Cotton Innovation Network

Cotton Strategy Forum Proceedings

21 May 2014

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1 Environmental scan

1.1 Introduction

The Australian cotton industry is mature and sophisticated, with high awareness of what drives performance from within and without the sector. Cotton's story is one of identifying opportunities and adapting to challenges as they arise underpinned by extensive development and application of science and technology. As a result industry's belief in the benefits of science and technology and the associated research[1] model is enormous.

Yet the industry, the research model and the way they align and support each other are continually challenged – by a culture within cotton of seeking continual improvement and by the need to simply adapt to changing circumstances.

This paper outlines some of the key changes that have and will influence the future of cotton's research model and how the Cotton Innovation Network sets out to address them. It was developed by reviewing key documents and discussions with and between individuals from key organisations inside and outside the Network. This included two preceding workshops, the Cotton Futures Forum hosted by CRDC in December 2013 and the Cotton Horizons Workshop hosted by CSIRO in April 2014.

This environmental scan provided the background for the 2014 Cotton Strategy Forum in Brisbane where senior industry and research leaders:

- reviewed the cotton industry's research **priorities** to ensure they are relevant and clear
- scoped improved and identified new **programs** to deliver the priorities for future consideration
- identified how **linkages** within the research model can be improved to lift performance

1.2 Cotton industry drivers

Cotton's success is completely dependent on holding a comparative advantage over alternatives in the regions where cotton is grown and there being a demand for lint grown.

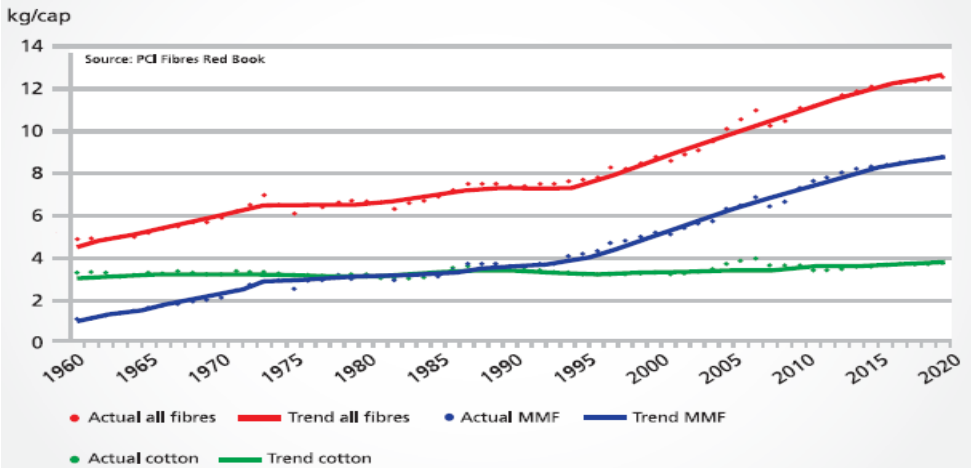
Cotton fibre markets

Australia has the position of being the third largest exporter of high quality cotton while only accounting for 3 per cent of global cotton production. The relatively small size of the industry means Australia has scope to increase exports without necessarily collapsing global markets.

Demand for cotton is growing but at a much slower rate than man-made fibres, leading to a smaller share of the global fibre market (Figure 1). The decline is driven by relative price, supply continuity, and functionality of cotton compared to man-made fibres.

[1] Research is used rather than research & development (R&D) or research development & extension (RD&E) for simplicity.

Figure 1 **World per capita demand for cotton and MMF 1960-2020**



Source: PCI Fibres, October 2012 in CRDC Strategic Plan 2014

The price of cotton, as with many agricultural commodity exports, is volatile due to variable supply, stockpiles and demand interactions. In the long-run competition with other exporters and man-made fibres limit the ability to significantly increase the real price of cotton.

Australia has led and supported a wide range of branding strategies, quality systems and environmental assurance frameworks to differentiate (Australian) cotton and meet consumer and market expectations. To date these approaches have been more successful in maintaining markets rather than securing a premium for Australian cotton.

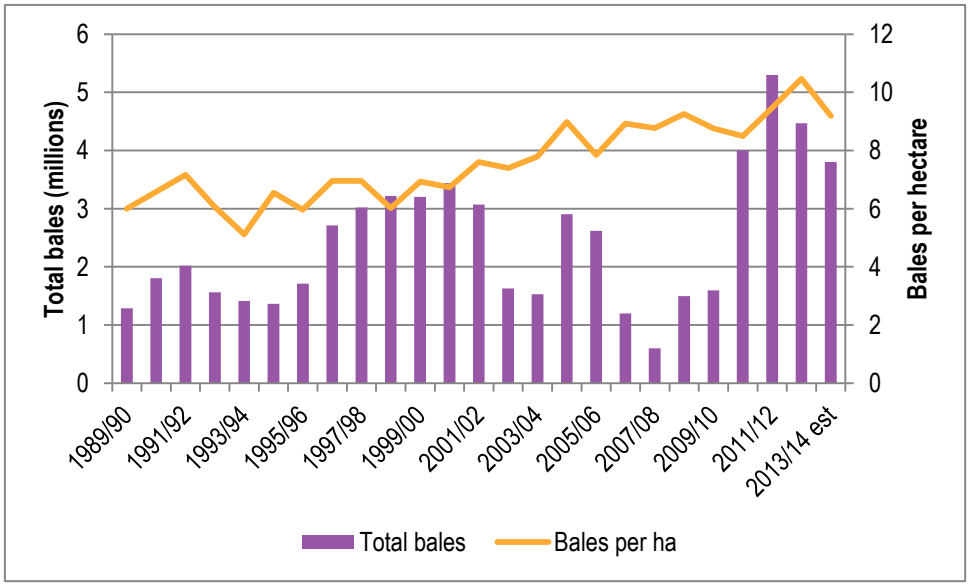
There is scope to develop new and differentiated uses for cotton on its own or as a blended fibre which could increase demand and/or price. Developing such uses will need to draw on expertise and capital from overseas, requiring new partnerships.

Cotton production in Australia

The Australian cotton industry has sustained yield improvements over many decades (Figure 2), providing a source of comparative advantage to alternative crops. Geographically cotton production is concentrated in central-northern NSW and southern-central Queensland. Over the past five years production has significantly expanded in southern NSW as irrigators have sought to maximise returns from available water. Expansion into northern Australia has been promoted, researched and trialled over many decades. Investment, rather than knowledge of where cotton can be grown and what the production systems are, is currently the next major step involved in expanding cotton in the north.

Cotton production is intensely variable - influenced by climatic conditions and water availability. Over the past decade cotton regions experienced a significant if not the worst drought, followed in many areas by extensive flooding. As a result the industry has produced four record high years, immediately preceded by four record low years (Figure 2). Research indicates that climate variability and wet-dry/hot-cold extremes will increase in the future.

Figure 2 **Australian cotton production and productivity**



Note: 1 bale equals 227 kg
Source: Cotton Australia 2014

Mining is rapidly expanding in many cotton growing regions, creating genuine competition for land many saw as being available for cropping in perpetuity. The change has brought an increased focus on the impact agriculture and mining have on landscapes, catchments and water resources. The efficacy of land-use and environmental planning in managing the competing priorities and mitigating uncertain impacts is also facing greater scrutiny from commerce and the community.

The relative attractiveness of other industries and adoption of labour saving technologies, such as GM cotton and round balers, has reduced both the demand and supply of labour. This has drawn people away from cotton in the regions and more critically away from the regions all together.

Higher variability across these drivers has increased uncertainty and ability of cotton growers to maintain and sustain profitability. When drivers converge, such as when water allocations reduce, drought is followed by flood, electricity costs rise and cotton prices fall, the viability of many growers is severely challenged.

The cumulative effect is that gains from new technologies and practices and better management have allowed the industry to hold rather than escape the relentless cost-price squeeze pressure. There is an expectation that research will continue to not only sustain, but improve the position and performance of the Australian cotton industry into the future.

1.3 Cotton research model drivers

The Australian cotton research model is also mature and sophisticated, having grown in parallel with the industry itself. The model is actually a domestic and international network of professional disciplines, public institutions, not for profit organisations and private companies bound by legislation and commercial relationships.

In 2011 the key cotton research organisations formed the Cotton Innovation Network to coordinate research in the Australian cotton industry to address a number of key drivers. The genesis of the Network is an initiative of the R&D Sub-committee of the Primary Industries Standing Committee now called the National Primary Industries RD&E Framework (NPIRDEF). The initiative requires a national RD&E strategy for each major

sector (e.g. cotton, grains) and cross sector (e.g. water use and soils) to be developed and implemented.

The Cotton Sector RD&E Strategy was developed by a Working Group of representatives from the CRDC, Cotton Australia, CSIRO, NSW DPI, QDAFF and ACDA in 2010. The Cotton Innovation Network was established to implement the strategy. For the cotton industry the NPIRDEF provided the opportunity to formalise and improve governance of the industry's research model.

The Australian cotton industry has always asked the question on where to focus the research model? Should its focus be resource sustainability, on-farm profitability, industry resilience, national prosperity or international competitiveness?

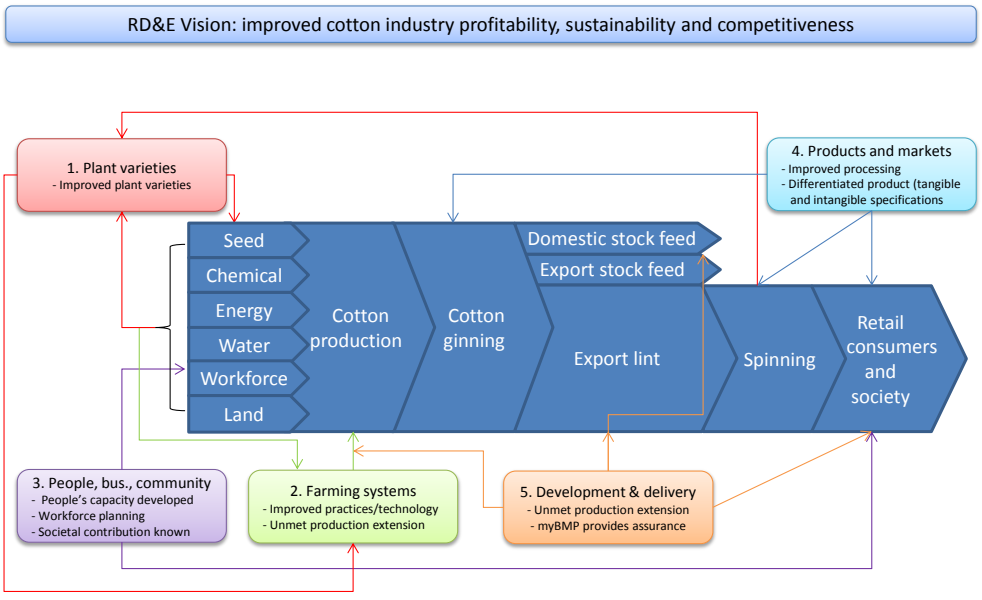
In 2009 the industry started a process of working out what the focal points for the industry research model should be. The first step was to provide an overarching context for research by creating an industry vision.

