

## The IET-BCS Turing Lecture History

### Introduction

In the beginning there were the Turing Memorial Lectures, proposed by the Turing Trust under the chairmanship of Prof Donal Michie (<http://turing.ecs.soton.ac.uk/trust/>), to be delivered by acknowledged authorities on topics related to selected aspects of Turing's work. This eventually became possible after the establishment of the Turing Institute in Glasgow. In association with the University of Strathclyde, the Institute hosted seven public lectures in the period 1985-93. Some years after 1993 the Turing Institute agreed, in discussion with Prof Keith van Rijsbergen, that these lectures could be continued under a new title: The Turing Lectures. It took some time to persuade IText to fund the lectures out of the budget for BCS's Computer Journal. It was also agreed to publish each lecture as a paper in The Computer Journal. In 2001 the lecture became a joint BCS and IEE (later IET) affair, with broadened scope. In recent years it has been given to capacity audiences in England, Scotland and Wales, as well as, since 2003, being streamed to iet.tv audiences.

The complete set of speaker biographies, lecture synopses and iet.tv recordings may be found on [www.theiet.org/turing](http://www.theiet.org/turing). Abbreviated versions of all eight surviving votes of thanks prepared by the Turing Lecture Champions follow.

### Votes of Thanks

#### 2005 Professor Fred P Brooks Jnr: 'Collaboration and Telecollaboration in Design'

Passing over Professor Brooks' achievements such as being the first and quite likely only computer scientist to travel to the South Pole, several notable threads emerge. First, Fred likes tackling *practical* problems. For example, correctly anticipating the removal men would say Nancy's beloved grand piano couldn't possibly go up the stairs of their new home, he proved them wrong by building a full size cardboard model. He also persuaded a very reluctant IBM to introduce lower case printing. So what, you may ask? Well, forty years ago this led to the eight bit byte, and thus enabled text processing. And his practical judgement is further underlined by his IBM System/360 microcoding principles, which endure to this day.

A further thread is Fred's conviction that computer scientists are here to help people become more effective. Modern day master tool-makers, so to speak. One such example is his virtual reality tool set. He helped design his local church that way, to great acclaim. His elegant Chapel Hill computer science building, too, convincing a reluctant architect that his lobby design wasn't people friendly. And helping his research chemist friends to design increasingly complex molecules ten times faster.

But Fred's much more than a brilliant engineer and computer scientist. As we learnt, he's a captivating teacher, using down-to-earth analogies to explain the most complex of issues, typically limiting his notes to a single index card. Or as tonight, not even that. And like his great Harvard PhD supervisor Howard Aiken, he mentors and motivates his research students. He's great on committees, usually intervening only when things go pear-shaped – and then typically perfectly summarising what to do in a single sentence. Best practice collaboration, in fact.

By way of another example, there is a nice story from the System/360 days. Fred was working with John Fairclough, who led Hursley's side of the project. In 1961, transatlantic calls cost a fortune. Fred was seen marching round Poughkeepsie complaining about an itemised Hursley phone bill running to more than eight hundred densely populated pages. *Not* about the awesome cost, but that there didn't seem to be enough communication! As you've heard tonight, some things never change! Especially, how to achieve conceptual integrity.

Fred, your lecture has informed and delighted us, adding lustre to the memory of the man who made computing possible. David Morriss would like to present you with a memento of this evening. As he does this, I propose - in the traditional words of this house - 'that the best thanks of the BCS and IEE be accorded to Professor Fred Brooks, for delivering the seventh Turing Lecture.'

#### 2006 Chris Mairs: 'Lifestyle access for the disabled - adding positive drift to the random walk with technology'

Clearly, Chris is always up for a challenge. As an undergraduate, and already virtually blind, he cycled everywhere, and has the scars to show for regular encounters with roadworks. He's fearless, going white water canoeing in the Ardeche. As his water-skiing record attests, he's fiercely competitive. And having recently reluctantly given up international waterskiing, he has taken to snow instead.

He's determinedly persuasive, able to convince Bill Gates that Windows needed communication protocols – and of course that they should be Data Connection's! The first time Bill came to Enfield, he grilled Chris for ten hours. At ten o'clock, Chris politely excused himself, explaining he had to be up at six next day – to solo water ski the Channel for charity.

I was interested to learn how he met Shirley, who's accompanying him throughout this four-city Turing tour. Her best friend Cathy was getting married and mentioned her disappointment that her family's garden was too small for a wedding reception. Shirley suggested Cathy should ask her neighbour if she could use his. Since neither actually knew Chris, they invited him to make up a foursome. Literally, a blind date - from which Chris acquired a partner, two teenagers and a menagerie. Shirley says he's been uncharacteristically tolerant about the change. Just one minor outburst after spending several minutes gingerly circumnavigating a wet towel daughter Amelia had left outside the bathroom. He was under the impression it was one of Shirley's cats.

Has Chris any weaknesses? Does enjoyment of a jar count? Chris's chairman recalls nearly losing him when, after a few, he tried to step onto a train on the opposite platform! He also leaves an amazing amount of flour about after bread making. More a strength, perhaps because he makes really good stuff in a sixteenth century bread-oven, with the only modern concession the talking scales. Irritation when shop assistants tell him that the changing room 'is over there'. A grumpy traveller. So much so that his Data Connection colleagues have elected him founder member of the Victor Meldrew Travellers' Club. And ranting while listening to the Today programme, though of course he's not alone in that!

Now, a few things to take away from this lecture. Let's help to get those web sites improved. How about registering as an ITCH volunteer? Or learn more about AbilityNet, the charity BCS co-founded, which helps 300,000 disabled people each year, to see whether you or your employer could help with cash or kind. And something for our two societies. Chris is concerned that though there's plenty going on, it needs joining up. How about setting up a forum to help that, for example by getting inclusion principles into codes of practice?

### **2007 Grady Booch: 'The Promise, the Limits, and the Beauty of Software'**

Although Grady's here a year later than originally intended, his timing's right. Because his Colorado home is currently buried under five feet of snow! And before I move a vote of thanks, you might like to know a little more about him. For there's so much more to him than influential publications, innumerable Google references and his thought-provoking blog. A blog which he updated only hours after coming round from last May's massive heart re-plumbing operation, by dictating it to his Mayo Clinic intensive care nurse.

The OED defines a polymath as a great scholar and a person of much and varied learning. And a mentor as a wise counsellor and a faithful friend. Grady is all these things. He's already created several potent software Silver Bullets, starting with Object Oriented Design. His Patterns and Services Assembly work promise more. That forthcoming Handbook on Software Architecture seems certain to harvest important lessons from legacy archaeology. And no one here tonight can be in any doubt about why Grady's the world's most sought-after software system designer.

