

CSIRO's experience in planning for triple-bottom-line outcomes: the Impact 2020 Project

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Abstract

Science and research institutions across Australia and internationally are under increasing pressure to more clearly and rigorously articulate future intended triple-bottom-line outcomes and monitor progress toward these future intended outcomes. A framework to improve CSIRO's approach to planning for outcomes has been developed and implemented by CSIRO for the National Research Flagship Program. This is the first time that planning for triple-bottom-line outcomes has been undertaken on this scale; that is, to encompass all the major outcome domain areas embodied by nine Flagships. The approach builds upon a strong foundation of work conducted within each of the nine research portfolios to plan for outcomes, and provides an overarching framework to improve both performance and accountability. The National Research Flagship Program represents over \$600m pa of research and in 2011-12 comprised nine Flagships focussed on delivering outcomes within the following domain areas: food, health, agriculture, energy, oceans, water, climate, manufacturing and minerals. Key findings of the work to date, lessons emerging, and implications for practitioners within large-scale institutions seeking to plan for outcomes in a complex and dynamic environment will be presented. Implications for evaluation theory, in particular systems approaches to evaluation, will also be presented.

"The question, 'What are the expected results from this work?' is almost never asked in traditional work study and Scientific Management. But it is the key question in making knowledge workers productive. And it is a question that demands risky decisions. There is usually no right answer, there are choices instead. And results have to be clearly specified, if productivity is to be achieved."
(Drucker 1993 p77)

Introduction

Science and research institutions internationally are under increasing pressure from government and other stakeholders to improve their performance and provide improved demonstration of accountability by developing improved impact planning, monitoring and evaluation systems (Productivity Commission 2007; Department of Innovation, Industry, Science & Research (DIISR) 2008; ACIL Tasman 2010).

CSIRO, the Commonwealth Scientific and Industrial Research Organisation, is Australia's national science agency and one of the largest and most diverse research agencies in the world. CSIRO employs 6500 people in 58 locations and has a total budget of \$1B+ per annum. CSIRO's vision is: *"Our science is used to make a profound and positive impact for the future of Australia and humanity"*. CSIRO's mission is: *"We deliver innovative solutions for industry, society and the environment through great science"*.

A central theme of the current CSIRO Strategy 2011-15 is *positive impact*. The Impact 2020 Project was developed to improve CSIRO's performance and accountability by more clearly articulating the future intended economic, social and environmental outcomes from the National Research Flagships Program. The project is aligned with Strategic Objective 1.3 *Develop and implement a robust impact measurement framework (delivered and projected) and track performance against it*. The approach taken within the Impact 2020 Project represents a novel and innovative approach to ex-ante evaluation and strategic management within the science and research sector, with implications for practitioners within large-scale institutions seeking to plan for outcomes in a complex and dynamic environment. This paper presents for the Impact 2020 Project: background context and rationale; approach and methodology; results; and conclusions and implications.

Background and Rationale

The National Research Flagships Program was established by CSIRO in 2003 and is one of the largest scientific research endeavours ever undertaken in Australia. Flagships are large-scale multidisciplinary research partnerships formed to tackle major challenges and opportunities in critical areas of human, environmental and economic significance. The detailed story of the development and implementation of the CSIRO Flagship initiative from an organisational change perspective has been documented and recently published (Sandland & Thompson 2012).

The Impact 2020 Project was operational from November 2010 to August 2012 and sought to clarify the nature and timing of future intended economic, environmental and social outcomes of the CSIRO National Flagship Program. The objectives of the project were:

1. to deliver a clear statement of the future intended triple-bottom-line (economic, social and environmental) outcomes for each Flagship;
2. to deliver an externally validated, rigorous and practical framework that enables the monitoring of progress toward future intended outcomes; and
3. to improve the capability of CSIRO staff to plan, monitor and characterise outcomes.

Within scope of the Impact 2020 Project was the nine CSIRO Flagships operational in 2010 as defined in Table 1. The Impact 2020 Project built on a strong foundation of work conducted within each of the nine research portfolios to plan for outcomes (O'Keefe & Head, 2011).