> Australian cotton, carefully grown, naturally world's best.
>
> The vision elements are differentiated, responsible, tough, successful, respected and capable.
>
> *Vision 2029*

The next step was to collate one set of national priorities that clearly articulated where the research model should focus its efforts over the next 20 years (Figure 3). The priorities were expanded in 2011-2012 by defining the pathways - problem definition, applicable research and required capability - for each one (Attachment F).

The importance of the priorities and pathway is not that they are new or absolute. Rather their significance stems from having the industry's, as opposed to one organisation's, priorities described to act as a reference and guide to everyone.

Figure 3 **Australian cotton industry research (RD&E) priorities**



Source: Cotton Innovation Network 2013

Australian cotton research is financed through a complex set of public and private funding arrangements. There is a visible trend of declining public funding through contraction of government services and less access to specific purpose programs, such as the Cooperative Research Centre and Caring for our Country initiatives. While naturally concerning, there are a number of reform initiatives embedded in the trend as well.

The move toward *beneficiary pays* means governments increasingly question whether public funds should be directed towards research directly benefiting individual businesses. Joint Commonwealth and industry funding of the CRDC and public providers, such as NSW DPI, QDAFF, CSIRO and universities, delivering programs with a public benefit address this issue to some degree. None the less every review covering rural research over the past few decades have questioned whether the distribution of public-private benefits aligns with government-industry contributions? The 2010 Productivity Commission review of RDCs and 2014 Commonwealth Commission of Audit both raise the option of reducing or changing the governance of government contributions to RDCs to increase public benefits. This trend of scrutinising and seeking to reduce public funding will continue.

At the same time public providers are required to pursue *cost-reflective pricing* for contracted services. The aim is to cover actual costs and foster a *competitive market* that does not crowd out other providers, particularly from the private sector. In practice the small and concentrated nature of the Australian cotton research market means there are limited alternative providers available. This can lead to "capacity shuffling" between providers as contracts are won and lost and significant lags before new entrants emerge.

There are duplications in services and capabilities between providers and some lack economies of scale-scope to be efficient and effective. This is simply a function of having a small industry requiring specialist services provided by a number of government and industry entities, each with their own governance arrangements. The cotton research model already implements many of the obvious things that can be done to improve efficiency. Core capabilities are clustered in Brisbane, Toowoomba, Narrabri and Black Mountain allowing infrastructure to be shared, staff to be co-located and cross partner programs to be delivered. Future opportunities may lie around shared administrative services between Network members and greater collaboration with other sectors. For cotton this means collaboration with the other sector and cross sector RD&E strategies, particularly in grains, water use, soils and plant biosecurity.

The cotton research model is exposed to considerable risk from variable income. CRDC, Cotton Australia, CSD, CSIRO and CBA, are all reliant on industry for a significant proportion of their revenue. As the industry expands and contracts with seasonal and market conditions, so does their revenue. Last decade's extended drought was so severe that research services were reduced, non-core capabilities shed, and organisations themselves faced considerable viability challenges. Fortunately the subsequent boom years have allowed the reserves to be replenished. But the low income years will return.

Finally the cotton research model has a unique feature, the industry owned seed company CSD. Through careful stewardship by the Australian cotton industry CSD receives a significant proportion of the returns from GM cotton seeds for future industry development. CSD has a long-standing breeding joint venture with CSIRO, Cotton Breeding Australia, to develop new varieties. In 2012 CSD partnered with CRDC and Cotton Australia to invest in the CottonInfo Team to reinvigorate cotton extension. There is scope for CSD to expand its role in cotton research, while recognising that this is only one of several options it can pursue.

It is clear from recent developments that government is looking to continue its long-term partnership with rural industries as one of the national economic pillars. They are also looking for different ways to partner with rural industries. The Minister for Agriculture is developing a white paper on agricultural competitiveness by the end of the year. The 2014 Commonwealth budget has made additional funds available for rural research but is requiring RDCs to pay industry's membership costs to international commodity organisations. The additional funds will be provided through competitively selected grants to

collaborative initiatives rather than individual industries. The Queensland government has set a goal of doubling agricultural production to align its services and partnerships. While the NSW DPI has sought to secure core capabilities and reinvigorate its research agenda to drive productivity and market development. CSIRO is currently restructuring to increase its level of innovation while retaining its strong industry focus. All these changes are happening in an environment of tight fiscal constraint.

It is also clear that the market-consumer-society research agenda is just as, if not more important to the cotton industry than the on-farm research agenda. Product and market development features strongly in the new CRDC and Cotton Australia strategies released in 2013 and are an important consideration in CSIRO and CSD strategies currently being formulated. This is not an area where existing cotton providers hold all the required capability. Therefore new capabilities, providers and partnerships will need to be introduced into the research model. In the short-run increasing post-farm gate investment will impact on farm research and capability. In the long-run it may lead to new sources of finance and provide additional on-farm research knowledge/capabilities, such as infomatics and robotics.

Overall industry and research leaders are reasonably *aware* of the opportunities and challenges associated with the drivers discussed above and summarised in Table 1 below. The leaders are not as sure that the industry is properly *prepared* to respond to some or all of them.

The Cotton Innovation Network was established to improve coordination in the cotton research model so that the industry is prepared and can respond. While there is no immediate crisis the model will need to adapt - significantly and probably sooner rather than later.

Table 1 **Key cotton industry and research drivers**

Cotton markets	Cotton production	Cotton research model
	Increasing expectations driver	
▪ Functionality central to cotton as fibre and product of choice ▪ Quality and ethical certification condition of entry	▪ Generating enough wealth to attract people and capital ▪ Continually improving environmental stewardship	▪ Research asked to address more and more problems ▪ Industry to fund increasing proportion of research
	Ability to grow driver	
▪ Emulating functionality of synthetics ▪ Potential to provide more high quality cotton	▪ Maintaining comparative advantage over other crops ▪ Attracting investment to expand growing regions	▪ Public funding increasingly contested and contingent ▪ Significant capacity to develop new partnerships
	Managing variability driver	
▪ Cotton price fluctuations ▪ Demand subject to fashion if cotton narrows to an “authentic” fibre niche	▪ Climate variability and biosecurity risk ▪ Adapting to higher variability and uncertainty	▪ Core revenue streams vary with industry revenues ▪ Key public roles uncertain through long reform process
	Getting more from less driver	
▪ Improved quality and ethical assurances increase costs and don’t influence the price of high quality cotton	▪ Less resource access and increasing competition ▪ Maintaining yield growth and limiting input cost increases	▪ Demand to generate internal and collaboration efficiencies ▪ New methods, disciplines & partners lifts performance

Source: ACIL Allen analysis of cotton industry sources, 2014

1.4 Cotton RD&E Strategy and the Cotton Innovation Network

The Cotton Innovation Network started in early 2012 to implement the Cotton Sector RD&E Strategy, developed the year before, through better coordination of four key functions:

- coordinating strategy and investment across cotton and with other sectors
- facilitating sound, coordinated research pathways to achieve the cotton RD&E priorities
- coordinating development and delivery (i.e. extension) of research to industry
- ensuring the required capability is maintained and developed

The Cotton Innovation Network approaches coordination from a strategic-oversight rather than operational perspective in line with the National Primary Industry RD&E Framework principles.

Implementation progress

The Cotton Innovation Network has focused on coordinating the strategy-investment and research pathways functions in its first two and half years of operation.

During that time all of the Network members have or are close to completing new strategic plans related to cotton research. The Network embarked on a program of mapping current research investment and determining future research requirements (pathways) to support members to develop their new strategies and align them with the Cotton Sector RD&E strategy (Attachment F). The program has also deepened members understanding of what each organisation contributes and how the cotton research model operates.

The Network has become a channel for members and other research organisations to raise challenges and promote opportunities for improved R&D coordination. The presence of the channel and wider communication of the Network's analysis will help researchers to understand how their work fits into the research model and industry priorities, leading to better results for cotton growers.

The Network has begun the process of linking to other national sector and cross sector RD&E strategies. Initial activities have focussed on building relationships and understanding through establishing contact, participating in other strategies' planning activities and attending NPIRDE Framework forums. It is apparent that co-investment, resource sharing and joint delivery will be between research and industry organisations, given the bodies implementing the strategies (e.g. Cotton Innovation Network) are not legal entities with resources. In addition strategies are at different stages of development. Sectoral strategies (e.g. grains) are more advanced and have higher levels of support than the cross sectoral strategies (e.g. water use and soils) which influences their willingness and ability to collaborate with the Cotton Sector RD&E Strategy. None the less cotton is well positioned to link given the Cotton Sector RD&E Strategy is being implemented, the Network is supported and the members are implementing new strategies.

The Cotton Innovation Network could start considering whether links to other organisations are needed. The importance and expansion of the post-farm gate research agenda means that new capabilities outside of the Network will be needed. This creates opportunities for refining procurement (e.g. CRDC's project selection process) and establishing new joint ventures.

At the same time Network membership could be expanded to private companies. This is particularly pertinent given the increasing importance of private investment and capabilities

to cotton research. An obvious example is exploring whether Monsanto or Bayer should be members given their importance to GM cotton and broader research capabilities.

Coordinating the development and delivery (i.e. extension) function became a lower strategic priority once the Network was established. When the strategy was written, cotton extension had declined as the industry concentrated around core research capabilities during the drought. There was also concern that extension would decline further once the third Cotton CRC ended in 2012. However the CottonInfo joint venture between CRDC, Cotton Australia and CSD was established just as the Network commenced. Therefore the Network continues to liaise with the joint venture's governance structure but there is no need for active involvement at present.

Coordinating capability management was and remains a critical issue for the Network and its members. CRDC, Cotton Australia and CSD have increased their capability in response to expanding operations and revenues. NSW DPI, QDAFF and CSIRO have and continue to face budgetary contractions and restructures which challenge their ability to sustain cotton research capability. The Network's capability coordination efforts have focused on creating and strengthening its role as a channel for members to raise concerns and identify opportunities relating to capabilities.

A key lesson from developing the Cotton Strategy was that the priorities and investment information available were too coarse to develop a shared and useful capability management framework for cotton research. The subsequent work of mapping current investments at a project level and determining future research pathways provides the required granularity. This can be used to design a more targeted capability audit from which a framework can be designed.

Overall the Cotton Innovation Network has been active and made considerable progress in the strategy-investment and research pathways strategic coordination functions. This foundational work has created the platform to start increasing strategic coordination of capability management. The key challenge of reinvigorating development and delivery was addressed prior to commencement and is a lower priority. The initial set of performance measures for monitoring and reviewing the Cotton Sector RD&E strategy have been mostly achieved (Table 2) and need to be updated.

