CREATING ECONOMIC GROWTH BY HARNESSING HIDDEN VALUE

FUTURE PATHWAYS CONSULTATION SUBMISSION

BIORESOURCE PROCESSING ALLIANCE

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KEY QUESTION 1: What principles could be used to determine the scope and focus of research Priorities?

- We suggest that the research priorities need to fit into industry business directions and New Zealand's position in the international context, as this could help to shape some of the focus. It is important to prioritise uptake of research outcomes by end users, as this is often more likely to result in economic (and other) benefits to New Zealand. The Bioresource Processing Alliance (BPA) focuses its research on areas identified as priorities *by industry*. These priorities can be challenges industry needs to overcome, or opportunities they would like to leverage. The economic value to New Zealand of these projects is approximately $20m to date and the outcomes from such projects have included:
    - New Zealand King Salmon's OmegaPlus pet food range – developed in order to make use of the company's by-products that were generating little to no value previously
    - A freeze-dried avocado powder made from pomace – created in response to Valic's desire to utilise all of its raw material. Another BPA project is currently looking at products to develop from the avocado skin and stones, which if successful, will make Valic's story a 'whole-of-resource' one
    - Functional foods company Anagenix's Feiolix product, which makes use of secondary stream feijoas – launched with the assistance of science from Callaghan Innovation's researchers, this converts this previously no-value by-product into a high value product for Anagenix and delivers value to the grower as a result
    - A large food processor's highly successful potato mash product – developed using a previously un-utilised stream from the company. This secondary stream has gone from a cost for the company to a valuable money-making product
    - Hemp Farm NZ's collaboration with NZ Yarns – supported with research from AgResearch that identified the optimal harvest time for the hemp to subsequently be used in fabric production. This collaboration between two fibre companies has resulted in the build of a plant to process hemp and wool and has thus opened up new markets for New Zealand products
- We recommend focusing on what New Zealand can do or does do very well and has a natural advantage in, to ensure our taxpayer money is maximised, rather than trying to get in to areas that other countries are dominating and that we can't realistically compete in in terms of expertise and/or budget

- Focus on opportunities that will enable New Zealand to move up the OECD rankings faster. Examples might include:
    - Areas of research in which we have a natural advantage
    - Ones that others can't do also
    - Ones that we have a reputation for
    - Niche areas that others may not be so interested in but are still, nonetheless valuable for New Zealand
- We highly recommend including some priorities that ensure New Zealand can be onshore resilient if there are increasing challenges with shipping to New Zealand. Examples could include:
    - The development of bio-based packaging/plastics that can then be commercialised at scale in New Zealand
    - Reinvigorating forestry processing expertise and associated facilities to produce products at scale rather than send them offshore for further processing
    - Alternative protein research and full-scale production
    - Developing animal feeds to replace imports (the BPA has done and is doing a number of these projects)
- Include ways to get short shelf-life products to offshore markets in sustainable ways so that countries don't exclude New Zealand products because of their carbon footprint. Examples could be:
    - Developing sea-based shipping solutions for live shipment of marine products
    - Extending shelf-life of existing products
    - Focusing on science to develop new shelf-stable products from primary produce rather than have companies focus solely on selling the raw primary product. The BPA does a great deal of this type of work in particular and much of it in response to COVID impacts such as markets being shut down, a lack of staff to pick and process primary produce and shipping challenges. Examples of these types of projects include:
        - Developing fruit-based ingredients and finished products from growing volumes of secondary streams (as a result of increased volumes of the primary product rather than *necessarily* increased wastage)
        - Developing a range of collagen products to deal with by-products that normally would have been sold offshore for little value
        - Developing ingredients and food products out of seafood secondary streams as a result of markets for the primary product being disrupted
        - Creating pharmaceutical products from marine sources as new high value opportunities to add to companies' product ranges and reduce the risk of having only one product in their range

<u>KEY QUESTION 2: A) What principles should guide a national research Priority-setting process?</u>

- We recommend focusing on getting New Zealand to once again being a highly productive nation quickly and efficiently
- A principle of true collaboration across research organisations/science disciplinary areas to bring a best-team approach and maximise taxpayer investment in research. The BPA has a long history of undertaking collaborative projects with the following principles underpinning the collaboration:

