

MATCH 2003-2008

FIRST PHASE AND VISION STATEMENT

When the Engineering and Physical Sciences Research Council (EPSRC) called for a healthcare challenge centre in 2002, its aim was to wrap two critical themes – clinical context and business methods – around traditional technology-oriented research. As with all its Innovative Manufacturing Research Centres (IMRCs), the aim was to support industry with concepts, methods and tools that would enable better products to be brought to market more quickly and with greater confidence of success.



MATCH
Multidisciplinary Assessment of
Technology Centre for Healthcare

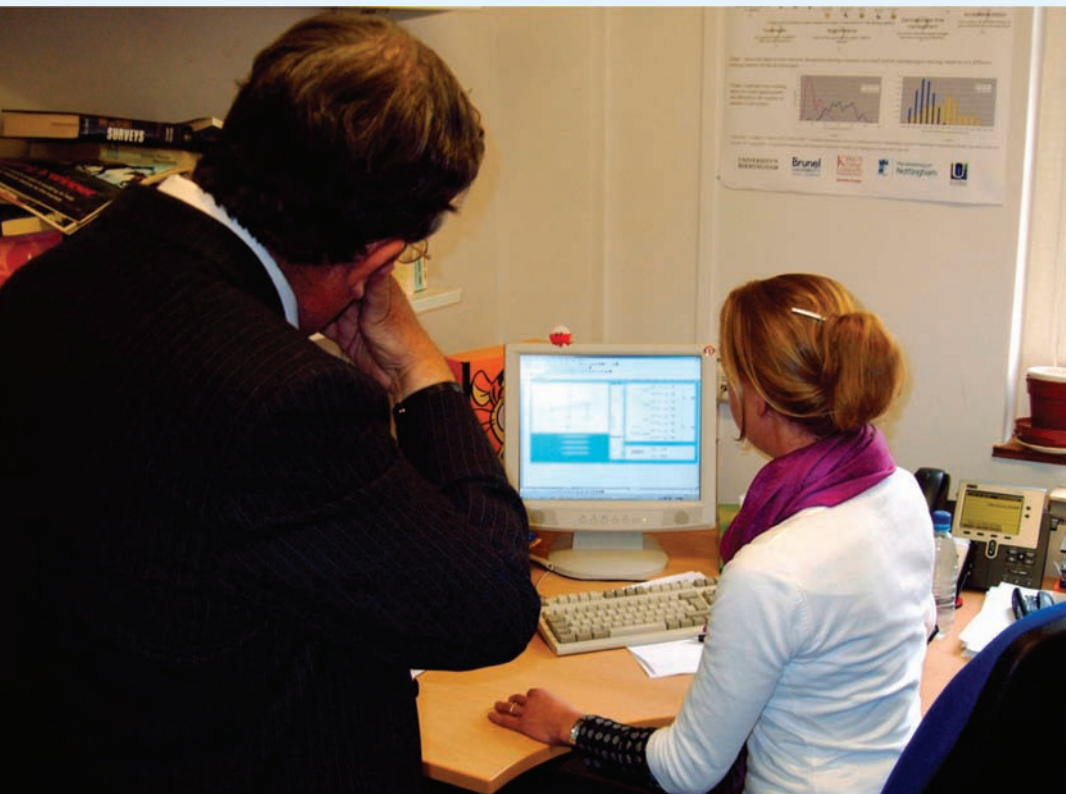


Figure 1: Lord Wakeham watches Dr Lotte Steuten demonstrate a MATCH software package

Key differences separate healthcare from the sectors in which other IMRCs operate: most notably the way in which Government is the principal funder of care through a single body, the NHS, with a politically established budget and aims for universal provision. The National Institute for Health and Clinical Excellence (NICE) assesses the cost-effectiveness of healthcare products, including interventions and the technology needed to support them. Competition with the NHS is at best limited, while the supply side is a mix of a few very large, and many very small, companies – a distribution in stark contrast with the pharmaceutical sector. It is not at all clear, therefore, that the market can survive in this form and the most likely impact of NICE is to move the market from one of untested differentiation to a place where competition is based on evidence of effectiveness. This is a unique context for an IMRC and a very exciting time to be undertaking research.