Table 2 **Cotton Sector RD&E strategy critical success factors and KPIs**

Critical success factor	Key performance indicator	Assessment
PISC agencies commit to the Strategy	Sign-off by PISC agencies	100% sign-off
	PISC accepts Strategy	PISC accepted strategy
Formation of Cotton Innovation Network	Agencies agree to terms of reference	Terms of reference agreed (2012) and reviewed (2013)
Network functions effectively	Members actively participate and support Network	All members have a nominated representative High (but not 100%) meeting attendance Members support Network
	Cotton RD&E improves	Improved member coordination Key strategic challenges not fully resolved Impact framework to be developed
	Members value Network	Members agree Network should continue and see potential for greater value in the future

Source: Cotton Sector RD&E Strategy, 2010 and Cotton Innovation Network minutes

1.5 Future assumptions and options

The Cotton Sector RD&E Strategy and Cotton Innovation Network is predicated on a series of assumptions that shape how the cotton research model should evolve. They include:

- there is on-going growing demand for Australian cotton
- the cotton industry is commercially viable and can manage variability into the future
- the cotton industry retains resource access and social licence
- productivity gains in cotton production and research will offset rising input costs and/or static prices/revenues
- on-farm research will develop industry at similar or greater rates than in the past
- post-farm gate research will develop the industry at a greater rate than in the past
- the research model will continue as an incremental evolution of its current form
- all current public and private organisations will continue to invest in and deliver research
- current levels of public research investment will be sustained
- industry can replace public investment
- cotton can attract and sustain the required research capabilities and critical mass
- collaboration with other sectors and overseas researchers is effective and efficient

It is highly unlikely all these assumptions will hold to 2029, the planning horizon for the industry vision and Cotton RD&E sector strategy. It is also uncertain as to if, when, how and to what degree these assumptions might change.

The cotton industry is well positioned to deal with the risks and realise opportunities arising from changes to these assumptions. The clear set of research priorities and pathways, long-term partners, significant capability and access to both public and private funds that make up the cotton research model are central to this.

The challenge for the Cotton Innovation Network, member organisations and senior industry and research leaders is to evolve the cotton research model so that it is prepared for the future. To that end the Cotton Strategy Forum explored three questions to design options which the Network can scope and potentially implement in the cotton research model.

Question 1: What should be added to the research pathways?

In order to provide a clear outline on the **types of RD&E, capabilities and outcomes** required to deliver on the national RD&E priorities that will ultimately improve the profitability, sustainability and competiveness of the Australian cotton industry?

Question 2: What new programs should be created?

That will ensure an **on-going supply of innovations** that can be **adopted earlier** by industry while improving the **efficiency** of research?

Question 3: How can cotton research model strengthen linkages?

To **gain and sustain access** to knowledge, capabilities and funds that will improve the effectiveness and efficiency of the cotton research model. This may include improving information **sharing**, developing new **partnerships**, changing the way research is **funded** and **allocated** and **combining** groups and organizations to build critical mass and sustain **capability**.

2 Forum Results

2.1 Introduction

The Cotton Strategy Forum will assist in updating the Cotton RD&E Strategy, and will help ensure that the strategy in place is relevant. It will help us determine what we are trying to achieve and the various pathways we can take to achieve it. The four primary objectives for the forum are:

1. Analyse the underlying assumptions of the strategy
2. Update the R&D pathways in terms of how we can achieve priorities and goals
3. Provide innovative thinking about how we can develop new ways of undertaking RD&E to improve the status quo, and do what we are doing more efficiently and effectively
4. Identify any linkages to strengthen our own model, and develop ways our model can be improved

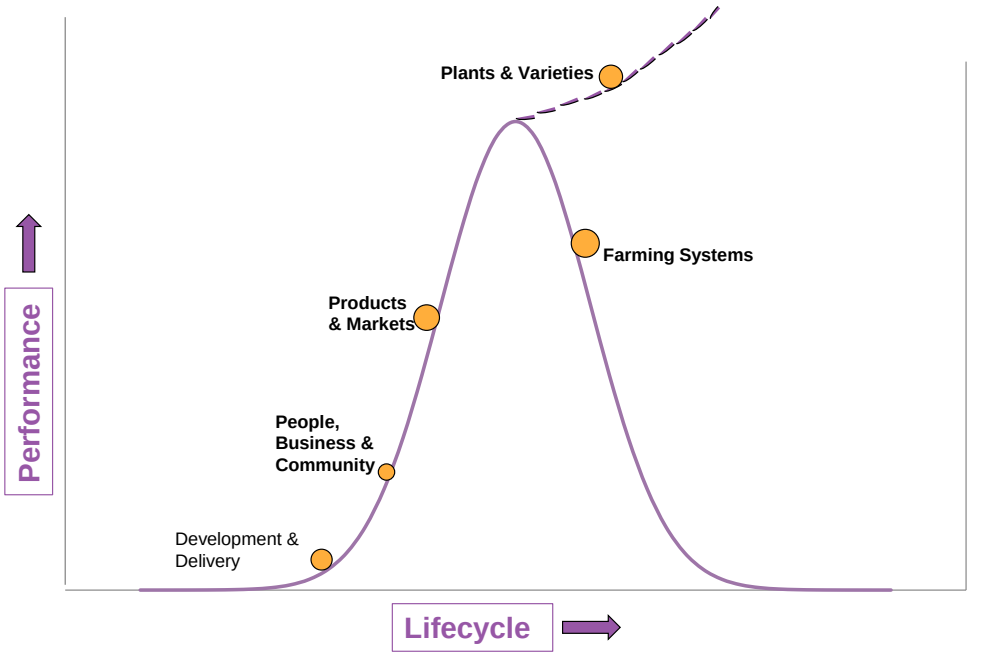
The Cotton Innovation Network has identified that each of the five national research priorities-pathways are at different stages of development (Figure 5). The Forum will place a particular focus on three pathways where there is the greatest need or potential for improvements

— Products and markets – which covers the need to improve off-farm research benefits

— Farming systems – to ensure on-farm research benefits continue rather than decline

— People, business and community – to review in light of the member strategies developed

Figure 4 **Development stage of cotton research priorities-pathways**



Source: Cotton Strategy Forum 2014

2.2 Review of cotton research model assumptions

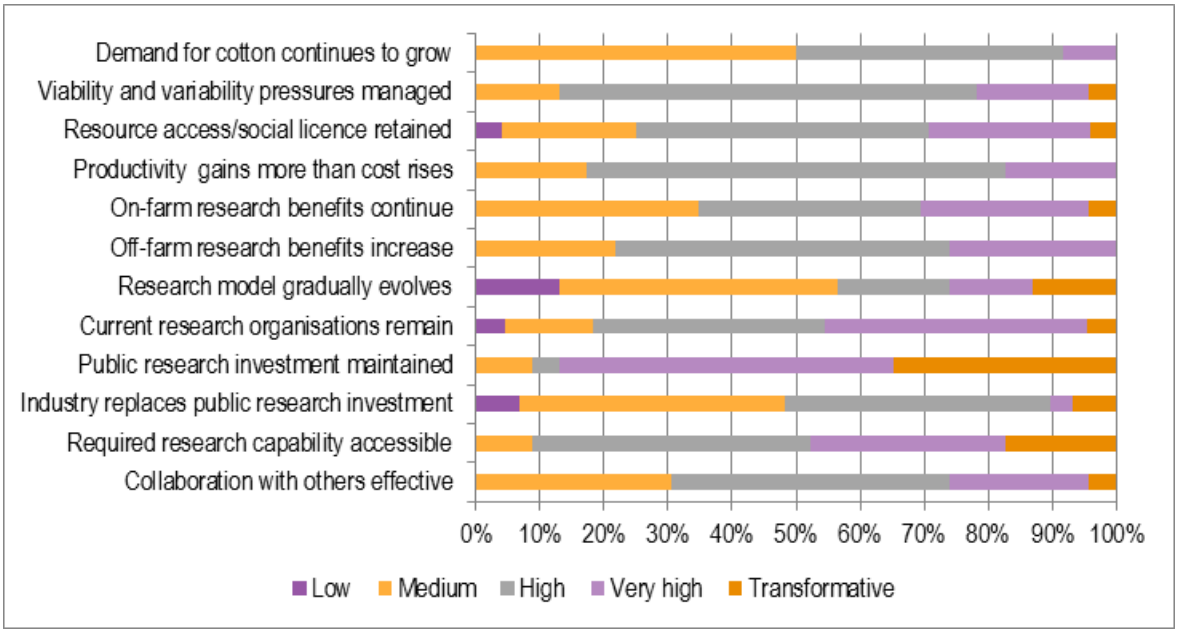
Forum participants individually assessed the impact (likelihood and consequence) of the key assumptions underpinning the current cotton research model not holding in the future (Attachment C). Figure 5 shows the distribution of the scale of impact ratings and Figure 6 (overleaf) shows whether the impact was rated as positive or negative.

More than three quarters of participants rated a decline in key industry drivers – managing variability and viability, resource access, social licence and improving productivity - as having a high to transformative impact. A decline in demand was rated as less significant.

Two thirds of participants rated the impact of lower on-farm research benefits as high or greater. While three quarters rated less impact from off-farm benefits as high or higher. This highlights the importance of both the off and on-farm research agendas. It also recognises industry is looking to post farm gate research for the gains required to develop the industry.

Views were evenly split on whether sustaining an incremental evolution of the research model would have a lower or high impact. Discussion revolved around the risk of disruptive change reducing research performance compared to the risk of the model not adapting sufficiently if and when required. The impact of a decline in public research investment and to a lesser but still important degree public research organisations was rated as significant. The impact of losing research capability and lower collaboration with others was also rated as significant.

