

Economics Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Industry, Innovation and Science Portfolio
2017 - 2018 Budget Estimates
31 May – 1 June 2017

AGENCY/DEPARTMENT: CSIRO

TOPIC: Advanced manufacturing Roadmap

REFERENCE: Written Question – Senator Carr

QUESTION No.: BI-108

1. What has prompted the development of the advanced manufacturing roadmap and other roadmaps in this series?
 - a. Are you receiving any external funding for the development of these roadmaps?
 - b. When are the additional roadmaps due for completion?
2. How does the definition of Advanced Manufacturing and what some people call “Industry 4.0” relate?
3. The roadmap seems to suggest that a viable future for Australian manufacturing is to integrate with global supply chains in pre-production and post production – i.e. R&D, Design, Marketing and sales and after-sale services. Is that a fair assessment?
4. The roadmap talks of a range of comparative advantages and disadvantages. One of those is a segregated and a lack of a bi-partisan agenda. What is that referring to?
5. The roadmap also talks about high labour costs being a comparative disadvantage. What is the extent of this?
 - a. Is it the case that this shift towards advanced manufacturing/industry 4.0 has significant labour force implications, particularly for those employees with low skill levels?
 - b. Do we need to move employee’s up the value chain in that case?
 - c. Could we face key labour shortages? If so, in what areas?
6. You also talk about digital infrastructure as a disadvantage. What is meant by that?
 - a. Does that mean getting the NBN right is vitally important?
7. In terms of opportunities the roadmap identifies, what is the role of continued government investment in science and technology play?
8. Once you develop a roadmap, what happens next? What actions do you take to advocate or monitor the progress towards the goals?

ANSWER

1. As part of CSIRO’s Strategy 2020, CSIRO undertook to develop a series of industry roadmaps in order to support national challenges and industry innovation by outlining the enabling science and technology that will underpin future opportunities for Australian businesses.
 - a. No external funding has been provided for the roadmaps. However, some activities (e.g. workshops, interviews, reviews) have utilised resources provided in-kind from industry.
 - b. Three of the five roadmaps have been published. These are: *Advanced Manufacturing* (Nov 2016), *Medical Technologies and Pharmaceuticals* (Apr 2017), and *Mining Equipment, Technology and Services* (May 2017). The *Food and Agribusiness* roadmap is scheduled for release in July 2017 and the *Oil and Gas* roadmap is scheduled for release in August 2017.

2. Both of these terms have slightly varying definitions across existing publications and are sometimes used interchangeably. The *Advanced Manufacturing Roadmap* defines ‘advanced manufacturing’ as “the set of technology-based offerings, systems and processes that will be used to transition the current manufacturing sector into one that is centred on adding value across entire supply chains.” The *Advanced Manufacturing Roadmap* does not define Industry 4.0, however the Department of Industry, Innovation and Science defines it as “the current trend of improved automation, machine-to-machine and human-to-machine communication, artificial intelligence, continued technological improvements and digitalisation in manufacturing”.¹
3. There are two relevant points made in the Roadmap, both based on qualitative evidence collected from stakeholders. First, the Australian manufacturing sector should seek to more strongly integrate with global supply chains across *all* stages of the value chain to access new markets and increase potential growth avenues. Second, the Australian manufacturing sector should focus on the areas of the supply chain where it has the greatest comparative advantage, which is usually in the pre- and post-production phases. That being said, there will still be exceptions where the quality (and therefore value) of the manufactured good outweighs the higher costs of production found in Australia.
4. Many industry stakeholders consulted as part of the project expressed a view that the differing standards and protocols of Australia’s States and Territories, as well as the large number and complex arrangement of industry and government bodies at the federal, state and local level pose a competitive disadvantage for Australia.
5. The Roadmap was not intended to measure the degree to which labour costs present a competitive disadvantage to Australian manufacturers. Qualitative feedback from the industry stakeholders consulted focussed on less frequently cited sources of competitive disadvantage and sources of competitive disadvantage that were felt to be more addressable. As such, a detailed assessment of Australian labour costs and markets was not performed. The Advanced Manufacturing Growth Centre’s *Sector Competitiveness Plan*² had a greater focus on investigating labour cost competitiveness.
 - a. The roadmap does not contain a detailed assessment of the labour force implications of this shift.
 - b. There are roles for high-skilled workers across the entire value chain, with many of the industry contacts we spoke to suggesting downstream (post-production) roles suit Australian strengths as well as upstream roles.
 - c. The roadmap highlights key skill gaps for Australian manufacturing, based on qualitative evidence collected through industry consultations. These skill gaps include digital literacy, leadership and strategic management, customer facing skills, and science, technology, engineering and mathematics (STEM) skills.
6. Advanced manufacturing requires strong digital infrastructure to support the growing number of connected “Industry 4.0” devices. Many of the industry stakeholders consulted for this project expressed a view that Australia’s digital infrastructure lags behind other countries.
 - a. CSIRO is unable to specifically respond to this question, but notes that in relation to comparative disadvantages, the Roadmap states the following regarding digital infrastructure:

¹ <https://industry.gov.au/industry/Industry-4-0/Pages/default.aspx>

² https://www.amgc.org.au/Article?Action=View&Article_id=1

Digital infrastructure – Australia’s global ranking for internet speed (average peak connection speed) dropped from 30th to 56th between September 2013 and July 2016.^{[1],[2]} Internet speed is a critical enabler to doing business in global supply chains. Digital infrastructure is important in all markets as advanced digital technologies and data analysis become business-as-usual in manufacturing. Businesses anticipate the rollout of the National Broadband Network will negate much of this disadvantage, however they also reported that rollout delays are causing them to be at a disadvantage for longer than necessary.” [page 20]

7. Most of the opportunities identified in the Roadmap are underpinned by science and technology. Government investment could help accelerate commercialisation of these technologies. Aside from direct science and technology investment, government can also play a role in improving the linkages between research and industry and in supporting the necessary skills, infrastructure and policy required to efficiently push research through to commercial outcomes. The Roadmap lists specific ‘ecosystem actions’ that include actions for government to consider. [page vii]
8. CSIRO has promoted the findings through high-profile launch events and distribution amongst our industry contacts with the intention of adding to the national dialogue and encouraging businesses to engage with CSIRO on specific challenges or opportunities that the Roadmaps identify. Internally, the Roadmaps have been used to inform CSIRO’s strategic planning process and Business Unit research direction.

^[1] Akamai (2013). *Volume 6, Number 3 - The State of the Internet 3rd Quarter, 2013 Report*, Cambridge.

^[2] Akamai (2016). *Volume 9, Number 2 – Akamai’s State of the Internet Q2 2016 Report*, Cambridge.