But there's much more to him than that. Who else here can play seven different musical instruments? Probably all at once, too. Or expect to get a perfect Mastermind score by taking Star Trek as their topic, especially relishing the Enterprise questions? Omnivorously well-read and the epitome of a Socratic teacher. Grady not only encourages people with ideas for making beautiful software easier to write. He then does everything possible to help them realise them. He has inexhaustible stamina. The day after crossing the Pond to give this lecture, he completed three two-hour engagements before Boulder breakfast time. And today he held the first of four Architecture Handbook case studies meetings at 7:30, then met the Press this afternoon. Yet there's one thing I don't quite understand. And that relates to the H-scale, the widely used measure of academic standing. Against that, Grady scores just three. Considering his massive impact, how come this modest score? There's something wrong. And it's not Grady.

On a personal note, he's a wonderful friend and a sought after god parent. Oh - and notwithstanding those cartoons in his books - he's really *does* like cats. And that last point underlines the wicked sense of humour we enjoyed tonight. By way of further example, read his October Blog, - laying out his stall on Architecture, and deliciously distinguishing between the snake-oil and service oriented varieties of SOA. He had the Turing Champion rise like a trout to a fly with his sneaky allusion to teaching Kate Middleton the subtleties of Ajax and the inference that she's probably a bit weak on abstraction skills. And, for a while, he had the Turing staff worried, too. They'd asked about his audio visual needs.

He replied that the stage needed to be a strong one, so as to accommodate the dancing elephant. And although he wasn't bringing his acrobatic troop with him this time, the curtains round the stage needed to be fire-proof, as he'd be setting off bangers to emphasize really important concepts. Oh, and paramedics would be needed for the faint-of-heart swooning at the rather explicit pictures he threatened to use to illustrate the beauty of software. Well, Grady, if any of us swooned tonight it would have been because of your infectious enthusiasm and exciting ideas.

## 2008 Dr James Martin: 'Target Earth'

Google famous people from Ashby de la Zouch, and up come *Robin Hood* and *Wilfred of Ivanhoe*. One a legendary romantic; the other a Saxon who lost out to the Normans. Guess whom they missed! After Oxford and National Service, James Martin became an IBM systems engineer, installing 305 RAMAC machines. These weighed 30 tonnes (he recalls the one in Lloyds Bank Birmingham needing pit-props to stop the floor caving in), had an amazingly slow two mega-character drum memory, were programmed in machine code and - as James found out - had an internal shelf which could store things like the customer engineer's whisky - and that in an era when alcohol on IBM premises was a dismissible offence! He went on to program *Panamac* and *Boadicea*, the world's first international airline reservation systems.

In 1966, he joined the IBM *Systems Research Institute*. Rather like the Cambridge's *Microsoft Research* group does today, SRI staff lectured, researched and published at will - as James said, just like university faculty, except for pay and conditions! About ten years and several real-time best-sellers later, he was skiing with his friend John Collins, then a Lancaster lecturer. Over a beer or three, they decided to take a year's leave of absence. Around midnight, they strolled out into a spectacular Aurora Borealis. Buoyed up by this augury, not to mention the beers, they walked through the Vermont hills until dawn, planning.

A year later, when James decided to stay out, IBM reportedly asked a psychologist to persuade him he was making a great mistake. When that failed, they generously told him they wouldn't hold this mid-life crisis against him! And although his next thirty years is now history, there is clearly much still more to come. Like his plans to write more books, produce another film and foster his Oxford *21<sup>st</sup> Century School*.

And what can I say about the lecture? *Marshall McLuhan* famously said 'there are no passengers on spaceship earth: we are all crew'. Tonight, though, we've also had a pilot on board. We've been given a *Target Earth* SWOT analysis, including practical ways to survive. We've listened to a man who for throughout his career has kept ahead of the wave, accurately predicting the technological future. This month alone has seen the publication of heavyweight UK and US reports on end-of-life-as-we-know-it issues, each underlining James's prescience. He has laid down a challenge for us to help safeguard mankind's future, one in which all of us can play our part.

## 2009 Professor Sir Michael Brady: 'Information Engineering and its Future'

System /360 designer Fred Brooks famously inaugurated the Manchester Turing event with a talk on telecommunication and design; Chris Mairs spoke about computers helping blind people, diverting to tell us about Virgin Rail's well-meaning but ineffectual lavatory guidance. Grady Booch struggled out of five feet of Colorado snow to treat us to his vision of the beauty and promise of software. And a year ago, James Martin ambitiously tackled the ten greatest challenges facing mankind. And tonight, another amazing lecture. A fitting tribute to Alan Turing, showing how computing and information engineering are making the world a better place, with much more to come.

But before getting to thank Mike - and particularly since your incredible concentration during his talk and subsequent applause largely speak for themselves - here is a little more about him. He never stands still, whether as a demon on the squash court, giving a lecture or expanding his lab. His colleagues tell me *Brady's Law* is to double his department every two years. And his professional activities are legion. He is a passionate and active supporter of Oxford's tutorial scheme. He has ongoing projects with ten clinical departments and six companies, demonstrates to first year computing and second year electronic labs and teaches five modules. For example, he lectured in Oxford this morning and will be on again at noon tomorrow.

If that side of life is not enough, he and Naomi are kept very busy with family, including four much loved grand-children (and another 0.7 currently on the way). And in such spare time as all this allows, he supports Everton, walks the Alpine high routes, reads avidly and plays the tenor sax in an ensemble.

Does he have any weaknesses? Such few as I could discover seemed largely minor. An infatuation with differential equations and Markov processes, perhaps? On second thoughts, that's hardly a weakness! Or his admitted excessive enthusiasm for fine wine? But surely that's only to be expected of a Keble College Fellow who spends his summers in France. And though *he* believes he talks too much, no-one else would agree. Or hinting he's thinking seriously about retirement. Don't you believe it! Mike will *never* give up exploring new ideas and looking after students. That left just two possibilities. While students love his lectures, they sometimes go away wondering what they were about, muttering about data rate! And one of his Oxford colleagues described him as a great big puppy dog. Meaning that if there's anything he could possibly knock over in their labs, he would.

Turning to this evening, it is clear an hour was simply not enough. For there was much we didn't hear about. Like DarpaNet pioneering work which was prerequisite to Tim Berners-Lee's World Wide Web. And, as Mike said, about 99 percent of his 24 years in Oxford. But there was still plenty to enjoy. We learnt about his rare triple ability to derive fundamental

mathematical [uncertainty and complexity] theory, use it to model *practical* problems and turn the results into exciting products and services. We followed autonomous vehicles, visited Fawltly Towers, were coached on face recognition mathematics, discovered how to read Roman soldiers' letters home, were introduced to visual nouns, learnt slightly queasily about colorectal tumour diagnosis and got a taster of great things yet to come.

It seems to me that Mike bears comparison with another luminary, a name I spotted when he was rebooting his system just now. The great physics Nobel Laureate Richard Feynman once said. 'I'm an explorer, okay! I get curious about everything and I want to investigate all sorts of stuff. Find out more about the world'. Like Feynman, Mike unstintingly gives credit to others, is a great enthusiast, a natural teacher and a team player par excellence.