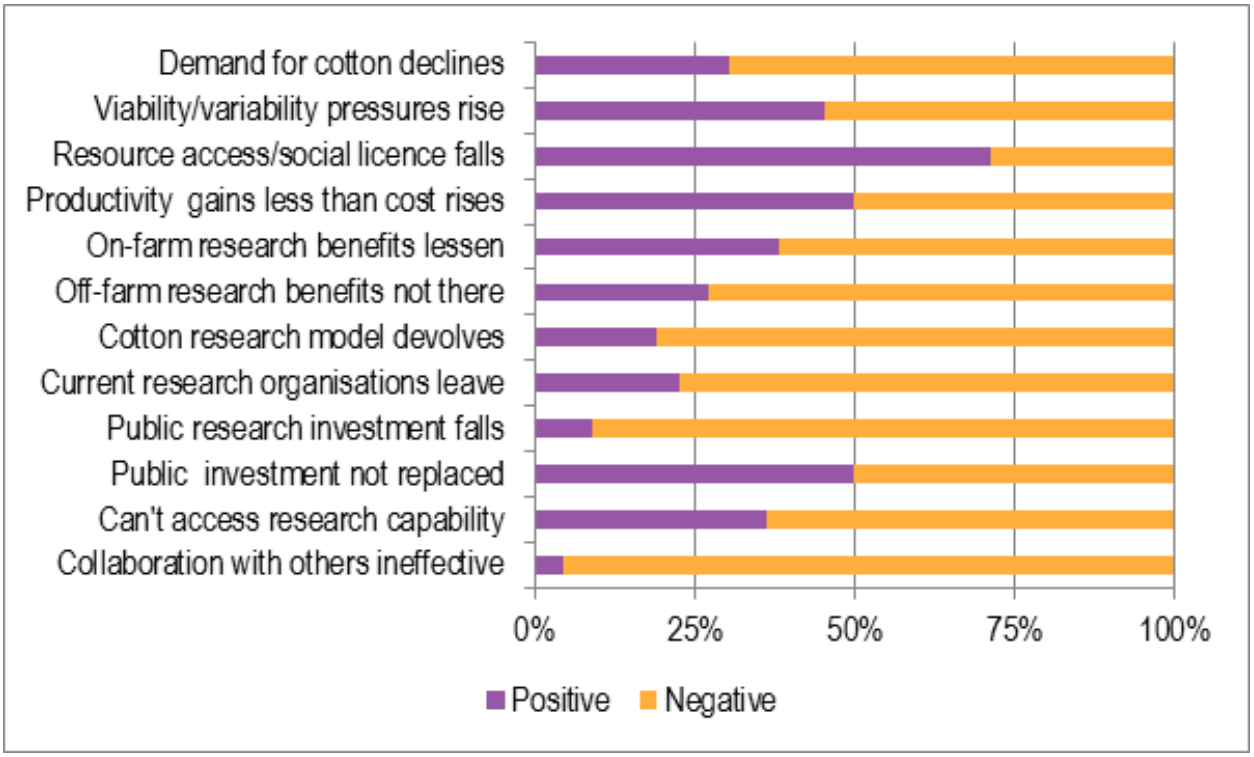
Figure 5 **Impact of assumptions changing on cotton research model and Australian industry (scale)**



Note: The impact ratings are based on likelihood and consequence of each assumption **changing** (i.e. the stated assumption not holding)
Source: Cotton Strategy Forum 2014

A change in nine of the twelve assumptions was rated as having a negative impact by more than 50 per cent of the participants (Figure 6). Participants noted that the impact of many of the assumptions changing could be either positive or negative, depending on what else happened. For example if private investment replaced a decline in public investment, then the impact of the latter would be neutral.

Figure 6 **Impact of assumptions changing on cotton research model and Australian industry (type)**



Note: The assumptions are stated as the opposite of the way they were presented for rating. For example "demand for cotton increases" is stated as the "demand for cotton declines".

Source: Cotton Strategy Forum 2014

The key points arising from the broader discussion of the assumptions were:

- Industry will need to adapt to the key drivers – demand, viability, variability, access and productivity – irrespective of the size of impact or whether it is positive or negative
- Both on and off-farm research is essential to generating benefits to assist industry to adapt to these drivers
- The cotton research model has its origins and strongest capability in on-farm research
- The on-farm research agenda and capability is being challenged by changes in public funding and public institutions. Further decline in public funding and capability will result in lower on-farm benefits unless they are replaced by additional private or public support
- Industry is increasingly looking to off-farm research to generate benefits for the Australian cotton industry. This will require new supply chain and research partners and new research to complement the targeted fibre quality and market assurance programs
- The incremental evolutionary nature of the current model is both a strength and weakness. The key strength is the stability it offers the partners and researchers to pursue the existing research agendas. The key weakness is the risk of focusing on existing partners and research at the expense of other challenges or opportunities

2.3 Improving products/markets research pathway

What should be added to the research pathways?

- Research investment in products and markets is currently focused on where science and technology can address a specific issue (e.g. ginning quality and breeding for fibre quality) or providing an evidence based approach to market requirements (e.g. my BMP and traceability))
- There is the potential to expand research more widely to ensure there is on-going demand and more value is created for the Australian cotton value chain. This includes:
  - More uses for cotton other than the lint (feed, fuel etc.)
  - Improving the functionality of lint as a stand-alone and blended fibre
  - Developing the supply chain to improve Australia's competitive and resilient commercial position – creating a different value mechanism, a product sensitive supply chain
  - Exploring ways to move away from a commodity focus through initiatives such as consumer focus and developing products based on authenticity or functionality
- These areas will require access to a broader set of capabilities such as market intelligence/research, material science (e.g. for new user such as cotton batteries) and how to leverage the value back to Australia

What new programs should be created?

- Developing a deeper understanding of the supply chain to understand what exactly adds value and where opportunities exist to marry what is possible with what's needed
- Focus on developing open and strong relationships to RD&E in China and other manufacturing countries - We need to work closer with customers in the early stages of product development
- Shorter term proof of principles, material science etc.
- Processing research – transformational e.g., ginning and baling in field robotics
- Develop product sensitive supply chain – targeted initiatives based on the previous programs

How can cotton research model strengthen linkages?

- We need to create a value proposition for Australian partners, and make ourselves more internationally attractive – leverage is critical
- The current research model doesn't support product and market innovation – the same people therefore come up with the same answers and ways of addressing problems
- There needs to be the formation of a leadership team/task force to make it happen => more broadly sourced – public, private organisations in Australia and overseas
- Market research and intelligence needs to be made more accessible by the leadership group, not publicly available - the generation of information sharing
- We need to form more partnerships – *but* be selective with due diligence. We need to do an environmental scan on what other industries might do around partnering and innovation and develop a value proposition for partners to come together and start

Voting Results

- 54 per cent voted that the improvements had the right ambition and right means
- 46 per cent voted that the improvements had the right ambition but unclear means

2.4 Improving people, business and community research pathway

- There is a need for a name change – the wording reflects the priorities of 2010 when consideration was being given to the role of R&D in community development
- New emphasis should be a networked industry rather than an industry network per se - we need to collaborate across the entire supply chain, not just for cotton

Outcome

- R&D to support an industry to have the right people, on the right task, at right time across the whole value chain

Concept

- We must define the industry and workforce capacity
- A networked industry (not industry network) across the whole supply chain => a “CRC” type model, that is collaborative and multi sector
- This needs to be across agriculture and other industries and disciplines, not only cotton
- We need to empower people
- Range of skills/disciplines
- Whole cotton supply chain
- “charette” – engage along the way – we must engage all key players in reviewing a design and redesign based on that assessment for workability (non linear)
- We need to consider:
  - What are the researchable questions?
  - What is the market failure?

Elements

- We need new strategy in terms of objectives, strategies, assessments etc.
- No motherhood statements
- Identify participants, leaders, champions and partnership
- We need workforce connectivity – beneficial interaction, not just structures
- We need to expand network membership, for example, to brand owners
- Leadership development, both inside and outside the industry
- Education strategy - How to be strategic about primary and secondary school, from primary school to university
- Communication – messages, telling the story outwards not just inwards
- Collaboration
- Brand owners, designers – sitting around the decision table
- Supply chain investment into a foundation for future capacity – independence of public funding and smooth funding cycle. For example, medical foundations

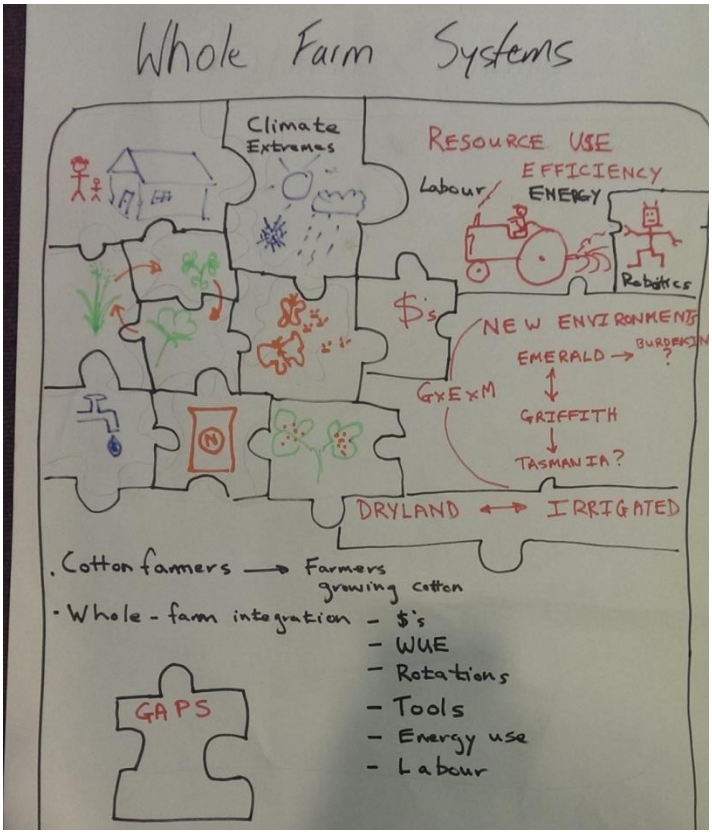
Voting Results

- 62 percent voted that the improvements have the right ambition but unclear means
- 27 per cent voted that the improvement have the right ambition and right means

2.5 Improving farming systems research pathway

— Farming systems research is a puzzle with many parts – the pieces need to be regularly reviewed to focus the farming systems effort

Figure 7 **Farming systems puzzle**



Source: Cotton Innovation Network

— Farming systems research needs to focus on three outcomes
  – Whole farm profitability
  – Farming systems resilience (biologically and economic at paddock to landscape scales)
  – Maintaining research capacity
— This will require an industry led alliance with public and private partnerships to create the structures and investments required to deliver these outcomes. This should include:
  – Faming systems champion(s) required to provide scientific leadership while integration tools will allow researchers to link findings to farming system outcomes
  – Opportunities to work across industries and establish cross industry centres on emergent and shared technologies such as sensing, automation and infomatics
  – A GxExM initiatives for the southern and northern cotton production regions to link farming systems with variety development

Voting Results

— 46 per cent voted that the improvements have the right ambition but unclear means
— 33 per cent voted that the improvements have the right ambition and right means

2.6 Closing panel discussion

- Off-farm research
  - Industry and the Cotton Innovation Network are increasingly looking to off farm research to generate the benefits requirement to sustain and develop the industry
  - This will require new capabilities and partners in the cotton supply chain, other industries and global research sector
  - Australia must be proactive to realise opportunities – but who will lead and is there a role to extend membership of the Cotton Innovation Network?
- Transformative research
  - Is important to future success but won't be realised unless we identify and try new ideas from existing researchers and new researchers and capabilities
  - Responsibility to focus on transformative opportunities needs to be recognised and taken by producers, researchers, managers, board and the organisations in the cotton research model – the issue is both cultural and institutional
- Current cotton research model
  - The model is effective and has strong capabilities and significant potential to evolve so that it continues to be relevant and add value to the industry
  - Recognising the model assumptions and constraints partners have is critical to future adaptation.
  - Both private and public investments are important. The former will become more so
  - A critical issue is the reluctance of organisations to employ researchers – even when funds and infrastructure are available
  - We need to make the system work regardless of bureaucratic agencies – refining what is already a good system
  - Up until now we haven't been constrained – we recognise now new challenges and need to respond in new ways
- Cotton Innovation Network
  - 87 per cent of participants voted that the Network has a useful function and the remaining 13 per cent were not sure
  - 29 percent voted that the Network is already influencing their work and a further 59 per cent voted that it would in the future
  - Members discussed how the Network and cotton RD&E strategy are critical to sustaining their organisation's commitment to cotton research
  - The Network's approach of open dialogue between members and events such as the Forum were seen as important to the efficient operation of the current model and strengthening readiness for future change
  - Participants challenged the Network members as to how they could be more proactive to address the challenges and opportunities discussed at the forum
    - I've learnt that whatever the industry is faced with, the organisation is so strong, we can deal with whatever comes our way.
    - If it wasn't for the sustained commitment from members, cuts would have had a substantive effect
    - Everyone is adjusting and aligning – it's difficult to see what action is giving us what result

