High Value Manufacturing in New Zealand to 2040
A Work Futures Otago Report
October 2018
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Ngā mihi – Acknowledgements

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Work Futures

The Work Futures Otago project analyses and forecasts the trends, future projections and potential disruptions in New Zealand with a time horizon of 2040. We utilise the power of a narrative approach to construct scenarios that draw together the drivers, differing voices and potential consequences of long-term change. By engaging people in narratives, we focus on perspectives and build sensitivities around future plausibilities. We develop scenarios using the Delphi technique to engage experts in conversations about the future. Our rigorous and in-depth data analysis informs stakeholders, policymakers and civic leaders.

In this project the Work Futures Otago team identifies a future vision for the transition from New Zealand’s traditional manufacturing base to a greater reliance on the high added value knowledge of design and manufacture, decoupling these from the traditional supply chain and manufacturing requirements. This project adopted a New Zealand focus and utilised a panel of experts from key institutions such as Trade and Enterprise as well as leading CEOs in High Value Manufacturing (HVM) industries. The aim was to explore the future of HVM in New Zealand and to therefore understand the implications for New Zealand Inc. Conclusions drawn from this study potentially empower organisational resilience and inform socio-economic strategic decision-making by key stakeholders within New Zealand over the next decades.

To learn more, please visit:
https://blogs.otago.ac.nz/futureofwork/

Follow us at:
Disruptive technologies are the norm resulting in all aspects of work undergoing radical change. Operational processes are more diverse, but also highly specialised, new models of investment have emerged and distribution channels are automated. People require dynamic skill sets to keep up with changes and there is a high level of connectivity and co-operation between industry/business, contractors/employees and education providers.

80% THOUGHT THAT DISRUPTIVE TECHNOLOGIES WILL BE THE NORM & WILL CHANGE HVM CAPABILITIES RAPIDLY.

In 2040 HVM WILL BE EXPORTING THE MAJORITY OF GOODS GLOBALLY USING VASTLY DIFFERENT DISTRIBUTION CHANNELS.

NZ HVM SPECIALISES IN PRODUCT KNOWLEDGE AND DESIGN EXCELLENCE.

"OUR FUTURE LIES IN BEING COURAGEOUS, VERSATILE AND NIMBLE"

What do we do now?

1. We do need to act now;
2. Having a shared vision is essential;
3. It takes a multi-stakeholder approach for change to occur.
Introduction

How will New Zealanders “Work” in 2030, 2060 and beyond?
This question initiated our pilot research into the future of work which took place in the period 2012-14 (Walton, Ruwhiu, O’Kane & Cathro, 2014). It was designed to: (1) develop and test a futures-based method; and (2) pilot that method with a panel of experts by exploring the future of work in the context of Dunedin. The project aimed to make sense, in the present day, of the many societal, economic and environmental pressures that will impact work in the future by adopting a systems approach to understand both these pressures and the potential impact of them. In doing so, we used scenarios to open up dialogues between business and society in Dunedin. We initiated this research in response to much literature discussing the dynamics of the business environment in which organisations operate, and the predictions of fundamental changes to workplaces and the way in which we work (Franklin & Andrews, 2012; Randers, 2012; Rifkin, 2011). We see that the opportunities and challenges future thinking poses for business, society and local government is significant and have been working to develop conversations in Dunedin based on our research.

HVM in New Zealand
The focus of this project is to take our research wider and further by exploring two key areas which emerged as important from our pilot study.

1. Information and Communication Technologies (ICT)
2. High Value Manufacturing (HVM).

These two research streams each have significant potential for economic and social impact at both local and national levels in the future and will be examined with a 25-year outlook (the previous study revealed that looking 50 years out was difficult for participants [Walton et al., 2014]).

This research was designed to explore how changing environmental and societal pressures will influence and direct the future capability of HVM. We refer to this as a ‘weighted’ industry, where a physical presence is needed. Traditionally, HVM has been interpreted in terms of high product cost and price, with examples such as high volume electronic components and product assembly, or aerospace and automotive manufacture. Traditional HVM also has a supply chain dimension, which is particularly pertinent to New Zealand’s geographic location, adding cost and time to any New Zealand manufactured product (Ministry of Business, Innovation and Employment, 2013). We intend to test this perception to better understand what HVM will mean in the future, and question if this future interpretation fits with New Zealand’s strategic capability. The two questions that drove the research are:

1: What does the future of work look like in the ‘weighted’ industry?
2: What strategic thinking is needed now to manage the transition of ‘weighted’ industries?

