

# ADOPT AN ON PROGRAM CASE STUDY

## BOX 1 ADOPT CASE STUDY - EXECUTIVE SUMMARY

### Key findings

ADOPT (the Adoption and Diffusion Outcome Prediction Tool) is the first decision support system of its type for forecasting and evaluating the likely rate of adoption of agricultural innovations. Since 2009, the project has produced the following main outputs:

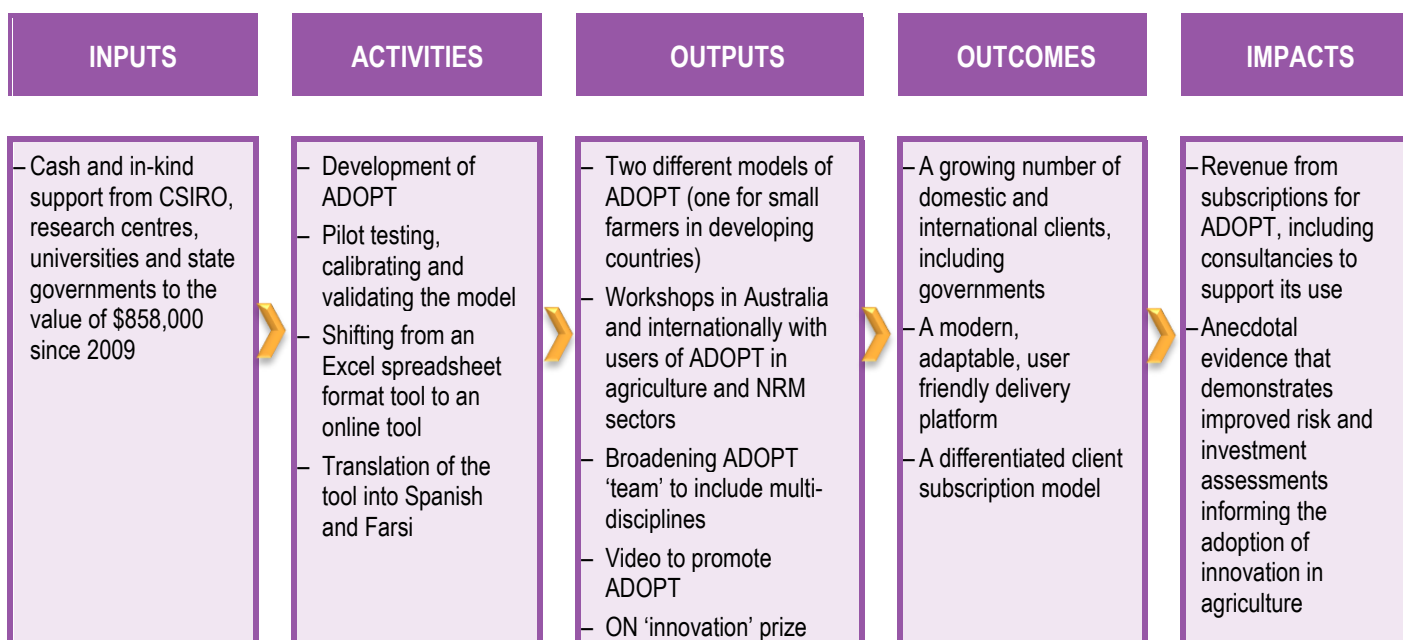
- An online, subscription-based resource(launched August 2018) with 252 registered users. (This does not include those using ADOPT through the group/workshop registrations and those still using ADOPT in the Excel version.)
- An article that is one of the top 10 most downloaded in publication *Agricultural Systems* (2017)
- Clients that include the Grain Research Development Corporation, NZ Government, and the Consortium of International Agricultural Research Centres (CGIAR)

### Role played by CSIRO ON

While ADOPT has been in development since 2009, participation in the ON Prime program led to the development of a business case that highlighted the potential market for ADOPT and secure internal development funding through Agriculture & Food. This encouraged the team to shift ADOPT to an online platform, and to introduce a two-tiered subscription-based licensing model. This model allows ADOPT to be more readily customised to meet the needs of different users and to be more available to more potential users (e.g. without being limited by MS Excel restrictions). The tool has been adopted by an increasing number of international clients.

This case study uses the evaluation framework outlined in the CSIRO Impact Evaluation Guide. The results of applying that framework to the ADOPT study are summarised in Figure 1.

