The adoption and diffusion outcome prediction tool

Adoption report for:

Autosteer adoption example. NB This example involves an innovation that has already reached near peak adoption and has been completed with the benefit of hindsight for the purposes of demonstration.

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Project Details

MODEL

Standard

YOUR INNOVATION

GPS guided autosteer on cropping machinery such as seeding equipment, spraying equipment and/or harvesting equipment.

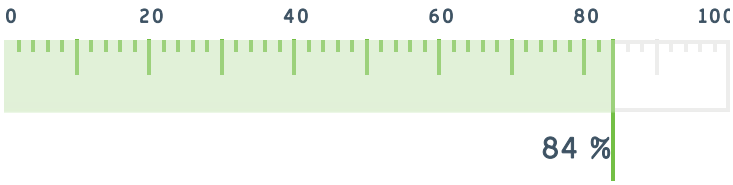
YOUR POPULATION

Australian dryland grain growers (cropping specialists)

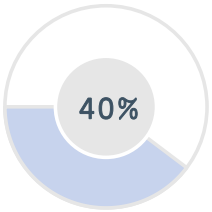
Adoption Level

TIME TO NEAR-PEAK ADOPTION LEVEL
(years)

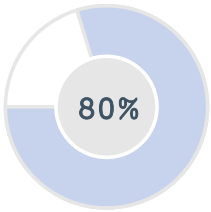
PEAK ADOPTION LEVEL
(percent %)



Predicted adoption levels



IN 5 YEARS FROM START



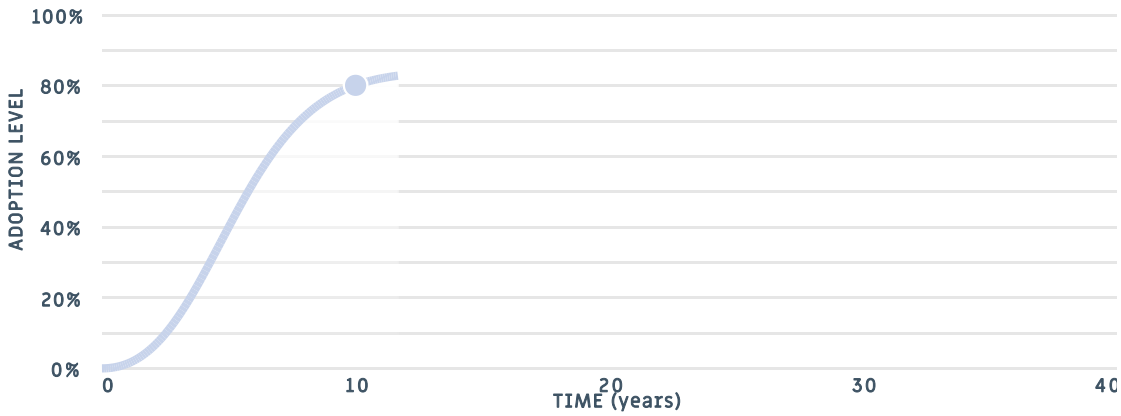
IN 10 YEARS FROM START

TIME TO 50% OF PEAK ADOPTION (years)

NOTES: The predictions of Peak Adoption Level and Time to Peak Adoption Level are numeric outputs that are provided to assist with insight and understanding and like any forecasts should be used with caution. Time to Near Peak Adoption represents the time to 99% of the maximum predicted adoption level.

Adoption level S-Curve

The following chart shows how the level of adoption in the relevant population of farmers changes over time.



Yearly Adoption Levels

Year	Adoption %
1	1
2	6
3	15
4	27
5	40
6	53
7	64
8	71
9	77
10	80
11	82
12	84

(Peak Adoption)

Changing the adoption levels

Many of the factors can be changed by activities such as extension. Based on the data entered, the ADOPT model suggests that changing the following factors would have the biggest effect on adoption.

Changing the peak adoption level

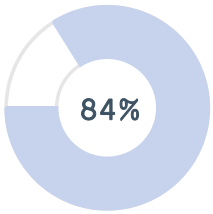
MOST SENSITIVE QUESTION

16 Profit benefit in years that it is used

To what extent is the use of the innovation likely to affect the profitability of the farm business in the years that it is used?

