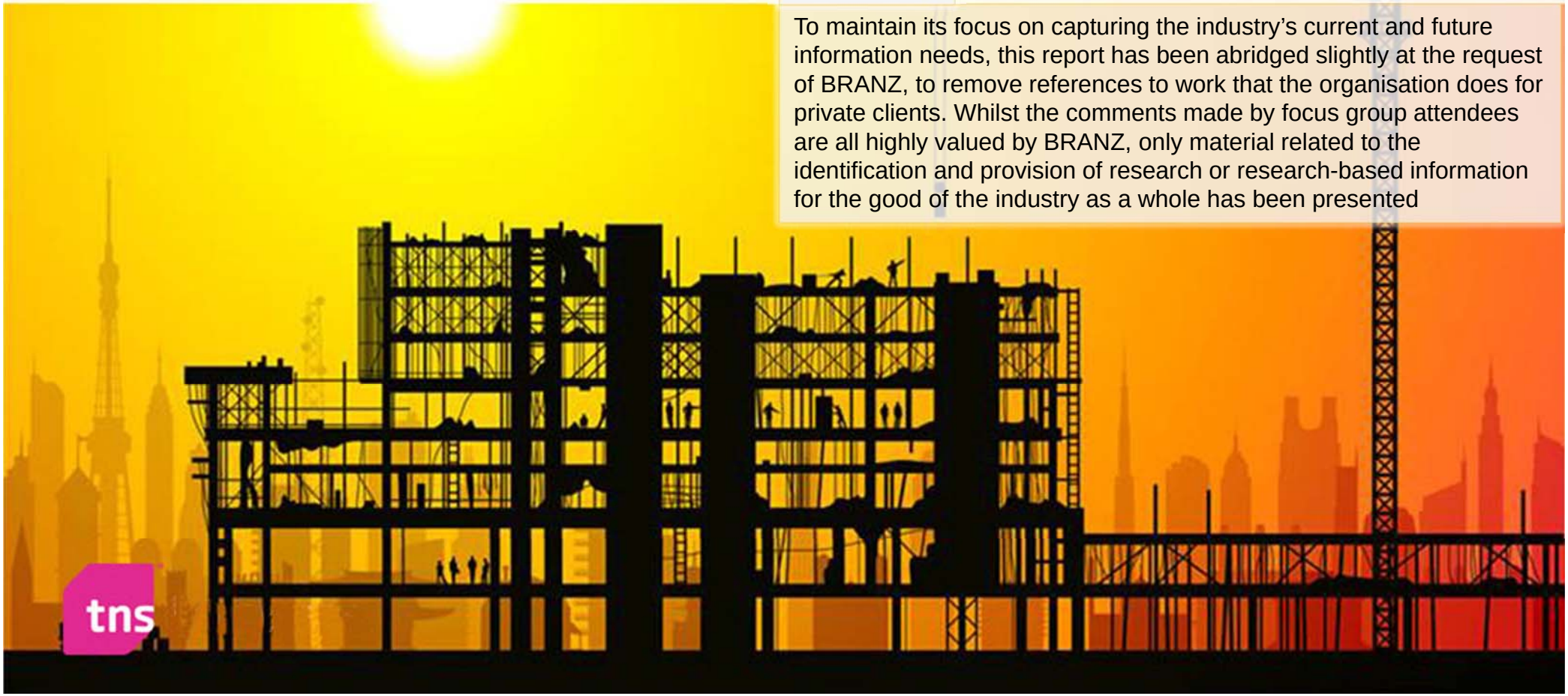
TNS

Review of Research Priority Topics

June 2011

Abridged

To maintain its focus on capturing the industry's current and future information needs, this report has been abridged slightly at the request of BRANZ, to remove references to work that the organisation does for private clients. Whilst the comments made by focus group attendees are all highly valued by BRANZ, only material related to the identification and provision of research or research-based information for the good of the industry as a whole has been presented



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Section 1

Introduction

BRANZ needs to test assumptions about its priority research and information topics and to fully understand critical uncertainties facing the construction industry in relation to the next 5 to 15 years

What we are trying to understand …

- To what extent are the ten priority research topics relevant and will the industry buy into them?
- What specific information in relation to the priority topics is the industry seeking, and what are the knowledge gaps?
- In developing the priority topics, is there anything that has been omitted?
- Has the heightened awareness of earthquakes identified knowledge gaps that were not previously obvious? And similarly, should fire safety be a higher priority?
- What else could BRANZ be doing to assist the industry to design and build better buildings?

… therefore our overarching business issue

Where does BRANZ need to invest to create knowledge and address critical uncertainties facing the industry?

We conducted six discussion groups covering all the major industry sectors

Industry Group

- Engineers
- Architects & Designers
- Building Inspectors & Surveyors
- Builders
- Mixed Industry Groups (x2)

Attendance

	Location		
	Auckland	**Christchurch**	**Total**
Engineers	9	-	9
Architects / Designers	10	-	10
Building Inspectors / Surveyors	8	-	8
Builders	9	-	9
Mixed Group 1	8	-	8
Mixed Group 2	-	10	10
Total	44	10	**54**

Discussion groups were held in Auckland, with the exception of one mixed industry group that was held in Christchurch

Section 2

Key Findings

The industry relates to most of the priority topics selected, believing that these are areas that will assist the industry to do a better job in the future, subject to the availability of more or better quality knowledge

Key Findings

The industry is relatively consistent in its agreement that the priority topics selected are the general areas that have the most potential to contribute to the construction of better buildings. There is also a high consensus that more knowledge will be needed about these areas in the medium to long term; i.e. the most important topics also have the largest perceived knowledge gaps

Topics that industry representatives most closely identify with are;

- Building codes & Standards
  - *Improving standards*
  - *Improving access*
- Environmental & Sustainability
  - *Improving durability*
- Materials Performance
  - *Use of inferior materials*
  - *Appraisals system not identifying potential failures*
- New Technologies
  - *Review and recommending appropriate new technologies for New Zealand conditions*
- Energy & Insulation
  - *Making existing building stock more energy efficient*

Structural engineering and refurbishment of buildings are either not high priorities for the industry, or not areas that the industry perceives that BRANZ can assist with developing new knowledge

Key Findings

The topic areas '*structural engineering*' and '*refurbishment, repair, additions and alterations*' do not feature highly as subjects that the industry representatives are seeking BRANZ involvement with, or consider to have potential to significantly contribute to the goal of better buildings

Earthquake and fire safety engineering are recognised as critical areas, but the perception is that a large body of knowledge now exists and as such these topics are not a priority. The competency around engineering is viewed as residing within academic institutions and this further explains why the industry is not looking to BRANZ to conduct research

Many of the industry representatives do not appreciate the distinction between BRANZ appraisals and research to create new knowledge. There is a perception that BRANZ is driven by manufacturers and that the outcome of product appraisals is a consequence of the investment made by manufacturers

A number of additional topics are suggested as areas that have potential to adversely impact the industry and BRANZ needs to consider the validity of these and whether any specific actions are required

Key Findings

Attendees identified a number of topics that they believe may have been overlooked and that have potential to significantly impact the industry in the future:

- Effect of electromagnetic fields on health as a consequence of increased electronic technology in buildings
- Effect of chemical use in building materials; health and environmental impact over time
- Resource depletion and resulting forced change in materials use
- Impact of climate change in terms of the continued suitability of building materials
- Geotechnical issues with pressure to build on less desirable land formations
- Effect of an aging population and the impact on building and urban design

The industry sees opportunity for BRANZ to take a stronger lead in two areas:

1. To act more strongly as an educator
2. To provide vision and guidance thereby establishing direction for the future

Although many of the representatives believed BRANZ could do better, there was consensus that the organisation was making a very positive contribution and the industry was much better off as a consequence of the work that BRANZ does

