Box 5.6. Collaborative mechanisms, knowledge networks and consortia in the life sciences

A more open architecture for innovation in health technologies is emerging. Collaborations, public-private partnerships, consortia, innovation networks, brokerage facilities, prizes and data sharing/exchange platforms are increasingly used to access, interpret and share widely dispersed sources of data, information, know-how, materials, compounds, software, methodologies, expertise and patented innovations. In the era of genomic medicine – increasingly known as personalised medicine – these open models will take on added importance. Given the vast size of the human genome (over 3 billion base pairs of As, Cs, Ts and Gs), improved access to and exchange of biological samples and the research and clinical data associated with those samples is critically important to building the scientific and medical knowledge base needed to address global needs in human health. As assets are externally distributed, organisations derive value from the ability to access, manage and exploit knowledge from multiple sources. Open or networked health technology innovation requires organisation, frameworks, financing, quality information, asset management and vision. These are essential for both public and private research organisations. There is no single model for distributed knowledge networks in health technology. Success depends on a variety of factors, including the goals of the network, the partners involved, financing, administration and governance. The following are some of the collaborative mechanisms, knowledge networks and consortia that help advance research in the life sciences to move these discoveries into the clinic.

The Genetic Association Information Network (GAIN). Gain is a public-private partnership of the Foundation for the National Institutes of Health, Inc. (FNHI) and includes partnerships with the US National Institutes of Health (NIH) and the private sector. GAIN supports a series of genome-wide association studies (GWAS) designed to identify specific points of DNA variation associated with the occurrence of a particular common disease. Investigators from existing case-control or trio (parent-offspring) studies were invited to submit samples and data on roughly 2000 participants for assay of 300 000 to 500 000 single nucleotide polymorphisms designed to capture roughly 80% of the common variation in the human genome. Specific genes involved in disease processes can be identified once particular areas of the genome are associated with the occurrence of disease. The GAIN initiative has officially concluded, and the resulting data have been deposited in the database of Genotype and Phenotype (dbGAP) at the National Library of Medicine at the NIH for the broad use of the research community. Access is controlled by the GAIN Data Access Committee.

The Innovative Medicine Initiative (IMI). The IMI is a joint technology initiative of the European Commission and the European Federation of Pharmaceutical Industries and Associations (EFPIA). It was launched in 2005. It has a total budget of EUR 18 million of which two-thirds is contributed by the Commission. The IMI aims to enhance Europe’s competitiveness by ensuring that the biopharmaceutical sector remains dynamic. IMI stated purposes are to improve predictivity of drug safety evaluation, improve predictivity of efficacy evaluation, and improve knowledge management as well as education and training. But the research agenda of IMI indicates that an important part of its activity is devoted to the discovery, development and validation of biomarkers. This shows the importance given to biomarkers in large-scale projects. The discovery, development and acceptance of biomarkers and the commercialisation of biomarkers-related products is seen as essential to improve country competitiveness in pharmaceuticals and diagnostic-related activities.

CollabRx. CollabRx is a privately held NetPortofolio company which builds “virtual biotechs to help slash the time, cost, and risk of developing new therapies”, and provides tools to patient groups and virtual biotechnologies to accelerate the development of treatments for diseases that do not attract major pharmaceutical company research funding. This web-based collaborative research platform gives different types of participants in a research system (e.g. genomic and proteomic profiling, combinatorial drug screening, mouse) access to all the data, knowledge and resources they need to function as a team. Scientific advisory board members can use the system to prioritise research opportunities in a funder’s portfolio. Project managers can co-ordinate and track all activities, and foundations can monitor progress and allocate resources in real time. A specific service in this initiative has been dedicated to personalised medicine delivery for cancer patients. Working on behalf of a limited set of cancer patients and their physicians, CollabRx is developing CollabRx ONE. This project aims to identify specific mechanisms of carcinogenesis based on a patient’s tumour samples and to provide hypotheses for compounds that target those mechanisms.

InnoCentive: breakthrough innovation for biomarker discovery. InnoCentive is a broker that connects companies, academic institutions, public-sector and non-profit organisations that are looking for innovative solutions, with a global network of more than 160 000 problem solvers all over the world. InnoCentive is built on the idea of crowd-sourcing. Crowd-sourcing typically involves allowing a mass of people to help a company or a group accomplish its goals. InnoCentive exploits this strategy to solve specific questions for its clients in areas ranging from business and entrepreneurship to mathematics and life sciences. These questions, turned into “challenges”, are posted online and those who provide a valuable solution are awarded a prize (ranging from USD 5 000 to USD 1 million). So far, InnoCentive has posted more than 700 challenges, over 250 of which have been solved. Finding biomarkers of complex diseases is one of these challenges – e.g. finding biological targets for obesity, developing a synthesis method for a new tuberculosis drug, finding biomarkers of amyotrophic lateral sclerosis.
### Box 8.1. Policy principles for innovation

1. **Empowering people to innovate**
   - Education and training systems should equip people with the foundations to learn and develop the broad range of skills needed for innovation in all of its forms, and with the flexibility to upgrade skills and adapt to changing market conditions. To foster an innovative workplace, ensure that employment policies facilitate efficient organisational change.
   - Enable consumers to be active participants in the innovation process.
   - Foster an entrepreneurial culture by instilling the skills and attitudes needed for creative enterprise.

2. **Unleashing innovations**
   - Ensure that framework conditions are sound and supportive of competition, conducive to innovation and are mutually reinforcing.
   - Mobilise private funding for innovation, by fostering well-functioning financial markets and easing access to finance for new firms, in particular for early stages of innovation. Encourage the diffusion of best practices in the reporting of intangible investments and develop market-friendly approaches to support innovation.
   - Foster open markets, a competitive and dynamic business sector and a culture of healthy risk-taking and creative activity. Foster innovation in small and medium-sized firms, in particular new and young ones.

3. **Creating and applying knowledge**
   - Provide sufficient investment in an effective public research system and improve the governance of research institutions. Ensure coherence between multi-level sources of funding for R&D.
   - Ensure that a modern and reliable knowledge infrastructure that supports innovation is in place, accompanied by the regulatory frameworks which support open access to networks and competition in the market. Create a suitable policy and regulatory environment that allows for the responsible development of technologies and their convergence.
   - Facilitate efficient knowledge flows and foster the development of networks and markets which enable the creation, circulation and diffusion of knowledge, along with an efficient system of intellectual property rights.
   - Foster innovation in the public sector at all levels of government to enhance the delivery of public services, improve efficiency, coverage and equity, and create positive externalities in the rest of the economy.

4. **Applying innovation to address global and social challenges**
   - Improve international scientific and technological co-operation and technology transfer, including through the development of international mechanisms to finance innovation and share costs.
   - Provide a predictable policy regime which provides flexibility and incentives to address global challenges through innovation in developed and developing countries, and encourages invention and the adoption of cost-effective technologies.
   - To spur innovation as a tool for development, strengthen the foundations for innovation in low-income countries, including affordable access to modern technologies. Foster entrepreneurship throughout the economy, and enable entrepreneurs to experiment, invest and expand creative economic activities, particularly around agriculture.

5. **Improving the governance and measurement of policies for innovation**
   - Ensure policy coherence by treating innovation as a central component of government policy, with strong leadership at the highest political levels. Enable regional and local actors to foster innovation, while ensuring co-ordination across regions and with national efforts. Foster evidence-based decision making and policy accountability by recognising measurement as central to the innovation agenda.