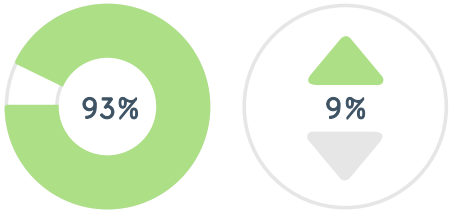
YOUR RESPONSE

Small profit advantage in years that it is used



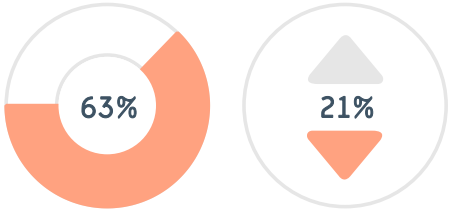
STEP UP RESPONSE

Moderate profit advantage in years that it is used



STEP DOWN RESPONSE

No profit advantage or disadvantage in years that it is used



Changing the time to peak adoption level

MOST SENSITIVE QUESTION

7 Trialable

How easily can the innovation (or significant components of it) be trialled on a limited basis before a decision is made to adopt it on a larger scale?

YOUR RESPONSE

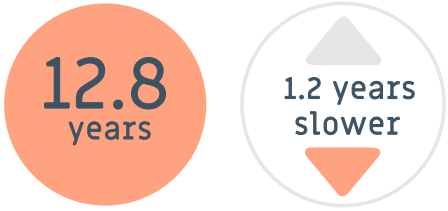
Moderately trialable

STEP UP RESPONSE

Easily trialable

STEP DOWN RESPONSE

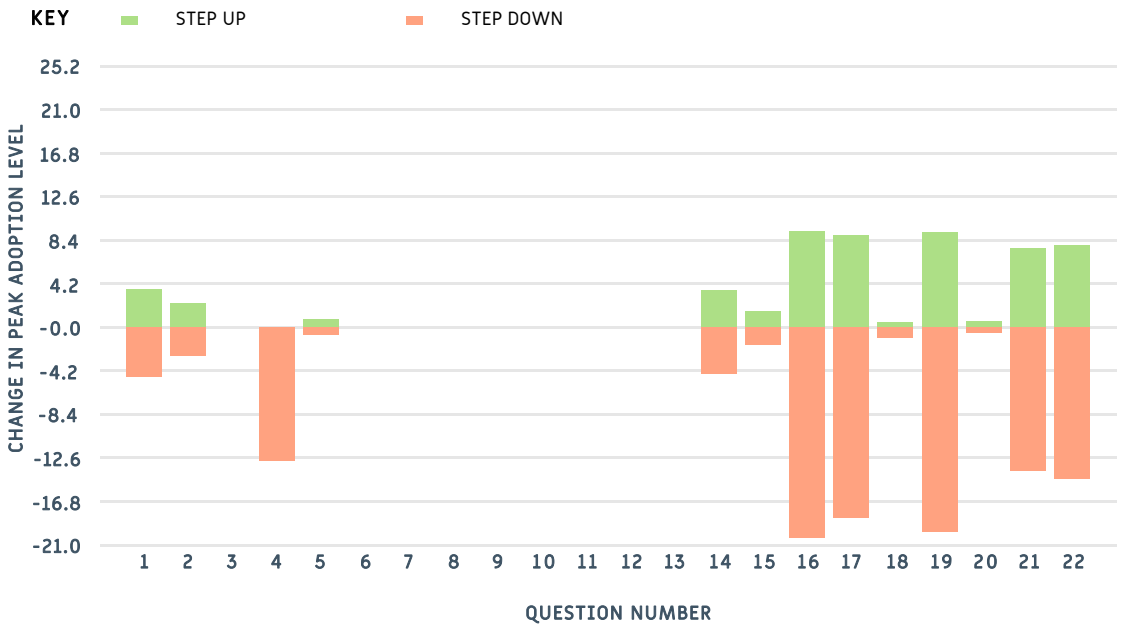
Difficult to trial



