

CONFIDENTIAL



REANNZ ECONOMIC VALUE ASSESSMENT

December 2008

Summary Discussion Document

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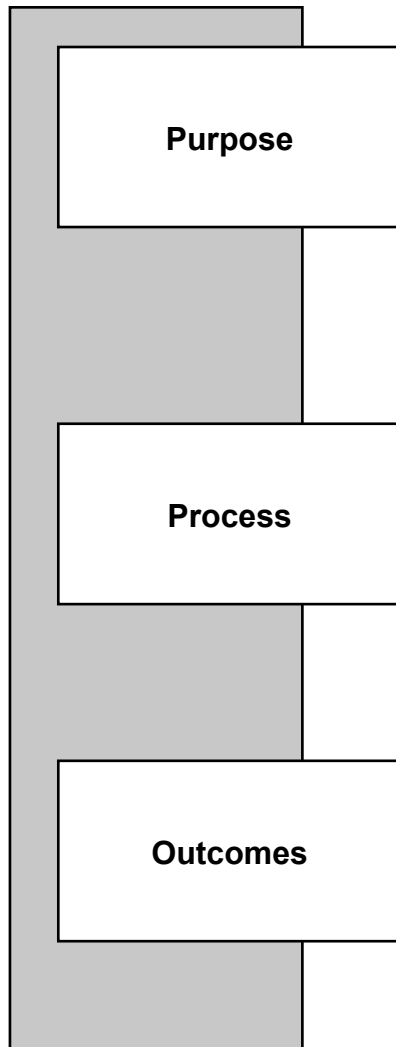
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Temple: Capital Investment Specialists was commissioned by REANNZ to undertake this independent assessment of the economic benefits of REANNZ and

KAREN

PURPOSE, PROCESS AND OUTCOMES OF THIS STUDY



The purpose of this study is twofold:

- to estimate and communicate the *minimum* economic value of KAREN and REANNZ to shareholders, stakeholders and KAREN users
- In doing so to facilitate the decision by the Crown to invest further in REANNZ
- To provide a value estimation framework that will allow new uses and new users to be added and value to be measured and monitored as it evolves

We have created a framework that examines economic value accruing to members and non-members of REANNZ. We have further segmented economic value into monetisable value (i.e. could be captured today by investors) and non-monetisable value (cannot be captured by investors today for a variety of reasons). Given resources constraints we have focused on selected sources of value to provide a *minimum* estimate of the economic value

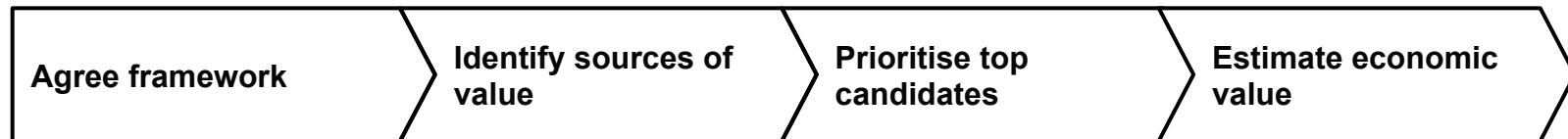
There are three principle outcomes from this study:

- An economic value framework has been created
- A qualitative review of benefits types and drivers has been generated
- Estimates of the economic value of three specific benefits have been made to give a *minimum* estimate the economic value from Crown investment in REANNZ

EXECUTIVE SUMMARY

- A robust, independent assessment of the economic value of KAREN has been commissioned by REANNZ and under taken by Temple: Capital Investment Specialists
- The assessment examined international research into the emerging drivers of value in high-speed communications networks and explored the New Zealand implications with the help of New Zealand sector experts
- The assessment explored three areas of potential economic benefit in detail: experimental and advanced research (REANNZ members), teaching and training (REANNZ members), and wider community spillover benefits
- The study concluded that over the next five years *minimum* benefits of ~\$200M per annum will flow by 2015 from the Crown's annual cash contribution of \$51m over this period (including \$9m / annum for KAREN) i.e. \$1 of Crown contribution provides a *minimum* of \$4 of ongoing national economic benefits that the market won't deliver.
- This document is an abridged version of the economic value study. The full study is available at <http://www.karen.net.nz/publications/>

