Oxford Conference on Innovation and Technology Transfer for Global Health
Bridging the Gap in Global Health Innovation – From Needs to Access

Recurrent Conference Themes:
Pointers to an Actionable Agenda[1]

This file does not report all themes touched upon in the conference, but a selection, as seen through the eyes of a delegate, having particular resonance in the area of global health access. It should be noted that many of the themes are already the subject of intense research elsewhere. The task for those following through on this conference is to work out where any remaining gaps are and to prioritise a research strategy to fill them, and to explore how to pull knowledge across all areas together and make it more actionable.

Case studies are selected only from the conference, these themselves being just a small selection of possibilities. Conference session numbers are in brackets.

1. Behavioural and anthropological research agenda and neglected communities

There was a great deal of discussion around an anthropological/behavioural research agenda (1.3, 3.0, 3.1, 3.6, 4.7, 4.8, 5.2, 6.0, 6.8, 8.2, 8.6, 6.11).

Specific issues raised as themes for further investigation included: the integration of modern medicines and medical devices in to rural communities and settings that favour traditional medicine (4.7) and lessons that can be learned in return from traditional medicine, including, where appropriate, the development and scale up of traditional medicines(1.3); an understanding of social norms and hierarchies that harm the ability of young women trained to be health delivery agents to perform their duties (3.1.); gender balance and empowerment (5.2); community engagement in the context of trials (microbicides 6.8 IPM); the political and anthropological contexts of vaccination (8.6); culturally appropriate materials (Mayo cancer research 6.11, Desa Siaga 6.9, EAGLES, 6.11) and the cultural aspects of adoption and adherence in general (6.0).

Communities are also highly heterogeneous; success stories have context (3.6). To help policy makers formulate priorities based on local understandings and perceptions about interventions, policy makers need to integrate their policy thinking with behavioural and anthropological analysis. Better cultural understanding and integration means better fit with

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local government agendas (8.2). This is an important way to get trust in government, and indeed, to make government, in turn, responsible for results.

Although there has been an explosion of funding, concern was paid to the coverage of treatment, especially of the rural poor (3.0) and pastoral and nomadic groups as particularly 'neglected' communities.

2. Supply chains

Numerous references were made to the need for improving the integrity, reliability, security and sustainability of supply chains (3.3, 4.0, 4.1, 4.3, 4.7, 4.8, 5.1, 5.3, 7.6, 8.6).

Reference was made to the need to consolidate fragmented product demand to improve incentives to maintain the supply chain, of better supply chain management to reduce the harm of counterfeits (4.7), of particularly demanding supply chain challenges in rural areas (4.3), and of concern for the fragility of the supply chain if and when donor funding ends (4.8).

Some delegates wondered whether private sector expertise in supply chain management could be much more fruitfully transferred over to settings where there was no commercial interest (5.1, 5.3). What are the challenges if there are no or low profits? What non-profit models have worked? What are the case studies? What is the current configuration of commercial incentives (that for example causes there to be 700 competing, poor quality, malaria drugs in one country in Africa alone), and how might these be better harnessed? How is policy/think-tank space created for this sharing to take place?

It was suggested that supply chain management for chronic diseases may have lessons for supply chain management for non-chronic diseases (8.6). The chronic disease supply chain may evolve to a steady state system that is working. What characteristics come to the fore? Can they be transferred by disease and across location?

It is also unclear how much the patient actually pays compared to what companies charge because of taxes levied on pharmaceutical products and the way supply chain fragmentation distorts prices for end-users (7.6, with MeTA set up by DIFD to look into this).

What are the case studies by region (4.1 IOWH supply chains in India)? When there are PDP 'access' and novel supply chain pilots, how are the lessons passed on? How are good results made scalable? There may also be an interesting neglected-community/rural supply chain theme related to the networks theme also picked up (see 'networks' entry below). We know that a lot of supply chain research is going on, so the issue is about how any conference follow-up might add value.