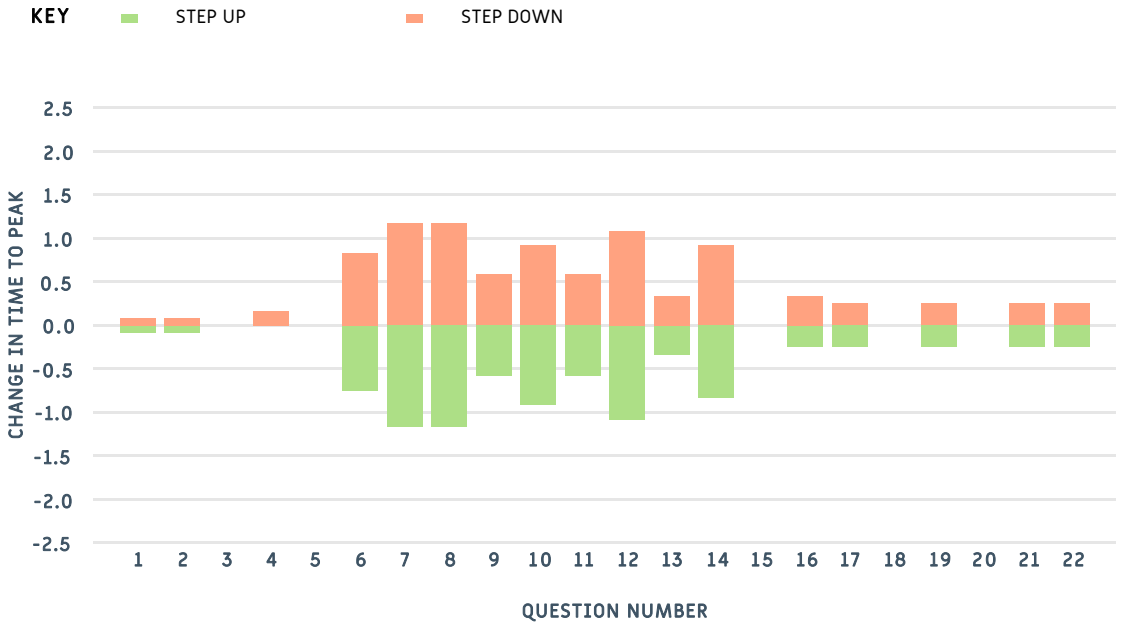
Sensitivity Analysis

The following charts show the effects on Peak Adoption Level and Time to Peak Adoption of single step changes up and down for all questions.

Peak level, sensitivity analysis

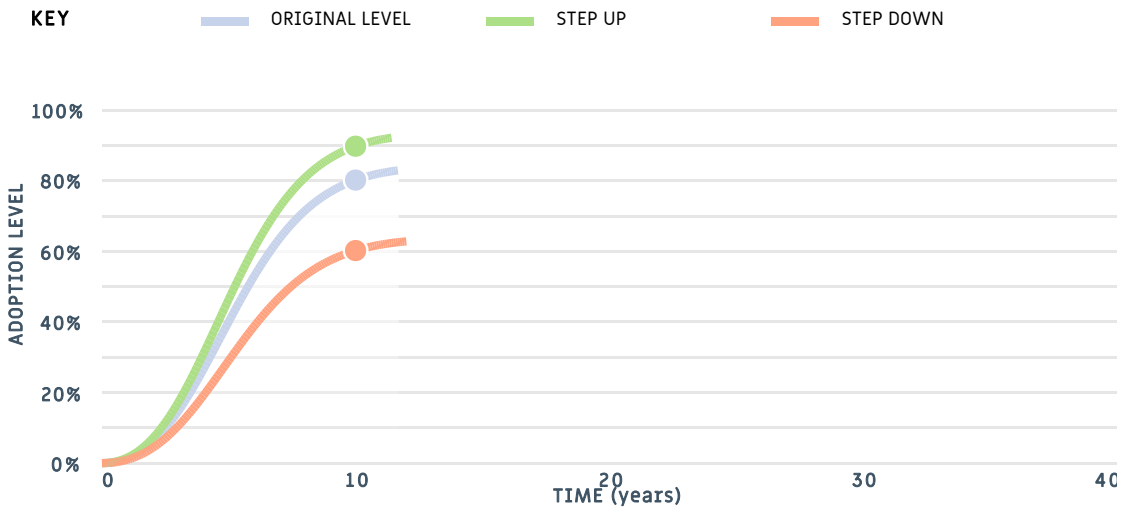


Time to peak, sensitivity analysis

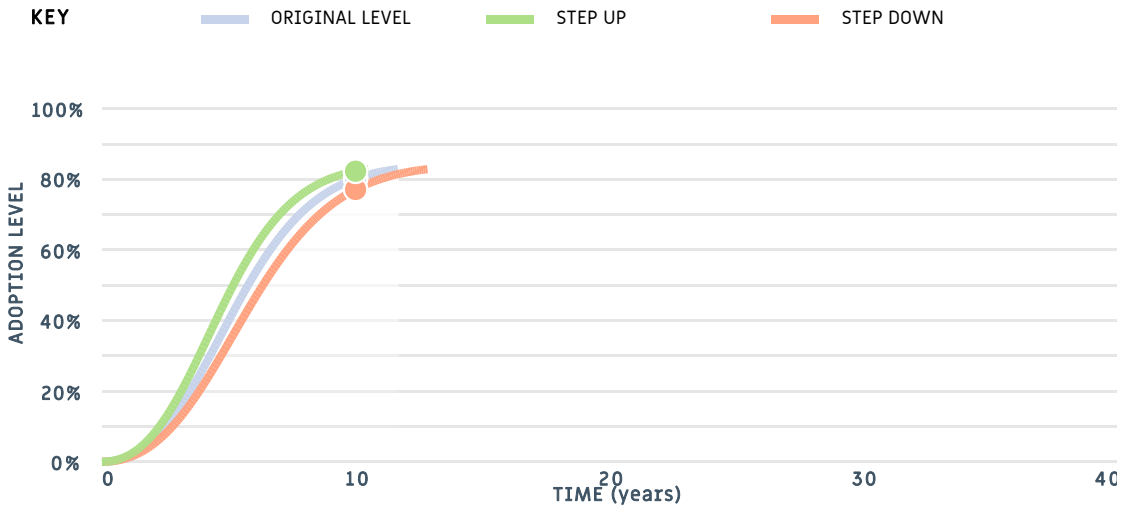


S-Curve Sensitivity

The following chart shows how the S-Curve is predicted to change when a single step change is made to the most sensitive question(s) with respect to Peak Adoption Level



The following chart shows how the S-Curve is predicted to change when a single step change is made to the most sensitive question(s) with respect to Time to Near Peak Adoption.