BRANZ should review what research is proposed for structural engineering and for alterations and refurbishment, but can otherwise retain the suggested priority topics in the confidence that they have wide acceptance. Consideration also needs to be given to a number of other topics identified for their potential impact

Implications

BRANZ should review proposed research associated with structural engineering and with alterations and refurbishment as the industry either does not rate these highly, or is not looking towards BRANZ as having the competency to undertake the research

BRANZ can safely proceed with the top priority topics, except '*structural engineering*' and '*building refurbishment*', secure in the knowledge that these are closely aligned with what the industry identifies with to assist it do a better job in the future

BRANZ needs to undertake wider communication about its work with materials appraisals so this area is better understood by the industry and to establish expectations based on the objectives of the appraisal process

BRANZ must not compromise its independence and should promote this position whenever the opportunity arises. Potentially, this could be incorporated within some form of brand statement to strongly reinforce its role as an independent industry advocate

BRANZ has an opportunity to take a stronger lead as an industry educator and visionary to guide and direct the wider industry into the future

Section 3

Detailed Results

The general view amongst engineers is that we are building better buildings now, but the industry is not doing as well as it could do, and there are challenges to overcome, particularly around skills and communication

Building Better Buildings: Engineers

- The industry is doing better, but it is difficult to assess the degree to which it has improved
- There are a number of barriers holding the industry back:
  - Willingness of the client to pay for something better
  - Lack of skills in specialist areas
  - Lack of process that encourages co-ordination between industry groups for a given project
- Materials availability in the future is a potential barrier

"Developing a NZ Green Star rating … that is a good start

Developers looking to sell environmental buildings, but want to do it on the cheap. They just want to tick the box, rather than being genuine

In specialist areas … we need to import the skills and train before we can commence … but going through the learning curve leads to mistakes

Information flow and communications throughout a project to share information and make decisions together … everyone works in a bubble"

Architects and designers are more pessimistic and noted numerous challenges and barriers concerning project supervision and on achieving greater integration

Building Better Buildings: Architects & Designers

- The focus needs to be on integrated design; considering the building as a system rather than components
- Excessive focus on meeting the minimum standard of the code
- Planning constraints impose excessive restrictions
- Improving on-site management and practices to achieve better adherence to plans
- The industry needs to more fully evaluate new products, processes and systems prior to acceptance

"We look at things in isolation, but not how one thing affects other aspects of the building…

Too much cost focus … no cross-pollination of expertise … everyone just trying to get it approved

Architects are hammered in the consent phase… a whole list of things to include or not include on the drawings

Not enough monitoring on site. Builders substitute products and decide how to do things"

Builders consider that there have been improvements from the ‘leaky buildings’ problems, but still see significant issues and barriers preventing the industry from delivering better buildings

Building Better Buildings: Builders

- The view of durability for 50 years is too short
- The focus on driving down price reduces quality and innovation
- Excessive segregation and a lack of co-ordination across the industry
- Lack of skills and knowledge. Education and training needs to be a focus
- Consent processes are too long
- Licensing builders is positive, but the threshold is too low

“Maximum durability of 50 years is too short. Old villas constructed with native timbers are 100 years plus and still good if maintained

Customers are always going after the cheapest price, and architects also select on the same basis … and it leads to engagement of less skilled builders. Anyone with a hammer can call himself a builder

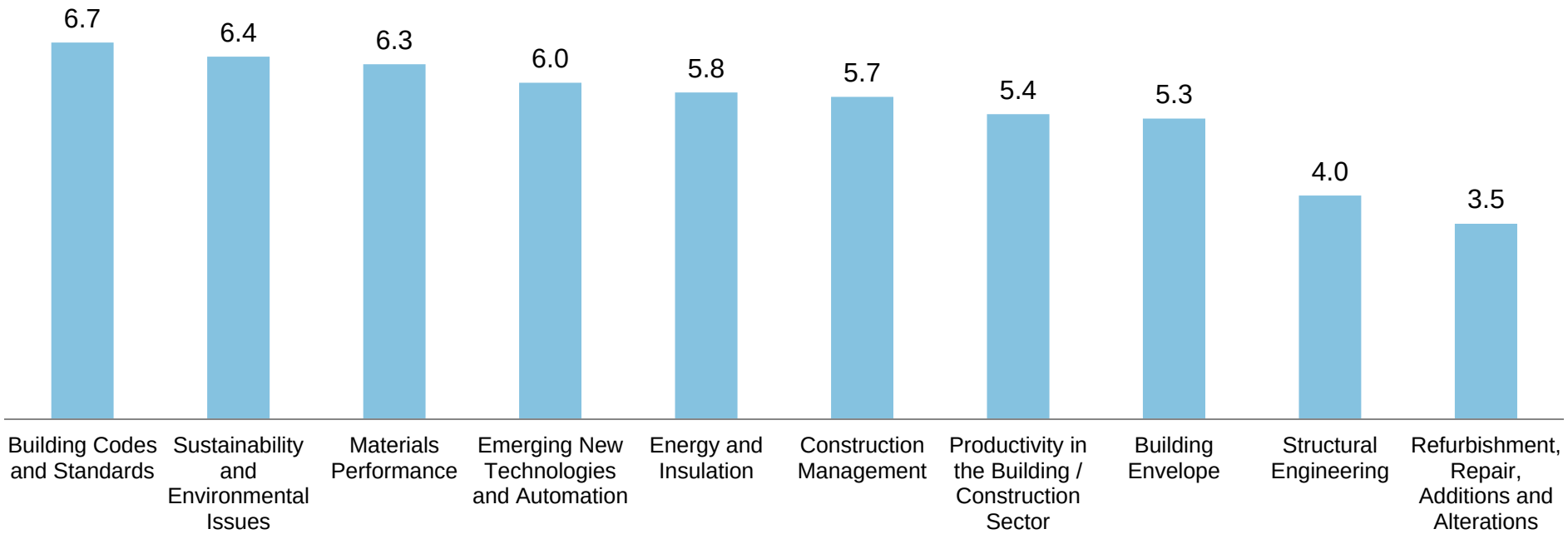
The industry is segregated …would get better results if we worked more collaboratively

Licensing will help, but is too easy to get”

Collectively, industry representatives believe that addressing building codes, sustainability, materials performance, new technology and energy and insulation have the most potential to continue to build better buildings

Topic Areas with the Most Potential (Averaged Ranking)[(1)]

Note: (1) Average importance ranking where 10 = most important and 1 = least important



Building codes and standards were most frequently identified as the area with the most potential to benefit the industry

Notes: 1. Average importance ranking where 10 = most important and 1 = least important

Architects and designers have the greatest interest in building codes and standards and believe that more development is required with a stronger future focus

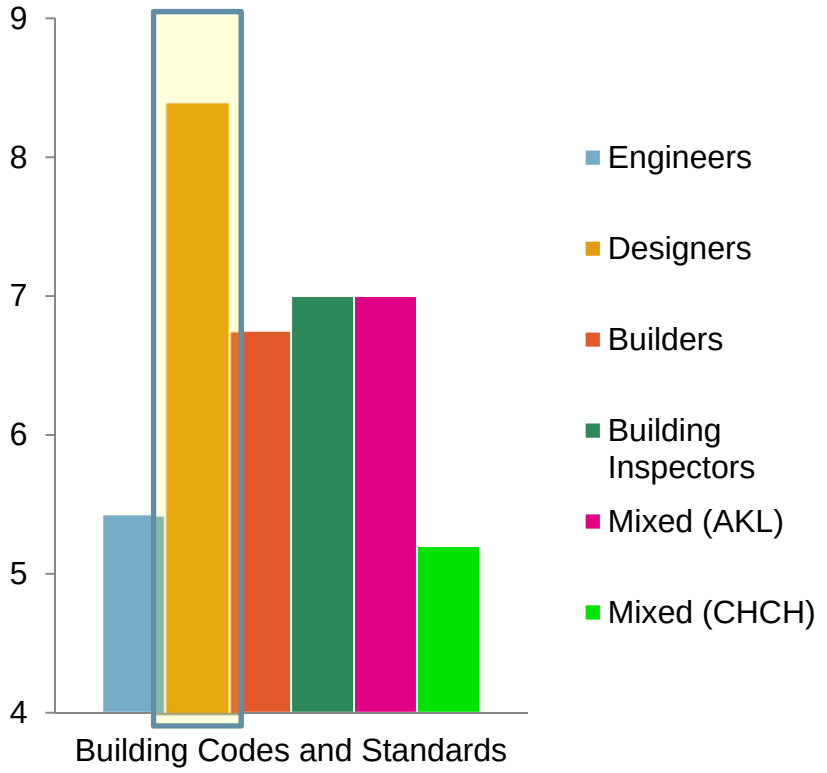
Building Codes & Standards: Perspective of Architects & Designers