FIGURE ERROR! NO TEXT OF SPECIFIED STYLE IN DOCUMENT..1 ADOPT CASE STUDY – IMPACT FRAMEWORK DIAGRAM



SOURCE: ACIL ALLEN

## 1.1 Purpose and audience for case study

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This case study describes the economic, environmental and social benefits arising from the development of ADOPT.

This evaluation is being undertaken to assess the learnings and impacts arising from the ADOPT project's participation in the CSIRO's ON. This case study can be read as a standalone document or aggregated with other case studies to substantiate the impact and value of the CSIRO ON activities as a whole, relative to the funds invested in these activities.

The information in this case study is provided for accountability, communication and continual improvement purposes. Audiences for this report may include Members of Parliament, Government Departments, ON, CSIRO and the general public.

### 1.1.1 CSIRO ON

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CSIRO ON was established in 2015 by CSIRO to help accelerate the impact of science research into market. The initiative was expanded through funding from NISA to service more broadly Australia's publicly funded researchers and their industry partners. The aim of the initiative is to more quickly translate great science and technology research into positive impact to help address some of the economic, environmental and social challenges facing the Australian and global community.

There are a number of elements to the program, including two facilitated programs, ON Prime and ON Accelerate. These two elements are designed to complement each other.

ON Prime is an open and collaborative program for existing science projects as well as new technologies and projects that are still in development. ON Prime helps research teams to ensure that they are working on the right problem, it provides frameworks to create and test assumptions about their idea and provide recommendations towards next steps. ON Prime can be considered as an entry level program, in effect it can be seen as a precursor to participation in the ON Accelerate program.

ON Accelerate is designed for teams that have made significant progress with their idea and their target market(s). This may be in the form of contracts for paid or unpaid trials, or at the most advanced stage, recurring sales with both new and existing customers. This implies that teams will have a working prototype of their product or service and have secured any appropriate intellectual property rights. It is expected that teams applying for ON Accelerate would have conducted significant engagement with their potential customers and be able to demonstrate what they learned throughout, including what the total addressable market is and what competition exists.

For ON Accelerate, shortlisted applicants are invited to participate in a two-day Selection Bootcamp event where teams will be provided with training and coaching simulating the accelerator experience. At the conclusion of the selection bootcamp, the teams will pitch to a panel of external judges for a spot in the Accelerator. Projects that are at Investment Readiness Level (IRL) Stage 3 can apply directly for ON Accelerate without going through Prime or Bootcamp.

Following a team's passage through the ON Prime or ON Accelerate program they are eligible to apply for ON Runway support. That funding is designed to help teams to further progress their project. The support provided can be spent on a range of services, for example, regulatory certification, marketing, bookkeeping or investor agreements.

## 1.2 Background

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In the past, investments in agricultural innovation were typically done without any structured analysis of the likely extent and rate of adoption. Guesstimates were common, despite the availability of significant research identifying the factors influencing adoption of innovation by the agricultural sector.

ADOPT is the first decision support tool for forecasting and evaluating the likely rates of adoption of agricultural innovations by farmers. It builds on extensive research about ex-post influencers on farmer adoption, together with a theoretical framework, to attempt to predict adoption ex-ante. It seeks to reduce the risk of investment in R&D by ensuring that funding decisions are better informed by having access to plausible predictions for the adoption of the results of that R&D.

Work to develop ADOPT began in 2009. It was a collaborative effort between a multidisciplinary team of researchers from the CSIRO, the University of WA, the WA Department of Agriculture and rural sociologists working for the Victorian Government who were all participating in a CRC for Future Farm Industries (CRC FFI).

The first beta version of ADOPT (2011) was a downloadable Excel format tool. Revisions to the tool were made in 2013, 2014 and 2015. There are now approximately 1300 users, including research bodies, governments and international institutions. In 2014 a version was released for small farmers (smallholders) in developing countries, after the Australian Centre for International Agricultural Research (ACIAR) provided funding for international development and testing. An online version of ADOPT went live in July 2018 and an online version of the smallholder version to be realised in 2019.

### 1.2.1 The science behind ADOPT

ADOPT uses expertise from multiple disciplines to make the knowledge surrounding the adoption of innovations more available, understandable and applicable to researchers, extension agents and research managers. Best results are obtained from the use of ADOPT when it is used in a workshop situation.

The tool has been designed to predict the likely peak level of adoption of an innovation and the time taken to reach that peak. It focuses on an innovation within a particular population (but does not aim to predict adoption behaviour of individuals) and encourages users to consider the influence of a structured set of factors affecting adoption. These include the:

- characteristics of the innovation
- characteristics of the population
- actual advantages of using the innovation
- learning of the actual advantages of the innovation.