In addition to complexity in healthcare development and procurement, other developments in the UK over the past five years have also been dynamic. The Health Industries Task Force (HITF) operated over the opening years of MATCH and, with its report, brought a new appreciation of the difficulties faced by manufacturers in addressing healthcare markets. Restructuring of the NHS Purchasing and Supplies Agency (PaSA), along with the commercialising of a large tranche of procurement and the emergence of Centres of Evidence-based Purchasing (CEPs), Innovation Hubs, and Procurement Hubs, have altered the

landscape considerably. Meanwhile, the Modernisation Agency was dissolved and a new NHS Institute for Innovation and Improvement came onto the scene, while, in the past year, the Darzi review has elevated quality to a new prominence in the NHS, and transformed the interconnections of the service with its focus on World Class Commissioning (WCC).

VISION: To transform the medical devices sector by researching, testing and making methods available to cut the time and cost from concept to continuous improvement in the market, in support of device users, the medical device industry, regulators and reimbursement agencies, and healthcare providers such as the NHS.

Although the pace of reform in the NHS has been bewildering and the number of new stakeholders with which to operate has made it an exhilarating ride at times, the net impact of these changes has been overwhelmingly positive from MATCH's point of view. There is a more widely received acknowledgement of the need to articulate value at all stages in healthcare delivery. Companies are much more willing to accept the need to develop formal propositions of the value their products bring to service providers and hence there is a much greater appetite for the tools and methods with which to do this. Moreover, the new procurement agencies seek formal ways of valuing options when going to the market for technology. A common view of value is seen by both sides as an attractive and accessible achievement.

ACHIEVEMENTS

- Research and methodological development. Many MATCH investigators are authorities in their own right and progress has sometimes relied upon research they are undertaking through other funding sources to broaden the scope of MATCH research. For instance, studies on left Ventricular Assist Devices (LVADs) and advances under MATCH were only possible because this area represented a major interest of two of the MATCH teams. Specifically, MATCH-related research highlights include:
 - three systematic literature reviews of the role of users in healthcare technology development;
 - development of a classification of users of medical devices;
 - engagement with user communities (e.g. self-regulation of anticoagulation therapy);
 - a survey of industrial methods in the medical device sector – the largest of its type;
 - demonstration for the first time that the ‘experience curve’ applies to healthcare products;
 - an improved power calculation for statistical analysis of trials data;
 - a ‘retrospective’ Bayesian trial in which historical information about a real product was concealed from a researcher who undertook an analysis of the critical decisions along its pathway to market, after which the findings could be reviewed in the light of what happened;
 - ‘Split-choice’ theory which applies when the benefit to the individual runs counter to the societal benefit in a trials context;
 - methodological development to articulate the value of safety aspects of medical devices;
 - methods around the transferability of cost-effectiveness findings from country to country;
 - methodological development in supply-side theory, including pricing strategies for companies whose products will be subject to cost-effectiveness analysis; and
 - use of patient pathways in assessing the impact of telemedicine and point of care technologies.



Figure 2: The Public Interest Forum listens to a presentation from the European Trade Association, EUCCOMED in 2007

- Developed first-generation tools for healthcare technology communities and started to trial their uptake with communities on both the supply side (through Innovation Hubs and with companies) and on the demand side (through the NHS Purchasing and Supplies Agency, PaSA, and the Centres for Evidence-based Procurement (CEPs)). The tools include:
 - Early stage economic analysis tool;
 - Headroom Method;
 - User Guide; and
 - Experience Curve.