"We are currently measuring heat loss from buildings, but the biggest issue for office buildings is heat gains. In the North Island we are pumping energy in to keep buildings cool, so we have completely the wrong standard

Put the principles up front of the Building Act around driving down green house gases and see how this filters through the code

Change won't come from the industry, it needs to be driven by Government. It is only when things are in standards that the client believes it is worth paying for

The code is too reactionary; i.e. leaky buildings, rather than looking forward"



Others believe that the building codes and standards need to be more accessible, that they need to be used in education and that a more structured feedback system should be implemented so that the quality of the codes and standards continues to improve

Building Codes & Standards: Perspective of Others

"There needs to be more training for builders… we only find out by default … by making mistakes

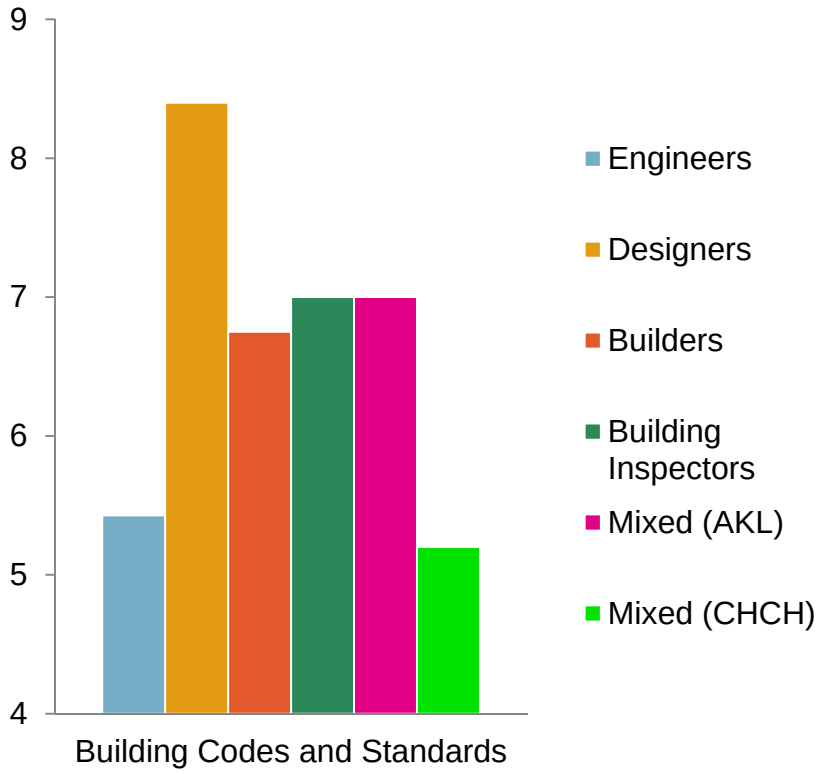
It's the Bible for our industry so everyone should learn it … but it is not accessible

There needs to be a better feedback system for real time solutions as it is too prescribed and too narrow

There have been so many changes that everyone is confused … they are a jumble at the moment

If we had great building codes & standards we could achieve greater energy and insulation, materials performance, building envelope and so on

Too often it is seen as a minimum standard that we design down to"



Builders have relatively low interest in sustainability and environmental issues, where this is a much higher priority for other groups such as engineers, architects and building inspectors with focus on improved durability

Sustainability and Environment

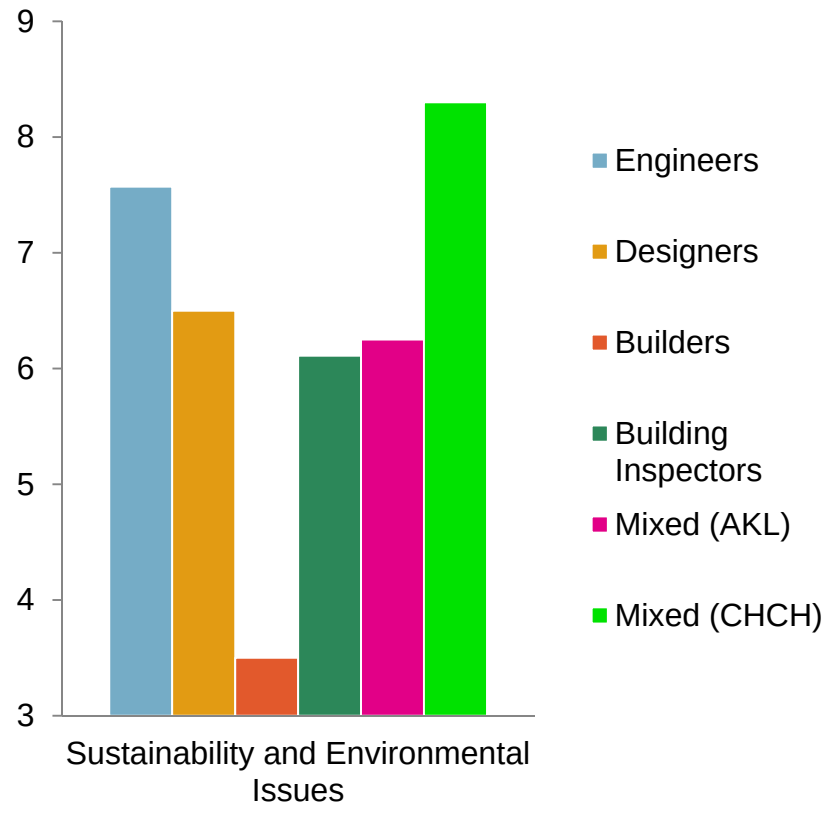
"It's about the quality of the materials; about making things better to last longer … but this needs to be incentivised

There is a growing level of knowledge, but designers are not considering the life of the building and what will happen at the end of life

Very rare for a client to want a sustainable house. This needs to be driven by education so it becomes a selling point rather than being seen as a cost

BRANZ needs to invest more researching this subject … or we will keep on using the cheapest products and not thinking about world resources declining. They are doing work on this, but don't think it is getting out

Labelling is good, but we don't use it enough … and it should be broken into categories; energy efficiency, durability etc … like Australia"



Builders had a view that the industry had learned a lot from the leaky buildings issues and that material performance was no longer such a priority issue, although this remains a strong focus for building authorities

