Innovation in Chemistry and Engineering (DICE) research project at The University of Nottingham. DICE opened in January 2008 and has received £4.4million in funding to research green chemistry at the interface between chemistry and chemical engineering.

Current areas of research include catalysts for making sustainable commodities, new applications for polymers and making nanocrystals from renewable materials.

Professor Howdle, who is working on polymers, said that supercritical CO<sub>2</sub> was best described as having a combination of liquid and gas like properties; its ability to liquefy polymers at low temperatures opens up many new processing routes, and importantly this can be carried out at close to room temperature — ideal for very delicate modern drug molecules.

The polymers his team produce have multiple medical applications. One example is in bone tissue engineering where the polymer with the right growth factor added can act as a support base allowing bone cells to grow and repair damaged bone. One surprising finding is that live cells can be successfully 'seeded' inside a polymer structure using SCFs.

Professor Howdle said: "This is surprising because what we are doing is exposing the cells to the same kind of pressure experienced at the bottom of very deep seas, and we wouldn't have expected them to survive. But the cells grew beautifully afterwards."

Critical Pharmaceuticals LTD, the spin-out company formed by Professor Howdle in 2002 and based at BioCity, is currently using SCFs to make better polymer drug delivery devices for medicines such as human growth hormone. Clinical trials of the devices in people should be concluded in 2009.

"If those tests are successful, then we will have shown that SCFs and our research can really help patients. Our aim will then be to extend the technology to a much wider range of drugs and diseases."

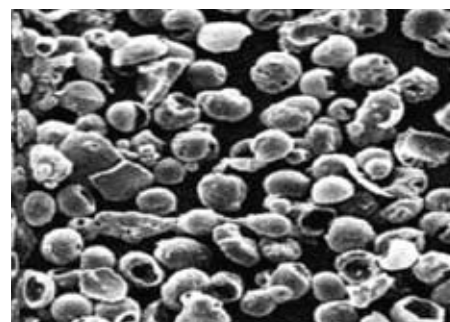


Fig 1: Tiny injectable polymer particles prepared by SCFs for drug delivery applications



Fig 2: 3D microtomography image showing very poor repair in the absence of growth hormone

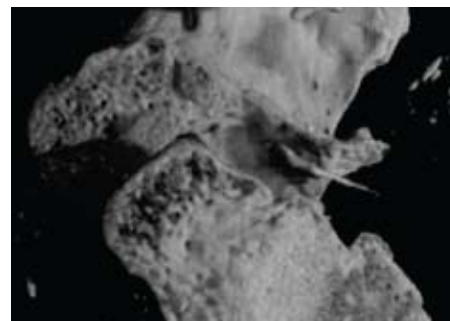


Fig 3: 3D microtomography image showing excellent repair of bone stimulated by growth hormone

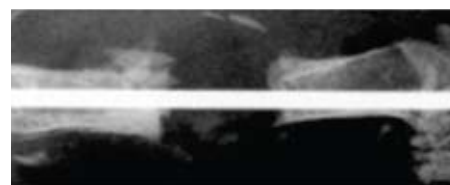


Fig 4: X-ray image showing poor repair- the thick white line is a supporting splint



Fig 5: X-ray image showing complete repair of broken bone when growth hormone is present

# BioCity provides fertile thinking

**MICRO LABS on microchips and freeze-dried sperm in the pantry. And meanwhile an Olympic athlete is having her eggs frozen in Nottingham so she can have children after the 2012 London Olympics...**

Such were among the intriguing developments in the fast-moving world of human fertility treatment that were revealed at the BioCity annual lecture, held in early October.

The prestigious event, in its sixth year, saw complementary talks to around 150 invited guests by two of Britain's and the world's leading fertility experts: Dr Simon Fishel, MD of CAREfertility in Nottingham and Prof Harry Moore, co-director of the Centre for Stem Cell Biology at the University of Sheffield.

The event was followed by the official opening of BioCity's R4 extension, named the Laurus Building, the word laurus being Latin for success. Among those in attendance at the opening was Minister for the East Midlands Phil Hope.