Attachment A Cotton Strategy Forum Agenda

Timing	Item
Introduction	
08:30 – 09:00	Welcome and purpose
	Workshop process
	Questions on what people know and the effectiveness of th forum discussion paper and Network communications/awareness
Discovery	
09:00 – 10:30	Team based discovery exercise ▪ Have 3 teams (one for each the 3 key priority-pathways) ▪ Teams travel (as groups and/or pairs) around a series of kiosks manned by Members to answer a set of questions ◆ Question 1: What should be added to each pathway? ◆ Question 2: What new programs should be created? ◆ Question 3: How can the cotton research model strengthen linkages?
10:30 – 11:00	Morning tea
Design	
11:00 - 12:30	Each team designs ▪ Critical improvements to their priority-pathway (Q1) ▪ 1-2 programs (new or enhanced) (Q2) ▪ Improvements to the model (Q3) ▪ Members who manned kiosks join one of the teams
12:30 – 13:30	Lunch
Reflection	
13:30 – 14:30	Team presentations with voting on multiple criteria ▪ Horizon rating (1-3) – time to action/benefit ▪ Strategy alignment ▪ Benefit ▪ Risk/feasibility ▪ Linkages
14:30 – 15:00	Plenary session with Network members ▪ Members reflect on presentation ▪ Q&A from the floor Synthesis and next steps

Attachment B Cotton Strategy Forum Invitees

Invitees	Organisation
Attending	
Juanita Hamparsum	Cotton Innovation Network
Bruce Finney	Cotton Research and Development Corporation
Steve Ainsworth	Cotton Seed Distributors
John Manners	CSIRO
Garry Fullelove	Queensland Department of Agriculture Fisheries and Forestry
Peter Ottesen	Commonwealth Department of Agriculture
Mary Corbett	Cotton Research and Development Corporation
Ian Taylor	Cotton Research and Development Corporation
Warwick Waters	Cotton Research and Development Corporation
Peter Graham	Cotton Seed Distributors
Graham Bonnett	CSIRO
Allan Green	CSIRO
Lewis Wilson	CSIRO
Alison Bowman	NSW Department of Primary Industries
Rod Jackson	NSW Department of Primary Industries
Mark Hickman	Queensland Department of Agriculture Fisheries and Forestry
Linda Smith	Queensland Department of Agriculture Fisheries and Forestry
Les Copeland	Australian Council of Deans of Agriculture
Jim Pratley	Australian Council of Deans of Agriculture
Steven Raine	University of Southern Queensland
Graham Hammer	University of Queensland
John Cameron	Farm Advisory Panel Chair
Barb Grey	People Advisory Panel Chair
Guy Roth	National Water RD&E Strategy
Coralie Merrick	ACIL Allen Consulting
Jan Paul Van Moort	ACIL Allen Consulting
Apologies	
Michael Bullen	NSW Department of Primary Industries
Greg Kauter	Cotton Australia
James Quinn	Cotton Seed Distributors
Guy McMullen	NSW Department of Primary Industries
Emma Colson	Queensland Department of Agriculture Fisheries and Forestry
Adam Kay	Cotton Australia, Performance Advisory Panel Chair
Lyndon Mulligan	Cotton Australia
Damien Erbacher	Industry Advisory Panel Chair
Bob Dall'Alba	Customers Advisory Panel Chair
Caroline Wardrop	Dept of Agriculture, Soils RD&E Strategy
Paul Lawrence	Department of Science, Information Technology, Innovation and the Arts
John Harvey	Grains Research and Development Corporation. Grains RD&E Strategy and Climate RD&E Strategy

Attachment C Assumptions qualitative analysis matrix

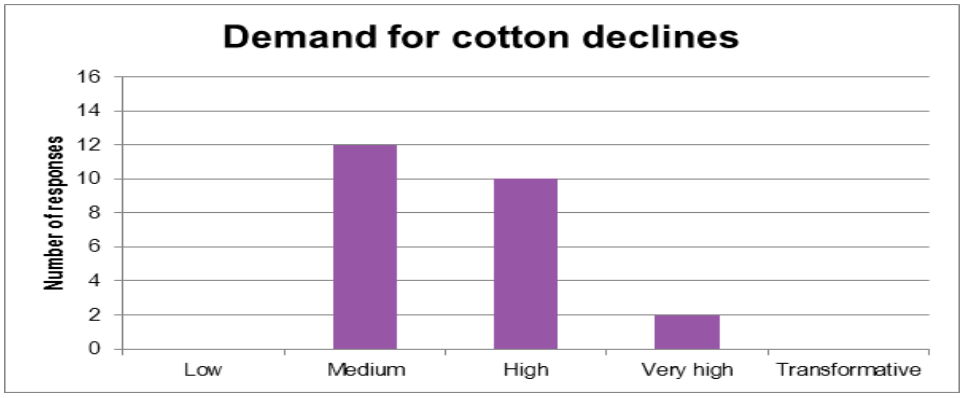
Impact
(how much value will this add or reduce to the cotton industry)

Likelihood (of the assumption continuing – number or cotton RD&E organisations or businesses affected or the number of years before the assumption is no longer valid)	**1.** (minor impact/small change)	**2.** (moderate impact/some change)	**3.** (major impact/very high change)
A – almost certain to hold (few impacted/ over a decade)	Low	Medium	High
B – likely to hold (many impacted/ less than 10 years)	Medium	High	Very high
C – unlikely to hold (nearly everyone/ less than 5 years)	High	Very high	Transformative

Attachment D Cotton Strategy Forum Voting Results

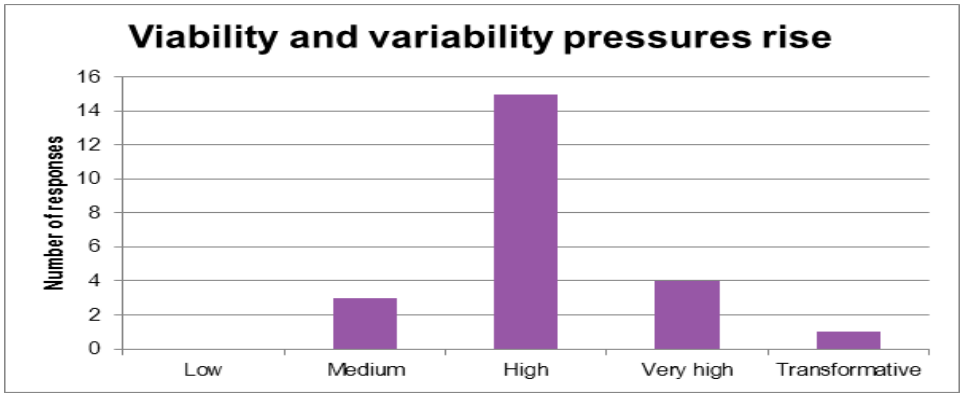
D.1 Assumptions questions

Figure D1 **Impact of the "there is on-going and growing demand for cotton" assumption not holding until 2029**



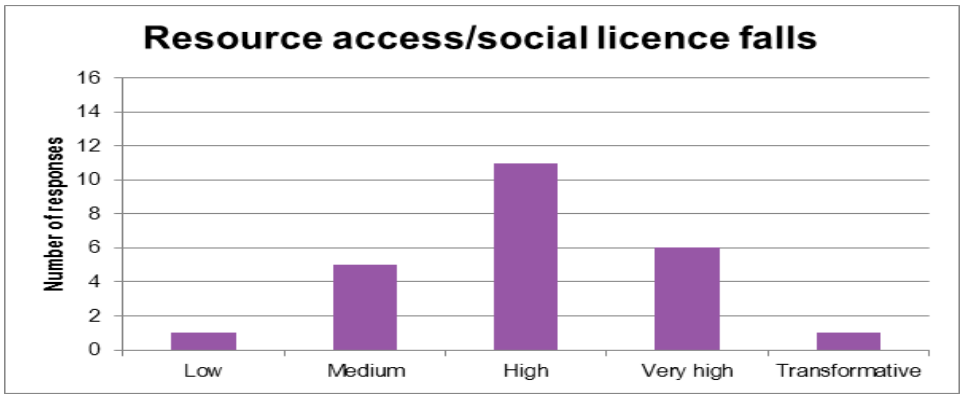
Source: Cotton Strategy Forum 2014

Figure D2 **Impact of the "cotton industry is commercially viable and can manage variability into the future" assumption not holding until 2029**



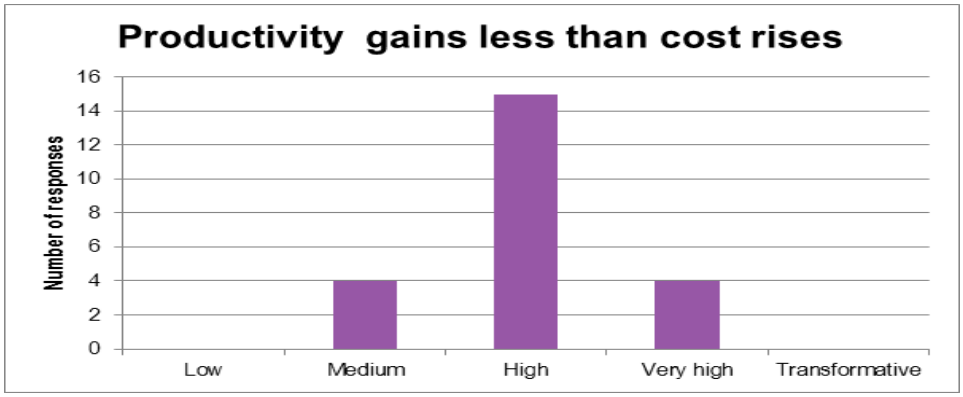
Source: Cotton Strategy Forum 2014

Figure D3 **Impact of the "cotton industry retains resource access and social licence" assumption not holding until 2029**



