THE MICROFLUIDICS CONSORTIUM

CREATING COLLABORATIVE COMMUNITIES

Cambridge needs no introduction to its science and learning. Latterly it has become known for its many start ups, and even the location of some highly successful "gorilla" companies, such as ARM, the microprocessor giant. Around this has developed a micro economy to supply supporting services, such as IP management, risk insurance, accountancy, and venture capital. To facilitate knowledge exchange between all these parts community networks have developed. In this field one personality stands out - Peter Hewkin, the former CEO of the Cambridge Network and now the founder and entrepreneur-in-chief of "Connected Cambridge" which is managed by his operating vehicle, The Centre for Business Innovation (CfBI).

Hewkin was recruited to Cambridge in 2000 to run the largest networking organisation in the region, "Cambridge Network". Previously he had been CEO of a government subsidised agency in London, the "Centre for Exploitation of Science and Technology" (CEST), which had a remit to bring UK government, academia and industry together to exploit emerging technologies (such as fuel cells, and smart tags, at that time).

CAMBRIDGE NETWORK

There is probably no other high tech network in the UK which has the size of membership, number of interest groups, and international reach of the Cambridge Network, while being entirely self funded. This last point is important to Hewkin who believes passionately in delivering value for money rather than relying solely on public sources.

In early 2009, having spent nearly 10 years at the Cambridge Network, a change in the organisation suddenly found Hewkin without a job. He had to re-invent himself quickly. His experience

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THE FIELD OF MICROFLUIDICS

Microfluidics is a multidisciplinary field comprising physics, chemistry, engineering and biotechnology that studies and exploits the behaviour of fluids at the microscale and mesoscale. It is also a general term for MEMS fluidic devices. Microfluidics is used in inkjet printheads, DNA and other diagnostic chips, lab-on-a-chip devices, flow chemistry, fuel cells, and micro-thermal technologies. Lab-on-a-chip, for example, combines semiconductor and microfluidics technologies, capable of routing, preparing and analyzing very small quantities of sample, especially of bodily fluids for medical purposes.

The construction of microfluidic devices requires sophisticated technologies to pattern channels, waveguides, microvalves and pumps onto rubber-like polymers or glass or silicon. Precise and repeatable mixing of liquids and developing standardised microfluidic components remains a technical challenge. There are also opportunities to develop new microfluidic chip designs which could find wider application embedded in everyday items like mobile phones and water pipes.

In drug discovery, advances in microfluidics technology are revolutionizing procedures for enzymatic analysis (e.g. glucose and lactate assays), DNA analysis (e.g. high-throughput sequencing), and proteomics. An emerging application area is clinical pathology, especially the immediate point-of-care diagnosis of diseases.

at CEST suggested a version of the model could be applied in Cambridge, privately funded, drawing on the same assets and out-of-the-box thinking he had employed at Cambridge Network – in particular, leveraging the best brains at the University for inspiration.

COLLABORATION FORMULA

At CEST Hewkin had established a formula for managing consortia to deliver specific results, such as reports and recommendations to government, so now he had to adapt it to one for which organisations would pay. He returned to the central idea of CEST - collaborative communities - and added the following three *commercial* selling points:

1. Doing more with less – by sharing the costs to be part of a larger programme reflecting the needs and interests of partners across Europe (not just UK);
2. Collaborative advantage – where members achieve things as part of a group which would not be possible for the individual parties alone;
3. Networking - to find, choose and build business relationships with relevant partners in a trusting, confidential environment.

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Microfluidics Consortium delegates

CEST had been able to run six or more consortia in any year. To do the same Hewkin established a franchise scheme. He manages two consortia directly (Microfluidics and Open Innovation). While two others – "Inclusive Design" and "Novel Applications of Printing" - are run by franchisees. Others are planned in areas like "Flow Chemistry" and "The Internet of Things". Hewkin's operating vehicle, "The Centre for Business Innovation" (CfBI) is the franchisor.

In his first month of trading as CfBI he contacted 15 professors at Cambridge University to find out what new technologies were coming through research pipelines but were not yet at the point of commercialisation. The enthusiasm of two professors at the Department of Chemistry in particular held his attention. Professors Steve Ley and Wilhelm Huck are active in the field of microfluidics (sometimes called lab-on-a-chip). Huck is the co-founder of a new spinout in the field, Sphere Fluidics. Hewkin noted that microfluidics also met all of his criteria for starting a "CEST-like" consortium: the industry was highly fragmented; it was not yet making money for participants; and therefore it was operating well below its predicted potential.