Table 1: Overview of the nine National Research Flagships within scope of the Impact 2020 Project

National Research Flagship	Budget (\$m) 2012-13	Goal	Start date
<i>Food, Health & Life Science Industries</i>			
Sustainable Agriculture Flagship	70	Secure Australian agricultural and forest industries by increasing productivity by 50 per cent and reducing net carbon emissions intensity by at least 50 per cent between now and 2030	2009/10
Food Futures Flagship	50	Transform the international competitiveness and add \$3 billion annually of value to the Australian Agrifood sector by the application of frontier technologies to high potential industries	2002/03
Preventative Health Flagship	40	Improve the health and well-being of Australians and save \$2 billion in annual direct health costs by 2020 through the prevention and early detection of chronic diseases	2002/03
<i>Energy</i>			
Wealth from Oceans Flagship	66	Provide Australia with the knowledge and tools to protect coast and ocean environments, increase their value to society and create a net economic benefit of \$3 billion per annum by 2020	2002/03
Energy Transformed Flagship	43	Develop, demonstrate and ensure deployment by 2020 of integrated low carbon pathways for Australia and alternative stationary and transport energy solutions that realise a reduction of Australia's carbon dioxide emissions by >20 million tonnes per annum by 2030 and by >50 million tonnes per annum by 2050	2002/03
<i>Environment</i>			
Water for a Healthy Country Flagship	88	Provide Australia with solutions for water resource management, creating economic gains of \$3 billion per annum by 2030, while protecting or restoring our major water ecosystems	2002/03
Climate Adaptation Flagship	43	Equip Australia with practical and effective adaptation options to climate change and variability and in doing so create \$3 billion per annum in net benefits by 2030	2007/08
<i>Manufacturing, Materials and Minerals</i>			
Minerals Down Under Flagship	90	Assist the Australian minerals industry exploit new resources with an in-situ value of \$1 trillion by 2030 and to more than double the size of the associated services and technology sector to \$10 billion a year by 2015	2007/08
Future Manufacturing Flagship	71	Secure a competitive and sustainable future for Australian manufacturing by creating \$2 billion annually in additional value and increasing resource efficiency by 30 per cent by 2030	2007/08

Source: CSIRO Annual Operating Plan 2012-13.

Note: Two new Flagships commenced operations July 2012: Biosecurity Flagship (\$26m); and Digital Productivity and Services Flagship (\$32m).

The key expected benefits of the project included improved capacity to articulate future expected outcomes in a consistent, rigorous and visible way; improved understanding of the research portfolio by both internal and external audiences; and improved focus on outcomes. In the medium to long term accelerated and greater triple-bottom-line outcomes is anticipated as a result of the Impact 2020 Project and other work.

Approach

The Cynefin Framework, drawn from network analysis, knowledge management, and the complex systems fields, highlights the difference between four kinds of situations: simple, complicated, complex and chaotic (Snowden & Boone, 2007; Williams & Hummelbrunner, 2011). This framework was useful in guiding the approach taken in the Impact 2020 Project.

“Simple and complicated contexts assume an ordered universe, where cause-and-effect relationships are perceptible, and right answers can be determined based on the facts. Complex and chaotic contexts are unordered – there is no immediately apparent relationship between cause and effect, and the way forward is determined based on emerging patterns. The ordered world is the world of fact-based management; the unordered world represents pattern-based management.” (Snowden & Boone, 2007, p4)

The Impact 2020 project was characterised as being in the complex realm, and also considered to be addressing a ‘wicked’ problem. As described by Rittel and Webber (1973), ‘wicked’ problems are those that are not able to be solved in a simple linear fashion, due to the fact that they present changing, incomplete or contradictory information. Further, the understanding of the problem also tends to change as new solutions are considered or implemented. Wicked problems present a very high degree of social complexity as perspectives of various stakeholders differs. Recognising these elements in the scope and context of the Impact 2020 project, a participatory and action-learning approach was taken in order to achieve the project objectives.

Factors contributing to the complex nature of planning, monitoring and characterising outcomes of the National Flagships Program included the large scale of the program (>\$600m pa); the diversity of intended outcomes across the nine Flagships; the diversity in evaluation culture and capability across the Flagships, and the lack of precedent. An iterative top-down and bottom-up approach characterised the approach taken and the action learning cycle of plan-act-reflect-learn was completed several times over the duration of the project in collaboration with the Impact Champions drawn from each of the nine Flagships. A Steering Committee for the project was formed involving several senior CSIRO Executives which provided valuable leadership, guidance and feedback for continuous improvement over the life of the project. In addition, individuals from other corporate support sections in CSIRO such as communications and change management, and a number of external experts in research evaluation provided insight, tools, advice and guidance on an ad hoc basis.