- Built a team that communicates across disciplinary and university boundaries, as well as beyond, with manufacturers and government agencies. The difficulty of doing this should not be underestimated, nor the development experienced by the co-investigators over this period.
- Provided an environment platform for early stage researchers, with significant development potential:
 - one former Research Fellow now runs a health economics group at Heidelberg University;
 - another runs a team at the National Co-ordinating Centre for Health Technology Assessment;
 - another is now a consultant with an HTA bias; and
 - a further one has joined a start-up.
- Undertaken studies with commercial partners that have made a difference to industry and have yielded important insights into what decision-making support is needed. The fact that there has been time and space on a research programme to tackle these studies more reflectively has also contributed to the personal development agenda noted above. Below are some examples.
 - **Near to market** – MATCH studies have been used to support late-stage analyses of products close to, or already on, the market.
 - A fibrin sealant to reduce blood loss in surgery was shown to be cost-beneficial, and the team developed a method for transferring the finding from one country to another.
 - Not all such studies have been taken up, often due to other factors. A study that demonstrated the cost-benefits of a diagnostic market for heart disease was not really converted into a marketing campaign, mainly because the division was taken over just as the results emerged.
 - **Mid-phase review** – A MATCH analysis of computer aided knee-replacement surgery has encouraged an international orthopaedics company to rethink its evidence-gathering strategy. It was just going to market at the start of MATCH and is now revising its plans because of the slow development of the market. MATCH researchers were able to show that computer interventions provided with high probability better alignment, but further evidence was needed to link better alignment to improved outcomes when replacing knees with artificial implants. The company is now gathering that critical evidence.

“...a common understanding of evaluation and customer input will be invaluable in the longer term exploitation of concepts for both clinical and commercial benefit.”

**Dr Jeremy Russell, R&D Director,
Smiths Medical International**

- **Early-phase analysis** – MATCH has helped a number of companies save money by identifying non-viable products.
 - The Experience Curve was used by one partner to decide that a second generation product was not viable because of price erosion in the first-generation product. The launch was pulled.
 - The Headroom Method, developed under MATCH (in conjunction with two other projects, REMEDI (EPSRC) and STEPS (EU)), was used to show

that tissue engineering a bladder was economically insupportable. A European company heeded this analysis and changed its plans while a US company ignored it and has proceeded to funding – so there is a trial of sorts underway!

- A user needs study of an imaging product being developed by an SME showed that the wrong users were being targeted, so the strategy was radically altered.

DISSEMINATION

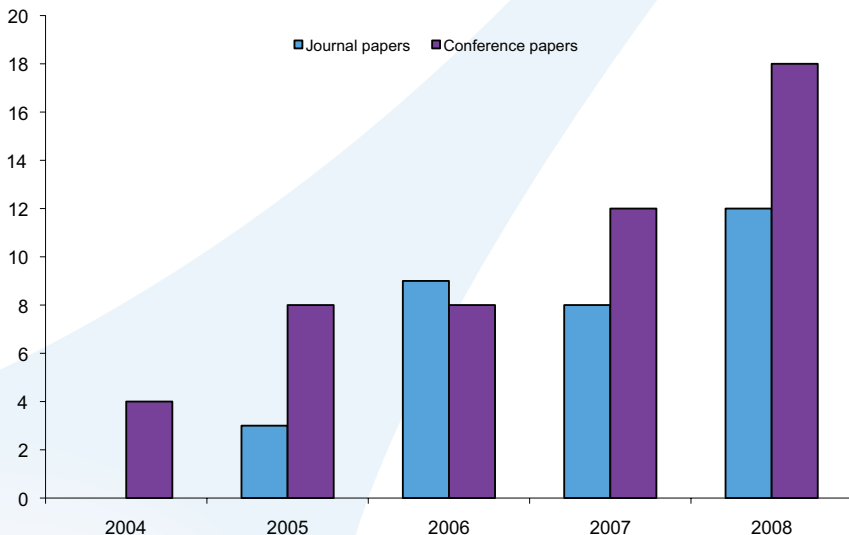


Figure 3: Journal & Conference papers published since 2004

MATCH has made its results available through a range of channels, from the formally academic, through to exhibiting at trade shows and invitations to specialist meetings of Venture Capitalists. The experience of engaging with such a range of communities has been challenging, but also informative and the findings are probably applicable to any highly cross-disciplinary, applied research programme.