3. Health insurance

There were many references to health insurance in poor and middle income countries (3.1, 3.2, 3.6, 5.4, 5.8 discussion, 6.10, 7.2, 7.6). Attention was drawn to country-level public safety nets as part of a way of making health systems more sustainable (3.6). Discussion included the optimal integration of health insurance and financing systems into packages of measures, for example to reduce diarrhoea, which requires a combination of good water management systems and sanitation, healthcare financing, novel interventions, health insurance and possibly microfinance (3.2). Health insurance systems are also a way to monitor local health conditions (6.10), and, as discussed in an entry below, the data they generate can be used to improve access. How?

Several references were made to the effect of health insurance markets (public and private) on pricing strategies and the cost of drugs (7.2, 7.6). Discussions following talk 7.6 highlighted that when there is a mix of low-volume high-price and high-volume low-price markets, the 'middle market' in developing countries may still not be addressed adequately. Donors tend to deal with the very poor segments, and commercial interests tend to target the richer segments first. The issue is whether there is critical mass in the 'middle market' for an insurance infrastructure to support the demand in this middle market: "These issues give a

strong indication that new pricing models and more infrastructure development in insurance markets are needed." Again, with global pressure on funding and concern about sustainability, this is a 'local' way to reinforce sustainability. It is both a cross-cutting research theme, but it also needs specific country attention.

Can, and should, the donor community take a more active role in establishing and even funding community health insurance plans? BMGF is working on microfinance as a form of insurance. What are the potential uses in supporting health uptake? What about for health emergencies? What form would these pricing models and infrastructure developments in insurance markets take?

4. Institutions, governance and politics

There was a running theme of better institutional and organisational design to achieve delivery (3.1, 3.4, 3.6, 4.3, 4.8, 5.0, 5.2, 6.12, 8.2, 8.6). Redesigning institutions and organisation is not a quick fix.

There was much discussion about the need for 'political leadership' (3.4) and of indigenous leadership (4.3), but at the heart of this debate was the issue of 'ownership'. There is tension between top-down and bottom-up capacity-building and policy approaches (e.g. 8.6 in the context of NEPAD). It was recognised (5.2) that there still was limited policy space at the global level for developing country governments to set their own priorities, and that ownership and accountability need to be aligned so that decision-makers bear the risk of policy failure as well as taking credit for success. A comparison of developing country and international priorities would be a sobering exercise (5.2). The many challenges in reconciling a global "helicopter" ideological view with the practice at the ground level (3.4) was picked up.

Having new interventions is one thing. Often the problem is getting change in developing country public health practice (5.0) and getting adoption into national policy (8.2). How, for example, does one tie an action to improve access to medicines to other aspects of social structure and programs to get on-the-ground political wins (4.8)? How do particular programs become part of a national agenda in the first place (8.6)? Are there lessons from policy makers about where achieving agenda status worked and where it did not?

There were a range of incentive and efficiency issues at the local level. For example, discussion (following 5.2) identified a lack of incentives of politicians at the country level to delegate downwards, instead of simply taking credit for 'achievements' themselves even if the result is that the overall level of impact is lower than it might otherwise have been. And bureaucratic failure in general (6.12) slows potential success stories. If governments are to act as system 'integrators and coordinators', they have to have legitimacy and there must be good quality control (3.6). Would an audit to highlight best and worse practices help generate change?

Better institutional design will help governments have more impact and avoid the overuse of NGOs and consequent fragmentation and complexity (3.1). Institution building also includes incentives, and conditions for markets to function.

5. Local priorities, referral systems and community engagement

An interesting range of ideas arose around systems for patient referral and local surveillance as ways to identify local priorities and to better match funding to needs and thus of improving access (1.3, 3.1, 4.1, 6.0, 6.10, 6.12, 9.0). Interesting case studies included the Uganda strategy of a 'tiered system of referral….' (3.1) to make more effective use of scarce health service resources at the district and regional levels, a similar IOWH referral process and analysis of economic impact on communities (4.1), and community-based participatory research (Mayo clinic, 6.12), and Desa Siaga (6.10), but many other cases too.

The appropriate mix of community-led surveillance, planning, and finance were discussed as a way to reduce demand and supply gaps (6.0) thus improving access by making market and

procurement more certain. This is not putting the emphasis on 'demand' forecasting of a global procurement body, but of empowering local systems to feed into more certain demand.