Responses to questions around these topics allow a number of relevant factors to be calculated, which in turn allow the peak adoption level and the time to near peak adoption to be predicted. This represents the time it takes to reach 99% of the predicted peak level of adoption. The nature of the typical 'S-shaped' diffusion curve means that the time it can take for adoption to proceed from 99% of peak adoption through to the full 100% of peak adoption can be a relatively long time.

## 1.3 Impact Pathway

### 1.3.1 Project Inputs

ADOPT has received a total of \$858,000 in cash and in-kind support since 2009. It was initiated with funding by the Cooperative Research Centre for Future Farm Industries (CRC FFI). In addition, cash support has been provided by Grains Research and Development Corporation (GRDC), CSIRO and ACIAR. The development of the smallholder beta version of ADOPT was funded by ACIAR. Additional in-kind support (time, a post-doctoral student) has been provided by CSIRO, the University of Western Australia (UWA), Department of Agriculture and Food in WA (DAFWA) and the Department of Primary Industries in Victoria (DPI Vic). Further investment from CSIRO was provided in 2017 to take ADOPT to an online platform and to support CSIRO staff to participate in ON Prime. The value of resources that CSIRO devoted to ADOPT in the ON Prime program is \$12,895.

**TABLE ERROR! NO TEXT OF SPECIFIED STYLE IN DOCUMENT..1** SUPPORT FOR THE PROJECT

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Cash</b>												
CRC FFI 1	34000	68000	70000									
CRF FF1 2				70000	18000							
ACIAR					30000	12000	40000	40000				
GRDC						20000						
CSIRO										40000	40000	10000
<b>In kind</b>												
CSIRO	60000	22000	43000	65000	88000	20000				10000	10000	10000
UWA		10000	10000	10000	15000	15000						
DPI (Vic)	5000	5000	5000	5000	5000							
DAF (WA)	5000	5000	5000	5000	5000							
<b>Total \$</b>	<b>104,000</b>	<b>110,000</b>	<b>133,000</b>	<b>155,000</b>	<b>161,000</b>	<b>67,000</b>	<b>4,000</b>	<b>4,000</b>		<b>50,000</b>	<b>50,000</b>	<b>20,000</b>

SOURCE: ADOPT

NB: VALUES FOR THE CRC FFI CASH CONTRIBUTIONS ARE 50% OF THE PROJECT SIZE AS THE PROJECT ALSO REQUIRED ACTIVITIES OTHER THAN ADOPT DEVELOPMENT.

### 1.3.2 Project activities

In order to develop ADOPT the team had to identify the factors or variables that influence farmers' adoption patterns, and test and apply calibration towards the development of the underlying model. Testing was done using 1990s innovation adoption activities as scenarios, to demonstrate how ADOPT may have aided thinking in these projects at the time.

In 2016, the ADOPT team participated in ON Prime to find ways to market their technology and develop a business model. They were motivated by a desire to ensure that ADOPT would remain up to date and useful to its users. The researchers considered this to be a real danger while ADOPT was marketed in the form of a static Excel spreadsheet. Importantly, the business model needed to incorporate an ability for CSIRO to provide ongoing support to its maintenance and development.

Since 2018 ADOPT has been available online through a subscription model. It has a 2-tier pricing structure. The cost for individuals is \$49 and for organisations it is negotiable within a customised plan. The ADOPT team also work with larger clients to negotiate a whole of enterprise subscription as part of providing a customised service. This is proving to be the largest source of income from ADOPT, with projects in place with Australian clients and international projects currently being negotiated.

Applications of ADOPT by end users include: integrating the findings from the model to inform RD&E investment decisions and proposal submission processes by major RDCs (including GRDC and MLA); as information to support project investment strategies by state governments, and in CGIAR and ACIAR projects; and adapted for use in EU Horizon 2020 projects.

Reflecting the growing demand for ADOPT from international clients, ADOPT has also been translated into Spanish and Farsi.

### 1.3.3 Project outputs

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Since 2009, the main outputs of this project have been the development, testing and deployment of two different models of ADOPT (one for smaller farmers in international agriculture and one for developed agricultural countries).

#### Publications

- Kuehne G, Llewellyn R, Pannell D, Wilkinson R, Dolling P, Ouzman J, Ewing M (2017) *Predicting farmer uptake of new agricultural practices: A tool for research, extension and policy*, *Agricultural Systems* 156:115-125

As at July 2019, this article had been downloaded over 20,000 times. It is currently among the top ten most downloaded *Agricultural Systems* articles.

