

Department of Computing, Imperial College London

Industrial Liaison Board

Monday 16th May 2016

5.00pm

Ballroom, 58 Princes Gate

South Kensington Campus

Present

External Ijaz Akram (Amazon), Tim Brennan (Amadeus), Paul Clarke (Ocado), Joseph Do (Formicary), Zoe Jervier (EF), Jon Page (BBC), Ioannis Papagiannis (Facebook), Hugh Proudman (IBM), Wendy Tan-White (EF), Rob Whitehead (Improbable), Sarah Wilkinson (Home Office)

Internal Catarina Fernandes (Teaching Fellow), Benjamin Glocker (Lecturer), Mark Hammond (Imperial Innovations), Michael Huth (Director of Research), Nic Katona (Head of Development) William Knottenbelt (Director of Industrial Liaison), Peter McBrien (Director of Undergraduate Studies), Victoria Nicholl (Industrial Liaison and Undergraduate Admissions Manager), Anne O' Neill (Department Operations Manager), Marcus Rees-Roberts (Major Gifts Manager) Daniel Rueckert (Deputy Head of Department),

Apologies Mark Baker (Mind Candy), Alice Bentinck (Entrepreneur First), Susan Eisenbach (Head of Department), Patrick Goldsack (Hewlett Packard), Julie McCann (Deputy Director of Industrial Liaison), Bill Mitchell (BCS), Raymond Mulligan (Credit Suisse), Alessandra Russo (Director of Postgraduate Studies)

Agenda Item

1. Introduction (Daniel Rueckert)

<http://wp.doc.ic.ac.uk/dr/>

- 1.1. Thanked everyone for coming and introduced new members and guests
- 1.2. Highlighted a few pieces of news (see slides and newsletter)
- 1.3. Marcus Rees-Roberts introduced the Faculty of Engineering Development Team, which is part of the College Advancement team. Most of their time is spent with alumni of the Faculty of Engineering. They also work with companies in determining philanthropic support at all levels. VIP events and access to students are some of the opportunities available for companies. Nic Katona emphasised that their focus is to build long-term sustainable relationships.
- 1.4. Jon Page asked about whether any of the outreach activities are showing dividends. Cat Fernandes and Daniel Rueckert said this would take time. Sarah Wilkinson asked how Imperial compares to peer universities. Cat Fernandes confirmed that at the student level there is parity, for staff the department is stronger. Ioannis Papagiannis asked about other Imperial departments. Daniel Rueckert said that CS does appear to suffer from the perceptions of what computer science is. Bioengineering, for example, has 50% girls. Sarah Wilkinson offered that it would be helpful to get primary research to identify why exactly why computer science has that issue. Cat Fernandes revealed that she has been asking the girls she meets at events and that there is a lack of clarity and knowledge about the

applications of computing, they see it as just hacking and programming languages. Feedback from activities so far is that it is helping girls see what can be done with CS. Sarah Wilkinson suggested getting every female who applies to complete a survey find out what their perceptions are.

2. Research Presentation (Ben Glocker)

<http://wp.doc.ic.ac.uk/bglocker/>

- 2.1. Benjamin Glocker presented on his research. His aim is to establish medical uses for the 3D scanning technology. For example, scanning a brain for surgery would be a long term goal, in the short term it would be for simulating for practice surgeries. Algorithms can assist in diagnoses and treatment decisions. Doctors provide lots of data, which is facilitating work to create visual classifications of tumours, using deep learning. At Facebook there are algorithms that are operating at human levels of intelligence. A neural network takes data (such as a brain scan) and the parameters get the information that you want out of that data. The neural network uses all the clues that a doctor would use to diagnose and learns what the images mean.