Is it possible to evaluate some of these local priority-setting mechanisms, and draw out comparative lessons? And what lessons are there from, for example, the reforms of developed country health system over many years that could be applied in these settings? To what degree can some of these local systems be strengthened/refined to play more of a role in global priority setting? This links to the issues of performance metrics and better monitoring of health impacts as ways to drive access (9.0).

There was a rich seam of possible cross-cutting lessons in the way PDPs work with communities. And there were calls for development of a 'systems' approach which actively integrates health systems, communities and infrastructure with product development.

6. Choices, tradeoffs and performance metrics

Closely related to institutional and organisational design is that of performance metrics and the, political, choice between competing projects given a binding budget constraint (3.4, 3.5, 3.6, 4.3, 4.7, 6.9, 9.0)

There is a need for improved mechanisms for rigorously and independently evaluating budget tradeoffs. For example, there are 60 IGWG recommendations (3.5). To implement all would be very costly. How does one price/evaluate tradeoffs given a budget constraint covering 60 options? A Global Funders Forum was suggested (4.3) to help achieve a more equitable choice of which projects should go forward. However, for such a Forum to work requires more independent evaluation of the costs and benefits of different choices. Similarly, a request was made for better modelling of what the real investment need is for each specific disease (6.9). Finally, how do we establish quality and not just quantity metrics? It was for example pointed out that there is need for more core funding to run trial sites but that often the incentive of sponsors is to see extension of the network and sheer numbers over quality (4.7).

If institutions and initiatives are to work better, improved accountability and improved governance (9.0) will be key. The notion of evidence-based change (3.6) and a 'needs-driven agenda' (3.4) means nothing without the balanced use of performance data/evidence.

How do we drive improved performance in the access and delivery area (9.0)? We would have a much greater chance of hitting some of the MDGs if we could do this. One proposal was to get together some PDPs to formulate proposals and actions.

Similarly, how do we drive the Paris agenda in practice? How can DECs establish their own priorities, and avoid the usual North/South colonial approach? How many DECs have the capacity to set their agendas, and who listens to them? What are the examples of good practice/performance (including ITTGH conference workshop materials)?

7. New kinds of PDPs?

There was much reference (1.3, 3.2, 3.3, 6.12, 9.0) to new mechanisms to improve the outcomes and relevance of policy making for global health (Preface), and of a 'need for new models of health care delivery/access' (3.3). One possibility was through developments involving PDPs.

There was discussion, but not really a settling of the debate, regarding new kinds of PDPs and PDP partnerships (for example partnerships with local health systems, 3.2). It was recognised that many issues span different disease areas, with many synergies and interfaces and not only disease-specific product development, and that access, like R&D, is a process (6.12) the components of which have to be carefully unpacked.

There was a suggestion of the need for 'infrastructure and distribution public-private partnerships' (5.8) with lessons learned from R&D PPPs/PDPs. There was an ongoing

debate about whether there should be deliberate capacity building by PDPs or capacity through other partnering frameworks (6.12). Some hold the view that deliberate capacity building efforts should be made, whilst others believe that capacity will be automatically developed with the act of partnering within a framework of common goals (6.3).

This surely requires better understanding of organisational arrangements and incentives in 'partnerships', PDP and otherwise? Not all PDPs are going to be equally good at partnering with health systems, since not all are equally good at partnering now. Not all should. What are the differences between, say, malaria drugs, TB diagnostics, and dengue vaccines? One size does not fit all. What is the best institutional design to create incentives to deliver on time (5.8)? What are the prior lessons – of successes and failures – of PDPs integrating with national health systems (1.3)? What sources of advice (including from each other, and, if so, by what mechanism?) can PDPs take regarding how, when, where, and how much to invest in marketing and positioning of a product, and distribution of the product through public and private marketing channels, and the formation of partnerships with existing supply mechanisms, including PEPFAR, JSI and others (6.7). Who owns the delivery piece?

There was much discussion of the need to avoid silo mentalities and of instituting diagonal approaches. All of the above needs to be done while avoiding the danger of creating new silos.