And that goes a long way to explaining why so many smart people like to work with him, including 105 DPhils, so many now occupying distinguished and influential positions in industry, commerce and academe. And his colleague Ron Daniel recently captured the essence of what Mike does when he said 'the *real* function of a university is to produce people: students with stars in their eyes and a belief in what they can achieve' and went on to say that he does all that and much more.

## 2010 – Professor Christopher Bishop: 'Embracing Uncertainty: The new machine intelligence'

After so gripping a lecture, giving us a taste of future computing breakthroughs with practical implications as profound as the transistor and the web, it's a real privilege to be moving a vote of thanks. But before you join me in showing your appreciation for so dazzling a lecture, here is a little more about our speaker. Things Chris's bio and the IET You Tube clip didn't mention.

Like his two outrageously ambitious childhood ambitions. The first was to give the Royal Institution Christmas Lectures! The other was to go into space. And while he hasn't yet managed that one yet, he's working on it, with his training so far including weightless sky-diving and aerobatics and his PhD under the man who conceived the boson particle. Nor was there mention of his work as a Culham theoretical physicist. Given what you've heard this evening, you may be surprised that Chris considers his insight into using magnetically-confined plasma to convert nuclear fusion into power is still by far his best achievement.

But Chris likes to do things with a practical outcome and saw fusion was far out of reach. So he broke his vow to have absolutely nothing to do with computers and moved on to machine intelligence. Given that only this week British scientists made their latest confident claim that viable nuclear fusion power generation was now only 20 years away, that was surely the right decision. You already know Chris is a keen, fully-qualified pilot and that he's planning to fly his own plane to the other Turing venues. What you didn't hear was what happened on a previous trip. Halfway from Cambridge to Manchester, one of his two engines failed. Chris recalls East Midlands Airport's fantastic response. Clearing the runway; holding up the incoming Easyjet flight; bringing out all the appliances; and giving him unconditional approval to land. His colleague sitting next to him in the co-pilot's seat was less helpful. As they passed over the M1 on the final run in, he said 'wasn't this where that BMI pilot shut down the wrong engine?'

Does Chris have any weaknesses? None that my moles could identify. Except perhaps such excessive enthusiasm to explain scientific phenomena over the family dining table as to get a regular 'Oh Dad!' reaction from his two sons. By the way, they were the ones on the front row in the Christmas Lecture clip who winced as the pendulum weight suspended from the roof of the Royal Institution's Faraday lecture theatre thundered towards him.

Enough of that. So what shall we remember from this evening's lecture? A brilliant speaker taking us on a wonderful journey, explaining difficult things with clarity and infectious enthusiasm and showing us that the best is yet to come. To paraphrase a well-known saying 'the future's bright; the future's machine intelligence'!

## 2011 Professor Donald E Knuth: 'In Conversation'

Every year, Turing regulars look forward to wonderful talks. From such as Fred Brooks Jnr, who took time out from establishing the world's second ever computer science department to finish designing the operating system for System/360; blind programmer Chris Mairs, digressing from his Random Walk talk to mention his experience of Virgin Rail's ineffectual lavatory guidance for the disabled; Grady Booch struggling out of five feet of Colorado snow to speak on the beauty and promise of software. And last year Royal Institution star Chris Bishop confidently Facing Uncertainty.

So giving the Turing vote of thanks is always a real privilege. The more so this year because one of the world's most revered and influential scientists has done us proud. But before getting to that - and perhaps because your close attention this last hour speaks for itself - here is a little more about our guest.

Along with his prodigious text and programming achievements, Don Knuth worked alongside Dijkstra and Backus pioneering compiler writing. He's written at least one novel. If those hexadecimal cheques Alan Bundy referred to *really* exist, they're worth far more framed than cashed; and some of his inimitable handwritten replies fending off letters inviting him to speak are now part of *my* family heirlooms.

Sharp-sighted speed readers of that continuous loop projection of *Fun and Games* will have spotted that in 1957 Mad Magazine issue 33 published his schoolboy weights and measures article - on the whimsical Potrzebie system, with the thickness of issue 26 as its unit of length; and the software world owes a great debt to the mercifully anonymous author of the unspeakably awful IBM 650 manual programming examples that lured Don into his computer science career.

As a Case undergraduate, Don's basketball performance analysis program helped the University team win the league championship – subsequently earning him a Walter Cronkite CBS interview and a Newsweek write-up; his TEX line break algorithm ideas came to him after using graph theory to help his wife design their kitchen; and he confidently predicted finishing Volume 4 by 2003!

Though some of you will have known that already, here are a few things you might not. He loves reading light fiction, but always with a pencil at hand, as he can't resist correcting typos and syntax. Coming to books after him, his wife says she finds those detailed annotations *very* distracting. He threatens there's at least one more of his Surreal romantic novels still to come. And he can't resist invitations to visit fine libraries or to exercise famous organs – like Manchester's, on this trip.

When it comes to computing, the Knuth household's dysfunctional. Don uses Macs, Jill PCs. And notwithstanding received wisdom as to who's the in-house computer expert, if Jill mentions she's a problem Don mostly looks worried, says he needs to see the source code and suggests she looks elsewhere. Yet when *he* has printer problems, guess who fixes them. Oh, and as will become evident, he has a sweet tooth. And in June, Jill and he celebrate their golden wedding anniversary

As many of you will know, Don has a wonderful website. It does however make one highly misleading claim - that in 1990 he retired. For a reliable mole told me that - in just one week last month: his publishers delivered the first copies of TAOCP Volume 4a and *Fun and Games* Volume 8; he had to defer taking a scheduled mystery international 'phone call to fix an emergency dental appointment; that when that call eventually got through he learnt he'd won another prize – worth a half million dollars – most destined for charity; Jill and he did a Skype recording for a ceremony honouring their son as Teacher of the Year; he lectured at Stanford; and he worked on ideas for volumes 4b, 4c and 4d! Oh, and his dentist filled his tooth. Twice. The second time due to an incident with a piece of sticky fudge. Not to mention a rich social life and four lively grandsons. All that hardly sounds like retirement, but to be fair, Don admits that all the word meant was that Stanford stopped paying him.

As regards tonight, we've met a true polymath. A brilliant conversationalist, responding to challenging questions on all matter of things with clarity, infectious enthusiasm and a wicked sense of humour. He's informed and delighted us, adding lustre to the memory of the man who made computing possible. And although we've not learnt the significance of 88520 5232 we've had a fabulous time, an evening which will stay long in the memory.

**2012**

### **Professor Ray Dolan: 'From cryptanalysis to cognitive neuroscience - a hidden legacy of Alan Turing'**

Every year, Turing regulars and newcomers alike meet to listen to inspiring speakers absolutely at the peak of their subject. It is my great pleasure to propose a vote of thanks to someone who has maintained that high standard, the more so because this year marks the centenary of Turing's birth.

In that respect I would like to mention the excellent book: "Alan Turing and his Contemporaries" published by BCS, with all proceeds going to the restoration projects of the Computer Conservation Society.