Materials Performance

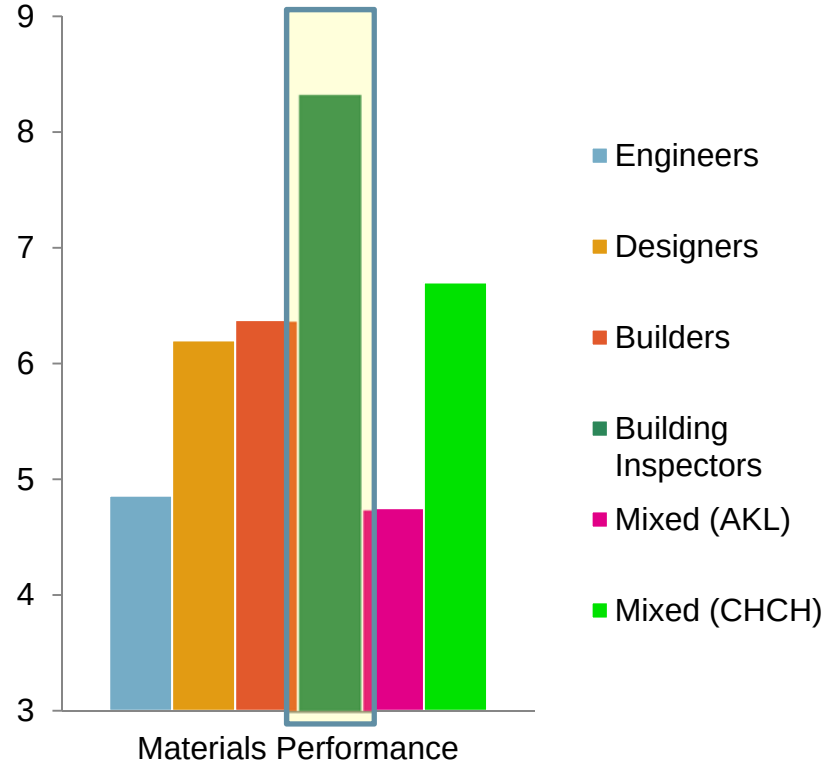
We are still using inferior materials … and a lot of people are using them. It's not good as we have too much rain and there will be problems in the future

Testing needs to be more extensive … and in different climates around the country

Groups other than building inspectors point to materials use

Product performance itself is not important, it is about how the products are being used and where they fit in the system

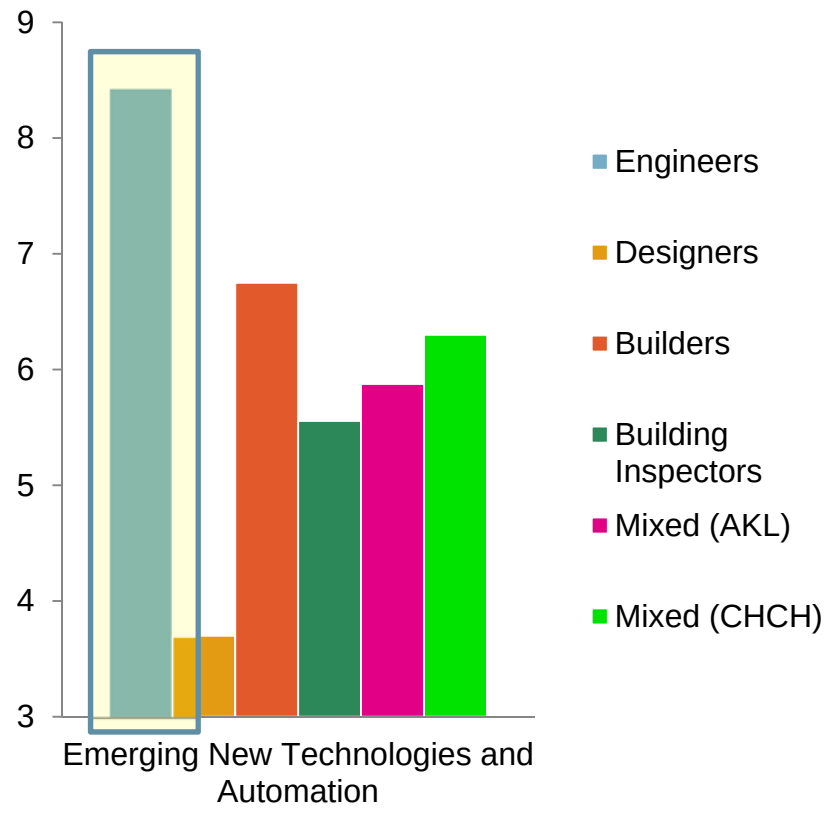
It's when there is inappropriate use of materials that there is a problem … the materials are fine



Engineers strongly view emerging new technologies as the single most important topic that will deliver better buildings in the future with a focus on reviewing and approving new technologies for adoption within New Zealand

Emerging New Technologies and Automation: Perspective of Engineers

> *Its about new technologies to help us solve problems around energy efficiency and resource availability*
>
> *There is a need for tools to facilitate the sharing of information between stakeholders in a construction project … to drive out mistakes and improve efficiencies*
>
> *BRANZ could take a lead role in putting a 'quality stamp' on new technologies; review and provide information so we don't need to go to the provider as they will be biased*
>
> *BRANZ does not focus on IT or automation. Some countries have usage manuals so the industry knows the best ways to use building information modelling, but there is nothing like that happening here*



Builders and other groups identify opportunities to automate house construction and to achieve better products and efficiencies through standardisation

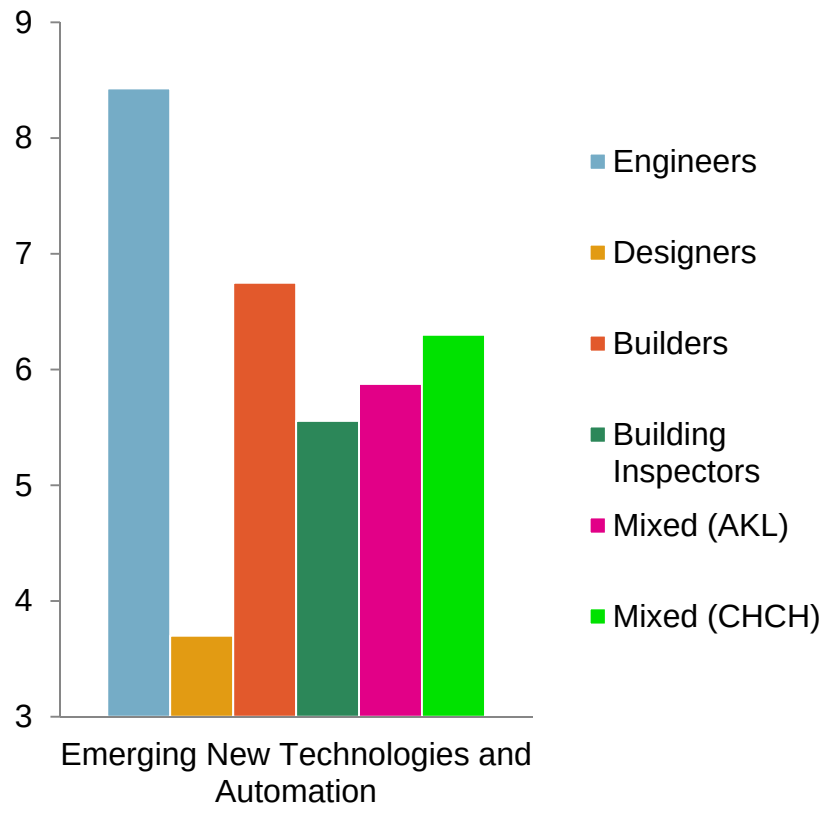
Emerging New Technologies and Automation

"Building has not fundamentally changed at all … like car production lines. Wonder whether we can build houses smarter to lower the cost

Preassembly would add value … walls could be delivered with cladding already on them, correctly fitted

In the US you go to a catalogue to order standard windows that are well made and welded … nicely made and don't leak. We should move towards this sort of standardisation

Other countries are better placed than us to do this … We should import the technologies from Japan and Germany etc, and test them for the New Zealand climate"



The greatest opportunity to improve the existing housing stock is by making existing buildings more energy efficient