8. Lessons from industry and innovation policy

There was much discussion about competencies that industry might be able to share with the non-profit sector and of the need speed innovative behaviour at the country level (3.4, 4.0, 4.3, 4.8, 6.11, 7.6). A need was identified for research/an audit of the possibilities and maybe a Forum (4.0) to share and apply lessons, and for compiling, evaluating, and disseminating 'success story' studies (3.4). It was recognised that the consolidation and specialisation of initiatives ran the risk of duplication, and a Forum would be a way to economise and avoid this duplication.

There was much interest in industry and developing countries working together (4.3) and a recognition that firms need to create trust with developing countries (4.8).

It took decades of effort to put together an innovation policy framework for India (6.11). There was a call for setting up a small working group to pull together information on the innovation policy frameworks around the world and to identify best practice, and to perhaps help speed up establishment of national innovation policy frameworks in follow-on developing countries (2.0).

India was also identified as a possible hub for public health innovation (7.6). India is unique in terms of universal access to medicines (though vaccine coverage is patchy), and it is locally important to stimulate R&D and innovation to benefit the poorer populations as well as those further a field.

9. Absorption capacity and commercialisation

A number of references (1.3, 1.3a, 8.2, 8.6) were made to absorptive potential (8.2) and 'commercial incentives' dedicated to R&D for the developing world (3.5), but there was also questioning of how much one could commercialise when absorption capacity was still weak or nonexistent (1.3a).

There was also concern that absorption capacity was often skewed, largely by external funding sources (1.3) and that absorption capacity varies enormously around the world (6.12) according to infrastructure, the broader impact of market mechanisms, incentives to enterprises, and governance capacity (8.6).

It was recognised that there was often a lot of value of 'hidden' innovation already going on in a country (8.6) and an interest to make hidden innovation into 'saleable commodities',

perhaps exploiting lessons from developed countries (8.6). Infrastructure investments (road, power, ports) would allow for interaction of users and producers of technology (8.6).

Part of this absorption capacity need is to establish innovation culture/systems in DECs. This could be a very rich practical research topic.

10. Sustainability and coherence

There was frequent concern about sustainability, most often of financing (1.3, 3.2, 3.3, 3.4, 3.5, 3.6, 4.6, 4.7, 4.8, 5.1, 5.2, 6.8, 6.12, 8.0, 8.2, 8.3, 8.4, 9.0). It was recognised that global health budgets have increased, but so have demands placed on them.

Specific issues raised for further investigation concerned: the impact of a funding plateau in HIV funding (3.3); recent initiatives for funding into vaccines that would need eventual replenishment such that it was important they be applied efficiently so as to generate run-on political interest to replenish them (8.3); fragilities, risks, and competition between interventions over different horizons, and a real need to reconcile global sustainable funding mechanisms with practice at the ground level (3.6); growing competition between trial sites and other health needs (4.7); the eventual biting of territorial issues with companies, especially for India, Russia, and China (6.8); and sustainability of investments into PDPs in the face of funding cycles and budget restrictions of certain donors (4.8). In the past five to ten years, many funding areas have been growing. In a period of growth, inefficiencies as well as efficiencies can survive. What are the risks to the system if funding into certain activities slows, stops or even reverses? What is the balance of power between the groups working in this space? How do we protect against negative consequences (3.3)?

There was tension around the meaning of the word ‘sustainable’ (9.0). Does this mean never-ending flows of finance, or are their milestones to reach by which time funding should naturally shift away? In some cases sustainability means going beyond external funders, but in some cases (such as EPI) external funders will have a role to play for a long time (5.2). The challenge is to work out which is which and how to switch off external funding in those cases when it is no longer needed. It was felt that future conferences could be used as a way to debate these rather radical milestones.

It was recognised that there are transaction and mechanism costs in any new financing mechanism (3.4, GAVI). These costs are not per se bad. The issue is how do they show up, can they be measured, and how complex can a system become before transaction costs are deemed too high? Where transaction costs are high, one is likely to get compromises and outcomes that do not match idealised predictions. A need was also identified for exploring ‘institutional rights’ and their part in allowing financing mechanisms to function effectively (3.4).