Returning to tonight, I think that you will all agree that Ray, in discussing the heritage of Turing's work, and its increasing impact on cognitive neuroscience, has given us a wonderful fresh insight into the work and intellectual reach of one of the most important pioneers of all time and one of my own personal heroes. He has for example shed further insight into how Turing's strongly Bayesian problem solving approaches have advanced developments in understanding the workings of the brain and the human mind. It has also been fascinating to hear something of Ray's work into human decision making and its aberrations, particularly as they are expressed in psychopathology.

Some of you may know that Ray is an obsessive hiker and fly-fisherman, pursuits that appear to me to embody the very type of problem he was describing tonight. It is gratifying to learn that in neither pursuit is he Bayes optimal. In fact in each he expresses opposite extremes, dominated alternatively by likelihood or by a prior.

I am for example reliably told that when hiking he is known to be over-dependent on the sensory evidence provided by the path (or the weather) and steadfastly refuses to read a map or take advice from a companion so as to approach the problem with an informed prior!!! Fly-fishing is the other extreme, where he has been known to fish obsessively the same patch of river

when the sensory evidence should inform him that there are no fish to be caught, an instance of a disposition to be dominant by a prior.

Ray has evidently not allowed those hobbies to distract him from his work for long. He has published over 400 peer review papers in a career spanning more than 20 years, culminating these past ten years as the world's most cited Neuroscience and Behaviour practitioner. As you heard earlier, he has deservedly received significant worldwide recognition for his contribution to knowledge.

As is customary, I would like to present our speaker with a memento of this evening, and at the same time ask you to join with me in according the traditional best thanks of the BCS and IET to Professor Ray Dolan, for delivering the 14<sup>th</sup> Turing lecture.

## **Biographies and synopses of IET/BCS Turing Lectures**

For all resources go to <http://conferences.theiet.org/turing/previous/index.cfm>

### **1st – 1999 - at the University of Edinburgh**

#### **Professor Samson Abramsky: 'From Computation to Interaction – Towards a Science of Information'**

##### **BIOGRAPHY**

Professor Samson Abramsky has MA degrees from Cambridge and Oxford and a PhD from the University of London. Prior to his current appointment, his first chair was at the Imperial College of Science, Technology and Medicine. His fields of scholarship include semantics, logic of computation, concurrency, domain theory, lambda calculus, semantics of programming languages, abstract interpretation and program analysis. He became a Member of Academia Europea in 1993

##### **SYNOPSIS**

As computer systems have developed from stand-alone batch processing to distributed systems and on to today's "global computing" on the Internet, the classical notion of "computation" has itself undergone a radical transformation. Instead of a program working in isolation to produce an output from an input, we have complex systems of agents interacting with each other to achieve some global effect. In the course of this development, the notions of agent, interaction and information flow have taken centre stage. On the one hand, this forces a re-examination of basic ideas, perhaps even in the foundations of logic itself; but in return, these newly emerging ideas may form part of the basis of a genuine science of information.

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### **2<sup>nd</sup> – 2000 - at the University of Edinburgh**

#### **Professor Brian Randell: 'Facing up to Faults'**

##### **SYNOPSIS**

As individuals, organisations and indeed the world at large have become ever more dependent on computer-based systems, so there has been an ever-growing amount of research into means for improving the dependability of these systems. In particular, there has been much work on trying to gain increased understanding of the many and varied types of faults that need to be prevented or tolerated in order to reduce the probability and severity of system failures.

In this lecture Professor Brian Randell (University of Newcastle) will focus on the following key issues: assumptions that are often made by computing system designers regarding faults; surveying a number of continuing issues related to fault tolerance; and identifying some of the latest challenges facing researchers in this arena

##### **BIOGRAPHY**

Brian Randell graduated in Mathematics from Imperial College, London in 1957 and joined the English Electric Company where he led a team which implemented a number of compilers, including the Whetstone KDF9 ALGOL compiler.

From 1964 to 1969 he was with IBM - mainly at the IBM T J Watson Research Centre in the United States - working on operating systems, the design of ultra-high speed computers and system design methodology.

In 1969 he took up his present position as Professor of Computing Science at the University of Newcastle upon Tyne, where in 1971 he set up the project which initiated research into the possibility of software fault tolerance and introduced the “recovery block” concept. Subsequent major developments included the Newcastle Connection and the prototype Distributed Secure System.

He was principal investigator on a succession of research projects in reliability and security funded by the then Science and Engineering Research Council, the Ministry of Defence and the European Strategic Programme of Research in Information Technology (ESPIRIT). Most recently he has had the role of Project Director of DeVa, the ESPIRIT Long Term Research Project on Design for Validation, and of CaberNet, the ESPIRIT Network of Excellence on Distributed Computing Systems Architectures. He has published nearly two hundred technical papers and reports and is author or editor of seven books.

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**3<sup>rd</sup> – 2001 – at Savoy Place, London**

**Nick Donofrio: ‘Technology Innovation and the New Economy’**

### **SYNOPSIS**

A million times more bandwidth; a billion people conducting global transactions through a trillion Internet-connected devices; a secure, reliable and self-managing computing infrastructure; unprecedented processing power for solving previously-incalculable problems; new and profitable digital relationships. All are coming, and soon. What will they mean for enterprises, institutions and individuals? What will they do for content, communities and commerce?

For nearly a century, IBM has put advanced technology to work on humankind's toughest challenges. Today, the company's growing investments in technology, research and development are forging a new Internet era in which browsing and dot-com hysteria gives way to bona fide, 21st-century business. It's an environment in which an enterprise will tightly link every aspect of its infrastructure and connect itself with other enterprises, markets and industries. It's an environment that requires not just constant technology innovation, but in-depth knowledge of industries and their challenges. It's an environment in which advanced technology will be integrated seamlessly into the core of every business operation. It's an environment that demands the complexities of technology be invisible, and the productivity and quality of our lives will consequently be vastly improved.

Nick Donofrio, IBM's senior vice president for technology and manufacturing, will outline that environment and describe the industry's capability to innovate, invent, integrate and capitalize on emerging technologies, to leverage new marketplace trends and to arm customers with competitive advantage. He will also encourage discussion on those topics, as well as the technology issues facing institutions and individuals around the world.

### **BIOGRAPHY**

Nick Donofrio leads the strategy for developing and commercializing advanced technology across IBM's global operations. He is chairman of IBM's Corporate Technology Council and chairman of the board of governors for the IBM Academy of Technology.

He joined IBM in 1967 and spent the early part of his career in integrated circuit and chip development as a designer of logic and memory chips. He held numerous technical management positions and, later, executive positions in several of IBM's product divisions. He has led many of IBM's major development and manufacturing teams - from semiconductor and storage technologies, to microprocessors and personal computers, to IBM's entire family of servers.

Nick Donofrio is a strong advocate of education and vigorously promotes mathematics and science as the keys to economic competitiveness. He is particularly focused on advancing education, employment and career opportunities for under-represented minorities and women.