    - The research organisations are not 'poaching' other research organisations' clients - if any organisation can deliver a great result for a company, *all* of the BPA parties look good
    - We do not force companies to use a particular research organisation – even if they have the natural expertise in a particular area. We do this to give companies options on who they would like to work with and while using organisations with natural expertise is encouraged and often taken up, it is not a prerequisite for funding
    - The General Manager is independent so is not affiliated with any particular research organisation – companies like this impartiality
- We recommend ensuring that New Zealand research is sustainably funded over the long term so that the organisations are not constantly having to worry about competing for programme funding
- We recommend measuring outcomes of success (via KPIs, effectiveness, reputation and industry uptake). During its time and even long after the original BPA had finished, we were able to measure our effectiveness by keeping close contact with the companies we had worked with. This is especially important given that much research takes years to result in a product *actually* entering a market. This close contact with companies helped with future BPA projects, as we often remain front-of-mind for industry when they need further R&D work done
- Don't shy away from considering a level of failure that we are prepared to accept in our research. A certain degree of failure is acceptable in terms of research outcomes but this should not stop us from taking risks:
    - Some of the original BPA projects did not succeed at the time due to economics not stacking up, the bioresource being too expensive to source, the technology not being worthwhile investing in, etc. In the current BPA, we are constantly revisiting old projects to see if they are now more likely to succeed due to the costs of inputs being more cost effective, new processing technology or new companies now more motivated to commercialise the outcomes
    - Having a deep understanding about the causes of failure is something we regularly reflect on in the BPA. These can include:
        - A change of personnel at a company commercialising the product
        - The lack of resource in a company to commercialise, get in market and then *keep* the product in market
        - The economics not stacking up. We find this out as early as possible by taking a staged approach to our projects so that if something proves uneconomic at one stage, we do not proceed further, or we may change direction or put it on the back-burner in case anything changes to make it worthwhile over time
- We think it is important to consider a broad range of social, environmental *and* economic priorities (for example, mitigating the effects of climate change crosses over all three of these priorities)
- It is crucial to consider retention and attraction of talent and mitigate 'brain drain', in key areas of importance to NZ:
    - The BPA funds internships, Masters projects, PhD projects and sometimes Post Doctoral Fellowships

- We have been particularly aware of providing challenging and interesting projects for talented emerging scientists who in normal circumstances (pre-COVID) may have left New Zealand
- Commit funding to ensure talented staff have a promising career path, with stability

KEY QUESTION 3: How should the strategy for each research priority be set and how do we operationalise and implement them?

- We recommend that you let each research organisation set their own priorities, as they are close enough to their market to understand what research is of importance to end-users, and agreed between them to be aware of others' research and reduce *unhelpful* duplication or competition. This can quickly be operationalised within these organisations using the processes that are already in place in these organisations
- You could also (in addition to the above) separately make calls for proposals periodically in areas the Government thinks are of value or are required. However, we strongly recommend:
  - Making the process for doing this as painless as possible for *everyone*
  - Having a quick turnaround for these rounds, as there is an opportunity cost for parties to submit ideas into rounds and if it takes longer than four or five months, it can be frustrating
  - Look for ways to encourage research organisations to engage with industry on such proposals (such as not expecting companies to write proposals, or alternatively, possibly provide funding for consultant proposal-writers to write proposals in order to expedite such projects – although note that such funding would not be necessary if a proposal is being written by a research organisation itself)
- As mentioned, we recommend working with industry to help articulate research priorities they would find useful. In order to not overwhelm companies, this could be done via existing relationships researchers have with industry or via key connectors who are familiar with industry needs:
  - These connectors should be familiar with a variety of funding mechanisms in order to advise companies on what funds and researchers are best suited to their requirements
  - These connectors should not be *automatically* directing a company down their own organisation's pathway if there are others who are better placed to do the work needed. Despite the loss of potential work, the *right* connectors across organisations will have positive long term benefits as other research organisations reciprocate. Pointing companies in the *right* direction is more likely to deliver the best result rather than simply generating contract research for one research organisation who may not be the most appropriate party to undertake the work
- In terms of operationalising and implementing priorities, we highly recommend doing this in the simplest way possible to limit the bureaucracy and cost. There are already good working examples of how research is conducted and administrated, such as the BPA:
  - This programme is run with a part time General Manager
  - It out-sources administrative services where possible, rather than pay CRI overheads
  - Its governance and management budget is less than 8% of the overall programme budget