#### Awards

ADOPT was awarded the ON Prime \$5000 incentive prize for most promising innovation and gained CSIRO investment to pursue the subscriber-based online format.

#### Innovation / commercialisation

When the CRC FFI concluded, CSIRO gained full ownership rights over ADOPT. CSIRO are actively pursuing the commercialisation of the technology through an on-line subscription model. Their aim is to have attracted 2,000 users in Australia by 2020 and 2,000 users internationally via individual and organisational registrations (at a \$100 per annum average subscription fee) in the same year. By 2025 they hope to have 10,000 users worldwide each paying \$200 per annum average in subscription fees.

#### Role of ON program

The research team's participation in ON Prime helped them realise the developmental potential and the potential customer demand for a tool such as ADOPT, and that with dedicated time and focus this could be harnessed.

ON facilitated the inclusion of new people in the project. For example, a person from CSIRO's business development area and a PhD student from New Zealand. These people brought fresh perspectives on the commercial potential of ADOPT, and diversified the skills set available to the team.

As a result of participating in ON Prime, ADOPT was moved online and therefore became more customisable, usable and accessible to a wider audience, including potential international users. The team also moved the tool to a subscription model, leading to the opportunity to have greater differentiation in the offer to users, such as different pricing for individuals versus organisations.

### 1.3.4 Project Outcomes

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Prior to participating in ON Prime, ADOPT had 1100 registered users, half of which were repeat-customers. Their clients consisted of universities (28 per cent), government (27 per cent), companies and organisations (38 per cent), private users (7 per cent). Of the government users, almost 10 per cent were from outside Australia. These users are not the product of promotional activities, only 'word of mouth'.

Mapping the potential market at that time of participating in ON Prime (2016), the team anticipated that if just 10 per cent of the potential market subscribed at \$400 per year, the project would generate around \$430,000 per year.

The GRDC have prepared an indicative estimate of the benefits derived from adopting ADOPT as a tool to assess what requests for R&D support they should support (see **Error! Reference source not found.**).

#### BOX 1.1 A USER EXPERIENCE — GRDC

The Grains Research and Development Corporation (GRDC) has estimated the potential value of ADOPT in assisting with adoption estimates in two areas, namely:

- the time that has been saved by understanding the adoption curve for an innovation project
- the value of improving the accuracy of the innovation adoption estimates.

Across 524 projects, the estimated value of time saved (due to faster decision making for each project) is approximately \$19,000. In terms of how the improved accuracy in estimating the adoption of innovations the estimated value of ADOPT to the GRDC is in the order of \$40,000. Thus, based on these conservative estimates, the estimated value that ADOPT has provided to the GRDC is approximately \$60,000.

GRDC have also used ADOPT with investment assessment and promoting consideration of adoptability in major investment areas such as Grain and Graze. ADOPT has been used in extension and impact training within GRDC training programs aimed at industry practitioners, and by GRDC program managers and other project proposers in presenting their case for funding consideration.

GRDC are now investing in embedding ADOPT into their investment development process for standard use by investment program managers. This is intended to create additional value that is not quantified here

SOURCE: PERSONAL COMMUNICATION AND ADOPT PROJECT MANAGER

#### *Role of the ON program*

Whilst the ADOPT team knew that ADOPT needed to move to an online platform, participation in ON Prime was pivotal to building the business case that enabled the team to secure the investment required to do so. Without moving to an online platform, the technology would have been limited to the existing user base, with limited opportunities for growth, no ability to track how it's being used and increased maintenance demands.

#### **1.3.5 Adoption**

Since the shift to the online version in 2018, ADOPT has attracted an additional 250 subscribers, including several group subscribers for the purposes of holding workshops. That is, users can use it for free and then purchase a license to use it with multiple users, such as in a workshop setting.

Clients include the GRDC, various consultancy firms, the WA Government, the NZ Crown Research Institutes, the International Maize and Wheat Improvement Centre (CIMMYT) and other CGIAR researchers. Income from online ADOPT comes from the projects that have been initiated since 2018/19 (examples totalling \$70,000) and current opportunities under negotiation (approximately \$250,000).

#### *Role of the ON program*

The post-ON prime model for delivery of ADOPT has made it possible for the team to customise ADOPT to a client's specific needs and provide workshops to educate clients about its use. Overall, this consultancy-based work is considered to have more financial potential than the user-subscriptions for ADOPT.