He is the holder of seven technology patents and is a member of numerous technical and science honor societies. He is a Fellow of the Institute for Electrical and Electronics Engineers, a member of the US National Academy of Engineering, a member of the Board of Directors for the Bank of New York, visiting Professor at Tsinghua University and a member of the Guangdong Economic Development Council, China.

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**4<sup>th</sup> – 2002 – at Savoy Place, London**

**Professor Mark E Welland: ‘Smaller, Faster, Better – but is it Nanotechnology’**

## **SYNOPSIS**

The anticipation of computer chips with ever increasing complexity, speed and data storage density will ultimately rely on atomic scale engineering - technology at the scale of 1 nanometre. Nanotechnology is of fundamental importance here in that it provides the tools for the fabrication of devices, structures and materials.

But nanotechnology has a lot more to offer. Firstly there is the opportunity for disruptive technologies to offer an alternative or radically different approach to produce a computer chip or data storage medium. The history of the evolution of the computer is littered with such innovations; the progression from thermionic valve to transistor being one example. The second, and ultimately greater opportunity, is to develop new types of devices, sensors and materials based on a combination of technologies straddling the life and physical sciences, and engineering.

Such developments are expected to make nanotechnology a pervasive technology with applications ranging from medical sensors for the diagnosis and treatment of disease to high efficiency solar cells. We are at the start of this revolution but already the signs of a .com style boom are with us. It is appropriate to take a realistic look at what exactly nanotechnology is, what it tells us about the behaviour of matter on the scale of a few atoms and how might this realistically develop over the next decade.

## **BIOGRAPHY**

After graduating from Leeds in 1979 and a PhD at Bristol, Mark Welland worked at the Garching Max Planck Institute and the IBM T J Watson Research Laboratory. He pioneered atomic level resolution scanning tunnel microscopy and invented the scanning probe microscope, two key enablers for one of today’s hottest engineering topics, nanotechnology. Welland joined the Cambridge Engineering department in 1986 and is today Professor of Nanotechnology. His primary interest is to apply his understanding of nano-scale science to solving interesting problems - ranging from nano-particulate inhalation influence on tumour formation to the fabrication of novel optical, molecular, electronic and magnetic nano-structures into practical devices for next generation products.

Mark directs the new IRC for nanotechnology and the Cambridge interdisciplinary Centre for Nanotechnology. He advises several governments on nanotechnology policy and is Principal Investigator for numerous UK and EU grant awards. His editorial activity spans six international journals across a notably catholic spectrum, including ‘Lab on a Chip’. He nevertheless still finds time to teach and to reshape Cambridge’s electrical and information science (EIST) course and his long-running micro-electronics MPhil (the first of its kind) continues to prepare many students for their own doctorates. He has founded several companies, which manufacture products ranging from nano-actuators to bio-sensor protein sequencing machines, and his magnetic storage discoveries have attracted substantial venture capital funding.

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**5<sup>th</sup> – 2003 – at Savoy Place, London**

**Dr Carol Kovac: ‘Computing in the Age of the Genome’**

<http://tv.theiet.org/technology/computing/45.cfm>

## **SYNOPSIS**

The announcement of the human genome sequence in 2000 sparked an explosion of scientific discovery in biology and life sciences, which in turn has created the need for powerful new computing solutions. The new knowledge that is coming out of life sciences projects today will change the world as much or more than the Internet, and will transform the pharmaceutical and healthcare industries and profoundly improve the practice of medicine.

Information technology is a key enabler to this revolution, to handle the enormous volumes of data and to create powerful new analytical tools for mining valuable information from these vast databases. Life sciences applications - now and in the future - are driving the roadmap for high performance computing as well as for collaborative, grid-based scientific computing environments. The convergence of computing and biology promises to transform the process of drug discovery and development and speed the ability to create effective and safe new medicines and introduce them to the market. Finally, the application of new technologies in biology and computing are already making their way into medicine, in an area we call ‘information-based medicine’. In short, the convergence of computing and biology is paving the way for new scientific discovery, value creation in pharmaceuticals and healthcare, and enormous benefits to humankind in medicine.

## BIOGRAPHY

Carol Kovac has responsibility for IBM's overall strategy for Life Sciences, including developing partnerships and directing IBM investments in this fast-growing emerging market. She spearheads the development of information technology solutions for the life sciences market, including biotechnology, genomic, e-health, pharmaceutical, and agri-science industries. Dr. Kovac's organisation brings together IBM strengths in such areas as e-business, supercomputing, data and storage management, data mining and knowledge management, as well as IBM's world-renown research expertise in computational biology and parallel computing to deliver leading edge solutions for life sciences.

Dr. Kovac joined IBM in 1983 and prior to assuming her current position in 2000 held executive management positions at IBM Research, including vice president of technical strategy and division operations, and head of IBM Research efforts in computational biology.

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6<sup>th</sup> – 2004 – at Savoy Place, London

**Professor Fred Piper: 'Security, The Good, The Bad & The Ugly'**

<http://tv.theiet.org/technology/communications/166.cfm>

## SYNOPSIS

Information technology dramatically affects the way business is conducted, the way we communicate and keep records, and how law enforcement and national security are handled. Our almost total reliance on IT means we are beginning to experience the serious impact of massive disruptions, such as losing the ability to communicate or do business. We need security technologies to keep society working, as well as to protect against loss of privacy, alteration of critical information and unauthorised access to confidential information.

This lecture looks at some of the technical security mechanisms used for protecting our infrastructure by providing confidentiality for information; entity authentication over distributed computer networks and the detection of alteration to information. It discusses some of the social and political problems that can result from their use and from the fact that the same technology can be used by law enforcers (to catch criminals) and law breakers (to avoid being caught), as well as by businesses (to protect their assets) and by individuals (to protect privacy and preserve confidential data). Further, every advance intended to protect the 'good guys' from the 'bad guys' can work in reverse. Clearly, there is a need to find a balance in trying to meet the rights and expectations of the various sectors of society.

The resilience of our national infrastructure depends on these security technologies. However, these technologies themselves require a second infrastructure which establishes trust and facilitates their secure implementation. Any defect in this second infrastructure could have profound consequences, as evidenced when trust is abused in political or accounting processes. This leads to a discussion of the Human Rights convention and relevant recent legislation.

Cryptography, a subject to which Turing was no stranger, is essential to many security solutions and there will be reference to the work that he and his colleagues undertook at Bletchley Park.

## BIOGRAPHY

Professor Fred Piper is widely regarded as an enthralling speaker. He has been Professor of Mathematics at the University of London since 1975 and has worked in security since 1979. He is currently Director of the Information Security Group (ISG) at Royal Holloway. Royal Holloway ISG offers MSc's in Information Security and Secure Electronic Commerce and has a PhD programme that has produced over 100 doctorates.