- It strives to create a process that is simple, uncomplicated, rapid and low touch for companies and researchers alike. This has excellent outcomes for everyone as evidenced by some quotes below:
  - 'Appreciate the speed of support the BPA has given us'
  - 'No paperwork which is good for us!
  - 'It enabled the company to continue to focus on its existing work. It doesn't make any sense for a company our size to develop expertise in house, it's much better to outsource to CRIs, etc. It's a great model for us! It enabled the business to understand how a partnership might work and understand how far we are away from commercialising. Time and resource required from us was very manageable when working with Plant & Food. Plant & Food is perfect – a really great model!'
  - '...so there are lots of business decisions to be made but we've confirmed that there is a niche in New Zealand and the BPA has been really useful in terms of knowing who to talk to.'
  - 'Excellent to work with, it's been a really good collaboration – I've enjoyed it a lot!'

<u>KEY QUESTION 7: How should we determine what constitutes a core function and how should core functions be funded?</u>

- We consider that as long as key areas of national interest are covered <u>somewhere</u> amongst New Zealand's research organisations, let the research organisations determine their own core functions, as they are set up to work on specific areas they feel fit with their organisation's expertise, equipment, history, etc
  - See earlier comment about allowing non-traditional research organisations to explore overlapping areas with other research organisations if it provides opportunities for companies to use a variety of research organisations if need be. It will also bolster New Zealand's expertise in specific areas, provide a range of career avenues for researchers in New Zealand, provide areas for collaboration and keep the research organisations focused on providing world-leading science
- Core functions could include industry-good research and as such, some funding should be set aside for industry-good research, with clear direction on how this should be used, or have clear KPIs and controls associated with this spending. One of the outputs of this funding would be a boost to the economy, as it would mean that R&D is more effective for industry by reducing R&D costs, bringing more targeted resource into their R&D projects and supporting R&D projects to stay on track and execute
- There could be base funding, core function funding, devolved funding, discretionary funding and contestable funding allocated for each organisation. There could also be a mechanism to support the career development of scientists at different stages

<u>KEY QUESTION 8: Do you think a base grant funding model will improve stability and resilience for research organisations and how should we go about designing and implementing such a funding model?</u>

- A base grant funding model will certainly improve stability but there needs to be accountability for deliverables, via KPIs and measures of success in order to avoid any

research organisations becoming bloated and/or complacent. Research organisations (and companies they work with) need a secure environment to enable good R&D outcomes and base funding will help support this. Fully costed overheads are very expensive for industry and as a result, many companies cannot afford to tap into the very expertise they may need in order to get their R&D done or some companies simply choose to go it alone. This is a shame for New Zealand, as collaborations between industry and researchers has proved to be highly effective (such as is the case in the BPA), so avoiding fully costing overheads in industry projects should be encouraged and overheads, should instead, be base funded. Examples of how the BPA gets high uptake from industry end –users include:

  - Flexible co-funding arrangements depending on a variety of factors (ownership of Intellectual Property - IP, company size, company stage, stage of project)
  - The BPA tends to put more of its funding into projects that are early stage so as to de-risk R&D for companies. By the time the concept is more developed or proven, the companies are more confident to invest more of their funds and ultimately take ownership of commercialising the products/processes
  - Taking a staged approach to projects means companies don't have to spend all of their R&D funding up-front. Projects can therefore go at the pace of the company and its ability to provide co-funding or commercialise outcomes
  - Providing expertise and equipment is highly valuable to companies and sharing the costs with the BPA enables them to minimise their costs at times when they can often least afford it. This can result in their R&D money going further, evidence to then secure investment from others and further use of the science system
  - Having the BPA teams project manage the projects is key, as many companies do not have dedicated people in-house to do this and even if they do, they can often be preoccupied with other work which risks a project falling over

- An institutional base model, rather than a competitive model will be more effective and allow researchers to focus on delivering the research outcomes
- The BPA has four founding Partners (Callaghan, Plant & Food, Scion and AgResearch). The BPA gives each Partner the same baseline budget every year which they put towards research projects they initiate with companies (but not necessarily *always* with companies). On top of this, the BPA has a Discretionary fund that is focused on strategic collaborative projects the Partners can also utilise to deliver *further* outcomes. This Discretionary fund can be used strategically to:
  - Fund large projects which may have wide 'NZ Inc' benefits
  - Fund areas that respond to particular industry or science need
  - To create infrastructure tools or,
  - To fund additional projects with Partners and/or universities.