This report summarises the key findings from the research and provides implications useful to not only the HVM industry, but also to wider New Zealand business and society, and to people working in HVM throughout New Zealand.
Method

To explore the future of HVM in New Zealand we used an established method designed to enable us to listen to stakeholders, integrate their thoughts and ideas and present these back to the stakeholders in an iterative process. We first analysed 48 futures-based reports, which supported the design of the questionnaire used in the first round of the Delphi survey. The Delphi survey comprised three rounds of questionnaires, which were circulated to identified HVM stakeholders. Only those who responded to the previous round received the next round. Table 1 below depicts the process used and provides information on the participants from each round. In the following pages we present the results culminating in the development of three scenarios.

Table 1: Delphi Method

<table>
<thead>
<tr>
<th>Delphi Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Round One:</strong> Delphi Questionnaire</td>
</tr>
<tr>
<td>Sample:</td>
</tr>
<tr>
<td><strong>Respondent profile:</strong></td>
</tr>
<tr>
<td><strong>Purpose:</strong></td>
</tr>
<tr>
<td><strong>Analysis:</strong></td>
</tr>
</tbody>
</table>
Environmental Scan

The HVM Work Futures Otago study produced a multitude of results. In this section we summarise these and draw out the pertinent findings for the HVM sector in New Zealand. The environmental scan enabled us to identify, on a broad basis, what was currently being discussed in relation to the future of work in New Zealand. Table 2 summarises these findings.

Table 2: Findings from the Work Futures Otago study under the PESTEL (Political, Economic, Social, Technological, Environmental and Legal) framework

<table>
<thead>
<tr>
<th>POLITICAL</th>
<th>ECONOMIC</th>
<th>SOCIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Living standards</td>
<td>• Living standards</td>
<td>• Living standards</td>
</tr>
<tr>
<td>• Industry support</td>
<td>• Productivity</td>
<td>• High levels of education</td>
</tr>
<tr>
<td>• Revise regulation (e.g. retirement, immigration, health &amp; safety)</td>
<td>• Regional development</td>
<td>• Social responsibility</td>
</tr>
<tr>
<td>• Treaty of Waitangi – (&amp; enactments e.g. Te Ture Whenua Act)</td>
<td>• Investment opportunities</td>
<td>• Increased global connectivity</td>
</tr>
<tr>
<td>• Govt. agency structure &amp; mission</td>
<td>• Business networking &amp; clusters</td>
<td>• Geographic spread</td>
</tr>
<tr>
<td>• Govt. strategy/investment</td>
<td>• City hubs</td>
<td>• Work-life balance</td>
</tr>
<tr>
<td>• Industrial policy</td>
<td>• Export orientation</td>
<td>• Wellbeing</td>
</tr>
<tr>
<td>• Advance education agenda</td>
<td>• Industry specific growth</td>
<td>• Low literacy &amp; numeracy</td>
</tr>
<tr>
<td>• Local/national Govt.</td>
<td>• Small economy – challenge of scale and scope</td>
<td>• Demographic changes</td>
</tr>
<tr>
<td></td>
<td>• R&amp;D investment low</td>
<td>• Automation &amp; job losses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Specialist education/training</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Changing workforce dynamics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Education not meeting the needs of business &amp; society</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TECHNOLOGY</th>
<th>ENVIRONMENTAL</th>
<th>LEGAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increased productivity</td>
<td>• Primary industries</td>
<td>• New legislation/regulation required (e.g. retirement, health &amp; safety, immigration)</td>
</tr>
<tr>
<td>• Increased global connectivity</td>
<td>• Driving innovative business models</td>
<td></td>
</tr>
<tr>
<td>• Integrated business systems</td>
<td>• New jobs emerging</td>
<td></td>
</tr>
<tr>
<td>• New business models</td>
<td>• Climatic events impacting infrastructure</td>
<td></td>
</tr>
<tr>
<td>• New jobs/new skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Agility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Value adding production/customisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Large tech and people capabilities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NB: Items appear multiple times if they were discussed in relation to different elements of the framework
This led us to consider four key areas that businesses in New Zealand need to focus upon in order to adapt and change to take advantage of the opportunities of the workplace of the future:

- **Business Models** need to be resilient and future focused; this can be achieved through collaboration, process integration and the development and maintenance of partnerships.