MEMBERSHIP RECRUITMENT

To secure members for the first "European Microfluidics Consortium", Hewkin used both his Cambridge Network and INSEAD connections, as well as some "chutzpah" of his own …He tells the story of visiting a leading biomedical research institute in the Cambridge area. Here he noticed a large box had been delivered, with the German supplier's name on it, one he had never heard of. Assuming the unknown company must be competent to supply such a prestigious institution, he phoned it, giving the research lab's name as his reference; this company shortly after became his first customer.

To ensure value for all the members, Hewkin calculated there needed to be a minimum of twelve, each paying £8,000. By May 2009, only three months after inception, he had secured 15 members. For the formula to work well he strove to secure a balanced membership that would allow each member to find at least three potential partners or customers. He points out that the formula also requires that competitors can sit down together around the table to benefit from gaining access to a mix of partners. All discussions are done without Non-Disclosure Agreements – "if you have a secret – don't tell". If a new idea arises during discussion, the first to capitalize on it, secures it, says Hewkin.

MEETING FORMAT

CfBI consortia hold five meetings a year. Each is preceded by a dinner, which helps to cement personal relationships. The first meeting is held in Cambridge. At this meeting members decide what they would like from the programme and how to secure it. Other meetings are generally held at the location of one of the consortium members – 70% of which are based outside the UK.

The Microfluidics Consortium has recently completed its second year of operation. The second consortium (MF2) had 17 members, from nine European countries. The European mix means it can address issues which a purely UK government initiative could not. The European constitution of the group also distinguishes it from publicly funded networks in the UK, like the successful KTNs (Knowledge Transfer Networks), as well as from the earlier CEST model.

POSITIVE OUTCOMES

Positive outcomes for the Second Microfluidics Consortium include: engaging with key influencers like NICE (National

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MICROFLUIDICS CONSORTIUM MEMBERS (MF2)

- University of Cambridge
- Imperial College
- University College London
- ST Microelectronics (I)
- Biocartis (CH)
- Bronkhorst High Tech (NL)
- Free University of Brussels (B)
- Dolomite (UK)
- Sony DADC (A)
- Schott (D)
- IMT (CH)
- Cyclofluidic (UK)
- BASF (D)
- Micronit (NL)
- Lionix (NL)
- Philips (NL/UK)

MF2 consortium meeting at SonyDADCs site in Salzburg, Austria

Institute for Health and Clinical Excellence), which is responsible for regulatory matters, and with the European Patent Office; there have been collaborations among members to win contracts, which the Consortium has enabled; and they have made further progress with the promotion of standards, platform solutions and interoperability formats.

One of the key insights members have found by sharing experiences together is that the most effective way to expand the market for microfluidics is by developing standardized interconnects which make it easier for kit from different vendors to be readily assembled and thereby making it easier for second sources to be specified. The comparison Hewkin makes is with mobile electronics, which was greatly enabled by standardized interconnects such as USB and Bluetooth.

The Consortium has divided the required interconnect schemes into three kinds:

1. Higher temperature/pressure interconnects for research, analytical and process instruments based on reusable chips.
2. Chips holders, including microfluidic and electrical and/or optical interconnects for analytical and process instruments based on reusable chips.
3. Interconnects for disposable chips for health care and diagnostics.

STANDARDS

Once proposals for standards have been agreed, the newly formed consortium, MF3, will take the schemes forward to a wider consultation process.

Building common platforms is important "rather than doing small things in little corners" as Hewkin puts it. Meetings have also highlighted the problem that companies do R&D on the basis of what Hewkin calls "suck it and see" - numerous iterations (a "build, try and throw away" approach). In discussions members have become more interested in using modeling and simulations to reduce the number of build iterations and to speed up the development time.

INTELLECTUAL PROPERTY PROTECTION

The other area where consortium members benefit, says Hewkin, is in improving their understanding of intellectual property protection. For example, smaller companies find it hard to monitor the patent landscape, as well as to enforce their patents. During the year the consortium invited speakers from both the Patent Office of the EU and the USA to provide better insights into the process. The members have also discussed how to resist actions by larger companies which use patents to force business deals in their favour.

This year for the final meeting of MF2 CfBI delivered a Study Tour to Japan. The third year of the Microfluidics Consortium (MF3) started in June 2011 and will visit the USA to promote its current members' interests and recruit more members.

The MF3 Microfluidics Consortium has a public face through its website www.microfluidicsinfo.com . Those interested in joining the Consortium should visit www.cfbi.com ■