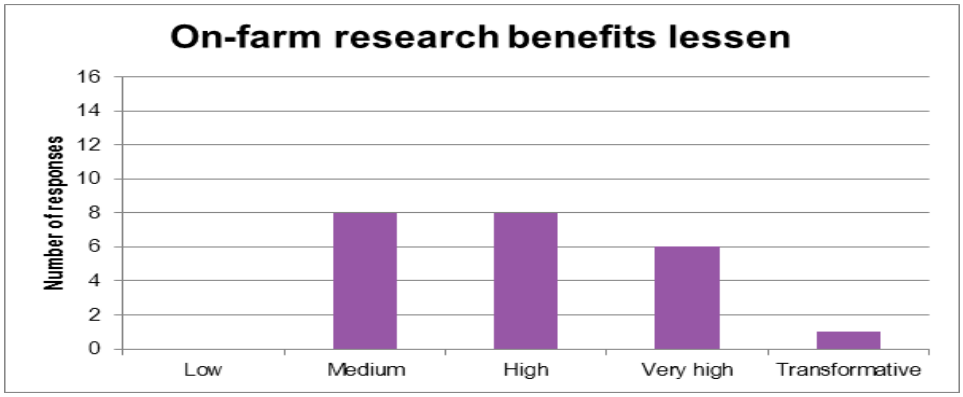
Source: Cotton Strategy Forum 2014

Figure D4 **Impact of the "productivity gains in cotton production and research will offset rising input costs and/or static prices/ revenues" assumption not holding to 2029**



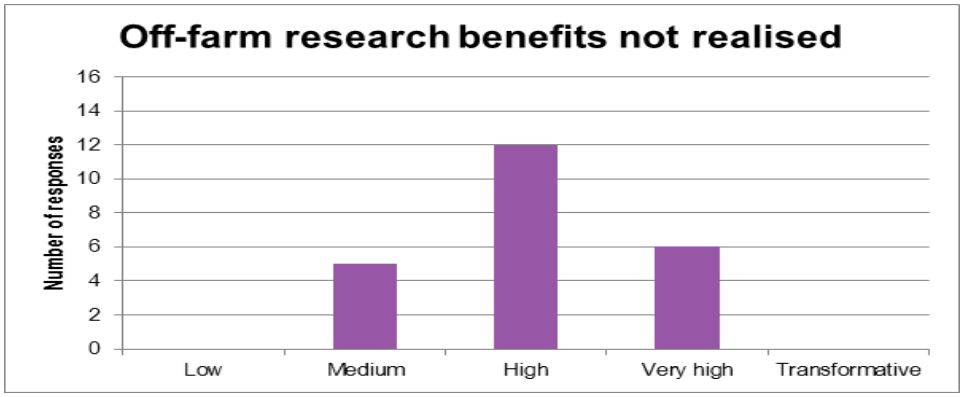
Source: Cotton Strategy Forum 2014

Figure D5 **Impact of the "on-farm research will develop industry at similar or greater rates than in the past" assumption not holding until 2029**



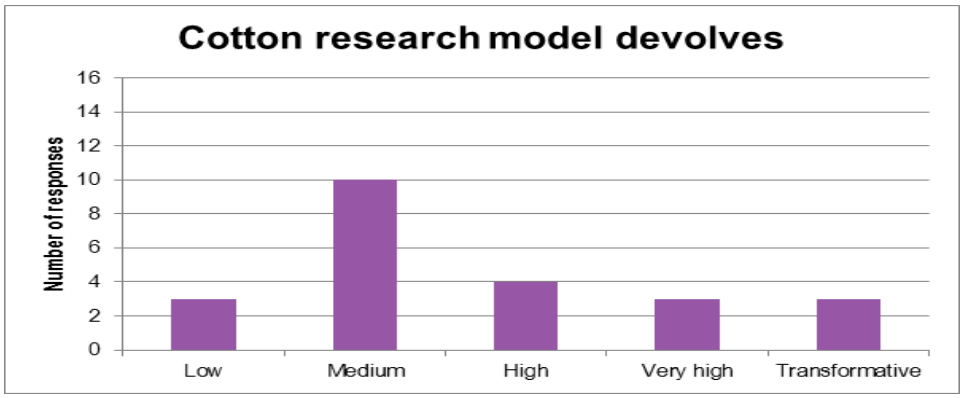
Source: Cotton Strategy Forum 2014

Figure D6 **Impact of the "post-farm gate research will develop the industry at a greater rate than in the past" assumption not holding until 2029**



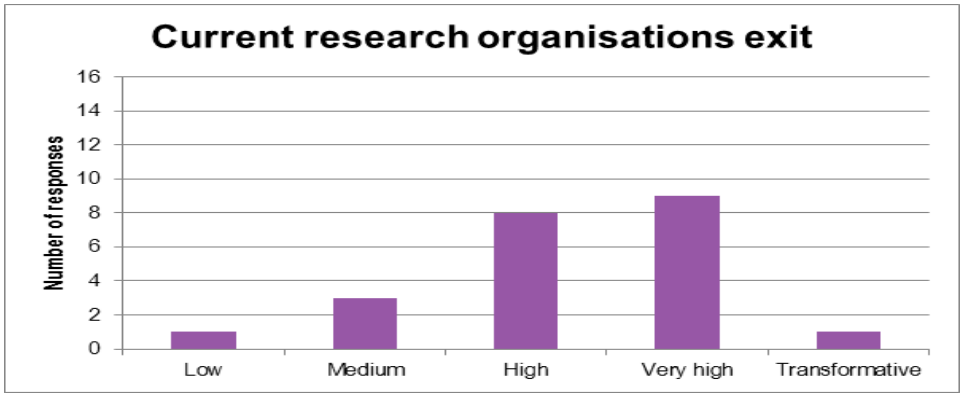
Source: Cotton Strategy Forum 2014

Figure D7 **Impact of the "the research model will continue as an incremental evolution of its current form" assumption not holding until 2029**



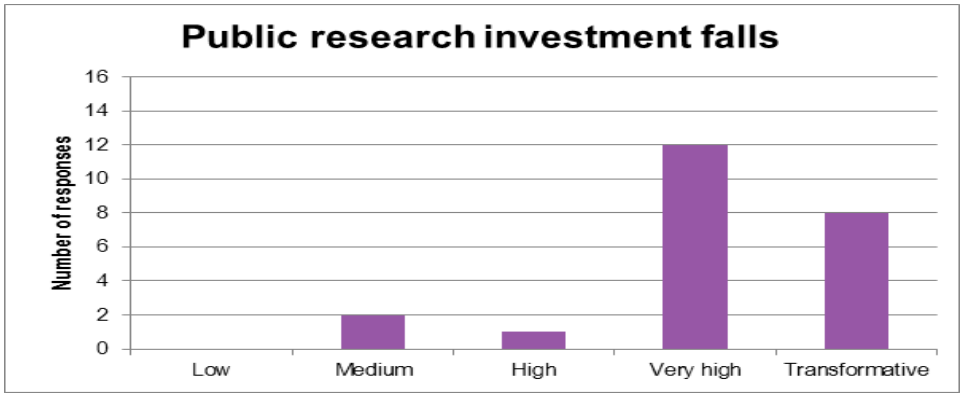
Source: Cotton Strategy Forum 2014

Figure D8 **Impact of the "all current public and private organisations will continue to invest in and deliver research" assumption not holding until 2029**



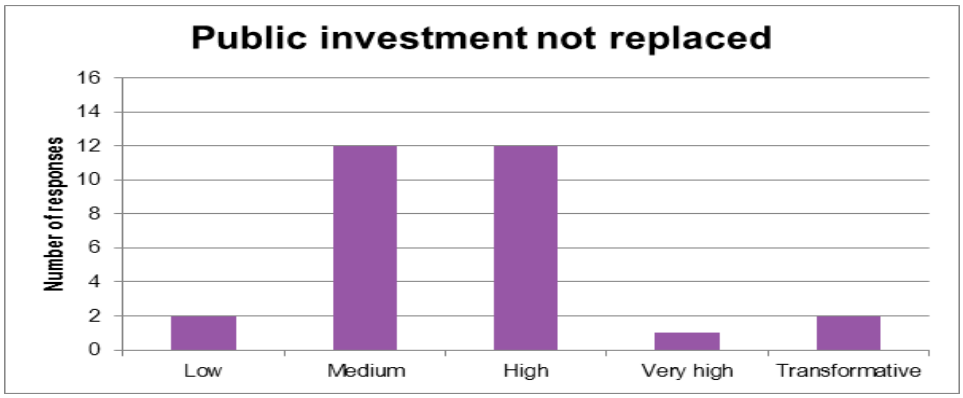
Source: Cotton Strategy Forum 2014

Figure D9 **Impact of the "current levels of public research investment will be sustained" assumption not holding until 2029**



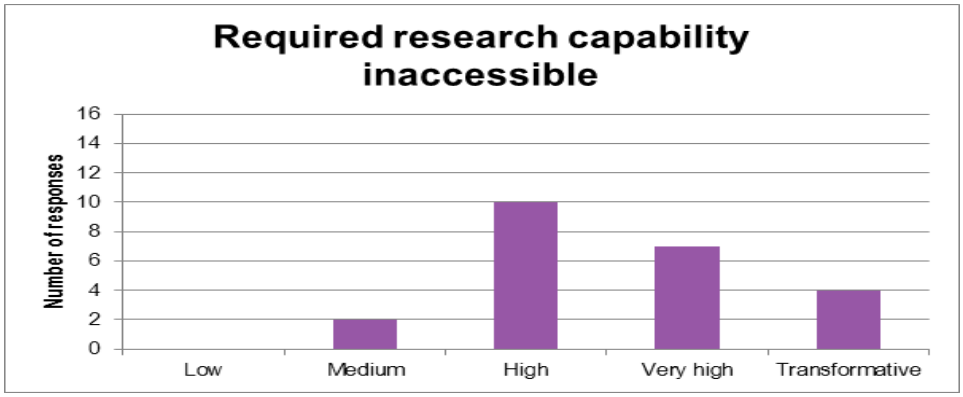
Source: Cotton Strategy Forum 2014

Figure D10 **Impact of the "industry can replace public investment" assumption not holding until 2029**



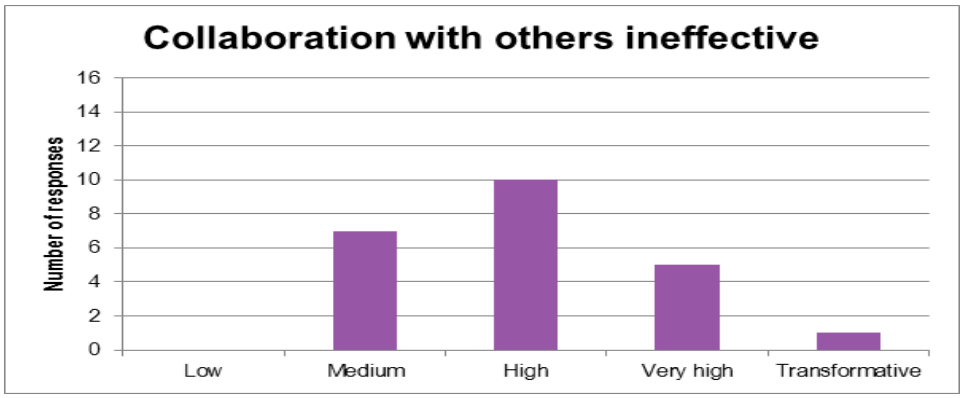
Source: Cotton Strategy Forum 2014

Figure D11 **Impact of the "cotton can attract and sustain the required research capabilities and critical mass" assumption not holding until 2029**