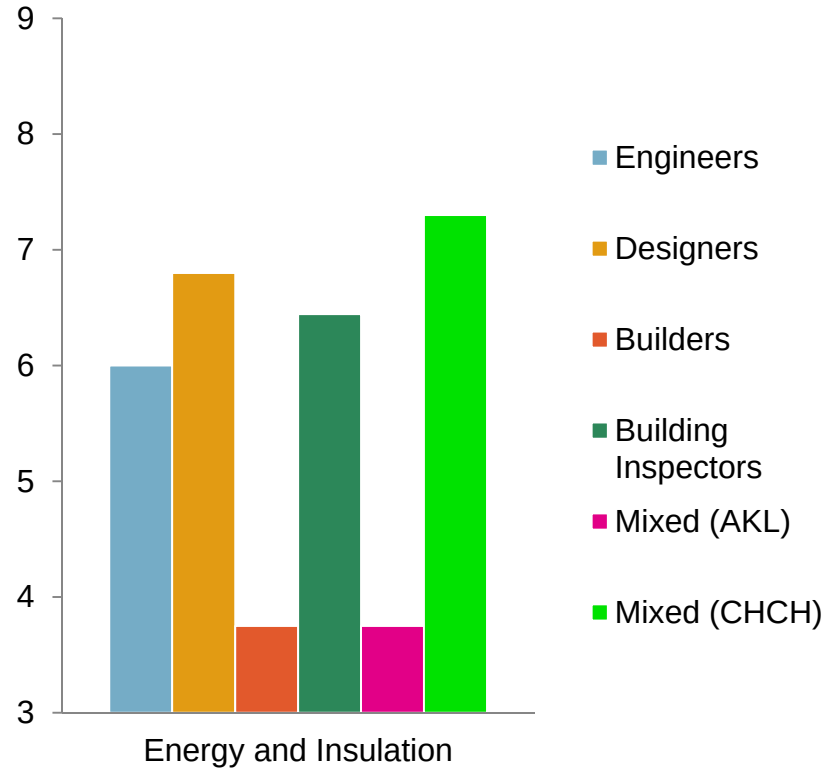
Energy and Insulation

"We only replace about 1% of buildings each year, so the greatest opportunity is to improve the energy efficiency of existing housing stock

If we did this right, we could stop building dams

Every well built house, properly insulated could be a net energy exporter, so a climate driven by design as we have a lot of sunshine

We buy a house every 7 years and replace the kitchen or bathroom, but do nothing to the building envelope or things that really matter"



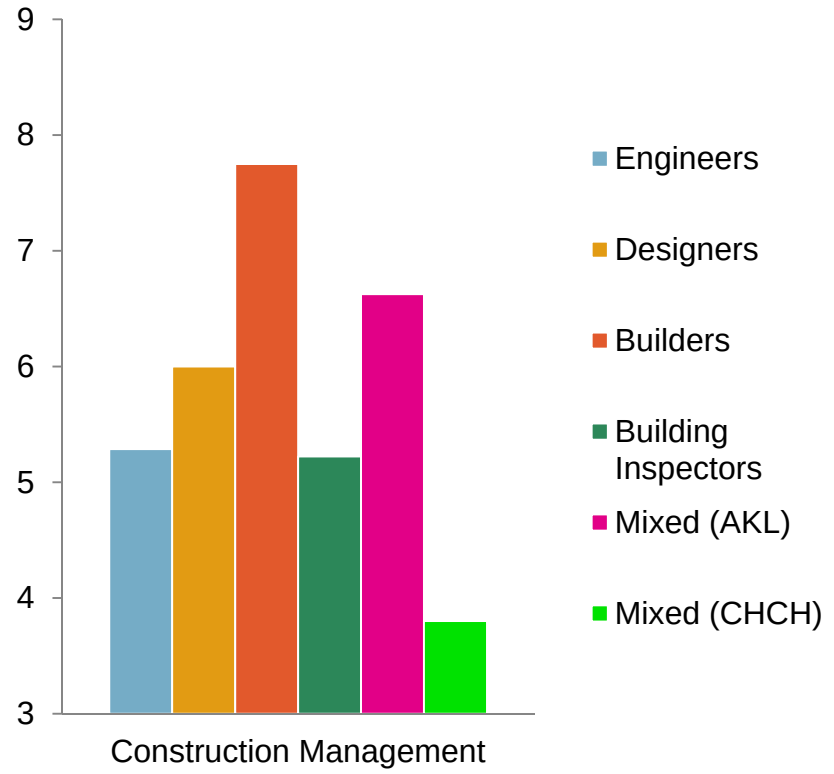
Promoting a stronger team approach where all industry groups work more collaboratively has potential to deliver superior outcomes in terms of better buildings

Construction Management

"BRANZ could potentially get involved promoting the best way to manage projects as they are involved with all industry sectors … promoting a team approach

There needs to be an optimized process for building and it needs to be publicised

Where the builder is brought into the process with the architect or designer early, the projects mostly go a lot better … too often the builder is brought in late and can often see better ways of doing things, but it is too late"



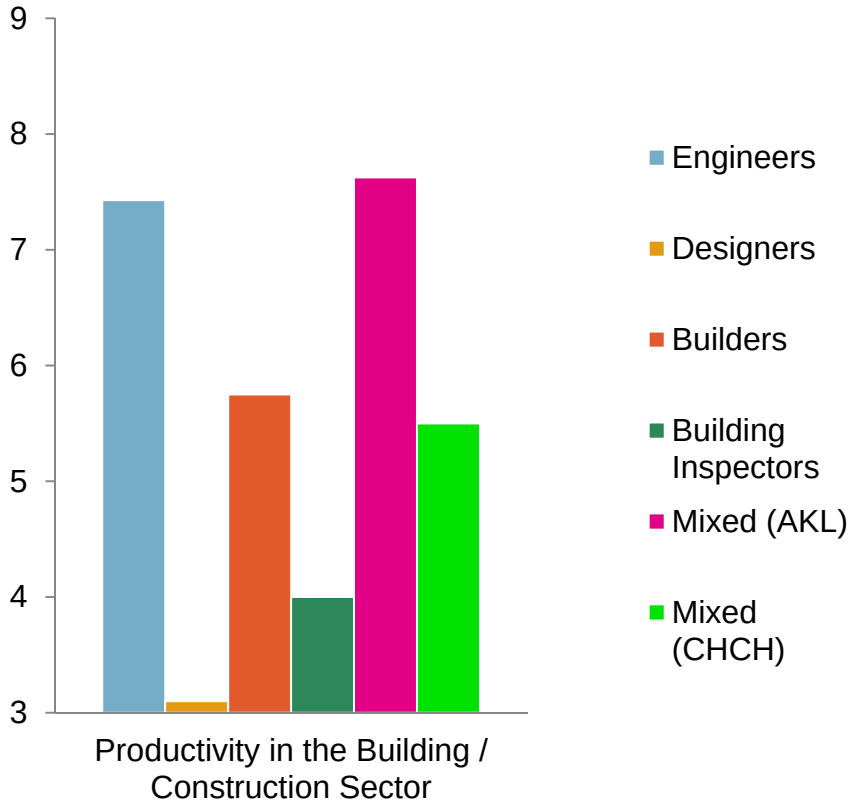
Opportunities for improved productivity are around automation with a focus on pre-assembly. The barriers however are capital investment, the need for volume to deliver economies and the 'boom and bust' cycle that is typical of the industry

Productivity in the Building / Construction Sector

"European and Scandinavian countries seem to be a lot more automated … they do a lot more construction off site

The future focus needs to be on automation, particularly around pre-assembly, but it will require capital investment … but also need volume to make it worthwhile

Part of the issue is that we have a boom and bust cycle … so how do we tool up to maximise productivity and then have to scale back?"