- **People** will work differently and need new and innovative skill sets. The workforce configuration will change dramatically with more cultural diversity and older workers.

- **Operational Capability** will see organisations needing to adapt their core technical skills, business processes, and organisational strengths to survive and remain competitive.

- **Innovative Infrastructure** will see organisations adapting their physical configuration and movement of assets, information and resources to the needs of a future workplace to drive innovative capability.
Trends, Projections & Disruptions

Trends for HVM in New Zealand

Participants were initially asked the extent to which they agreed with the trends identified in the environmental scan. The responses below received more than 50% agreement:

- Organisations in the HVM sector would recruit globally for appropriate employee skills.
- The vast majority of HVM output will be exported to overseas markets.
- HVM is going to require different approaches to distribution.
- Technology has caused the biggest changes to HVM in New Zealand.
- Organisations in the HVM industry will be more connected to their customers and markets.
- Compliance issues have increased.
- HVM will have different employee skill sets and more employees will have portfolio careers where they are contracted/work for more than one employer.

Projections for the Future

From our analysis of reports on the future we identified five key areas which would likely change in the run up to 2040. We created projections from this data and invited our experts in HVM to consider those projections.

Projection 1: Dynamic HVM skills
In 2040, HVM skills sets are broader and more dynamic.

Implications:

- Changing workforce demographics, particularly due to global mobility, will create higher competition for HVM jobs.
- The HVM industry is constantly changing and as such, both employee capabilities and how the workplace is organised will need to be adaptable.
- The education sector needs more collaborative and innovative models strongly connected to industry.
- HVM skill sets must balance technical and non-technical skills, such as creativity, communication and relationship building.
## Projection 2: Disruptive technology is the ‘norm’
In 2040, R&D resourcing models that embrace new technologies determine competitiveness.

### Implications:
- The New Zealand legal and regulatory framework has to be more flexible and responsive to the reality of a high-tech environment, particularly in relation to employment and international law.
- HVM organisations need to be more adept at adopting new technologies (big data, 3D/4D manufacturing) and recognise the need for systems which organise and manage them.
- Methods of planning and investment will be influenced by environmental and people-centred strategies of improvement.

## Projection 3: Dynamic operational capability
In 2040, HVM organisations pursue higher productivity through disruptive technologies resulting in widespread reconfiguration of operational capability.

### Implications:
- Rate of technological change will continue to rise. Drivers of productivity are tied to operational capabilities that enhance adaptability and responsiveness.
- Operational processes become more specialised and those that are non-essential are outsourced.
- There is an emphasis on service and entrepreneurial capabilities to meet customer and market development expectations.
- Knowledge of socio-environmental implications are highly regarded operational capabilities.

## Projection 4: Global investment
In 2040, HVM organisations rely on Foreign Direct Investment and consequently they are highly integrated with international companies.

### Implications:
- FDI and offshore ownership makes the environment for new local entrants challenging. This requires new policy frameworks from Government.
- The ‘global village’ becomes the enterprise platform from which investment will be delivered, and therefore higher levels of collaboration with foreign investors are needed.
- New models of investment will emerge to overcome technology gaps, skill shortages, and/or lack of working capital. These include alternative funding sources (e.g. crowd funding, angel investing), public/private collaborations and clusters of small companies which form trading co-development partnerships.
**Projection 5: Virtual and virtuous supply chain**

In 2040, HVM physical supply chain infrastructure is constrained by increasing costs, value added is derived from design knowledge and niche materials that also satisfy the socio-environmental expectations.

**Implications:**

- New technologies mean that small scale production is just as cost effective as large scale.
- “Designed in New Zealand” and/or “Made in New Zealand” – HVM remains an important production niche for New Zealand, but sources of competitiveness reside in design knowledge.
- Supply chain environmental footprint reduced through automation of the distribution infrastructure and manufacturing taking place closer to markets and end users.
Disruptions

Disruptive systems level changes have the potential to impact the future of work in New Zealand and the future of HVM. Thinking about the year 2040 from the New Zealand HVM industry perspective, participants were asked to agree or disagree with 54 statements derived from the environmental scan reports as well as key global reports on the future of work.