In 1985 Fred formed a consultancy company, Codes & Ciphers Ltd, and since then he has been consulted by more than 100 companies and government across the world. The consultancy work has been varied and has included algorithm design and analysis, key management and security audits of large networks. Fred has lectured worldwide on Information Security, both academically and commercially, with recent emphasis on the use of digital signatures and the role for public key infrastructures. He has published more than a hundred research papers and is joint author of Cipher Systems (1982), one of the first books to be published on the subject of protection of communications, Secure Speech Communications (1985), Cryptography: A Very Short Introduction (2002), and an ISACA research monograph on Digital Signatures (1999). He has been a member of a number of DTI advisory committees and is a member of the Board of Trustees for Bletchley Park.

In 2002 he was awarded an IMA Gold Medal for "Services to Mathematics". In 2002 he was also awarded the first honorary CISSP for a European. This was for 'leadership in Information Security'. In 2003 Fred received an honorary CISM for 'globally recognised leadership' and 'contribution to the Information Security Profession'.

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**7<sup>th</sup> – 2005 – at Savoy Place, London, and the University of Manchester**  
**Professor Fred Brooks Jr, ‘Collaboration and Telecollaboration in Design’**  
<http://tv.theiet.org/technology/computing/443.cfm>

#### **SYNOPSIS**

The process of designing computers, programming languages, operating systems, and big applications systems seems to have a lot in common across media. These same commonalities also occur in the processes of designing buildings and other engineering creations. A new characteristic of design in the 20th Century is the dominant use of teams to do design. We design with teams both because we are in a hurry and because our creations require more skills than one mind can master. Yet we want our designs to have excellence, and that requires conceptual integrity. Achieving conceptual integrity in team design is then a formidable challenge.

Telecollaboration is now, in the 21st Century, not only possible but even fashionable. The mantra of "telecollaboration" assumes implicitly that collaboration is a good thing per se. The more one collaborates, the better. This is far from self-evident; it probably is not true. Nevertheless, there are parts of the design process where collaboration not only shares out the work, but also produces a better design. Here telecollaboration can be most fruitful. Analysis of these aspects of design inevitably generates opinions on how design should be done and taught.

#### **BIOGRAPHY**

Frederick P Brooks Jr is Kenan Professor of Computer Science at the University of North Carolina at Chapel Hill. A native of North Carolina, he studied physics at Duke University and did his Ph.D. work at Harvard under Howard Aiken.

At IBM in Poughkeepsie NY he was an architect of the IBM Stretch and Harvest computers. He was Corporate Project Manager for the System/360, including development of the System/360 computer family hardware and the Operating System/360 software. The first 360 model and key components of the operating system were developed in IBM's laboratory at Hursley, Hampshire.

He founded the UNC Department of Computer Science in 1964 and chaired it for 20 years. His research there has been in computer architecture, software engineering, and interactive 3-D computer graphics ("virtual environments"). His best-known books are *The Mythical Man-Month: Essays on Software Engineering*, (1975, 1995) and *Computer Architecture: Concepts and Evolution* (with G.A. Blaauw, 1997).

Professor Brooks has received the National Medal of Technology, the ACM Turing Award, the Bower Award and Prize of the Franklin Institute, the John von Neumann Medal of the IEEE, the Allen Newell and Distinguished Service awards of the ACM, and the Eckert-Mauchly Award of the IEEE and the ACM. He is a member of the National Academy of Science, the National Academy of Engineering and a Foreign Member of the Royal Netherlands Academy of Arts and Sciences. He is a Distinguished Fellow of The British Computer Society and a Foreign Member of the Royal Academy of Engineering. He has spent sabbatical stays at Cambridge and at University College London.

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**8<sup>th</sup> – 2006 - at the Universities of Glasgow, Edinburgh and Manchester, and Savoy Place, London**  
**Chris Mairs; ‘Lifestyle Access for the Disabled – Adding Positive Drift to the Random Walk with Technology’**  
<http://tv.theiet.org/technology/computing/946.cfm>

#### **SYNOPSIS**

On one hand, technology can and sometimes does help visually disabled people: synthesized access to talking newspapers, easy access to online music with speech synthesized catalogues, email reading/writing with speech synthesis, and a speech interface to hand-held GPS for blind orientation/navigation. On the other hand, the 'technology heavy' nature of 21C lifestyle often disenfranchises the disabled. Examples include microwave cookers, mobile phones, iPods and 24-bit animated graphical user interfaces.

What should and can be done to improve the outcome resulting from this technological dichotomy?

## BIOGRAPHY

Chris Mairs is a founding member and director of Data Connection Ltd, which develops software for international blue chip ICT companies. He created the enduring architectural blueprint for DC's thirty highly profitable communication products, directs Data Connection's product line strategy and is Chief Technical Officer and Senior Vice-president of their MetaSwitch telephony subsidiary.

Chris also founded the a-technic charity, developing technology for the disabled (enlightened self-interest, since he himself is blind). His Bat Blaster is used by blind water skiers throughout the world, including at four world championships where Chris led the British disabled team to victory. a-technic's focus now is information access for the vision impaired. Their free NewsReader software will soon be followed by NewsBox, a speech enabled system costing c. £300, giving the technologically frail blind access to broader content sources.

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**9<sup>th</sup> – 2007 - at the University of Manchester and Savoy Place, London**  
**Grady Booch: 'The Promise, the Limits and the Beauty of Software'**  
<http://tv.theiet.org/technology/infopro/826.cfm>

## SYNOPSIS

Within this generation, software has changed the way that individuals collaborate, organizations do business, economies operate, and cultures interact.

Software-intensive systems can amplify human intelligence, but they cannot replace human judgement; software-intensive systems can fuse, coordinate, classify, and analyze information, but they cannot create knowledge. So although software offers seemingly limitless promise, there are some very real limits to what software can do. Not everything we want to build can be built: there exist pragmatic theoretical and technical limits that make software development hard, if not in some cases impossible. Furthermore, not everything we want to build should be built: there exist moral, economic, social, and political limits that govern human industry.

Software-intensive systems are perhaps the most intellectually complex artefacts created by humans, and while the majority of individuals in the civilized world rely on software in their daily lives, few of them understand the essential complexity therein, the labour required to create such artifacts, and the beautiful and elegant chaos of their architecture.

Tonight's presentation will examine the promise, the limits, and the beauty of software, as well as offer some conclusions that can be drawn from the last 60 years of software and some expectations and cautions for the next generation.

## BIOGRAPHY

Grady Booch is recognized internationally for his innovative work on software architecture, software engineering, and modelling. A renowned visionary, he has devoted his life's work to improving the effectiveness of software developers worldwide. Grady served as Chief Scientist of Rational Software Corporation since its founding in 1981 and continues to serve in that capacity within IBM.

He is one of the original authors of the Unified Modelling Language (UML) and was also one of the original developers of several of Rational's products. Grady has served as architect and architectural mentor for numerous complex software-intensive projects around the world in just about every domain imaginable. He is the author of six best-selling books, including the UML Users Guide and the seminal Object-Oriented Analysis with Applications, and has published several hundred articles on software engineering, including papers published in the early '80s that originated the term and practice of object-oriented design.