Architects, designers and builders have the strongest interest in the building envelope noting opportunities around a more integrated approach and achieving designs that deliver better energy efficiency and better quality

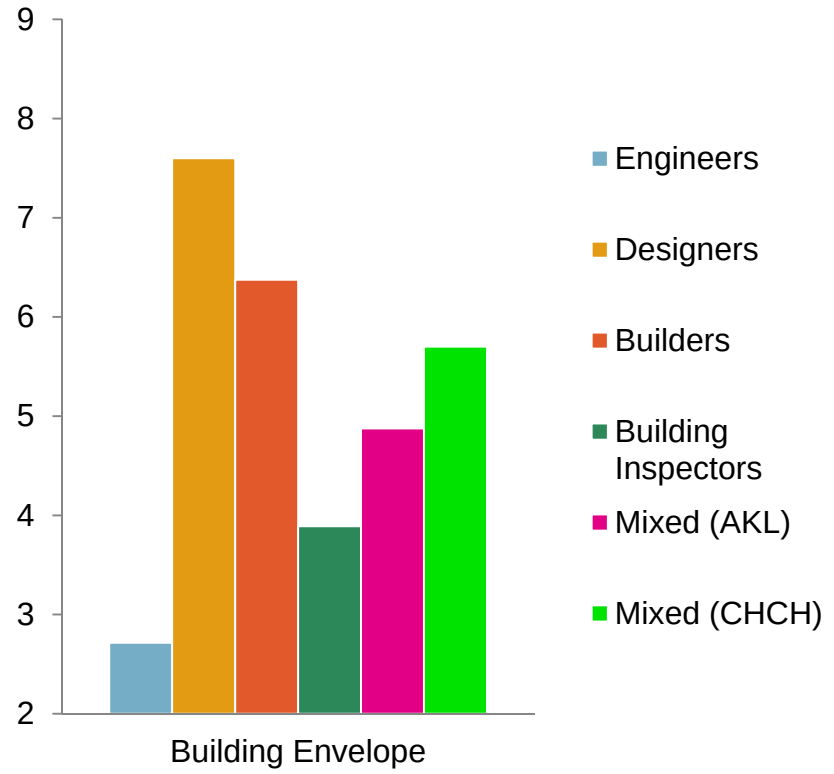
Building Envelope

"The building envelope is the most critical … it is the first line of defence, it is what we design and the most potential to do what we need it to do; deliver comfort, warmth and space

Older buildings had shading and basic comfort but we could pump energy into them because it was cheap … where now energy costs have risen and so have our expectations for comfort

Don't see that BRANZ is taking an integrated approach in their research … just looking at an area in isolation. For example, cavity construction … looking at how air is moving in and out of a building

Our approach has been to drive down cost … but should it be that low? Perhaps we should be aiming for better quality, not the cheapest"



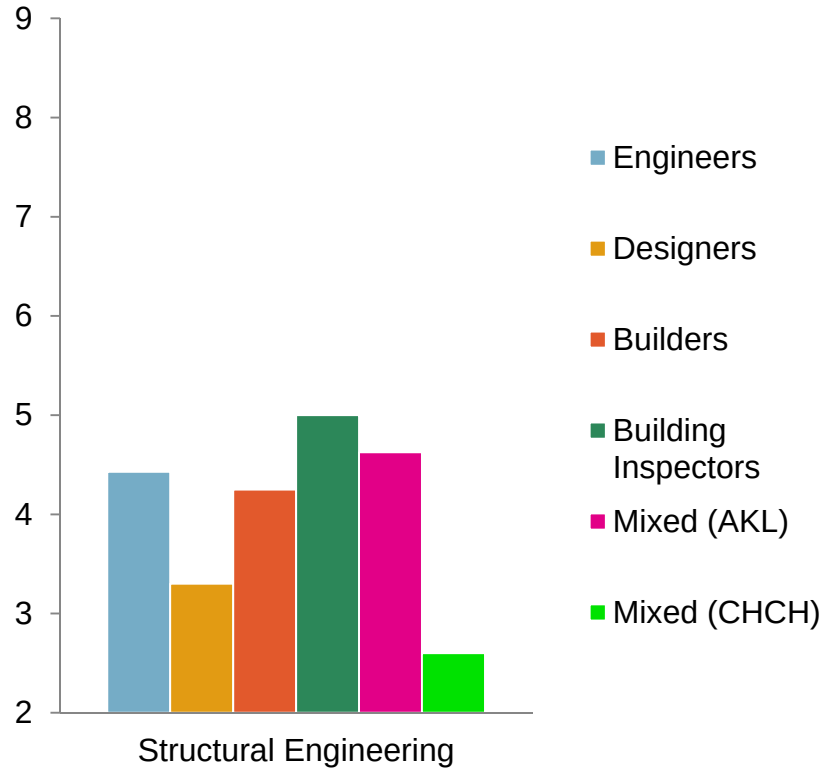
Structural engineering is not a topic that is rated highly in terms of having potential since there is already a vast amount of knowledge available, and this is mostly held in the universities

Structural Engineering

"If I wanted to know about structural engineering, I would not go to BRANZ … it is something that is done in the universities

By and large, we don't need to know much more about structural engineering of domestic buildings

Trying to get some defined standards across the engineering industry. There is no right way of doing things so everyone comes up with their own solutions … we need to think of a better way of doing it to avoid problems"



Refurbishing existing buildings was evaluated across the groups as having the least potential. The opportunity mostly relates to information held about older buildings and how best to assess the viability of refurbishment versus demolition

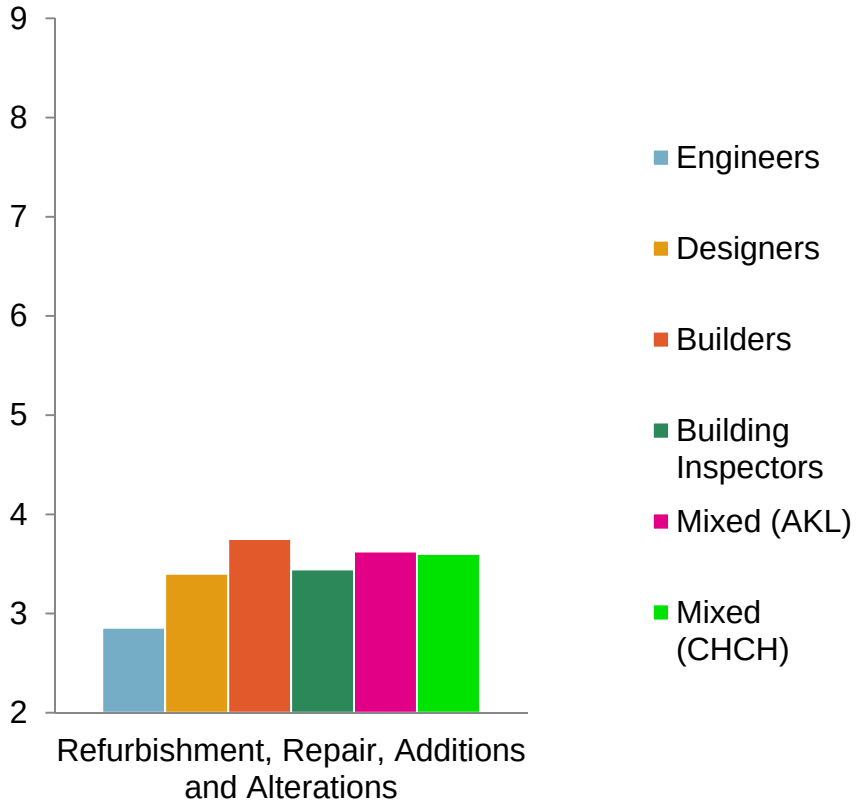
Refurbishment, Repair and Alterations

"There is poor understanding of the processes involved with older buildings and how to manage them … how to discover what's there

There is very poor information about how a building has been built or designed and even worse, information about how the building has been maintained over its life

