Foreword

Synthetic biology is an emerging technology that shows promise for investigating some of the burning issues in biological research. It also has the potential to address some of the grand challenges facing society, such as climate change and energy security. Some argue that it has the potential to create a new manufacturing paradigm and has obvious roles in a future bioeconomy. With the creation of engineering standards, it is hoped that synthetic biology will enable mass manufacturing based on several decades of biotechnology research and development.

Applications are envisaged in important economic sectors, such as energy, chemicals, medicine, environment and agriculture. Policy development is as yet rather limited. Several countries, and especially the United States, have taken a lead in subsidising R&D, and the international Genetically Engineered Machine (iGEM) competition goes from strength to strength, bringing in large numbers of talented young entrants from many countries. Synthetic biology challenges higher education's ability to provide the required workforce, which will need a multidisciplinary education that covers both science and engineering. There are intellectual property issues, but the community does not consider them insurmountable. Synthetic biology benefits from the decades of regulation and governance that has been developed for genetically modified organisms, but it may be hindered in some parts of the world by over-regulation.

Roadmaps hold promise in the area of policy. Technology roadmaps are generally held to be useful for setting the development agenda for a new technology. For the semi-conductor industry they may even have been instrumental in the successful development of that industry. To date very few countries have a synthetic biology roadmap, but some are under development. If carefully formulated, a technology roadmap can be a policy roadmap, and it can contribute to public awareness and debate. While there is currently no international forum for addressing all of these issues, the OECD is well placed to take the lead.

The work described herein builds on a synthesis report published in conjunction with the Royal Society[1]; the report of the expert meeting on synthetic biology held in conjunction with the SynBio5.0 meeting in Palo Alto, California on 15-17 June 2011; and work on the challenge of intellectual property access and sharing in the field of synthetic biology. The expert meeting at Palo Alto helped highlight the three areas of greatest challenge: i) infrastructure; ii) IP access and sharing; and iii) standards and interoperability, and this current work was partly shaped by the conclusions of that meeting.

It also draws on discussions at the OECD International Summit on Delivering Economic Value from Synthetic Biology: Current Challenges and Opportunities (12 March 2012, Sydney, Australia) and the Forum on Synthetic Biology: Challenges and Opportunities for Australia (13 March 2012, Sydney, Australia). These events were held in conjunction with the Human Genome Meeting, HGM 2012, from 11-14 March 2012 in Sydney. We are particularly grateful to the outgoing Chairman of the OECD Working Party on Biotechnology (WPB), Dr Gerardo Jiménez-Sánchez, who was instrumental in establishing the partnership between the OECD and HUGO (the Human Genome Organisation).

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[1] See www.oecd.org/sti/biotechnology/synbio.