Formal publication and conference output

MATCH started at the end of 2003 as a genuinely new collaboration, so there was no pipeline of papers. Figure 3 shows the rate of journal papers published from 2004 onwards. Not shown is a pipeline of 9 papers, accepted for publication out to 2009. A major question concerns where to publish and what constitutes the higher ranked journals from MATCH's perspective. Clearly, publications in the medical literature enjoy citation factors that may be a factor of twenty higher than a top social science journal. However, much of the MATCH research does not fall into such easy niches, but an heuristic process has led us to consolidate around a more select corpus of journals and conferences. A striking example of this involves HTAi, (Health Technology International). HTAi runs annual conferences and has a high quality academic partner, the International Journal of Technology Assessment in Health Care (Cambridge University Press), which is the leading journal in the field. MATCH now has 7 papers published in IJTAHC and 14 in the annual conferences. MATCH targeted HTAi 2008 in Montreal, with 10 papers,



Figure 4: HTAi Conference Montreal MATCH Pre-conference Panel

L to R: Dr Sarah Garner (NICE), Dr Anna-Lisa Oswalder (Chalmers University of Technology, Sweden), Dr Sarwar Shah (MATCH), Dr Lotte Steuten (MATCH), Laura Vallejo-Torres (MATCH), John Wilkinson (Eucomed), Prof Terry Young (MATCH), Dr Mike Craven (MATCH), Alan Ashby (DePuy), Martin Jordan (Health Technology Solutions Spain).

a MATCH session and a pre-conference workshop that attracted 80 attendees. Some of the MATCH material is of interest to new publications, whose credentials have still to be established. For instance, the Journal of Medical Marketing has proven a good repository for work on the Experience Curve, building on Boston Consulting's work in the 80s and having a strongly applied flavour. On the other hand, some MATCH findings contain messages that may conflict with other market goals, such as securing private venture funding. For instance, a paper establishing that bladder replacement was a poor prospect for tissue engineering was rejected with a rather vituperative review. The fact is that MATCH has a wide range of potential outlets with Impact Factors >1, and is building a reputation with key journals and conferences.

Informal dissemination and engagement with investors

At the other end of the spectrum, MATCH has engaged in a high level of informal dissemination through visits to companies and by company representative, through to the MATCH Internal conferences. A critical part of MATCH has been its internal 'connectedness' and there is a marked difference in understanding between partners as they discuss MATCH2 as compared with the early conferences in 2004. Industrial Partners have always been welcome at the MATCH Conferences, most of which have included an industrial dinner with supporting sessions. Over the five years, MATCH has run 13 internal conferences, 12 of which had Partner representation, and has run another 10 events for Partners, including the MATCH Launch with Lord Sainsbury and the Deliverables Launch with Sir Keith O'Nions. Beyond all this, the MATCH Steering Committee contains industrial representation and has met, in one guise or another, on a total of 15 occasions. Finally, MATCH has run two Public Interest Forums that have brought together industry, government agencies and academics.

MATCH has enjoyed representation at trade fairs and exhibitions since 2005, and has exhibited 10 times, including taking stands at the Medical Innovations Forum, and running 8 themed events from Northern Ireland. In addition, we have run two Public Interest Forums and have a third scheduled for 2009, with Andre Dillon of NICE as the main speaker. These events enable

“ A major problem in product introduction is the different approaches used by approval and purchasing bodies and those in industry. ”

**Dr David Huckle, Chief Executive,
Adams Business Associates**

industry, healthcare agencies and academics to discuss critical issues in a neutral environment.