Sustainability includes sustained funding of the delivery system (8.0) as well as R&D and product purchase. Sustainability also means a symbiosis of product readiness and systems readiness (3.2) integrating health systems, communities, infrastructure and product development (3.6), and of integrated delivery in general (such that the impacts of delivering one class of therapies with others is assessed and ways are found to scale up appropriately, 3.2). This symbiosis takes a real community effort.

A range of ideas were suggested for creating sustainability through local initiatives: Local partnerships to create local ownership and assessment of own needs (8.2 Axios Partnership); African needs-driven technology agenda (8.4), and a list in an earlier section above. This ‘local sustainability’ approach has very practical requirements. As well as monitoring, it can also include (just drawn from this conference, there being a huge number of other initiatives not included here): practical technical support to write action plans (8.2) and to teach grant-writing skills so that researchers can become self-sufficient (5.1); help with technology scale up (8.3); investment in education, marketing (6.12), and training the trainers (4.6); the training of whole health treatment teams (4.7, Jump program with pilots in Kampala, Ghana, Senegal, Kenya, under counsel of FSG social impact); and people exchanges (4.7).

11. Risk models to guide policy choices

The concept of risk was touched upon many times (1.3, 3.4, 4.0, 4.8, 6.0, 6.2, 6.5, 6.9, 6.12, 7.3, 8.1, 8.4). There is a massive amount of technical literature on 'risk', which has been transferred to this area very unevenly (lots on liability risk, 1.3, and pharmacovigilance, 4.8, less on the pricing of risk-mitigation/creation through certain kinds of funding mechanisms and organisational forms).

What are the risk management frameworks underlying PDPs (4.0)? There is a lot of discussion about PDP 'portfolio' approaches, but the quality of portfolios varies and it can be difficult to evaluate in every case. Biotechs face a lot of risk (5.1); how exactly (meaning not vague assertions but quantifiable figures) do various financial instruments and partnerships offset this risk? In what ways do or do not new instruments, like AMC/IFFIm, act as risk reduction instruments (8.1)? To what degrees is there a trade-off between rapid access to treatment and exposure to lower levels of safety (4.5), and how is this to be handled?

What are the 'insurance' elements contained in certain practical cases? For example when building capacity for a technology that may or may not succeed (such as a vaccine where many lives can be saved by having production capacity in place earlier even if there is a risk that the capacity is not used), there is an insurance element / option component in building this capacity early (see also 7.4 in the context of India vaccine technology, and 6.2 Aeras presentation). If there is a need for greater at-risk investment in manufacturing capacity (4.8), what role could the public/foundation/private sector play in this? Should the public sector amortise this (4.8) to ensure that products reach market sooner (the cost is claimed to be about $20m extra per factory, though the exact figure is not certain), and such that there is more of a range of products if one fails? What is the 'investment' instrument needed to do this? How do we find the right mix of incentives and mechanisms by disease (8.1)?

What technology risks are there (e.g. 6.5, female condom, where other activity changes in response to the presence of the new technology thus changing the pattern of risk-taking behaviour)? What are the ranges of political risks (6.9)? Who is final insurer of the public good (4.8, "an unanswered question that needs to be addressed by well-considered legislative instruments.")? What (truly) is society's attitude to risk? How risk averse is public opinion?

There are some very vague, largely un-quantified, risks such as that caused by shifting the technology paradigm in the vaccine sector (7.3, in the context of plant derived vaccines), that could be better analysed. Plant-derived vaccines may offer opportunities for cost reductions, but it is argued that since this goes against the traditional method (i.e. inactive and recombinant vaccines) it is perceived as a risk. Similar issues arise in the case of pandemic flu vaccine development and production. In addition there is a perceived high opportunity cost in transferring knowledge and skills to a different area. What is the truth behind this? And how do we create mechanisms to overcome any risk that is present?

Risk mitigation can come through certainty of demand/predictability of financing, and 'through collaboration' (3.4), but risk can be imposed by poorly-working collaboration and maybe also through some of the uncertainties of sustainability, etc.

What is the shadow price of risk and the value of risk mitigation in all of these circumstances? Getting rid of risk is something 'unseen' above and beyond pure funding flows, but it can have great 'unseen' value. Having a better handle on such concepts and on the value of such components will help drive more efficient decisions.