3. Entrepreneurship (Wendy Tan-White)

<https://uk.linkedin.com/in/wendytanwhite>

- 3.1. There was a huge amount of money being given in the US (sums that would normally be at IPO stage) and a lot of companies were not IPOing. Exit strategies were not available to investors. This will affect start-ups in the UK as impacts in Silicon Valley tend to come across to the UK within about a year. It is therefore critically important to have a sustainable company. The internet still growing and new technologies are being invented so there is still lots of potential. There are also massive emerging economies: Africa, Latin America, China, Asia. The UK is already smaller than Nigeria in mobile usage, for example. Shifts in the labour market, how do you make
- 3.2. Elephants are big corporates that are looking to innovate – how to innovate is a hugely important question to them and one way they do this is to buy start-ups
- 3.3. London is one of the keenest cities in the world to innovate with an appetite to do more. It is possible for a start-up to get big extremely quickly.
- 3.4. Only a few sectors have been disrupted by new technologies. There is plenty of room to assist without disrupting.
- 3.5. There is a huge population growth in the world, that can shift the UK's sphere of influence (Brexit, for example, is important).
- 3.6. The difference between now and 2000 is that there is now an ecosystem for venture. Huge amounts of money are available in Europe to be invested.
- 3.7. Tech clusters all over the UK.
- 3.8. Tech City is helping companies beyond series A funding and looking at visas etc.
- 3.9. Wendy joined EF as a venture partner one year ago and a general partner 2 months ago. EF is just closing a £40million fund, which is in the final legal stages.
- 3.10. Imperial is one of EF's biggest sources of recruitment. They provide an alternate career path for best talent in Europe. Today, there are significantly more opportunities for graduates to be able to start their own companies.
- 3.11. Wendy and her husband mentor the EF start-ups on a weekly for 6 months. The new fund will give them an extra 18 months of mentoring and funding.
- 3.12. Joseph Do asked about whether the students who join EF cohorts receive salaries. Wendy confirmed that they get a stipend for the first three months while they find a co-founder. They then receive £26k when they found their company. The new fund will provide a £70k convertible note.
- 3.13. Daniel Rueckert asked for more information on what has convinced students they can build a start-up. Wendy confirmed that this was due to multiple factors. The world has changed, smart people can see that they could go the "safe" option or join a start-up or create a start-up themselves. They see that there is support there. There is enough money so that would-be entrepreneurs know they won't starve.

They see that there is money available down the line. There is university support too. Europe is now doing what Stanford did and thereby creating virtuous circle. The corporate world is also getting better, they see the need to innovate and that supporting and buying start-ups are a key way to do this. Other organisations are going to have to think about how to attract these students – not all students want to take the risk of creating a start-up, but plenty do. Even a “failed” EF experience will temper grads.

- 3.14. Ijaz Akram asked about how you help people with tech skills but not much business skills. Wendy stated that EF have found that at least one person needs to have huge drive and understanding of a domain. They take approximately a quarter who have a domain edge, the rest are hugely strong technically.
- 3.15. Tim Brennan asked if have EF have co-funded with corporates. Wendy confirmed that EF has not, but they do invite them in. For example, they had the Telegraph in on 16th May (morning of the board) to see if that can stimulate the entrepreneurs.
- 3.16. Jon Page asked how to make the entrepreneurs aware of a potential ecosystem. Wendy said to let her know she will ensure. Victoria has her details, which Wendy is happy for Victoria to pass on, as she is happy to communicate with anyone.