Methodology

Five work streams were created to achieve the Impact 2020 Project objectives. The methodology of each work stream is summarised in this section.

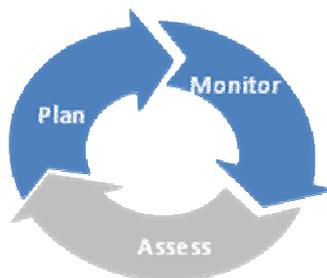
Stream 1: Project leadership

The importance of strong leadership in achieving project success was recognised early, as the Impact 2020 project represented a significant change initiative for the organisation. Change management theory identifies active and visible executive sponsorship as the greatest contributor to achieving success (ProSci 2012). This stream therefore sought to involve senior leaders of CSIRO in the planning and implementation of the project through participation in the Impact 2020 Steering Committee, and communications and engagement with the CSIRO Executive Team and the nine Flagship Leadership Teams.

Stream 2: Strategic framework for impact planning, monitoring and characterisation

A strategic framework for impact planning, monitoring and characterisation was developed by CSIRO and independently validated by The Centre for International Economics (The CIE) in June 2011 and again in August 2012. The Impact 2020 Project and framework scope includes ex-ante evaluation including *planning* for outcomes, and *monitoring* progress toward planned outcomes. Out of scope is the ex-post *assessment* of past outcomes delivered – as illustrated in Figure 1.

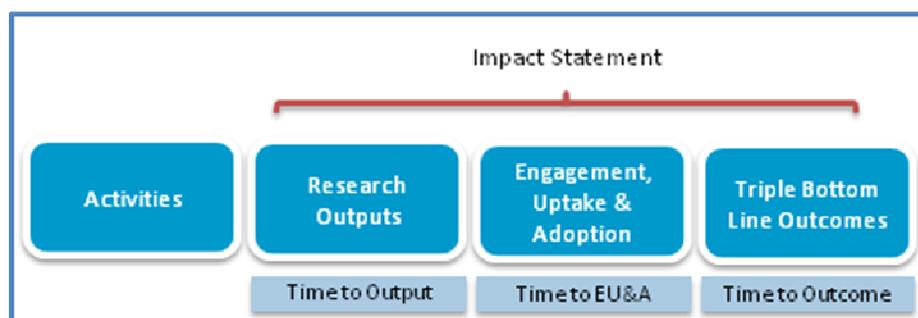
Figure 1: Scope of Impact 2020 Project framework



The Impact 2020 Framework emerged over the life of the project and comprises the following seven elements, (key elements are represented in Figure 2 below):

1. A guiding principle of “time to goal” or focusing on what remains to be done.
2. Clarity and consistency of language, with definitions of key terms emerging as a result of workshops and debate.
3. Outcomes hierarchies which were established for some Flagships to clarify intended outcomes.
4. An impact statement which is defined as including 3 parts:
 - research outputs;
 - engagement, uptake & adoption;
 - triple-bottom-line outcome.
5. The time to goal measure which applies to each of the 3 parts of an impact statement:
 - time to research output;
 - time to engagement, uptake & adoption;
 - time to triple-bottom-line outcome.
6. The outcome characterisations which are:
 - Scale (on a scale of 1-5)
 - Reach (local, regional, national, global)
 - Role (indicating the level of CSIRO’s role in contributing, influencing, directing)
 - Type (economic, environmental, social – as per 17 OECD outcome characterisations)
7. Four factors critical to success: leadership, culture, capability, systems

Figure 2. The Impact 2020 framework.



Stream 3: IT system

The functionality of an existing CSIRO IT system was expanded to include an Impacts module. The purpose of this tool was to capture the impact statement data provided by the Flagships and enable the analysis reporting and export of this data and associated graphics and reports. A major benefit of this approach was that it did not require users to learn another stand-alone system; rather it built on users' familiarity with an existing system, leading to a more user-friendly and integrated process. The new module was developed in a number of three-week development sprints spread over a 12 month period, and employed an adaptive management approach to incorporate feedback from Flagship Impact Champions.