Key findings (disruptions that scored a mean agreement of more than 70/100 across participants and in order of level of agreement, highest to lowest):

1. Fresh water is the new oil.
2. New Zealand specializes in product knowledge and design excellence
3. Digital security and the protection of digital identities is paramount to people.
4. Robots are in use across all workplaces – not just used for hazardous jobs.
5. The ‘digitisation’ of production has radically changed manufacturing.
6. New ways of thinking about economic growth are emerging.
7. Automation has become the norm across all job types.
8. Thousands of connected sensors contributing to big databases (‘the Internet of things’) are driving our everyday life.
9. Artificial Intelligence has changed the way we work.
10. Productivity is being driven by thought activated technology (brain computer interface technology, for example brain-controlled prosthetic limbs).
11. Big data is driving productivity.
12. 3D printing is mainstream and most households create their own products by buying designs.
13. Augmented reality is commonplace.
14. Globally there are new laws to regulate immigration.
15. New forms of economy are rising (e.g., shared economy, tribal economy).
16. Increased foreign investment in ICT/HVM sectors is driving innovation and growth.
17. A digital personal branding strategy is essential e.g., LinkedIn.
18. Economic growth is no longer automatic.
19. The gap between the rich and the poor has continued to rise.
20. Large countries are buying land where appropriate to produce food and obtain water for their people

Participants also disagreed with some potential disruptions. For example:

- They do not see a clear demarcation between work and personal lives in 2040.
- There will not be a minimising of personal digital footprints – indeed a slight majority see more personal data being shared online.
- Globalisation will not reverse, but it is unlikely that Australia and New Zealand will become one economic entity.
- They do not see compliance costs decreasing.
- Climate change will not affect immigration to New Zealand.
What Keeps Participants Awake at Night?

Participants were asked to think about the future and consider what three things kept them awake at night. Four key areas emerged.

Table 4: What keeps participants awake at night

<table>
<thead>
<tr>
<th>Theme</th>
<th>Participant Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Family, health, well-being, employment and financial security</td>
<td>• “Whether my kids’ education will allow them to compete globally?”</td>
</tr>
<tr>
<td></td>
<td>• “...for NZ, child poverty and child abuse, and growing gaps between haves and have nots for NZ”</td>
</tr>
<tr>
<td></td>
<td>• “The challenge to finance a long and healthy retirement without the risk of eventual poverty”</td>
</tr>
<tr>
<td></td>
<td>• “The hope that NZ maintains a balance between the good aspects of socialism (free and good: education, health, police/judiciary and welfare)”</td>
</tr>
<tr>
<td></td>
<td>• “Ensuring the education system allows for youth to gain skills required for the future workforce”</td>
</tr>
<tr>
<td></td>
<td>• “Unskilled workers will have issues with future work”</td>
</tr>
<tr>
<td>2. Consequences of climate change</td>
<td>• “NZ water quality and the effect of high density dairying”</td>
</tr>
<tr>
<td></td>
<td>• “Clean water, climate change”</td>
</tr>
<tr>
<td></td>
<td>• “Degradation of NZ environment”</td>
</tr>
<tr>
<td>3. Adapting to technological change</td>
<td>• “Rapidly accelerating technological change...Diminishing ability to communicate with a human being other than with a smart phone”</td>
</tr>
<tr>
<td></td>
<td>• “Keeping up with digital economy”</td>
</tr>
<tr>
<td>4. Concern about global systems:</td>
<td>• “The state of the world’s politics and economy, and finally the constant global campaign of terror and extremists”</td>
</tr>
<tr>
<td></td>
<td>• “Social disorder due to rising numbers of poor, unskilled, unproductive and angry lower socio-economic groups, a lack of meaningful social policy objectives, and the heightened cost to fund unproductive members of society”</td>
</tr>
<tr>
<td></td>
<td>• “Nationalism/ religious discontent and terrorism - that is social disturbance and unrest”</td>
</tr>
</tbody>
</table>

Summary: Trends, Projections and Disruptions

The data we received from the quite comprehensive first round questionnaire had a number of strong but at times conflicting messages from participants. There are some clear trends in the HVM sector in New Zealand emerging (e.g., some clear projections and some clear disruptions). However, in amongst that, there are a number of big societal level changes that are keeping people awake. After both qualitatively and quantitatively analysing the data we made sense of the results by developing a series of scenarios. The next section outlines these scenarios and the reactions to them from participants in the study.
Bringing it Together: The Scenarios

As a result of the first round of the Delphi survey, scenarios based on the responses from the participants were developed. These were produced in a narrative style to bring together the ideas from the responses in a consequential manner. The following pages present each scenario accompanied by the participants’ reactions to each. The majority of the participants (83%) see scenario two “New Zealand HVM 2040: Made in New Zealand” as plausible but interestingly, when asked which scenario they would like to be a part of, participants were split 50/50 between the two scenarios.