12. The power of networks

From the plenary lecture onwards, networks were mentioned several times, and network thinking appeared elsewhere several times (5.0, 5.4, 8.5, 8.6, 9.0).

The key thing about networks for innovation (5. 0) is that the more connections there are, the greater the potential to extract value (5.4). Similar network thinking can be applied to other cases, including social, marketing and other networks (9.0). Networks are a way to grow

partnerships, to create channels for delivery, for creating political connectivity (multidisciplinary and multisectoral), and connectivity in-country between similarly interested groups for addressing critical issues (8.6), and for creating positive feedback mechanisms that boost initiatives in innovation and delivery.

Deeper and denser networks increase the fitness of the individual agents in the network, and allow the opportunity to trade and exchange and to build the institutions that regulate and empower those exchanges. There was discussion of an Africa-centred network in biosciences (8.5) as a way to create country-capacity and avoid brain-drain, and as a way to pull along less fashionable technologies (for example devices) where infrastructure already exists but there is no 'technological buzz' to pull in sponsors.

Knowledge from systems biology can be transferred and translated to better health care of less developed countries, by self-organising networks (5.4). The key issues are how to establish networks, manage them, monitor them, evaluate and compare them. How is value created and extracted in PDP networks, healthcare and supply-based NGO networks, and developing country networks? What is the role of networks in enabling diffusion of global health innovation (broadly defined), how can early adoption escalate into majority take-up (often it does not), and what network externality effects are there to be exploited?

13. Price/cost/manufacturing issues

A large number of speakers raised issues surrounding pricing policies and ways to make products more affordable (2.0, 4.0, 3.2, 3.6, 4.4, 4.5, 4.8, 6.2, 6.7, 6.12, 7.2, 9.0).

The plenary lecture raised the issue of what is 'best practice' in respect of prices, and the consequences of various initiatives on prices. It is not as straightforward is it might seem; where there are many complex causal forces, it is often hard to entirely pin down causality (for example lower vaccine prices and uptake of vaccines in past successful cases, as per plenary lecture).

It was observed that processes to establish price differentiation / tiered pricing (4.0, 4.4 also as part of demand forecasting) in pharmaceutical markets and technological transfer agreements have often been slow (7.2). It was said that PDPs seem to have improved this (for example, extreme tiered pricing in the case of malaria drugs, 6.7). However, PDP strategies vary; the strategy of some PDPs is to have no control of price (PDVI), while others build a model on the control of pricing and distribution (Aeras, 6.2). Some companies licence manufacturing to a developing country partner, so as to avoid some of the constraints associated with tiered pricing (9.0), and some are contracting out to low-cost manufacturers to avoid competitive licences (4.8).

The role of developing country manufacturing of essential medicines and vaccines was raised, and the need for markets that are competitive and non-exclusionary (3.6). New incentives for generics (such as funding to conduct bioequivalence and develop new manufacturing techniques) were suggested (4.5). How would these work? What are the incentives to make products cheaper (6.2, footnote)? What is the infrastructure impact on the costs of drugs (7.2)? What ways are there to reduce the cost structure of existing healthcare systems to support access (4.8) including analysis needed to enable cost reduction at every stage (3.0)? As well as R&D incentives, there is a need for incentives for manufacturing innovation and development of lower cost manufacturing models leading to more affordable pricing models (3.2).

It is probably well covered already, but what is the role of IP for flexible pricing and manufacturing strategies, and marketing strategies where these may also impinge on costs, and the role of cost in initial product specification (6.12)?

14. IP, capacity-building and access

A great deal of work has already been done regarding IP issues as they impinge on innovation and access (for example MIHR-PIPRA "Intellectual Property Handbook in Health and Agricultural Innovation").

The conference identified the need for countries to either innovate domestically or to import technologies (7.0). At the moment many developing countries have relatively weak innovative capacity domestically, so it is important to keep channels for imported technology as open as possible and to create domestic innovative capacity. IP is one of the fundamental determinants of innovation and is a means of transferring value between partners (7.5). Increased awareness of IP law in scientific research and at a policy level are needed to encourage effective capacity building (7.3). It is necessary to reformulate policies to ensure that the right mix of ownership, access and exclusivity is agreed so that project goals can be achieved (7.4). Furthermore, what matters in terms of the effects of patent reform on licensing is that it reduces the cost of technology transfer transactions and provides incentives.