  This system means the Partners are not competing for one pool of funding, as they have minimum guaranteed funding, it allows researchers to focus on solving science problems that are most relevant to industry partners and encourages collaboration (when a project across multiple Partners is approved, the funding for each Partner comes out of their individual allocation, so there is no concern that other Partners will access another organisation's allocated funds). The Discretionary fund allows the BPA to tackle major issues and addresses science gaps in New Zealand that would not be otherwise easily solved by a single organisation

- The MBIE grants application process for research organisations is a soul-destroying exercise and detracts from the good work the researchers are doing, as it is a distraction. Baseline funding will alleviate much of this issue and thus free up the researchers to focus on their valuable science instead

KEY QUESTION 9: How do we design collaborative, adaptive and agile research institutions that will serve our current and future needs?

- We think the system is working reasonably well as it currently is and collaboration has been increasing over recent years as the research organisations realise there are benefits to working with others. This is also filtering down to companies many of whom are working with a number of research organisations. We would recommend avoiding confusing the industry as much as possible by changing too much of the existing set-up
- We would argue the competition between the organisations is largely productive and creates better value for industry who engage with them, as research organisations can bring in other parties that industry may not be aware of and can help industry navigate the science system
- The Callaghan Innovation philosophy of responding to company-initiated R&D with grant funding only covers the tip of what is needed and many companies do not fit the criteria for funding
- The BPA funding model empowers researchers to engage with industry because they already have funding (via the BPA) that they can then leverage in their interactions with industry. Unlike Callaghan Innovation grant funding in which companies receive the funding and either undertake the R&D themselves or outsource the R&D, BPA funding puts the power in the hands of the researchers to target and support companies to execute on the companies' R&D needs A key advantage of the BPA is that it encourages the use of experienced research scientists and engineers – which can improve outcomes and also lifts companies' innovation capability – as it illustrates the value that bringing a science-based investigatory approach to a problem or opportunity can provide
- BPA works well to encourage companies to take on more risk. As mentioned, it helps to de-risk early stage opportunities and take them to a stage where companies have more confidence to put in further investment and it also builds their internal R&D capability through this interaction
- It is currently difficult for researchers to leave CRIs or Callaghan Innovation and go to work in industry and then come back to the research organisations. By creating an environment in which this is easy and desirable, it will create a fit-for-purpose, adaptive workforce, dynamic career pathways for researchers and foster long term connections between science organisations and industry. The BPA offers the ability for R&D staff from the research organisations to be seconded to industry and for R&D staff to be seconded to the research organisations in order to learn more about how each other's organisations work. This helps to embed industry within the research organisations and enable the Crown researchers to deeply understand company requirements
- Provide support mechanisms to allow research organisations to be flexible to move on company-initiated research projects when the companies are ready

KEY QUESTION 10: How can institutions be designed or incentivised to better support capability, skills and workforce development?

- We recommend continuing to encourage researchers to see the benefits of working alongside industry, which increases the researchers' chances of valuable ongoing professional development
- There is excellent diversity in New Zealand research organisations already and this reflects the diversity seen in research organisations overseas. There is a very good number of women in science in New Zealand and increasingly, boards are become more diverse reflecting the country's changing demographics. Māori are increasingly being represented in the science community and this will naturally increase further in coming years
- As mentioned, the BPA funds student projects (internships, Masters, PhDs and even Post Doctoral projects). The BPA's structure includes students working with industry and by encouraging this interaction, students can flourish, companies can tap into the wealth of expertise in universities and research organisations and they can also effectively 'trial' potential employees available once the students have completed their studies. This also encourages companies to subsequently make use of students and research organisations on future projects, which is an excellent outcome for everyone, as students get real work experience, companies get the use of these enthusiastic and focused emerging scientists and engineers and the research organisations continue to enhance their ongoing relationships with industry
- The current system is not seen as a satisfactory pathway for researchers:
    - Poorly paid by international standards
    - Few career development opportunities
    - Lack of science funding in particular areas
    - Lack of funding for early career development