Grady is a member of the Association for Computing Machinery (ACM), the Institute of Electrical and Electronic Engineers, the American Association for the Advancement of Science (AAAS), and Computer Professionals for Social Responsibility (CPSR). He is also an IBM Fellow, an ACM Fellow, a World Technology Network Fellow, and a Software Development Forum Visionary. Grady was a founding board member of the Agile Alliance, the Hillside Group, and the Worldwide Institute of Software Architects, and now also serves on the board of the International Association of Software Architecture. He also serves on the boards of Newmont University and the Iliff School of Theology.

Grady received his bachelor of science from the United States Air Force Academy in 1977 and his master of science in electrical engineering from the University of California at Santa Barbara in 1979. He lives in Colorado. His interests include reading, travelling, singing, and playing the harp.

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## 10<sup>th</sup> – 2008 at Savoy Place, London and the Universities of Manchester and Glasgow'

**Dr James Martin: 'Target Earth'**

<http://tv.theiet.org/technology/infopro/895.cfm>

### SYNOPSIS - Lecture

The problem of global warming is now widely known about. There are 12 megaproblems, like global warming, which must be urgently dealt with. All of these have potential solutions, but most of them are largely ignored. It is desirable to set targets so that we can measure the progression towards solutions. If we deal with these megaproblems in time, the 21st century could bring a magnificent future.

### SYNOPSIS – Film

#### **The Meaning of the 21st Century**

A film by Dr James Martin

Narrated by Michael Douglas

We are at an extraordinary crossroads of human history. Our actions, or failure to act, during the next 20 years will determine the fate of the Earth and human civilization for centuries to come. This is a make-or-break century. Humanity's demands for affluence are growing rapidly, and there are massive problems in the decades ahead. The public is aware of some of the effects of global warming and climate change, but there are many other megaproblems, some more dangerous or debilitating.

The good news is that there are solutions. If we are able to make the planet work, as shown in this film, we face a magnificent future. If we fail, we could be headed for a new Dark Age. This film is a realistic assessment of how we can deal with the problems of the 21st century. Innovative in its approach, the film prompts its audience to think about how cooperation around the world and exciting technologies are providing answers. Whether the future is bleak or filled with unimaginable opportunity depends upon education and political will.

First with his book, and now with this film, James Martin rallies today's young people to be given the confidence to transform their lifestyles, the environment and Homo sapiens itself. He inspires us with visions of extraordinary futures and civilizations more magnificent than anything yet conceived. But we must learn to understand this century and play its complex game. We must develop the political will to transform our world rather than wreck it.

Young people everywhere need charts of the worldscape ahead. They, collectively, will be responsible for the greatest transition in human history.

### BIOGRAPHY

Dr James Martin is an author, business leader and social entrepreneur. He founded the James Martin Institute for Science and Civilization at the University of Oxford, and then the extraordinary 21<sup>st</sup> Century School at that University. He is also a Senior Fellow of the James Martin Center for Non-Proliferation Studies at the Monterey Institute in California.

Martin is Pulitzer nominee for his book *The Wired Society*. He has written 103 major textbooks – more than any other living person. Many have been seminal in their field. His latest book, published in 2006, is *The Meaning of the 21<sup>st</sup> Century*, now made into a major film. In addition to a D.Litt from the University of Oxford, Martin has honorary doctorates from all six continents. He is renowned as a riveting lecturer. He is also a social entrepreneur, in the fields of education, technology and international development. He founded James Martin Associates in London, and the company quickly became global. A follow-on company, James Martin and Co., is now called *Headstrong*, develops ultra-complex systems for corporations, worldwide.

Martin was a member of the software Scientific Advisory Board of the U.S. Department of Defense. He was ranked 4<sup>th</sup> in Computer World's 25<sup>th</sup> Anniversary Edition's most influential people in computer technology.

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**11<sup>th</sup> – 2009 – at Savoy Place, London, and the Universities of Cardiff and Manchester**  
**Professor Sir Michael Brady; ‘Information Engineering and its Future’**  
<http://tv.theiet.org/technology/infopro/936.cfm>

## SYNOPSIS

What is information engineering? What could the future hold for this subject? How does this impact and benefit the planning, designing and implementation of systems across your enterprise?

In 2009’s prestige Turing Lecture, Professor Sir Michael Brady explores these questions drawing on 20 years work and experience at Oxford University. Summarising his knowledge in the areas of computer vision, signal processing, medical image analysis and artificial intelligence, he examines information engineering possibilities in this field’s future.

## BIOGRAPHY

Professor Sir Michael Brady FRS, FREng, FMedSci, FIET, FInstP, FBCS is BP Professor of Information Engineering at the University of Oxford. He holds degrees in mathematics (BSc and MSc from Manchester University), and a Mathematics PhD from the Australian National University.

He was appointed Senior Research Scientist of the MIT Artificial Intelligence Laboratory in 1980, and helped found its world famous robotics laboratory. He is the author of over 450 articles and 24 patents in computer vision, robotics, medical image analysis and artificial intelligence, and is also the author or editor of ten books.

He has been awarded honorary doctorates by the universities of Essex, Manchester, Liverpool, Southampton, Oxford Brookes, and Paul Sabatier (Toulouse) and was knighted in the 2003 New Year’s honours list.

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**12<sup>th</sup> – 2010 – at Savoy Place, London and the Universities of Cardiff, Manchester and Edinburgh**  
**Professor Christopher Bishop: ‘Embracing Uncertainty: The New Machine Intelligence’**  
<http://tv.theiet.org/technology/infopro/turing-2010.cfm>

## SYNOPSIS

Computers are traditionally viewed as logical machines which follow precise, deterministic instructions. The real world in which they operate, however, is full of complexity, ambiguity, and uncertainty. In this year’s Turing Lecture, Professor Chris Bishop discusses the field of machine learning, and shows how uncertainty can be modelled and quantified using probabilities.

He looks at the recent developments in probabilistic modelling which have greatly expanded the variety and scale of machine learning applications, and he explores the future potential for this technology.

## BIOGRAPHY

Chris Bishop has a B.A. in Physics with First Class Honours from Oxford, and a PhD in Theoretical Physics from the University of Edinburgh with a thesis on quantum field theory under the supervision of David Wallace and Peter Higgs. After graduating he joined Culham Laboratory where he worked on the theory of magnetically confined plasmas as part of the European controlled fusion programme.

He subsequently developed an interest in pattern recognition, and became Head of the Applied Neurocomputing Centre at AEA Technology. In 1993 he was elected to a Chair in the Department of Computer Science and Applied Mathematics at Aston University, where he was a member of the Neural Computing Research Group. He then took a sabbatical during which time he was principal organiser of the six month international research programme on Neural Networks and Machine Learning at the Isaac Newton Institute for Mathematical Sciences in Cambridge, which ran from July to December 1997. After completion of the Newton Institute programme he joined the Microsoft Research Laboratory in Cambridge where he is the Chief Research Scientist, and head of the Machine Learning and Perception group.