Taking as their central theme, '30 years of IVF – the Medical and Scientific Challenges at the edge of Ethical and Moral Dilemmas', Prof Moore concentrated on the potential treatments made possible by new research into human embryonic stem cells – one of the major spin-offs from fertility research – while Dr Fishel touched on the changing ethical environment and looked ahead to future developments in fertility treatment.

The theme was apt because it is 30 years since the birth of the world's first 'test-tube baby', Louise Brown.

**"It was now possible to freeze eggs quickly just as it is possible to freeze sperm. This ability has caused a "paradigm shift" enabling women to put off childbearing until later in life."**

Dr Simon Fishel, MD of CAREfertility in Nottingham



Prof Moore said human embryonic stem cells now had the potential to be developed as cures for a wide range of degenerative diseases and conditions. But research was still in its infancy and there was a problem of "hype", or false expectation, about how quickly scientists could produce actual treatments.

"A lot of people have faith in medical progress and realise that it takes years to come up with a treatment," he said. "It's really the politicians who have trouble with this because they have much shorter time-spans and want things to happen more quickly."

Nevertheless, human stem cells are now so valued that nine different 'lines' are available in a UK stem cell bank for researchers.

Prof Moore picked out four other potential uses for stem cells – as heart cells, as insulin-producing cells, as neurones and as placental cells.

"The challenges are: how do we direct differentiation?" he said.

Yet Prof Moore, who founded Accordia, a company which develops treatments from stem cells, added that he hoped that first stage clinical trials on a stem cell-based treatment for age-related macular degeneration, which causes blindness, would take place within 18 months.

Dr Fishel, who worked alongside the pioneers of IVF, Patrick Steptoe and Robert Edwards, at Cambridge, said the ethical challenges facing fertility

researchers was "daunting."

But ethical standards, he said, depended on the current social situation and could change. Thus, researchers such as himself were once "pilloried" for certain fertility techniques which were now accepted as normal.

Looking to the latest developments in fertility, for example, Dr Fishel said it was now possible to freeze eggs quickly just as it was possible to freeze sperm. This ability had caused a "paradigm shift" enabling women to put off childbearing until later in life.

He continued: "We are just about to freeze an Olympian's eggs because she reckons that she'll probably be around for the 2012 Olympics and she realises that she can't have children before then – so she wants her eggs frozen."

In the future, the cloning of human beings will become a viable option; so will the production of sperm using skin cells – a breakthrough that offers the possibility of asexual reproduction. Such major developments will throw up new ethical dilemmas.

Dr Fishel ended his talk by suggesting that in future, nanotechnology might also enable a 'lab on a chip' to grow human eggs. And that just as sperm can be frozen for future use at the moment, so one day it might be stored in powdered freeze-dried form.

"Why not have it stored freeze-dried in the pantry?" he said.

# GameCity 3 ready for action

**IAIN Simons is a happily self-confessed computer nerd whose formative years were spent playing Sheep in Space on a Commodore 64. But now, at 34, all that bedroom time has paid off since Simons is both a journalist specialising in videogames and the director of Nottingham's own international games festival, GameCity, which is in its third year and coincides with the national Science City summit.**

In fact, the two events have more in common than calendar dates, since Science City guests are set to be entertained by an evening of free game-related activities put on by GameCity3 on the summit's first evening. But while the summit ends on October 31, GameCity3 is a three-day affair that continues until November 1 and will bring thousands of people into contact with new and established games, their designers and the global buzzing games culture.

Risking the pun, but computer gaming is hardly child's play. The value of games sold in the first six months of 2008 totalled £738m in the UK alone – representing sales of 31.3m units across all formats. That was a staggering 42% increase on the previous year's half-year figures. So much for recession. According to industry body the Entertainment and Leisure Software Publishers Association (ELSPA) the gaming industry is enjoying a 'golden era', with the average age of UK gamers now being 33.

But science and computer and console games? One could argue that the gaming industry is made possible by science since computer games are, after all, based on programming, software writing and hardware developments. But Iain Simons also sees common ground in creativity.

"Games give people the permission to be interested in lots of interesting stuff," he says. "Science does the same in that it keeps alive your sense of wonder."

Another connection between Science City and GameCity is an approach which encourages informality and access. At

GameCity, for example, game players will have the chance to meet and talk with game designers – a breed who don't normally have the chance to get close to its fan base.