**DESIGNED IN NZ VERSUS MADE IN NZ**

**COMPARING THE 2 SCENARIOS**

<table>
<thead>
<tr>
<th>Designed in NZ</th>
<th>Made in NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVM focus is on: 1. blueprint designs 2. designing the underlying technology.</td>
<td>HVM focus is on value-added production and specialisation of high value parts and finished goods.</td>
</tr>
<tr>
<td>HVM production process involves less material, less transportation &amp; less energy.</td>
<td>HVM sector has consolidated and there are small clusters of collaborative companies.</td>
</tr>
<tr>
<td>HVM workers need a range of skills sets beyond production, eg design programming, AI and creative engineering.</td>
<td>HVM workers have high levels of technological skills and a good balance of technical and soft skills.</td>
</tr>
<tr>
<td>There are fewer opportunities for low-skilled workers seeking work in these new and emerging industries.</td>
<td>NZ Govt has increased spending on R&amp;D and incentivised production in the regions.</td>
</tr>
</tbody>
</table>
Scenario 1: Designed in New Zealand

It is the year 2040 and the population of New Zealand has stabilised at around 4.9 million, reflecting the global political environment and a declining birth rate. Disruptive technologies are the norm. These are unpredictable and game changing, creating a challenging, fast-paced and globally oriented working environment. Therefore New Zealand firms have to attract highly skilled professionals from around the world. The New Zealand HVM sector has changed dramatically from production to design and mainly focuses upon two key areas: (1) designing “blueprints” for products that can be manufactured anywhere; and, (2) designing the underlying process technology. New Zealand’s HVM firms are much smaller, agile and mainly contract to large global organisations, exporting knowledge as opposed to physical products. This has been a successful strategy and although the sector has compressed overall, profit margins are higher and New Zealand HVM has a strong reputation.

Globally, the separation of production and design means supply chains have been disrupted and reconfigured to support centres of production. HVM supply chains have become more nuanced, with distinctive value chains emerging around specific technologies and markets. Small scale production is just as cost effective as large scale; it can be carried out close to the point of sale with increased automation and robotics. Consequently, most products result from consumers buying designs from online retailers; and then producing these either at home on 3D printers or at local production facilities. Overall, the HVM production process involves less materials, less transportation and less energy.

In this environment HVM workers need a range of skill sets beyond production, including; programming for design, artificial intelligence and creative engineering. Organisations contract highly skilled workers, on an “as-required” basis and these workers no longer need or want to be tied to one employer. This has seen the rise of the professional contractor. These highly paid and skilled professionals upskill themselves continually, work on fixed term contracts for multiple companies, and are in high demand globally. To attract these workers, employment arrangements in New Zealand have changed to enable more flexible remuneration and working conditions.

Job losses, specifically in production and middle management, have prevailed across the HVM industry with a significant loss of production knowledge in general. There are now three subsets of worker skill in HVM: (1) in-demand skills; (2) emerging skills; and, (3) low-level skills. New Zealand education and training providers work collaboratively with industry to design innovative and adaptable programmes that support the development of in-demand and emerging skill sets necessary to be globally competitive. These range from traditional degrees to shorter on-line modules, providing a flexible education environment.

The change from mass to local automated production means low skilled, often older, workers no longer operate on the shop floor; instead they seek employment in new and emerging industries, such as 3D production, where they support customers to engage with the new production process. However, there are fewer opportunities and weakened job security for these low-level skilled workers. This has increased social inequality, resulting in a general feeling of unrest across society and creating a definite delineation between the ‘haves’ and the ‘have-nots’.
Reaction to Scenario 1

**NOT an ideal vision:**

- This narrative portrays too much reliance on machines and ignores human capabilities and values.
- Technology cannot replace all shop floor skill sets.
- Ignores rising unemployment.
- Nothing to suggest sustainable management practices.
- Requires high levels of skill.
- Ignores value add business strategies.
- In the economic realities of this scenario, lifestyle will suffer.