For the past couple of years, we have started to engage with the Medical Devices Investor community. A European investor circle, headed by Gate2Gate, arranged one of their meetings at Windsor Great Park (March 21/22, 2007) in order to take in some MATCH presentations. The PI has also accepted an advisory position with the MedTech Investors Europe (MTIE) conference cycle, being a panel speaker at Imperial (September 2006) and Lausanne (February 2007). MATCH has also opened negotiations with ABN AMRO to see how the MATCH value concepts might be more widely adopted in the Mergers & Acquisitions community – although the present financial crisis may well undermine some of this activity.

LOOKING FORWARD

It is becoming clear that to rise to its potential, MATCH needs a sustainable vehicle to lead the world, that...

- (a) ...can fund a communications and marketing arm in order to make the most of the increasing number of opportunities. An External Affairs Directorate would have a full agenda in working with the MediLinks, Venture Capital and other Investor activities and in taking the MATCH tools and methods out to the wider community.
- (b) ...can focus the intellectual property (IP) of MATCH, currently spread across 4 universities, and focus into knowledge transfer and revenue creating streams that will come back to the partner universities in order to sustain both the basic research and the dissemination activity.
- (c) ...can enable MATCH to work with other academic communities around the world. We are exploring the idea of MATCH*inside*, which might enable the basic research results from MATCH to be fed out to other collaborations seeking to support industry in other parts of the world. This would provide those groups with the expensive, underlying, expertise, while allowing them to focus on their industrial clients with more applied services.

Some planning for this has been done under a recent call for Knowledge Transfer Account proposals. Consultancy company Red Ochre was commissioned to look into legal structures (see figure 5).

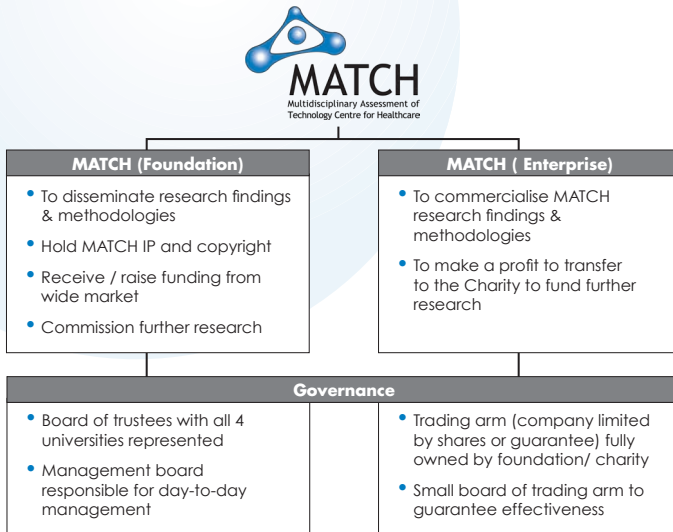


Figure 5: A possible structure for a MATCH commercial vehicle

In tandem we have developed a plan to bring 5 knowledge transfer schemes to market:

- **MATCH Partners** – to build a network that offers tools, MATCH papers, information dissemination events and discounts on other MATCH services;
- **MATCH Publications** – to produce guides, workbook, tools, and knowledge around valuing technology in an accessible format;
- **MATCH Events** – to run conferences, seminars, workshops, etc, to spread the latest ideas and industrial experiences of using them;
- **MATCH Training** – to deliver everything from 1-day introductions to evaluation, through to in-house training programmes in economic evaluation, users and their involvement in design, and other aspects of decision-making; and
- **MATCH Services** – offering bespoke services from consultancy through to contract research.

The groundwork for this development has been laid in the new Collaboration Agreement signed by the four MATCH Universities and serious discussion has now

“ We believe... strategies to develop, promote, train & disseminate awareness of the QALY tool and methodology will be of great benefit to... industry, healthcare procurers & commissioners alike ”

Brian Winn, Head of Technology and Product Innovation, NHS National Technology Centre

taken place as part of the proposal process, while the partners are committed to further negotiations. One way or another, there is a strong aim to create the vehicle that will sustain this research beyond the end of the present grant.

MATCH research for 2008-2013

MATCH has now restructured itself into four basic project themes.