4. Research Challenges (Rob Whitehead)

<https://www.linkedin.com/in/robert-whitehead-9bb18a3>

- 4.1. Improbable now have approximately 90 people. His background is virtual worlds and simulation. Interesting blends of different domains. They have people who simulate cities and other similarly complex concepts.
- 4.2. Their original aim was to build a video game based on a real place. They wanted millions of agents (each tree etc. is an agent) which is a really hard problem.
- 4.3. They use their technology to simulate things like internet use in the USA. Very easy to understand the protocol of two computers interacting. However, if you remove one it can radically change the routing of how information is sent.
- 4.4. They are using commodity cloud to do real time physics interactions.
- 4.5. They want to create a realistic, logical 3D space.
- 4.6. Under the hood they provide computational models. They move the data around in real time. Their system works by looking at all the entities and ensuring that only those which are affected by each other do the computational work on them. The worker allocation challenge is still a massive challenge that they are working on. There are going to be a world of different abstractions over the next few years and they will be one of those.
- 4.7. Joseph Do asked how Improbable licence the software. Rob said it is open and you can sign up for an account on the website. It costs approximately \$10,000 a month for something with a million entities.
- 4.8. Daniel Rueckert asked how many computer scientists are at Improbable. Rob answered that the COO is from Imperial College and they have approx. 40, with eight new grads this year (Cambridge, Imperial, Oxford).
- 4.9. William Knottenbelt pointed out that Improbable are running a research lab in the form of a start-up. He asked if Rob thought about running this in traditional university environment. Rob said original idea was a video game and the other opportunities only occurred after they had founded.

5. Outreach and Turing Labs (see slides) (Catarina Fernandes)

<https://uk.linkedin.com/in/drcatarinafernandes>

- 5.1. Cat joined the Department of Computing approximately one year ago. The Department currently has a Bronze Athena Swan and is going for Silver this year.
- 5.2. Computing in Schools – current students going into schools to teach CS
- 5.3. Last year Engineering Summer School for Girls started, which has proved successful and popular.

- 5.4. Turing Labs founded last year. Huge benefits to the children who take part in the courses and to current students who are receiving training into how to deliver these courses.
- 5.5. Joseph Do wanted to know how to get his nine year old daughter to sign up?!
ACTION Cat will send the website information.
- 5.6. Wendy Tan-White asked what programmes are being used? Cat confirmed Scratch for younger students and Python for older
- 5.7. Nic Katona said there is a hope for this to be extended, and there are plenty of opportunities for corporates to get involved. Cat confirmed that there is a desire to have courses at Imperial to give children the opportunity to experience the campus, but to also a need to have in schools as it can be difficult for widening participation students to travel
- 5.8. Tim Brennan asked if funding or people is needed. Cat said funds are vital and that the department wants to expand its efforts.
- 5.9. Hugh Proudman said IBM just celebrated 21st running of their own programme. They had five people who had been students from previous years. They struggle for data protection reasons to track outcomes from such engagements. IBM would be keen to collaborate more systematically. Easier for them to contribute manpower rather than money. Bigger initiatives, rather than everyone doing similar smaller initiatives. Daniel Rueckert and Wendy Tan-White agreed.
- 5.10. Daniel Rueckert observed that Cat made an important point that the department's students are its best ambassadors and it is important to support them.
- 5.11. Sarah Wilkinson said she has teenage kids at GCSE who don't want to do computer science as a GCSE as they feel the curriculum is hideous. Can Imperial influence teaching and publication for guidance notes for curriculum? Daniel Rueckert informed the board that Bill Mitchell and the BCS are working on this.
- 5.12. Paul Clarke said that computer science should be a mandated literacy as it is now just as important as numeracy and natural language literacy. Wendy Tan-White said she has a Government Digital Board meeting and she would like to raise this concern as coming from the Imperial Computing Industrial Liaison Board.
- 5.13. Paul Clarke said that teaching people the skills for entrepreneurship should be done far earlier in life (mind mapping, goal setting etc.) Tim Brennan agreed and gave his daughter's cookery GCSE (using celebrity chefs to make it attractive) as example of how to engender engagement. Wendy Tan-White recommended that people talk to Zoe Jervier who is an expert in recruiting tech talent.
ACTION: Wendy Tan-White to raise the issue of digital literacy under the aegis of the Imperial College London Department of Computing Industrial Liaison Board

6. AOB (Daniel Rueckert)

- 6.1. If people spot any omissions or errors from last minutes please notify Victoria
- 6.2. Suggestion made at post-meeting dinner by Sarah Wilkinson to set up a LinkedIn
ACTION: Victoria Nicholl to gauge interest and create LinkedIn Group for the Board if the interest is there

7. Close (Daniel Rueckert)

- 7.1. Thank you to everyone for their contributions.