**Participant Quotes:**

“Not entirely convinced (primary sector involvement coming through). One of our opportunities is to move to value add and at the top end for our primary products, based on their high standards of environmental and production. While there is a never ending increase in customer expectation it is a track we are already going down. With this in mind I see a significant focus on niche marketing specialist products generated from our primary production that we can cost effectively move to global markets”

“Automation, AI, Robotics risks the rise of the precariat with unmatched skills, low wages, no job security with risk of exclusion from the consumer class”

**Future Proofing for this Scenario:**

- Promote positive attitudes in business environment.
- Increase collaborations at different levels.
- Better leadership.

**Participant Quote:**

“We would need to be flexible, adaptable, and have a high level of connectivity and co-operation between education providers, businesses and contractors/employees”
Scenario 2: Made in New Zealand

It is the year 2040 and the population of New Zealand has risen to 5.4 million, through both positive net migration and an ageing population. Disruptive technologies are the norm. These are unpredictable and game changing, creating a challenging, fast-paced and globally oriented working environment. Being able to quickly learn and adapt to new knowledge and technology is crucial for a firm’s survival. The New Zealand HVM sector responded to this environment by consolidating. There are few large HVM companies; instead clusters of smaller companies that closely collaborate. Firms have maintained value adding production and specialisation producing low volume, high value component parts and finished goods with the ‘Made in New Zealand’ label. In this approach, the industry is not competing with high volume generalist manufacturing, which still predominates in Asia and the emergent African economy. Therefore, the HVM industry is a significant contributor to the New Zealand economy.

The HVM value chain has a downstream focus. Therefore, reducing delivery times and meeting high customer expectations are crucial for international competitiveness. The complexity of the HVM supply chain and increasing demand for products has driven higher levels of automation, robotics and the development of sophisticated production methods. International companies want to partner with dynamic New Zealand organisations. These global companies view the New Zealand HVM industry as providing an advanced technological base and a highly skilled workforce. The focus on international collaboration has meant that New Zealand HVM firms have had to upskill in aspects such as international contract law and trading standards, one example being sustainability verification.

Job losses, specifically in production and middle management, have prevailed across the HVM industry with a significant loss of production knowledge in general. As a result there has been a small increase in unemployment, but many in the workforce have transferred their skill sets to complementary industries. The HVM workforce has high levels of advanced technological skills. Although there are fewer production jobs, these are more highly skilled and offer superior employment arrangements. The right combination of technical and soft skills (people, relationship management and creativity) is considered essential. Education and training has not kept pace with technological advances seen in the workplace. Indeed, educating for flexibility is particularly difficult and there has been an outsourcing of training to specialised organisations and skills gained through on-the-job training are seen as important by workers. Therefore, those with high skills can be selective about what work they accept.

The New Zealand government has increased spending on research and development, specifically in the primary industries. This has a positive flow-on effect for the broader HVM sector. Growth, both in terms of innovation and production, has been steady across the industry. The government has also highly incentivised both immigrants and Kiwis to relocate to the regions in New Zealand as a part of a campaign to reduce the pressure on the main centres. Consequently, HVM has moved out of the larger cities, particularly Auckland. This has afforded HVM workers a better work-life balance and seen an increase in productivity as a result.
Reaction to Scenario 2

Not an ideal vision:

- The disruptive fast paced environment doesn’t encourage consolidation.
- Cutting edge business competition leaves little room for collaboration.
- It does not account for the implications of:
  1. Climate change and resource scarcity;
  2. Population Rise;
  3. Jobs loss;

Participant Examples:

“Not as plausible than the first as I think that technology trends and the disruptive environment make smaller companies more likely to succeed. Technology also lowers the capital barriers to production making smaller companies more viable. Consolidation is something that could occur as products mature but there will always be a group of small innovative companies at the cutting edge of manufacturing”.

“The big alarm bell is around climate change and our ability to maintain high standards. It is probable that we need to get over the science and ethics dilemmas ... There is a great need for some smart people to be working in this area for research and promoting informed discussion”.

Future Proofing for this Scenario:

- Focus on R&D investment.
- Investment in sustainable management practices.
- Offer new models of education which help to address gaps in skill.
- Develop human/technology interfaces which will influence HVM practices.

Participant Examples:

The future is exciting, and Scenario 2 would be great to be part of. The emerging influences from Maori Business will definitely have an impact in bringing employment to the regions. Science/Innovation/Technology will be key and distance learning in short, developmental segments probably more popular with employers/employees alike. "Learn as you go."