- I. **TOOLS FOR INDUSTRY.** MATCH has now made four types of tool available to inventors, research managers, and procurement agents. The aim of this project is to put the development of tools onto a firmer, more systematic footing, and to secure the configuration control and documentation needed to support tools that will be used by others. A second aim of this work is to bring new tools and workbooks to market. Finally, research is needed into how such tools are taken up and to identify the link between this and embedding value-based decision-making into industrial practice, on the one hand, and procurement, on the other.
- II. **ECONOMIC EVALUATION.** This represents the main activity on the economic side of the programme. It includes: research into the value of safety; creating a full Bayesian framework for assessment and decision-making; and linking the Bayesian framework to Real Options theory for pricing and costing strategies. Extra resources have been applied to this research since the 3-year review.

III. USER NEEDS. This research will continue to address two interlinked themes. The first question is what sort of user to engage with (e.g. end user, carer, clinician). The second is at what stage, and how, to bring that perspective into the design process. Extra money is being injected into this theme through the 'MATCH-PLUS' programme, under which the Department of Health has invested £1M in MATCH, part of which money is to improve user needs research. The most exciting prospect is to link the qualitative work in eliciting user views to the more quantitative ways of capturing views in II above.

IV. IMPLEMENTATION ISSUES. Many technologies now coming to market are likely to change the care delivery system and so evaluation of these devices involves more modelling and simulation of the process than is typical for more standard economic evaluations. These technologies include Telecare and an increasing range of hand-held meters for self-monitoring (glucose, anti-coagulation regime, etc). At the other extreme, simply trying to join the conflicting metrics for procurement into a coherent process is not easy. The research in this project is therefore aimed at the whole spectrum of practical issues associated with introducing new technology to the market.



Figure 6: Publicity folder with four MATCH tools.

KEY TARGETS FOR 2013

By 2013, we hope that the following will have been achieved and are well-recognised.

- Collaboration with three or more HTA groups in the US, Europe, and the Far East.
- An end-to-end Bayesian framework with worked examples for decision-making at each stage of product development (supply side, or evaluation (demand-side)).
- Integration of the Bayesian framework with pricing theory, Real Options, and other economic and business theories as appropriate.
- An integrated view of users: whom to approach, how to engage, and how to feed findings back into design processes (supply side) or evaluation processes (demand-side).
- Methodological development to link the views of users into the Bayesian framework, initially through elicited priors, in order to close the gap between social science methods and economic theory. This would be truly novel.
- A MATCH entity capable of sustaining research beyond 2013 by making the MATCH IP available on a commercial basis, initially to UK companies, but eventually on a global basis.
- 250 UK MATCH Partners, all of whom use 10 MATCH tools and guides, with support, training, and ongoing research into how they are being adopted and embedded in the partners' culture.

WITH THANKS TO:

3DMD Ltd	Diameter Ltd	NHS Purchasing
3M Healthcare	Finsbury Orthopaedics	National Patient Safety Agency
Active4Life Healthcare Technologies Ltd	GE Healthcare	Olympus Optical
Adams Business Associates	Heartsine Technologies Ltd	Orthodocs Ltd
Anson Medical Ltd	Investment Belfast	Oxford Biosignals Ltd
ApaTech Ltd	Invest Northern Ireland	Pearson Matthews
Astron Clinica Ltd	Luxfer Gas Cylinders	Plus Orthopedics UK Ltd
Baxter Healthcare	Matrix Knowledge Group	Smiths Group PLC
Bayer Plc	Medilink UK	Smith & Nephew
Boston Scientific Ireland Ltd	Mintea Ltd	SSL International PIC
Cinimod Ltd	Molnlycke Health Care UK	Sensor Technology & Devices Ltd
Corin Ltd	Moor Instruments Ltd	Translucency Ltd
Datalink	MSI Consultancy	Triteq Ltd
DePuy International	NHS Institute for Innovation & Improvement	Zimmer Gmbh