At the same time as he joined Microsoft Research, he was elected to a Chair of Computer Science at the University of Edinburgh where he is a member of the Institute for Adaptive and Neural Computation in the School of Informatics. He is also a Fellow of Darwin College, Cambridge, a Fellow of the British Computer Society, and has been awarded an Honorary Doctor

of Science by Oxford Brookes University.

His research interests include probabilistic approaches to machine learning, as well as their application to fields such as biomedical sciences and healthcare. He is the author of the leading textbook *Neural Networks for Pattern Recognition* (Oxford University Press, 1995), which has almost 10,000 citations, and his latest textbook *Pattern Recognition and Machine Learning* (Springer, 2006) has also been widely adopted.

In 2004 he was elected Fellow of the Royal Academy of Engineering, in 2007 he was elected Fellow of the Royal Society of Edinburgh and in 2008 he presented the 180th Royal Institution Christmas Lectures, with the title *Hi-tech Trek: The Quest for the Ultimate Computer*.

Chris holds a Commercial Pilot's Licence, and for relaxation he enjoys flying light aircraft, including aerobatics in an Extra 200 unlimited-category aerobatic aircraft. He is married and has two children.

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**13<sup>th</sup> – 2011 – at Savoy Place, London, and the Universities of Cardiff, Manchester and Glasgow**  
**Professor Donald E Knuth: 'An Evening with Don Knuth: All Questions Answered!'**  
<http://tv.theiet.org/technology/infopro/10267.cfm>

## SYNOPSIS

The 2011 BCS/IET Turing Lecture will not follow the usual form of a talk followed by a question and answer session. Instead, Don will make a short introduction and then take questions about any subject. He warns in advance that "The audience should be aware that the answers will be my best shot, though those outside the field of *The Art of Programming* may have somewhat less credibility than a Wikipedia article." Time permitting, he will also reveal the significance of the number 885205232, which some speculate may turn out to be surreal.

## BIOGRAPHY

Donald E. Knuth (B.S. and M.S., Case Institute of Technology 1960; Ph.D., California Institute of Technology 1963) is Professor Emeritus of *The Art of Computer Programming* at Stanford University, where he supervised the Ph.D. dissertations of 28 students since becoming a professor in 1968. He is the author of numerous books, including three widely translated volumes (so far) of *The Art of Computer Programming*, recently augmented by a new hardback released as Volume 4A, five volumes of *Computers & Typesetting*, eight volumes of collected papers and a non-technical book entitled *3:16 Bible Texts Illuminated*. His software systems TeX and METAFONT are extensively used for book publishing throughout the world.

He is a member of the American Academy of Arts and Sciences, the National Academy of Sciences and the National Academy of Engineering, and he is a foreign associate of the French, Norwegian, Russian and Bavarian science academies as well as the Royal Society of London.

He received the Turing Award from the Association for Computing Machinery in 1974; the National Medal of Science from President Carter in 1979; BCS Distinguished Fellowship in 1980; the Steele Prize from the American Mathematical Society in 1986; the Adelsköld Medal from the Royal Swedish Academy of Sciences in 1994; the Harvey Prize from the Technion of Israel in 1995; the John von Neumann Medal from the Institute of Electrical and Electronic Engineers in 1995; and the Kyoto Prize from the Inamori Foundation in 1996.

He holds honorary doctorates from Oxford University, the University of Paris, the Royal Institute of Technology in Stockholm, the University of St. Petersburg, the University of Marne-la-Vallée, Masaryk University, St. Andrews University, Athens University of Economics and Business, the University of Macedonia in Thessaloniki, the Universities of Tübingen, Antwerp, ETH, Oslo and Bordeaux, and at least eighteen colleges and universities in America.

Don hasn't had an email address since January 1, 1990. As might be expected of a person who owns a sixteen-rank 812 pipe Abbot and Sieker organ he is a member of the American Guild of Organists.

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**14<sup>th</sup> – 2012 – at Savoy Place, London and the Universities of Cardiff, Manchester and Edinburgh**  
**Professor Ray Dolan: ‘From cryptanalysis to cognitive neuroscience - a hidden legacy of Alan Turing**  
<http://tv.theiet.org/technology/infopro/12739.cfm>

## **SYNOPSIS**

2012 is a special year – marking 100 years since the birth of Alan Turing, the Manchester computer pioneer, and explorer of the human mind.

‘The "computable" numbers may be described briefly as the real numbers whose expressions as a decimal are calculable by finite means... a number is computable if its decimal can be written down by a machine.’ Bringing mathematical logic to bear on the problem of mind and matter turned out to be Alan Turing's crucial innovation, as did his knowledge of the classical analysis of the real continuum... discover how Turing's work has paved the way for the brilliant computing minds of today as Prof Ray Dolan takes to the stage to discuss ‘From cryptanalysis to cognitive neuroscience - a hidden legacy of Alan Turing’

Professor Dolan will focus on the challenges Turing faced in relation to Enigma, explore Turing's strongly Bayesian problem solving approaches, look at the similarities with the problem the brain faces in making sense of its environment, examine how this translates into algorithms used in decisions in relation to the world, extend the problem to the greater complexity entailed by an environment where there are other intentional agents and determine how the approach and solutions to Enigma forged by Turing can be turned inwards, where the brain itself is the unknown, to probe mechanistic processes that give rise to the very apparatus that is the human mind.

## **BIOGRAPHY**

Ray Dolan is Mary Kinross Professor of Neuropsychiatry, and Director of the Wellcome Trust Centre for Neuroimaging, at UCL. He obtained his primary medical degree in Ireland (1977), and then trained as a Psychiatrist in London. He then embarked on a research career where he was one of the pioneers in using functional neuroimaging techniques to study human cognition. He was appointed Professor of Neuropsychiatry at UCL in 1996.

Ray is the author of over 440 peer reviewed publications. His principal research interests have been understanding human emotion and decision making. Between 2001 and 2011 he has been ranked as the most cited author in the world in the field of Neuroscience and Behaviour. He holds major grant funding from the Wellcome Trust.

He is a Fellow of the Royal College of Psychiatrists (FRCPsych), Fellow of the Royal College of Physicians (FRCP), a Fellow of the Medical Academy of Sciences (FMedSci), a Member of the Royal Irish Academy (Hon), (MRIA) and a Fellow of the Royal Society of London (FRS). He holds an Honorary Doctorate from Ghent University (2010).

He has received numerous awards including Alexander Von Humboldt International Research Award for Outstanding Scholars (2004), the Kenneth Craik Research Award (2006), the Minerva Foundation Golden Brain Award (2006), the Max Planck Research Award (2007), Santiago Grisolia Chair Prize, Fundación Valenciana de Investigaciones Biomedicas (2012) In 2011 he was made Einstein Visiting Fellow by the State of Berlin.

Ray lives in London. He has numerous interests outside of his work being an enthusiastic hiker, an expert fly fisherman, a compulsive reader of literature and a lover of music.

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