  Research organisations and companies alike are wondering where they will source their R&D staff from and this has been exacerbated due to COVID-19 immigration restrictions. Without a thriving research community and logical career pathways, companies will struggle to find the skills needed to undertake highly valuable and much-needed science. This applies for companies both outsourcing their R&D from external research organisations and for employing scientists and engineers *within* their research teams
- There should be an incentive for companies to establish research organisations (such as *Fonterra's Research and Development Centre* and the previously established *Bayer International Centre for Dairy Research*). Such centres of research provide professional development opportunities for researchers, foster innovation and create wealth for New Zealand

<u>KEY QUESTION 11: How should we make decisions on large property and capital investments under a more coordinated approach?</u>

- We would recommend continuing encouraging the use of any infrastructure by industry, which will maximise value out of the investment:
    - Continuing to allow industry to access expensive pilot scale, pre-commercial and commercial scale equipment in research organisations saves these companies investing when they may not be able to afford it
    - It also fosters ongoing engagement between researchers and industry
    - The technical support/staff time associated with this can be cost-prohibitive for companies to fund wholly, so funding to reduce these barriers would be recommended where possible

- Try not to double-up on equipment unnecessarily if it can be shared across research organisations, or if it makes sense to share it (this may not apply between geographically separated regions who may need the same equipment)
- The BPA has developed a Virtual Pilot Plant Network (VPPN) – a free resource that lists processing equipment in New Zealand universities, research organisations and companies - to efficiently utilise equipment in both research organisations and in industry. This enables research organisations to:
    - Maximise the value of expenditure in their CAPEX
    - Minimise wastage
    - Encourage collaboration
    - Enable companies to use equipment rather than needing to invest in the same equipment when they may not be able to afford to or before they have proven the concept
- We can look at and learn from overseas models (e.g. University of Melbourne Bio21 facility) where expensive capital research equipment are centralised and can be accessed by researchers as well as industry

KEY QUESTION 13: How do we better support knowledge exchange and impact generation? What should be the role of research institutions in transferring knowledge to operational environments and technologies?

- We highly recommend removing the overheads in the current costing structure of both CRIs and universities, which are a barrier to industry's engagement
- We would like to suggest recognising and rewarding scientists for working with industry as early as possible. It needs to have the same weighting (if not more) as publications
- Some of the reasons that industry might not feel engaged in funding applications are:
    - Science funding is often focused on 'discovery science' which is rarely immediately relevant to industry
    - Science funding often asks to set long term horizons and companies generally can't see past the next two years, let alone commit budgets that far out
    - Science funds often expect applicants to focus on discovery science, with long term horizons *but* have industrial applications. These expectations are often at odds with each other as too early stage isn't necessarily of interest or apparent to industry regarding the value
    - Highly scientific, combined with long term outcomes are expensive and risky for business and instead, businesses need certainty, with short term outcomes
    - Currently, many companies are pre-occupied with their COVID impacts to put time into new areas, or they may have been instructed to cut costs due to COVID or other reasons
- IP consistency across research organisations would be very helpful as it would stop companies shopping around for the best deal and thus causing unhealthy competition between research organisations. Keeping IP terms as simple as possible will bring companies in whilst having room to enable the claw-back of IP that may be squandered by any company (examples include 'use it or lose it' terms, periods of exclusivity, paying back taxpayer funds if a company or IP is sold offshore, etc)
- Many times, proposals for project funding are written by researchers, reflecting the researcher's interests and bringing companies along is sometimes a forced afterthought. It

is certainly beneficial to industry to have proposals written by researchers (as companies don't have the time, energy, knowledge on what an effective proposal looks like, or the resource to write them) but in order to engage effectively with industry, proposals need to balance company needs with researcher's needs

- We recommend setting up programmes that are:
    - Clear on areas of national interest (strategic focus) and
    - Have good frameworks to provide 'on-demand' funding for the projects that come up

  This is preferred over programmes that span multiple years and are very fixed in their design as it provides more flexibility. There could be some 'best-practice' frameworks for such programmes established to support delivery and effective operation and governance
- *'The route to research impact relies on a linear model of innovation that starts with idea generation in the research system and ends in the hands of end users'* – not necessarily, as many ideas are generated by end users and worked on alongside researchers but the costs of doing this solely funded by end users can be cost prohibitive, so co-funding from other sources can be very helpful in order to execute. As mentioned previously, consider enabling research organisations to have some discretionary budget to be used on co-funding industry projects
- The BPA enables companies to make use of experienced people from research organisations to help make their R&D go faster and/or be more effective. This is in contrast to Callaghan Innovation grants that also allow companies to undertake their own R&D and whilst this should be encouraged for many companies who have the expertise and facilities in-house, some companies would benefit from being offered the assistance of researchers with the capability and equipment necessary to execute on a company's R&D needs, thus making the R&D journey potentially more effective