Source: Cotton Strategy Forum 2014

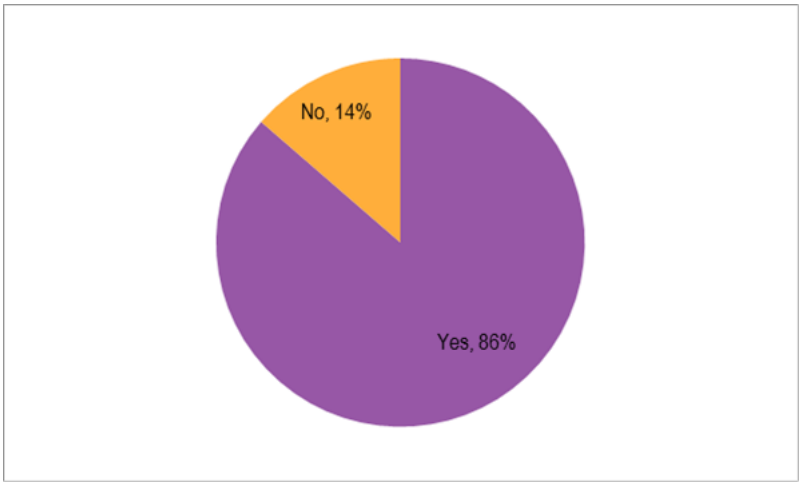
Figure D12 **Impact of the "collaboration with other sectors and overseas researchers is effective and efficient" assumption not holding until 2029**



Source: Cotton Strategy Forum 2014

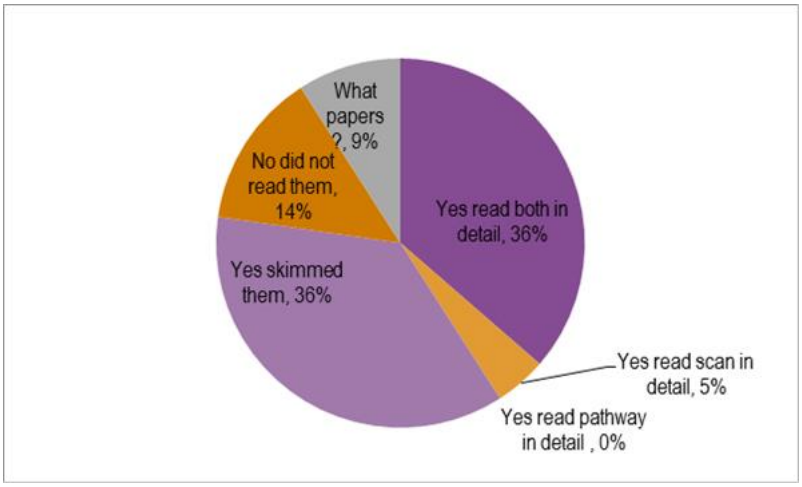
D.2 Cotton Innovation Network awareness questions

Figure D13 **Were you aware of the Cotton Innovation Network before being invited to the Strategy Forum?**



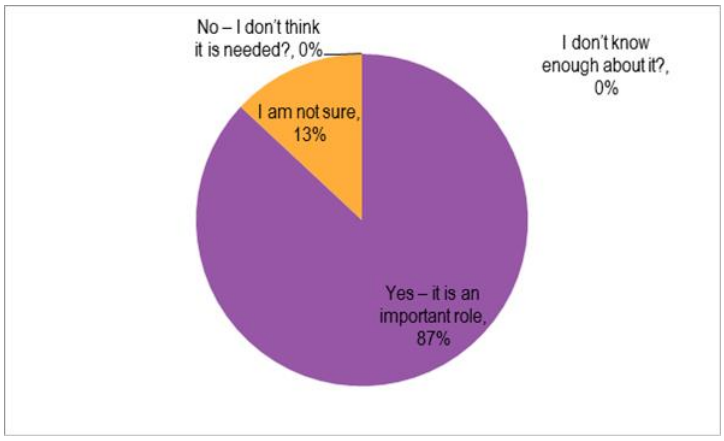
Note: Question asked at the beginning of the Strategy Forum
Source: Cotton Strategy Forum 2014

Figure D14 **Did you read the environmental scan and pathways papers sent on Monday?**



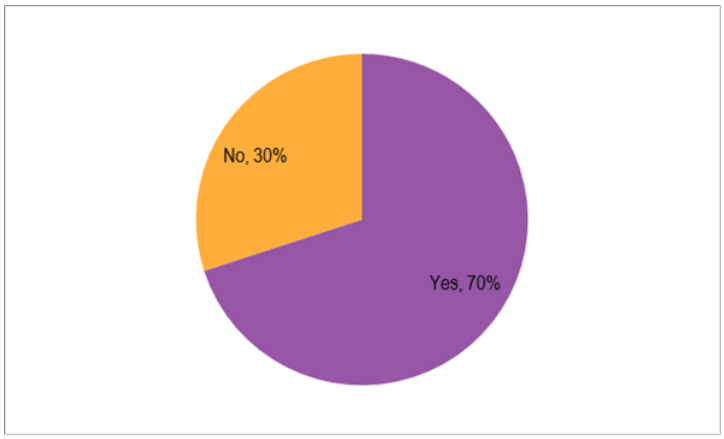
Note: Question asked at the beginning of the Strategy Forum
Source: Cotton Strategy Forum 2014

Figure D15 **Do you think the Cotton Innovation Network plays a useful function?**



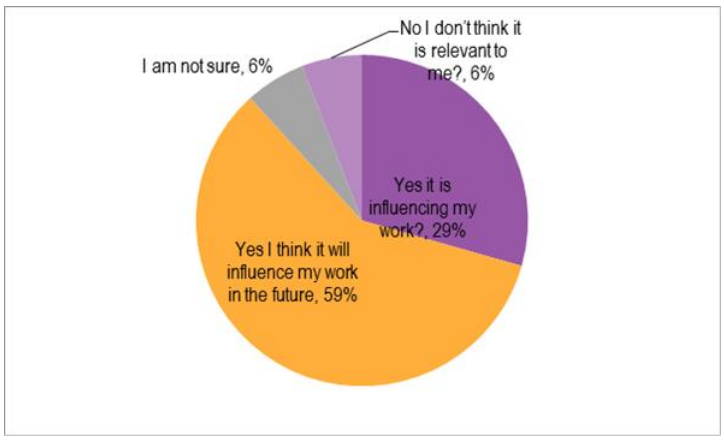
Note: Question asked at the end of the Strategy Forum
Source: Cotton Strategy Forum 2014

Figure D16 **Do you know how to contact the Cotton Innovation Network?**



Note: Question asked at the end of the Strategy Forum
Source: Cotton Strategy Forum 2014

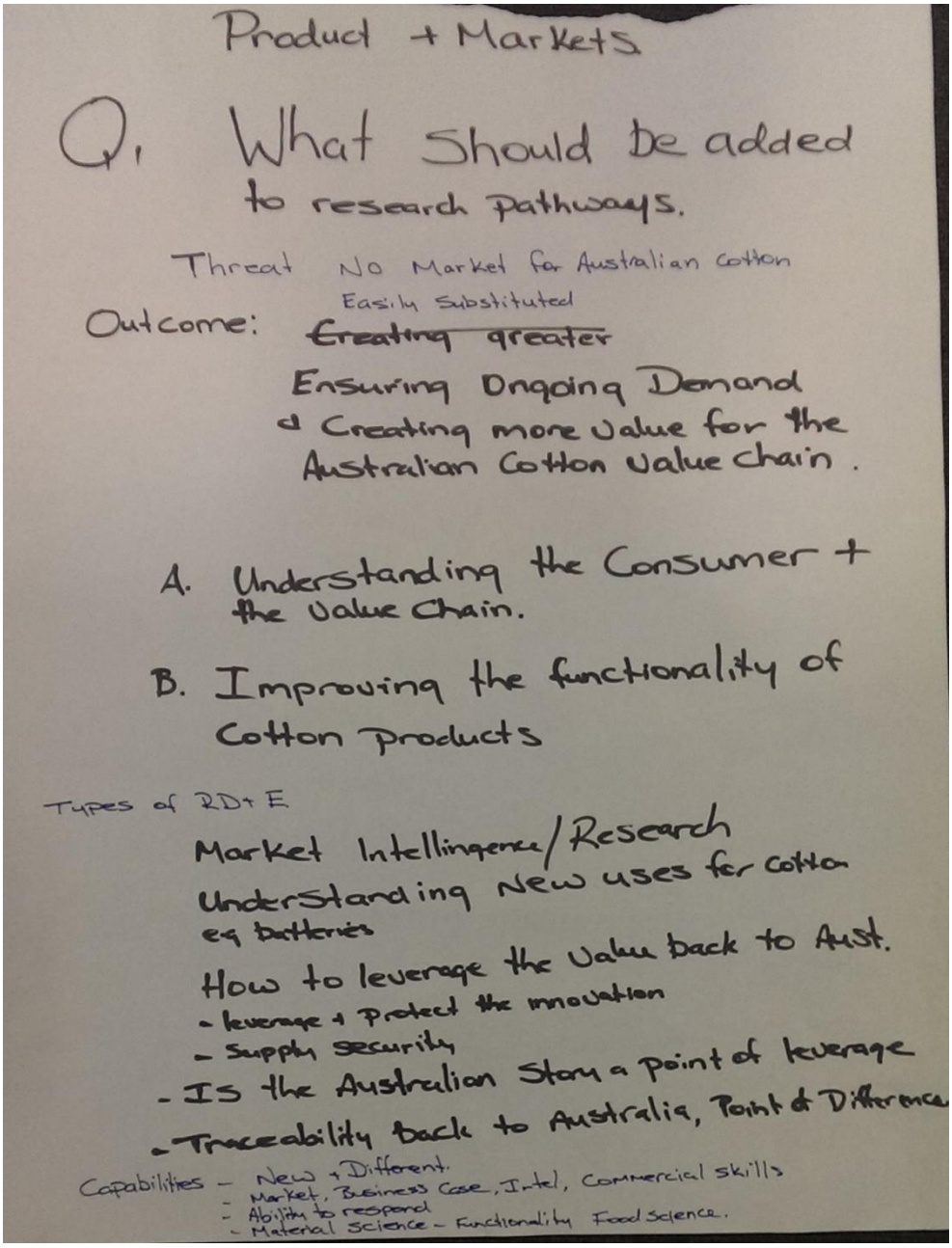
Figure D17 **Do you think the Cotton Innovation Network will have an impact on your work?**



Note: Question asked at the end of the Strategy Forum
Source: Cotton Strategy Forum 2014

Attachment E Cotton Strategy Forum Pathways Presentations

E.1 Products and markets pathway improvements



Product + Markets

Q. What should be added to research pathways.

Threat No Market for Australian Cotton
Easily Substituted

Outcome: ~~Creating greater~~
Ensuring Ongoing Demand
& Creating more Value for the Australian Cotton Value Chain.