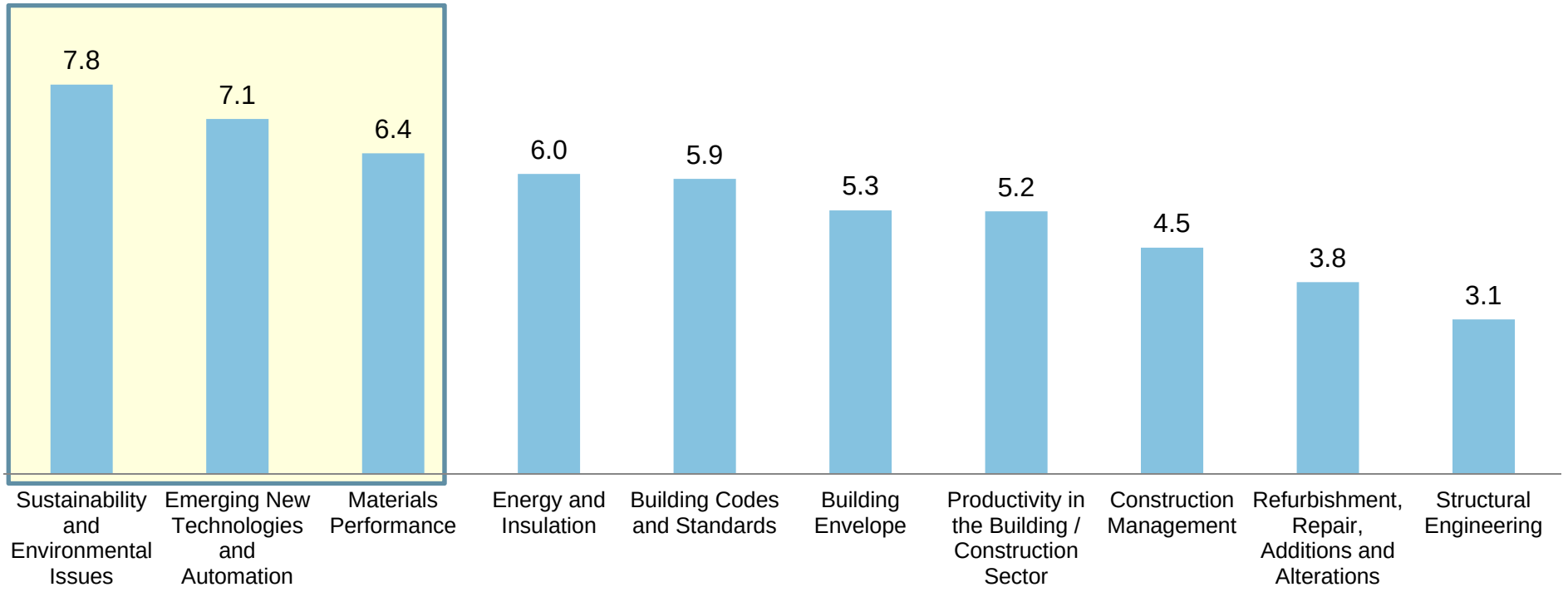
Sometimes there is too much information available from Councils … but it is all jumbled on a CD and takes ages to sort through to find what you need. Councils need better filing systems

The building assessment process … figuring out what can or can't be refurbished"



Collectively, the industry perceives that the most significant knowledge gaps also occur with the topics that they consider have the greatest potential to contribute to better buildings

Topic Areas with the Largest Knowledge Gaps (Averaged Ranking) (1)



Sustainability and environmental issues is the area that is perceived to have the largest knowledge gap

Notes: 1. Average importance ranking where 10 = most important and 1 = least important

The technology around sustainability and environmental issues is seen as expensive, within New Zealand knowledge is limited and people won't invest because the focus is short-term rather than life-cycle based

Sustainability and Environmental Issues

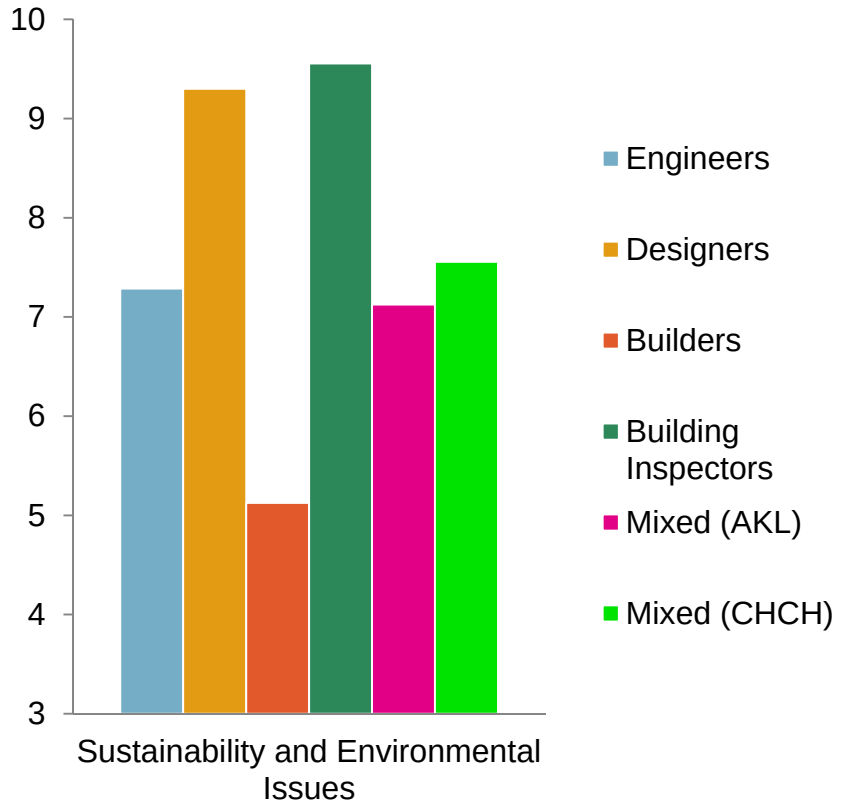
"Perceived that we already know how to build a sustainable, energy efficient house, but the information is not widespread

The problem is the cost … and until more people are doing it and the technology becomes more widespread, the cost won't come down

People don't look at the life-cycle cost … and they won't until this is taxed … until there is a penalty

There is heaps of information worldwide … BRANZ could be collecting this, condense it and put it to Government as a way to move forward

There is a real lack of knowledge around building a sustainable city, such as the opportunity that we have with Christchurch"



There is considerable uncertainty across the industry as to what new technologies are emerging and how they will impact, and who should help the industry determine what should and should not be adopted

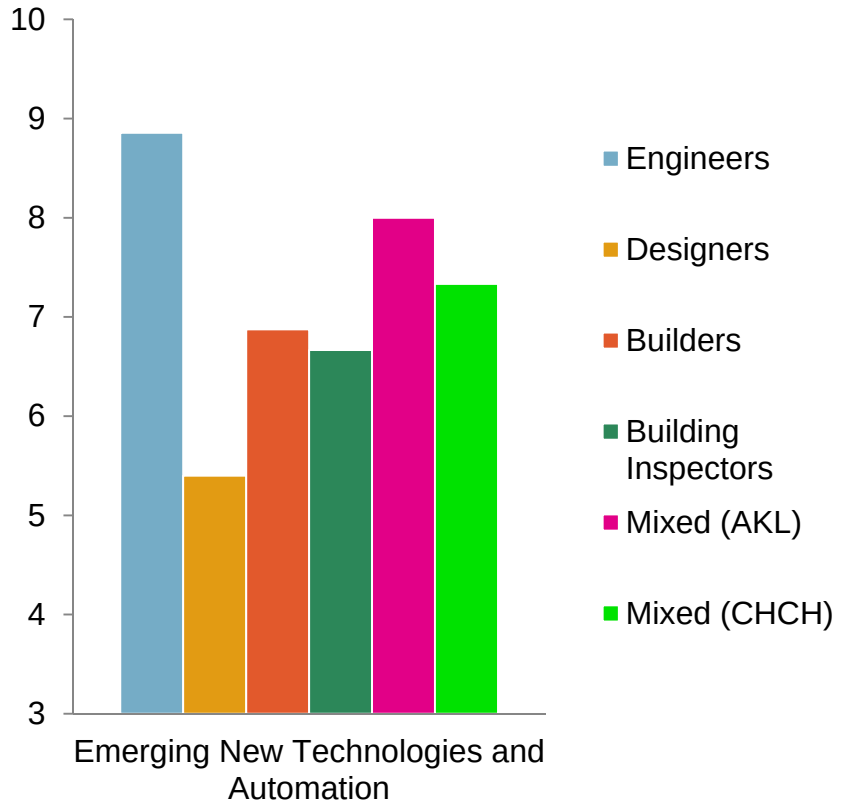
Emerging New Technologies and Automation