Stream 4: Impact-centric culture

This stream involved regular face-to-face and videoconferencing workshops and capacity building sessions with the nine Flagship Impact Champions both one-on-one and as a collective team. The terms of reference for the Flagship Impact Champions were:

- to contribute to the achievement of the Impact 2020 Project Objectives, and
- to create and maintain a network of people across CSIRO interested in learning from each other's experiences in planning, monitoring, and characterising impact.

Each of the nine Flagship Impact Champions demonstrated commitment to the intent of the Impact 2020 Project and provided leadership within their portfolio and to others both internally and externally. Six Flagship Workshops were scheduled over the life of the project, and these and other activities enabled both Champions and Flagship Leadership Teams to engage with the Impact 2020 Project team, and with each other, on an as needs basis. This was particularly useful for Flagships to share different approaches with each other, and for the Impact 2020 team to learn what was relevant and applicable to the Flagship audience. A workshop session was hosted on constructing program logics as a direct result of the Champions' discussion and demand. Resources were also deployed to develop an internal Impact 2020 Project Brief and Toolkit document.

Stream 5: Communications and engagement

A Communication Plan for the project was developed and implemented. A CSIRO-Council of Rural Research and Development Corporations (CRRDCs) Evaluation Round Table was held in Canberra in May 2011 to engage with thought leaders and peers outside CSIRO within the government, academia, and consultancy sectors. This event also ensured lessons from others were incorporated into the early phase of the Impact 2020 Project. The majority of communications and engagement since May 2011 has targeted the CSIRO internal audience, with particular focus on the Flagship Leadership Teams and the Impact Champions network. External engagement included connecting with the Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) and other Federal Government agencies via a Coordinating Committee for Innovation – Evaluation Working Group. This group contributed to the development of a Best Practice Guide for the Evaluation of Science and innovation Initiatives (Australian Government Coordinating Committee on Innovation, 2012). In addition, ongoing two-way communications via forums organized by the Australian Technology Network and Group of Eight, and others in the innovation system enabled this and related impact evaluation work to be discussed with a range of external audiences (Henderson, 2011).

Results and Analysis

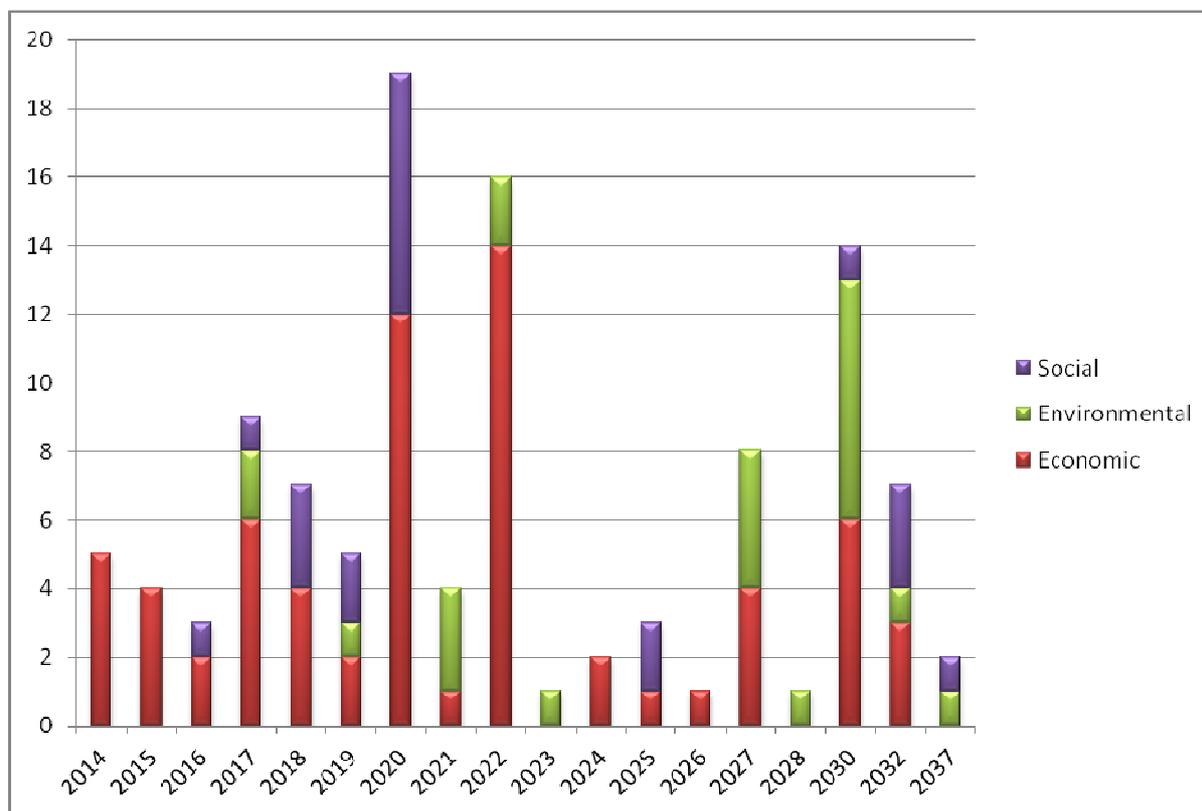
Results and analysis are reported against each of the three project objectives.