#### **1.3.6 Impacts**

While ADOPT has been cited in over 70 international studies, this is a simple proxy of its influence. Establishing the impact of ADOPT is more challenging. How clients use its findings is typically confidential, so it is difficult to quantify the changes it has brought about. ADOPT mitigates over-optimistic perceptions of the impact of innovation. It helps with decisions by running through various scenarios consistently for a wide range of innovation. It encourages actors to explain their inputs and assumptions, and incorporates non-financial variables like risk, ease of use and reversibility.

Anecdotal evidence suggests ADOPT's contribution to better decision making is significant, as the following quotes illustrate:

*"The dynamic nature of the program (as opted to static tables and diagrams), the ease of use and the discussion and learning it generated has provided an excellent platform to communicate the issues around adoption and what can influence it. Feedback from these groups has reflected a high level of interest and valuing of the program."* Rural Survey Specialists/QualDATA.

*"The ADOPT tool is one of significance for those working in contemporary practice change settings in agriculture. ADOPT simplifies and makes accessible the concepts that we can support practice change at a far and industry level by attention to the components of the tool."* Animal Science, Agri-science Queensland.

*"I think your ADOPT model has been the best new contribution to extension for a long time. It will be highly beneficial for those designing new RD&E project proposals, as it will help them to critically consider the factors they can influence to improve the overall adoption (and success) of their project."* eExtension Team Leader, Animal Science, Department of Agriculture

## 1.4 Clarifying the Impacts

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### 1.4.1 Counterfactual

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The counterfactual would be clients continuing to use ADOPT as a downloadable Excel spreadsheet.

### 1.4.2 Attribution

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Based on discussions with the ADOPT team, ACIL Allen has assumed that 50 per cent of the benefits from the online version of ADOPT can be attributable to the project team's participation in ON Prime, while the remainder of the benefits is due to capabilities already embodied in the Excel version of ADOPT that was developed prior to the team's participation in the ON program.

## 1.5 Evaluating the Impacts

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### 1.5.1 Cost-Benefit Analysis

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#### Costs

The costs to the ADOPT team of participating in ON program activities are estimated to be \$25,000. The overhead costs of the ON program that have been apportioned to the ADOPT project total \$12,895. Both sets of costs are assumed to be incurred in 2016.

#### Benefits

##### **Benefits to Australian users of ADOPT**

As discussed previously in **Box 1.1**, the benefits of ADOPT to GRDC in the one year (since its use of the online version) in terms of time saved due to faster decision-making from each project and from improved accuracy in estimating the adoption of innovations, have been conservatively valued at approximately \$60,000.

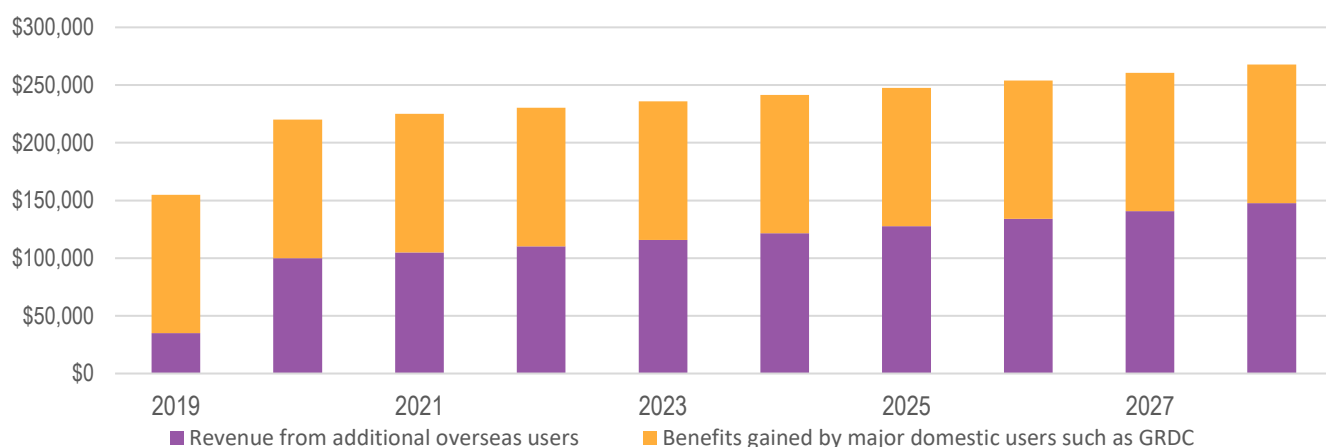
It is conservatively assumed that in each year to FY2028, there are two Australian organisations that experience a similar quantum of benefits from using ADOPT as GRDC did. That is, the benefits to Australian users of ADOPT are conservatively projected to be \$120,000 per year to FY2028. The benefits stream ends that year as it is assumed that an online version of ADOPT would be launched that year (that is, without the existence of the ON program).