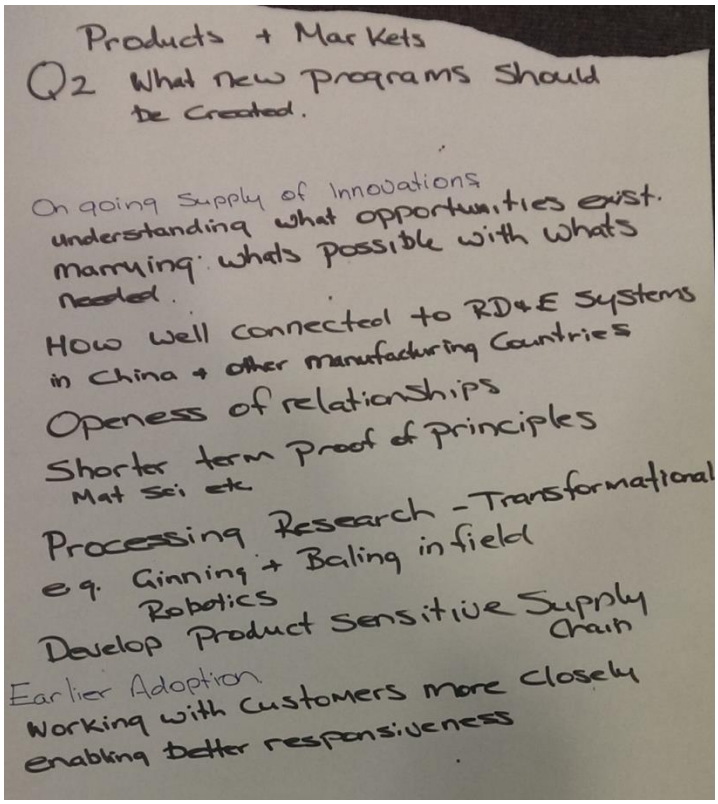
A. Understanding the Consumer + the Value Chain.

B. Improving the functionality of Cotton Products

Types of RD+E

Market Intellingence/Research
Understanding New uses for cotton
eg batteries
How to leverage the Value back to Aust.
- leverage + protect the innovation
- supply security
- Is the Australian Story a point of leverage
- Traceability back to Australia, Point of Difference

Capabilities – New + Different.
- Market, Business Case, Intel, Commercial skills
- Ability to respond
- Material Science – Functionality Food Science.



Products + Markets

Q2 What new programs should be created.

On going supply of innovations
understanding what opportunities exist.
marrying whats possible with whats needed.

How well connected to RD&E systems in China + other manufacturing countries

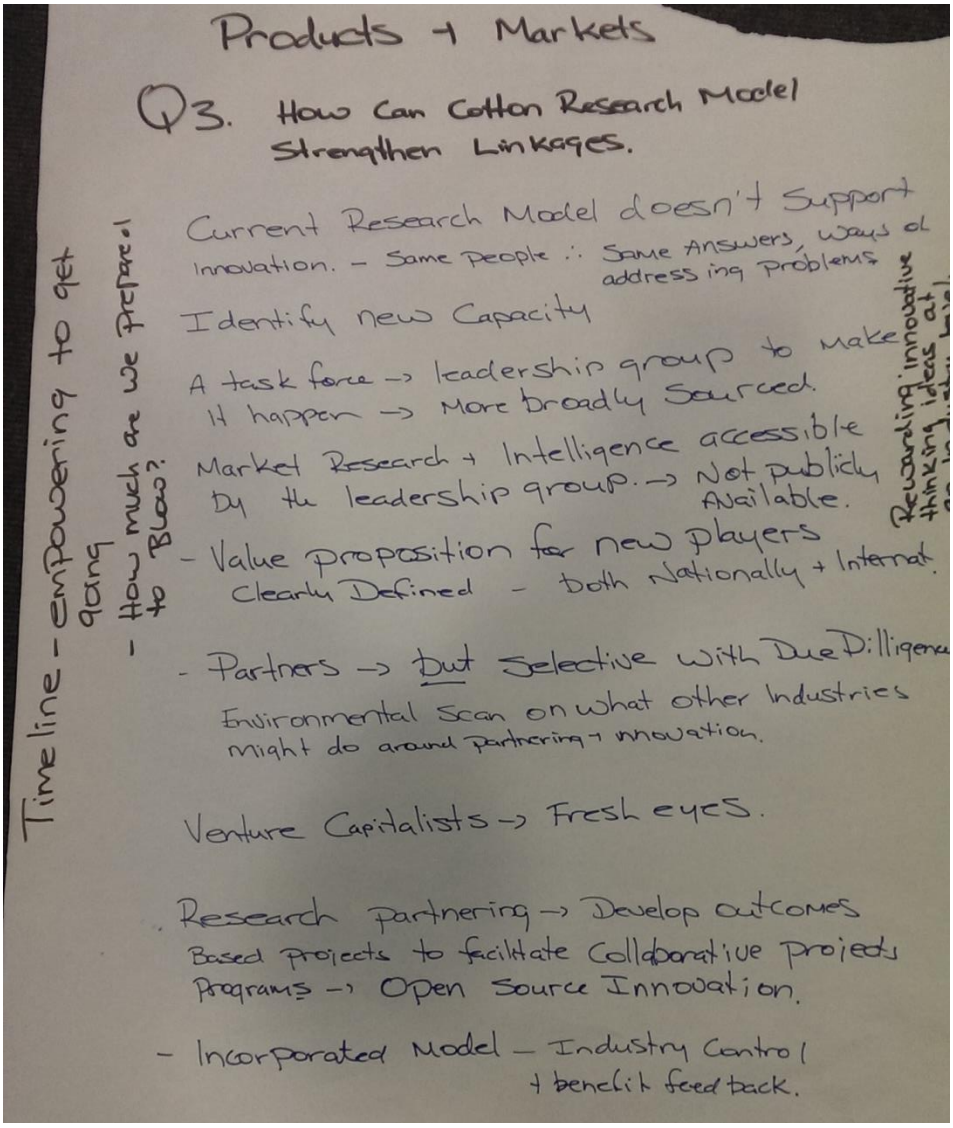
Openess of relationships

Shorter term proof of principles
Mat Sci etc

Processing Research - Transformational
eg. Ginning + Baling in field
Robotics

Develop Product Sensitive Supply Chain

Earlier Adoption
Working with customers more closely
enabling better responsiveness



Products + Markets

Q3. How Can Cotton Research Model Strengthen Linkages.

Current Research Model doesn't support innovation. - Same people ∴ Same Answers, ways of addressing problems

Identify new Capacity

A task force -> leadership group to make it happen -> More broadly Sourced.

Market Research + Intelligence accessible by the leadership group. -> Not publicly Available.

- Value proposition for new players Clearly Defined - both Nationally + Internat.

- Partners -> but Selective with Due Diligence
Environmental Scan on what other Industries might do around partnering + innovation.

Venture Capitalists -> Fresh eyes.

Research partnering -> Develop outcomes Based Projects to facilitate Collaborative Projects
Programs -> Open Source Innovation.

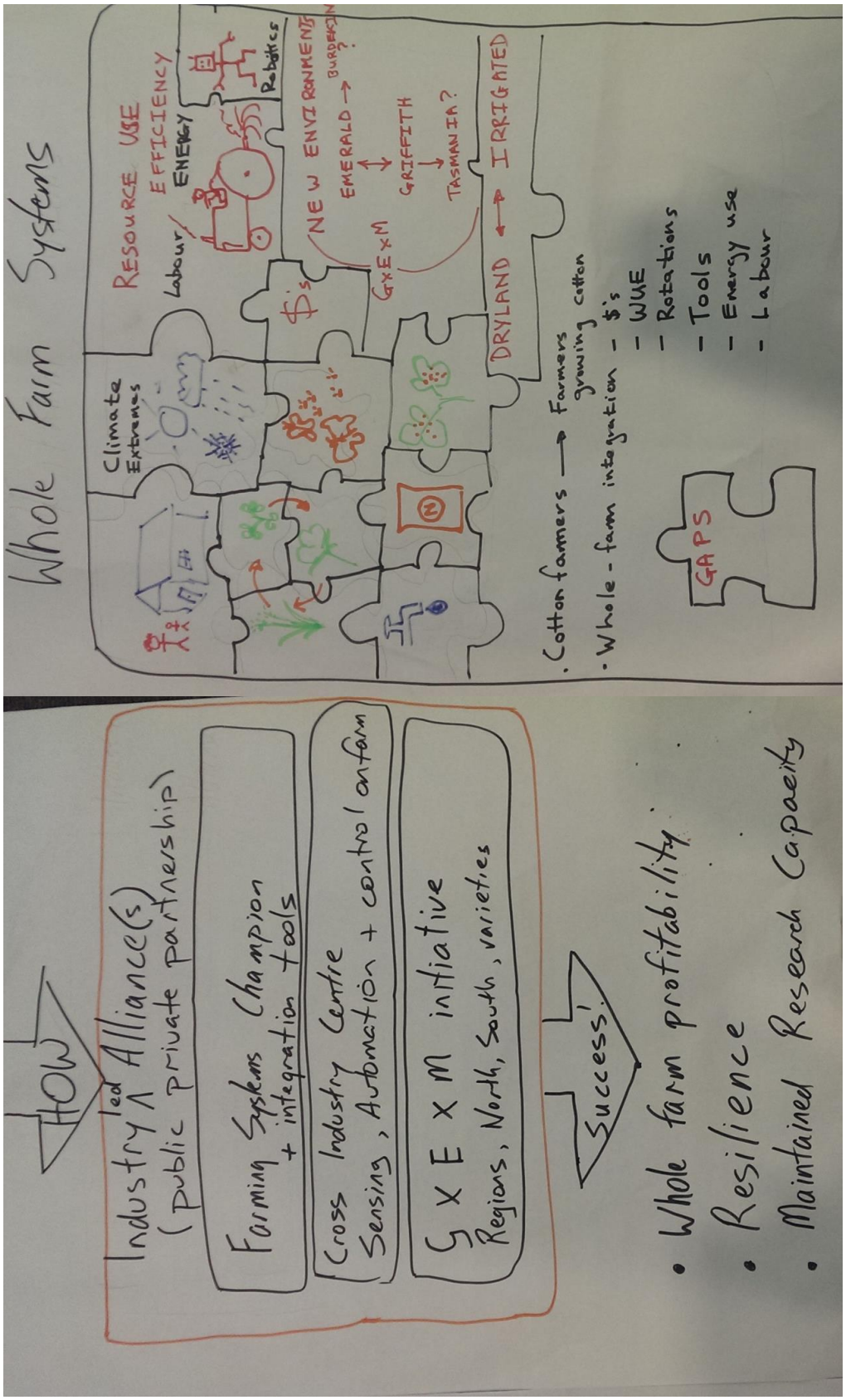
- Incorporated Model - Industry Control + benefit feedback.

Timeline - empowering to get going
- How much are we prepared to Bleed?

Rewarding innovative thinking ideas at

E.2 People pathway improvements

E.3 Farming systems pathway improvement



Attachment F Cotton Research Pathways

Separate attachment