Manufacturers will develop more advanced products and processes that will help NZ companies maintain their manufacturing competitiveness.
Scenario Summary
Stories are a powerful way to connect issues and possibilities and to draw responses from participants about how they see the connectedness and consequences. The scenarios triggered further future thoughts from participants as described below:

Participants feared the following may happen:

- The increasingly uneven distribution of wealth will continue unless this is disrupted by the emergence of some immense utopian society.
- The tyranny of distance may result in scenario two being dominant.
- Global conditions and technology are difficult to predict.
- Skill development may be slower than the market needs.

Participants suggested the following to enable an ideal situation to emerge:

- New Zealand HVM industry should become more responsive to changing business models by quickly learning and adapting to new knowledge and technology.
- We need to re-think what it means to be Kiwi.
- The skill base needs to be developed, particularly within the ageing population.
- Government policy needs to keep pace with and anticipate change. There needs to be political will and courage to make necessary change happen, i.e. migration policy and a flexible education framework.

Other possible scenarios for the future of HVM:

1. A hybrid of the two scenarios.
2. A scenario where we get completely left behind and only export basic commodities.
3. A scenario where political and global factors such as the anti-trade and globalisation rhetoric of the US has created a global recession.
4. A progressive and vibrant scenario resulting from highly positive mind-sets.
Actions for Now: Implications

“Most New Zealanders have been born and raised in a time of safety and comfort. It is easy and yet naïve to expect that this happy state will continue as the numbers of people feeling disaffected grows and the science around the state of this planet provides evidence of change. (Hopefully I’ve not been suckered by merchants of doom.) I would like to see some unfearful thinking around how NZ will address global political and environmental change that is totally disruptive to the social and economic ideals we currently strive for”

While the participants are split on which scenario they would most like to be part of there is a clear 83% support for Scenario 2 being more plausible. Participants recommend the following steps to be taken to enable a positive HVM future:

**Recommendations for Change**

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| **1. Significant change to existing thinking about ourselves as Kiwis.** | “I think there are major barriers to overcome if we are to achieve our full potential. We will really need to re-think what it means to be Kiwis!”

“This scenario requires NZers to think globally and to be tolerant of immigrants - seeing ourselves very much as part of the international marketplace and letting go of a little bit of our NZ uniqueness” |
| **2. Education and skill development** | “I hope education responds but knowing current attitudes this change to more flexible smaller group skill development may be slower than the market needs”

“A lot will depend on our skill base and how we develop this especially with an ageing population”

“Science/ Innovation/ Technology will be key and distance learning in short, developmental segments probably more popular with employers/ employees alike”

"Learn as you go"

<p>| <strong>3. Expect upheaval</strong> | “In my view there is a high likelihood of political and environmental upheaval on a global scale which may be best addressed by having expectations of ourselves (as New Zealanders) to focus on doing what we do well and supplying our products to high value niche markets. I expect new niche markets will continue to develop unless the increasingly uneven distribution of wealth is disrupted by some immense utopian society - which I don’t foresee” |</p>
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<td><strong>4.</strong> Having deliberate policies to achieve a sustainable HVM sector</td>
<td>“Policy doesn’t keep up with business needs and NZ gets left behind. A 21st century economy and workforce will need 21st century forward thinking policy -&gt; challenge!!”</td>
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<td>“Tax and social assistance may need to increase for short periods to help us adjust.”</td>
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<td>“Enabling policies”</td>
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<td>“...need to be empowering and able to respond quickly”</td>
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<td><strong>5.</strong> Invest and engage with young people</td>
<td>“Hire and enable millennials”</td>
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<td>“promotion of manufacturing as a ‘new industry’ to entice young people to think about it”</td>
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<td>“Graduate skills are important for ideas and innovation”</td>
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<td>“...Investing in youth and technology”</td>
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**What do we do now?**

Our key question from the final round of the survey was to ask participants their thoughts on action for now for the future they wanted. The main thoughts can be summed up as:

1. We are acting now but learning is on-going;
2. Learning and changing the way in which we learn is essential; and,
3. We need confident driven entrepreneurs and supportive infrastructure to drive collaboration and success.

It is hoped that this report is one step in the process of future thinking for the future of High Value Manufacturing in New Zealand.