Objective 1: Deliver a clear statement of the future intended triple-bottom-line (economic, social and environmental) outcomes for each Flagship.

The future intended outcomes for the nine Flagships within the scope of the project have been articulated by Flagship Impact Champions and others, and entered into the IT system. Over 150 impact statements are currently in the system (as of August 2012) and of these, over 75% were characterised as describing future intended outcomes. In comparison, 12 months ago just over 30% of these statements were characterised as describing outcomes, with the majority (nearly 70%)

describing activities and/or outputs. Figure 3 provides a graphical representation of the nature and timing of future intended outcomes the National Flagship program, to illustrate the type of outputs now able to be produced for the Flagship Program, and for individual Flagships.

Figure 3: Characterising the nature and timing of future intended triple-bottom-line outcomes (number of outcomes by year)



Objective 2: Deliver an externally validated, rigorous and practical framework that enables the monitoring of progress toward future intended outcomes.

The Impact 2020 framework was *externally validated* by The CIE consultants in June 2011 and again in August 2012. The independent consultants highlighted the Impact 2020 work is at the international forefront of approaches to planning, monitoring and characterising impacts from major research investments. The external review generally confirms the validity of the Impact 2020 Framework for strategic management of Flagships and provided recommendations for future work.

The level of *rigor* present in the framework reflects the level of resourcing allocated to this work to date, with scope for improvement. The framework itself is robust and rigorous, however the quality of the data within the tool is envisaged to improve in quality over time assuming adequate resources are deployed to address this priority issue. Both Flagship Impact Champions and the project Steering Committee have highlighted the need to improve the rigor and quality of impact statements and time to goal estimates as a future priority, and one Flagship has recently commissioned an independent external validation project to improve the quality and rigor of impact statements.

The *practical* value of the Impact 2020 Framework to Flagships (along with the value of other elements of the project) was determined by the Project Manager and Project Officer in April 2012 via semi-structured 30 minute telephone interviews of each Flagship Impact Champion. The strategic framework was perceived by Flagship Impact Champions as a necessary element in achieving consistency of approach, with one of the most useful elements of the framework being the common language, and the clarification gained in distinguishing between activities/outputs and outcomes. The

framework was viewed by Flagship Champions as important for bringing the various business support aspects (communications, business development, legal etc) of a flagship together with a common focus. The framework was viewed as of practical value to Flagships in preparing for a Flagship Review (held on a rolling cycle with each Flagship reviewed every 3-4 years). From an enterprise or corporate perspective a One-CSIRO framework to impact planning, monitoring and characterisation is essential to (a) structure and make sense of the diverse nature of future intended outcomes across the Flagship program (b) enable consistent and rigorous monitoring of progress toward future intended outcomes.

Objective 3: Improve capability of CSIRO staff to plan, monitor and characterise outcomes.