<u>KEY QUESTION 14: How should we include workforce considerations in the design of research Priorities?</u>

- We suggest minimising staff in organisations or consolidate similar capabilities/areas (including those in universities for research purpose) in order to be more effective, as larger organisations can often be slow-moving and expensive. Look to reduce positions that do not add value to the organisation itself, to the science system and therefore, to New Zealand. Effectiveness can be tied to KPIs of both individuals within research organisations and within the organisations themselves. Regularly reflect on whether an organisation is becoming too cumbersome to effectively address research priorities and look to decrease the number of people who are not focusing on R&D if these FTEs are not adding value to the country. This will effectively free-up more money to put into research that *could* actually add value to New Zealand
- We recommend that you look to models of efficiency (such as the BPA) that are lean, manned by staff that stay focused on research priorities and deliver impacts. This BPA model ensures its workforce is fit for purpose and results-oriented
- Provide opportunities to 'second' researchers to different organisations to deliver various projects as required to bring a best-team approach to projects and build our researchers' professional networks and relationships

<u>KEY QUESTION 15: What impact would a base grant have on the research workforce?</u>

- Universities are often focused on securing funding in order to gain or retain talent. This can sometimes create perverse behaviours of senior researchers that can be at odds with industry needs (such as securing a project with industry, then handing it over to a student to execute without informing the company, or being more focused on securing funding for valuable staff than focusing on project deliverables for the company who is providing the funding). If research organisations had base funding for researchers, everyone could focus on delivering outcomes
- The cost (literally) that research organisations incur in order to write Endeavour proposals is astounding (various research organisations claim to spend from $200,000 to up to $1m *per* proposal). Given the low success rate of Endeavour funding, this is a massive cost which is more often than not, never recouped. Base funding would enable researchers to get on with their research without worrying about securing funding for their staff.
- Having a contestable funding mechanism is useful and important as part of the NZ science system. However, it needs to have the priority areas clearly defined (which can vary from year-to-year) so that it is targeted for the purpose (or portfolio balance) and not creating a competition for the sake of competition
- There is clearly a gap between Endeavour funding and applied funding (e.g. MPI's, Sustainable Food and Fibre Futures fund) in the system currently. We have mechanisms for 'discovery' and 'industry-led', but nothing in the transition period to support and assist the knowledge exchange and implementation of science to real applications, particularly to support SMEs and new start-ups. R&D doesn't have to be long term and there needs to be a balanced portfolio in terms of short, medium and long term programmes and a range of funding values, depending on a variety of needs The BPA prides itself on supporting a variety of organisations and takes a flexible approach to their individual needs which is highly valued by industry

<u>KEY QUESTION 17: How do we support sustainable, efficient and enabling investment in research infrastructure?</u>

- Models such as the New Zealand Food Innovation Network (NZFIN) could be rolled out further to enable industry to utilise expertise and equipment in research organisations that might otherwise not be being used. Such models provide industry with a commercial entry into the science sector which means they are more likely to continue to do R&D and/or utilise the science sector for their innovation requirements. Subsidising costs for industry to use such equipment will have an excellent impact for New Zealand, as these companies undertake R&D and turn out products faster than they otherwise might and many companies go on to develop further products which ultimately create even more wealth for New Zealand
- NZFIN is a valuable centre for applied development work. Industry and researchers work together as appropriate for the project and facilities are accessible in key stages of commercialisation. Technology transfer occurs effectively in the process of undertaking work and having versatile pilot plant gear is an advantage
- As alluded to, providing facilities for companies and researchers to share CAPEX is useful, as this is a huge expense for businesses and it maximises the investment in expensive equipment
- By creating more 'databases' such as the BPA's VPPN will help busy companies find equipment quickly and saves them incurring the cost of buying equipment too soon

- We think it could be useful to potentially centralise key facilities (e.g. culture biobanks, seeds/cultivar collections, high tech research equipments, etc.). Having them managed independently as the country's resources and available to all researchers and industries to access

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