The revenues earned by the ADOPT project from Australian users are not counted as a benefit in the cost-benefit analysis. Instead, there are regarded as a "transfer" from these users to the ADOPT project.

##### **Revenues from overseas users of ADOPT**

The revenues from overseas users of ADOPT constitute an additional source of benefits for the ADOPT project. It is estimated that \$70,000 and \$200,000 in subscriber fees and payments from consultancy work will be earned in FY2019 and FY2020 respectively, of which approximately 50 per cent are from overseas users. Thereafter, it is conservatively assumed that such revenues will grow by 5 per cent each year to FY2028, after which the benefit stream ends due to the reason cited previously.

The benefits to Australian users of ADOPT and the revenues earned from overseas users of ADOPT between FY2019 and FY2028 are shown in **Figure** .

**FIGURE 1.2** BENEFITS FROM ONLINE VERSION OF ADOPT, FY2019 TO FY2028

SOURCE: ACIL ALLEN CONSULTING

Of the benefits to Australian users of ADOPT and the revenues earned from overseas users of ADOPT, it is assumed that 50 per cent can be attributed to the ADOPT team's participation in the ON program, as stated in Section 1.4.2.

### Assessment of benefits against costs

The present value of ON-related costs is estimated to be \$49,330 in 2018-19 dollars under a 7 per cent real discount rate. The present value of benefits (encompassing benefits to the Australian users of ADOPT and revenues from overseas users of ADOPT) that can be attributable to the ON program is conservatively estimated at \$918,985 in 2018-19 dollars under a 7 per cent real discount rate.

The net benefit or net present value (NPV) of the ON program in relation to ADOPT is thus estimated at \$869,655 in 2018-19 dollars under a 7 per cent discount rate. The benefit-cost ratio (BCR) is estimated at 18.6.

### Sensitivity analysis

Sensitivity analysis was undertaken to test the robustness of the cost-benefit analysis results to changes in key assumptions and parameter values.

#### **Benefits to a major Australian user of ADOPT**

In the central case of the cost-benefit analysis, it is assumed that the benefit of ADOPT to a major Australian user (such as GRDC) is \$60,000 a year. If the benefit is assumed to be \$90,000 a year, the BCR increases from 18.6 to 23.5. Conversely, if the benefit is assumed to be only \$30,000 a year, the BCR decreases to 13.7.

#### **Number of major Australian users of ADOPT**

In the central case of the cost-benefit analysis, it is conservatively assumed that there are two major Australian organisations that each benefit \$60,000 annually from using ADOPT. If there are four such organisations, the BCR increases to 28.4.

#### **Annual growth in revenue**

In the central case of the cost-benefit analysis, it is assumed that revenues from subscription fees and consulting work associated with the online version of ADOPT will grow by 5 per cent a year from FY2020 to FY2028. If the annual growth rate is 8 per cent, the BCR increases from 18.6 to 19.6. Conversely, if the annual growth rate is only 2 per cent, the BCR decreases to 17.8.

#### **Proportion of benefits attributable to ON program**

In the central case of the cost-benefit analysis, it is assumed that 50 per cent of the benefits from the online version of ADOPT can be attributed to the ON program. If the attribution rate is 75 per cent, the BCR rises from 18.6 to 27.9. Conversely, if the attribution rate is only 25 per cent, the BCR decreases to 9.3.

**Discount rate**

In the central case of the cost-benefit analysis, a 7 per cent real discount rate was used, resulting in a BCR of 18.6. The BCR is 22.4 under a 4 per cent real discount rate and 15.7 under a 10 per cent real discount rate.

**1.5.2 Potential future impacts**

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As the online version of ADOPT becomes more widely embedded in the impact planning and evaluation systems of major agricultural RD&E organisations in Australia and internationally (see Section 1.3.5), it is expected that the impacts and learnings from these will increase opportunities for more ongoing income from these collaborations as well attract new engagement from similar organisations

**1.5.3 The ON program's role**

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ON allowed the potential of an online ADOPT to be identified and realised. The greater usability, data management capacity and ability to link the online version into shared applications within organisations has helped to drive the current demand and income potential being realised, in particular for delivery and service to organisations.