The Impact 2020 Project team focused efforts on building the capability of the Flagship Impact Champions from the nine flagships over the duration of the project. Feedback from the Champions via the April 2012 semi-structured interviews indicated that the mentoring and support provided by the Impact 2020 project team was one of the most valuable elements of the project. In particular, Impact 2020 personnel from both the Steering Committee and Management Team attended numerous Flagship Leadership Team meetings and these engagements were viewed as positive, and helped to answer questions and provide guidance as well as contribute to improved desire to improve capability in this space across the Flagship Program. Coaching individuals through the Impacts tool was seen as timely and helpful contribution to enhance skill and capability.

In the July 2012 round of semi-structured interviews the Flagship Impact Champions highlighted a lack of skills and constrained resources were priorities to address in the future. Priority areas for building include a step-by-step process to embed a common approach to articulating impact statements within Flagships, Themes, Streams and projects. In addition, capability building to embed a common impact 'language' both within Corporate and within the business was viewed as a priority, as was a One-CSIRO and rigorous approach to measuring and quantifying outcomes. The Impact 2020 Project has built capability of Flagship Impact Champions to plan, monitor and characterise outcomes, and has also contributed (along with other projects and initiatives) to a strong demand for further capability building in this area within the nine Flagships.

Summary

The key results of the Impact 2020 Project work are summarised in Table 2.

Table 2: Key results of the Impact 2020 Project

Work stream	Results
Project leadership	-Improved awareness of the importance of planning for impact among key internal audiences
Strategic framework	-Impact planning, monitoring and characterisation framework developed -Impact 2020 framework externally validated by external consultants -Outcome hierarchy within some Flagships established
IT system	-IT tool developed -IT tool populated with impact data -EOP Impacts support material developed and coaching undertaken
Culture of innovation for impact	-Impact Champions network created -Common impact language among impact champions & I2020 project team & other corporate teams -Good understanding of the difference between outputs and outcomes (33% to 78% in 12 months)
Communication & engagement	-Internal engagement: Flagships using their impact statements to engage internally (and to some degree externally) -External engagement: CSIRO-CRRDC; DIISRTE CCI EWG; ATN-Go8; Thomson Reuters

Conclusions and Implications

In conclusion, the ex-ante evaluation work within the Impact 2020 Project has been conducted at the organisational level at CSIRO, with implications for practitioners in large-scale institutions seeking to plan for outcomes across a diverse range of portfolios, each with unique attributes and features. A particular challenge of the work has been to develop a framework that characterises future intended outcomes at the enterprise level and takes an enterprise-level approach while also embracing the inherent diversity across the nine Flagships. Another challenge has been to develop a framework that simultaneously contributes to both enhanced performance and accountability objectives. The CSIRO Impact 2020 Project team have drawn upon frameworks from change management and systems theory in the development of the Impact 2020 Framework which have proven useful in addressing this complex issue.

For others embarking on a similar journey, we recommend the *scope* of inquiry be carefully defined and a rigorous program logic planning exercise completed in the initial scoping phase of the project to ensure resources are aligned with the expected outcomes of the project. In a complex and dynamic context, it is critical to evaluate the trade-off between *rigor* of understanding and *breadth* of application in determining the appropriate scope of inquiry.

The following four factors emerged as critical to the success of the Impact 2020 Project, and may be valuable to consider in the design phase of evaluation projects in a complex and dynamic context:

1. **Leadership** – a need to show commitment to the intent of the project, to deliver clear and consistent messages internally and externally, and to empower people across the breadth and depth of the organisation to explore creative and innovative approaches to addressing the project objectives.
2. **Culture** – a need for the intent of the work to be understood, valued, prioritised and rewarded, so that it becomes the way we do business. In this case this represents a change in culture and focus from research activity/outputs to outcomes.
3. **Capability** – a need for appropriate resourcing to support growth in line with organisational demand. Capability building may include providing the means to support a common language; delivering training and engagement programs to target audiences; supporting improved capability to quantify and measure outcomes; and developing and connecting information management systems and frameworks.
4. **Systems** – a need for efficient, effective systems and processes to support the delivery of the project, which may include harmonisation of current systems to reduce overlap and administrative burden; and robust governance processes.

Evaluation practitioners not already doing so may benefit from drawing on the change management discipline to enhance the effectiveness of evaluation projects and programs. Employing change management principles to 'bring the people along' on change initiatives has been shown to significantly increase the success rate of projects (Hiatt, 2006), and these principles are highly complementary and applicable to the evaluation discipline.

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