Responses

Question	Response	Reasoning
Relative Advantage for the Population		
1. Profit orientation	A majority have maximising profit as a strong motivation	For Australian dryland grain grain grower we usually assume that most have profit maximization as a strong motivation.
2. Environmental orientation	About half have protection of the environment as a strong motivation	For Australian dryland grain grain grower in general we usually assume that a about half have protection of the environment, including prevention of soil erosion, as a strong motivation.
3. Risk orientation	About half have risk minimisation as a strong motivation	For Australian dryland grain grain grower we usually assume that about half have risk minimization as a strong motivation.
4. Enterprise scale	Almost all of the target farms have a major enterprise that could benefit	Grain production is the major enterprise on most grain producing farms which is the target population for this innovation.
5. Management horizon	A majority have a long-term management horizon	For Australian dryland grain grain grower we usually assume that a majority plan to be farming their land into the longer-term future as individuals or as a family.
6. Short term constraints	A minority currently have a severe short-term financial constraint	We assumed that there were no widespread temporary but severe constraints affecting more than a minority of grain growers across this broad target population.

Learnability Characteristics of the Innovation		
7. Trialable	Moderately trialable	We assumed that at the time of early availability of autosteer that it was potentially trialable but the access and set up required for GPS and the fitting required to machinery made autosteer only moderately trialable.
8. Innovation complexity	Slightly difficult to evaluate effects of use due to complexity	Autosteer could be easily evaluated by its potential to allow straight driving lines with reduced overlap but other aspects of its overall benefits such as labour saving, fatigue reduction, easier night operations, and benefits of the GPS guided lines to next year's crop placement and production were a little more complex to evaluate.
9. Observability	Easily observable	The shift to autosteer was usually observable from the equipment visible on the machinery and often the GPS guided driving lines relative to previous.

Learnability of Population		
10. Advisory support	About half use a relevant advisor	A majority of Australian grain growers now pay advisors for cropping related advice but at the time of initial autosteer availability this was lower.
11. Group involvement	About half are involved with a group that discusses farming	About half of Australian grain growers were known to be involved with a relevant group that discusses farming.
12. Relevant existing skills & knowledge	A majority will need new skills and knowledge	For most farmers at the time autosteer was an introduction to GPS systems and software so most needed new skills and knowledge.
13. Innovation awareness	A minority are aware that it has been used or trialed in their district	The technology had attracted considerable media and local industry attention prior to local commercial release but we assume it was not tested locally in all districts prior to availability.
Relative Advantage of the Innovation		
14. Relative upfront cost of the project	Large initial investment	The upfront cost of the GPS autosteer equipment was very large in many initial cases but soon became more commonly pre-installed in new machinery and available at a lower cost as GPS also improved.
15. Reversibility of the innovation	Easily reversed	The GPS autosteer equipment can be turned off and not used or in most cases removed.
16. Profit benefit in years that it is used	Small profit advantage in years that it is used	The profitability of GPS autosteer in the year that it is used may not be large with reduction in overlap (over application) of inputs often only leading to savings around 5%. It is possible that the ability to

		spray and seed more area at night may also increase profit in the year of use but that has not been included in this assumption.
17. Future profit benefit	Small profit advantage in the future	Benefits to next year's crops by enabling more accurate inter-row seeding, improved night weed spray efficacy (eg of summer weeds) and reduced areas of input overlap exist but are not considered to have a large impact on profit.
18. Time until any future profit benefits are likely to be realised	1 - 2 years	Most future benefits are assumed to be gained in the following year's crop.
19. Environmental costs & benefits	Small environmental advantage	The small reduction in inputs through reduced overlap (eg reduced pesticide and fertiliser use) is assumed to have a small environmental advantage.
20. Time to environmental benefit	Immediately	Any environmental benefits of reduced inputs and greater input use efficiency are assumed to be gained in the year of use.
21. Risk exposure	No increase in risk	No net change in risk to the farm business is assumed through the use of autosteer.
22. Ease and convenience	Large increase in ease and convenience	

ADOPT can be cited as: 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 https://doi.org/10.1016/j.agsy.2017.06.007