And then there's the learning link. In September this year, for example, ELSPA trumpeted a Learning and Teaching Scotland report that pupils who daily played Nintendo's Dr Kawashima's Brain Training improved their maths attainment and levels of concentration.

Of course, most games to date have not made an issue of their potential to raise the level of GCSE grades. But even so – many games require manual dexterity, quick-thinking and problem-solving skills. Or as Iain puts it: "You cannot be stupid and play video games. You can't not be co-ordinated and you can't not problem-solve. But a lot of people don't appreciate this about

videogames and that's because the industry is not very good at explaining itself. It's a PR problem."

This year, GameCity3, which began as a Nottingham Trent University project and continues to receive the bulk of its funding from it, is split into two main parts: a public event in Market Square and ticket-only events for more specialist audiences at Gatecrasher club.

Along the way there'll be the launch of the National Videogame Archive, which has been put together by Nottingham Trent University researchers and will be housed in the National Media Museum, Bradford. The Guinness Book of Records people will also be officiating as gamers attempt to break and make various game-playing world records.

Asked to pick out his own three GameCity3 highlights, Iain chooses events with:

- Harmonix – the US games company responsible for the best-selling Guitar Hero and Rock Band series, including the new Rock Band 2, for the X-Box 360.

"Harmonix is a bunch of MIT graduates whose project is to make software that lets non-musicians feel what it's like to play music. It's like a university project that has become a series of global brands."

- Travellers Tales – a UK software house whose latest release is Lego Batman: The Video Game, following on from Lego Star Wars II, the Original Trilogy, Lego Star Wars: The Complete Trilogy and Lego Indiana Jones: the Original Adventures.

"TT is a really interesting company who make games targeted at younger players. They make brilliantly radical games disguised as games for kids – in the Lego games, for instance, you can't die..."

- Media Molecule – makers of innovative PS3 game LittleBigPlanet.

"This is an amazing game, probably the most anticipated game of 2008 – it's all about creativity and sharing your content and ideas with other players."

\*GameCity3 begins on October 30. For more information and tickets go to [www.gamecity.org](http://www.gamecity.org)



# Flu fast response unit

**THIS summer Nottingham Trent University announced that it was helping to develop a portable machine capable of rapid diagnosis of bird flu, including the deadly H5N1 strain which has caused the deaths of over 240 people.**

A press release described how scientists from Nottingham Trent University's School of Science and Technology were part of an international team working on an EU-financed project titled Portfastflu, which aims to create a portable device capable of cutting the time of diagnosis of strains of flu from up to a week to just two hours.

As there is yet no definitive vaccine for bird flu the device has the potential to prevent the development of a pandemic, thus saving many lives, since rapid diagnosis should enable the quick establishment of exclusion zones and other control methods where flu is identified.

The Nottingham Trent University press release came out on August 14. By the next day the national BBC News Online website was carrying an article on the research and followed this up with a video featuring an interview with one of the university's research team, molecular biologist Dr Alan McNally.

But that wasn't all.

The Daily Telegraph also had the story on the 14th, along with The Times,

Nottingham Trent University's School of Science and Technology are part of an international team working on an EU-financed project titled Portfastflu, which aims to create a portable device capable of cutting the time of diagnosis of strains of flu from up to a week to just two hours.



adding the unsettling detail that the Government's risk register estimated that up to half of the UK's population could become ill if a flu pandemic was to break out.

The Daily Mail and Daily Express ran with the story, as did The Daily Star under the surprisingly sober headline 'Bird Flu Detection 'In Two Hours'.' Another red-top tabloid, The Sun, began its coverage with the alliterative intro, 'Boffins are making a bird flu detector at a British University.'

And according to the Nottingham Trent University Press Office, other national media outlets also covering the story included BBC Radio 2, 4 and Radio Five Live, BBC World Service and Channel 4 News.

It was further covered by dozens of key regional newspapers such as the Yorkshire Post and Manchester Evening News, and specialist publications and online sites too - including two pieces in the online edition of Nature magazine.