Examples of good practice (Singapore was flashed up) would help. Whilst, in principle, IP tools are the same (patents, trademarks, data protection), deals also incorporate a number of issues including patenting strategy, out-licensing strategy, patent enforcement and infringement policy, pricing and capturing added value (7.5). Forums for sharing knowledge about how to do these things are to be encouraged.

15. Disruptive technologies, marketing and catch-up

Some current R&D initiatives are developing what will turn out to be 'disruptive technologies' (6.4, 6.5, 6.12, 7.5). It was observed that it is quite difficult in general to get truly breakthrough/disruptive innovations that potentially generate substantial returns, to come to fruition (6.12). Some felt that too little thinking had been done on such cases, on the presumption that take-up would simply happen. But a disruptive technology, as well as potentially having great value, disrupts what is already there. How, for example, can users be incentivized to transfer away from old products to new products?

Linking to the institutions and governance piece, new institutional and organisational design can itself be a 'disruptive technology'. How does one replace prior organisational arrangements with new ones if this has disruptive qualities?

Catch-up immunisation strategies (6.4) are a sort of disruptive event, but there are many other cases of catch-up amongst new technologies. What are the consequences in terms of production, costs, etc.? How does one speed up catch-up? What are the lessons in many other non-health sectors, especially in poor countries? Can lessons from completely unrelated areas (e.g. diffusion of manufacturing technology in China, the expansion of IT capacity in India, etc.) be applied in the area of global health diffusion? What is the early role of PDPs in consideration of issues of branding and trademarks (7.5)

16. Drug resistance and counterfeits

The growing problem of drug resistance was mentioned several times (1.3, 3.3, 4.8, 5.0, 5.3, 7.6). Drug resistance impacts on many of the issues discussed above, especially on the costs of distribution, administration, and monitoring needs for new products and the health system costs where health clinics and trained personnel are already heavily stretched. What is the full audit of this? What are the shadow prices of all of this on the rest of the system?

Counterfeiting and consequent build up of drug resistance is a recipe for big increases in healthcare management costs. There are technological and economic solutions to counterfeiting. However, if it is financially worthwhile to do so, counterfeiters have proved very capable of making rapid advances that undermine the effectiveness of technological solutions (5.3). The economic solution (4.8) would suggest to simply make products so cheap that there is no incentive to copy (5.3, in context of the global subsidy for ACTs); however the degree to which this is generalisable to all products is not clear. Furthermore, manufacturers

face a trade-off between the need to preserve their reputation through a high quality product (and this has a cost to them that has to be passed on to consumers) and the need to lower price to reduce the incentive to counterfeit (7.6). The finger is often pointed at manufacturers to bear responsibility for tackling counterfeiting, but there are many other players too. The solution needs to empower the consumer and also needs to be transparent and sustainable (5.0). More regulatory harmonisation can help to reduce counterfeiting (4.8) as can investments in the development of the integrity and security of supply chains (5.3), and more international collaboration with governmental agencies, international global bodies and firms (5.3). What is the optimal balance between the components of the solution to counterfeiting?

17. Other neglected foci

Other neglected foci discussed included chronic diseases (1.3, 3.3, 3.6, 4.0), prevention (discussion following 2.0) and regulation (1.3, 4.5, 4.7). Some argued that there are 'triple epidemics of chronic diseases' (3.3) and a great need to make interventions for chronic diseases more affordable (4.0), and that there should be at least as much innovation in prevention as there is emphasis on product development (3.3) with more emphasis on knowledge transfer about best practices in prevention programmes. Meanwhile, weak regulatory systems (4.7) and variations in regulatory standards also delay access (4.5), and there is a great need for regularity harmonisation (1.3, 4.5, including reference to a developing country vaccine regulators network). Stronger regulatory institutions enforce quality control and sustain industry and donor commitment (3.6).