"We are a consumer society driven by manufacturers and new products. Codes and standards have difficulty keeping up and this is where gaps will occur

We need someone like BRANZ to review new technologies and provide a 'Consumer Magazine' of the pros and cons and applicability for New Zealand

Government should run studies to figure out what works … what the better systems are

We should be evaluating things like ground source heat pumps … important for energy and sustainability"



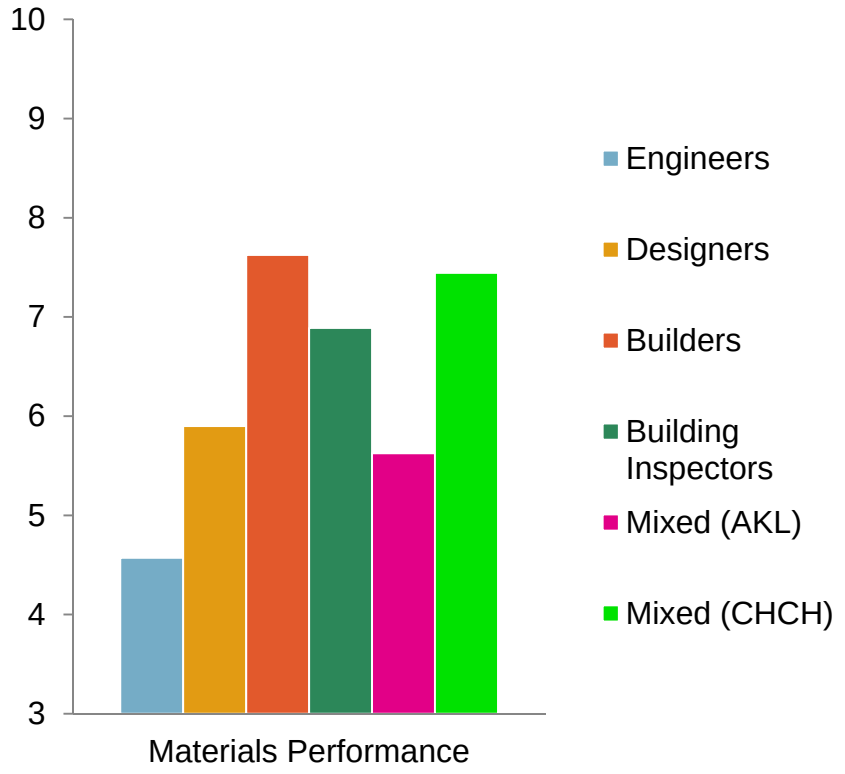
The knowledge gap with materials performance relates to how different materials will perform when joined in a system, as opposed to performance in isolation

Materials Performance

"We have information about the materials, but it is knowing how they will perform when various different materials are linked together

In the UK for example, materials failure is regularly dealt with and they don't hide it

It's about risk and reward … if you do push architecture you will always have the risk that it may fail"



There is widespread belief that considerable work has already been done within the areas of fire and earthquake engineering and as such, there is limited potential to improve or to add new knowledge

Fire & Earthquake Engineering

- Systems are already in place, based on research from universities worldwide
- It has historically been an important area but has been addressed
- This is not seen as an area that the industry would look to BRANZ to address, but to universities
- That newer buildings mostly stood up to the Christchurch earthquake was cited as evidence that sufficient research has been done

"This has been well researched and there are good standards and guidelines in place

This was important up until the 90s, but it has been researched and there are strict rules in place

Where does the competency around this rest. I would not go to BRANZ for engineering … it is an important topic but at an academic level … at the universities

The question is do we design to achieve a result where buildings have a life after a major earthquake, or they stand up sufficiently that you can get out the door"

Various potential issues are foreseen for the industry including harm from electrical fields, chemical use within buildings, consequences of a changing environment, resource depletion, an aging population and geotechnical considerations

What we Don't Know

- Increased use of electronic technology within buildings has increased exposure to electromagnetic fields without understanding the risks
- Almost everything that goes into buildings is based on chemical compounds, yet we don't fully understand how these will perform over time and the potential consequences to our health
- Resource depletion has potential to drive us to new and untested products, or to fundamentally change how we build
- A changing environment means that products that currently perform well may not be as suitable in the future
- The aging population means that building utility may no longer be appropriate. We may need buildings that are more integrated and specialised
- As pressure for land increases we are increasingly forced to consider building on less desirable and higher risk land. Geotechnical issues represent a big unknown

Opportunities for BRANZ were largely seen around education and taking on a leadership role for the industry by identifying future challenges and providing direction

BRANZ Improvement Opportunities

BRANZ could take on a stronger education role for the industry

> *"They used to do a lot of seminars that were fantastic"*

BRANZ needs to be closer to the industry to better understand the issues first hand

> *"They used to employ people to cruise around the building sites and see what was actually happening … going beyond theory"*

BRANZ needs to provide vision for the industry and provide guidance as to future direction

> *"Like to see them taking a big picture look and give us guidelines as to the direction we should be heading and the challenges that we need to confront in the medium and long term"*

Creating a greater level of public awareness is identified as an opportunity and also improving what and how BRANZ communicates research findings to the industry

BRANZ Improvement Opportunities (Continued)

BRANZ should achieve a higher public awareness

> *"They should do more to raise public awareness so a BRANZ appraisal means something to the customer"*

BRANZ should consider researching the lifestyle use of buildings

> *"While we build all these buildings, no one does any research to assess how good they really are to live in… how are the buildings we are developing adding to the quality of life"*

BRANZ needs to communicate more with the industry about its research outcomes

> *"They are seen to do a good job selecting topics for research… but not enough filters through to the industry and sometimes it is just presented at a scientific conference. There is a need to make the research understandable and relevant"*

Although some criticism was directed at BRANZ's performance, industry representatives were virtually unanimous that BRANZ does a good job and that the industry was better off as a result

BRANZ

"Although we can be critical, the country is much better off for having BRANZ and we would all love it if they were even better … but I am grateful that they exist and what they have produced I have found really useful"

"BRANZ has been and continues to be a constant anchor and point of reference. One plea is that whatever BRANZ do, they need to maintain independence and never be swayed by Government or manufacturers"

Section 4

Appendix

Topics with the Most Potential

Topic Potential

	Engineers	Designers	Builders	Building Inspectors	Mixed (AKL)	Mixed (CHCH)
Building Envelope						
Construction Management						
Energy and Insulation						
Building Codes and Standards						
Materials Performance						
Refurbishment, Repair, Additions and Alterations						
Structural Engineering						
Sustainability and Environmental Issues						
Productivity						
Emerging New Technologies and Automation						

Rank	Icon
Bottom 2	
3-4	
5-6	
7-8	
Top 2	

Topic Information Gaps

Topic Information Gap

	Engineers	Designers	Builders	Building Inspectors	Mixed (AKL)	Mixed (CHCH)
Building Envelope						
Construction Management						
Energy and Insulation						
Building Codes and Standards						
Materials Performance						
Refurbishment, Repair, Additions and Alterations						
Structural Engineering						
Sustainability and Environmental Issues						
Productivity						
Emerging New Technologies and Automation						

Rank	Icon
Bottom 2	
3-4	
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7-8	
Top 2	