Indeed, when *Wavelength* googled the words bird flu and Nottingham Trent University the search engine came up with more than 3,500 results. Thus, we know that other well known and less well known media which helped spread the word about Nottingham's scientific research prowess included:

News-Medical.net; the poultrysite.com; microbes.info ('the Microbiology Information Portal'); Medical News Today; Meatinfo.co.uk ('the Online Meat Trades Journal'); The Hindu; Iran-Daily.com and the Information Agency of the Tatarstan Republic in Russia.

This all added up to valuable global publicity for Nottingham Trent University and Nottingham's reputation as a Science City.

But the mainstream media could have had their pick of good science stories coming out of Nottingham this summer. In August, the university also reported that it had been conducting research which suggested that adverse weather conditions at the Beijing Olympics could actually help athletes improve their performance.

The University of Nottingham press office, meanwhile, has also been pouring out interesting stories. A pick of the summer science press releases includes, 'Nottingham at forefront of research into childhood brain cancer', 'Nottingham researchers in dementia breakthrough', 'New blood biting back at Malaria', 'New Centre of Excellence in Parkinson's disease' and 'Possible link found between diagnostic radiation and prostate cancer.'

# A meeting of minds

**THE 5th national Science Cities summit being held this October will be a double first for Nottingham.**

Not only will the annual event be taking place in Nottingham for the first time, but it will also see the handing over of the chairmanship of the Science Cities nationally to Nottingham.

Professor Neil Gorman, Vice Chancellor of Nottingham Trent University and chairman of Nottingham Science City, will now also be chairman of the National Science Cities consortia, representing all six of the Science Cities, for 12 months. The chair was previously held by Birmingham.

As briefly reported in the last edition of *Wavelength*, the Science Cities summit takes place on October 30 and 31. The invitation-only event will be held at BioCity and will have 'Sustainable Futures' as its theme.

Speakers are to include BioCity CEO Dr Glenn Crocker; Jonathan Kestenbaum, CEO of the National Endowment for Science, Technology and the Arts (NESTA); Louise Seymour, Principal Project Officer of Nottingham Regeneration Ltd; and Professor Chris Rudd, Pro Vice-Chancellor of The University of Nottingham.

At the time of writing, the keynote address was set to be given by Lord Drayson, Minister of State for Science and Innovation (DIUS).

Day one will comprise talks and discussions between representatives of the six Science Cities representatives, government and universities. The



work will be followed by an interactive exhibition at the Malt Cross in St James's Street staged by GameCity 3, the festival of computer and video gaming which is taking place in Nottingham at the same time as the conference (see separate article). The evening will culminate with dinner at Nottingham Castle.

Day two will be workshop-based and will feature contributions from invited businesses.

The workshop themes are 'Healthcare', 'Digital Media', 'Energy' and 'Young People in Science.'

Neil Horsley, CEO of Nottingham Development Enterprise, which is facilitating Nottingham Science City activity and awareness, said: "The conference will give us a chance to meet

our colleagues from all the other English Science Cities and discuss important issues of common interest, particularly the vital contribution that science is making to our economies and other key areas such as energy and healthcare.

"However, the event will also help to focus interest on Nottingham itself and the great strides the city has made in developing its science sector - through its attractive property offer and the business support which is offered to the many science and innovation companies that are choosing to base themselves in the city."

It is hoped that delegates will be encouraged to stay on after the conference to enjoy the rest of GameCity, which continues until November 1.

## What is Nottingham Science City?

The Government designated Nottingham as one of the six Science Cities in March 2005. Nottingham holds this science status to acknowledge a rich science heritage, from the invention of ibuprofen and the MRI scanner, to Nottingham's present strengths, including two of the country's leading research universities.

Nottingham Science City is supported by a number of organisations and they include: The University of Nottingham, Nottingham Trent University, Nottingham City Council, Greater Nottingham Partnership, East Midlands Development Agency, Nottinghamshire County Council, Nottingham Development Enterprises, Nottingham Regeneration Ltd and the Learning and Skills Council.

**Nottingham Science City aims to:**  
**NURTURE...** Nottingham's role as an international leader in scientific discovery and teaching excellence  
**STIMULATE...** community pride and interest in our scientific heritage  
**CONVERT...** science into thriving businesses in Nottingham