WE HAVE TAKEN A SYSTEMATIC APPROACH TO ESTIMATING THE MINIMUM ECONOMIC VALUE



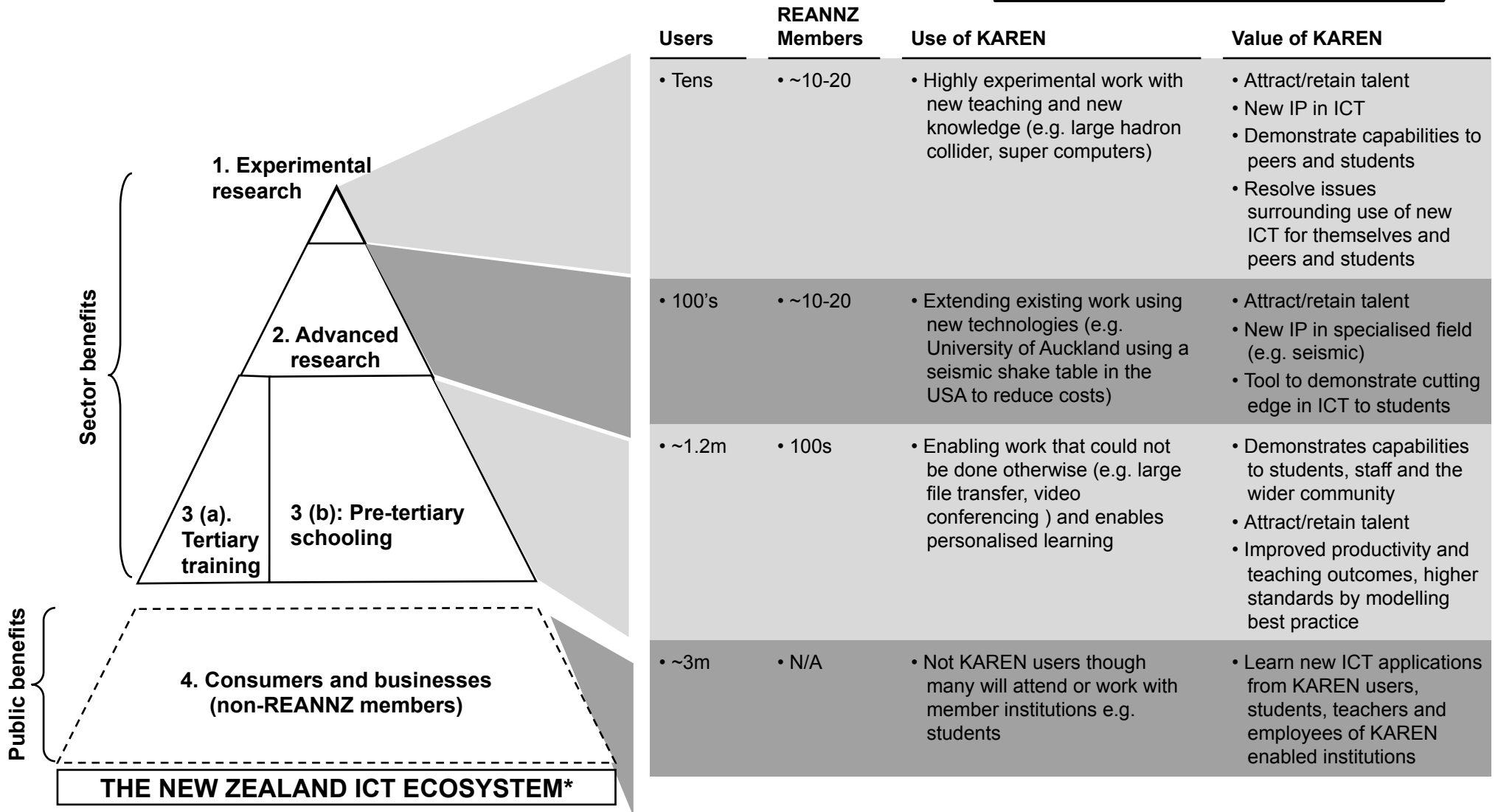
What?

- | | | | |
|---|---|---|---|
| <ul style="list-style-type: none"> • Finalise the framework that will be used to estimate value • Agree on a working definition of economic value | <ul style="list-style-type: none"> • Identify the potential drivers of economic value that are delivered or enabled by KAREN | <ul style="list-style-type: none"> • Identify three to five sources of value that will make a significant contribution to economic value to NZ • Validate the availability of data and research to make robust estimates for each | <ul style="list-style-type: none"> • For each segment estimate the economic value and the recipient that this value flows to |
|---|---|---|---|

Outcomes

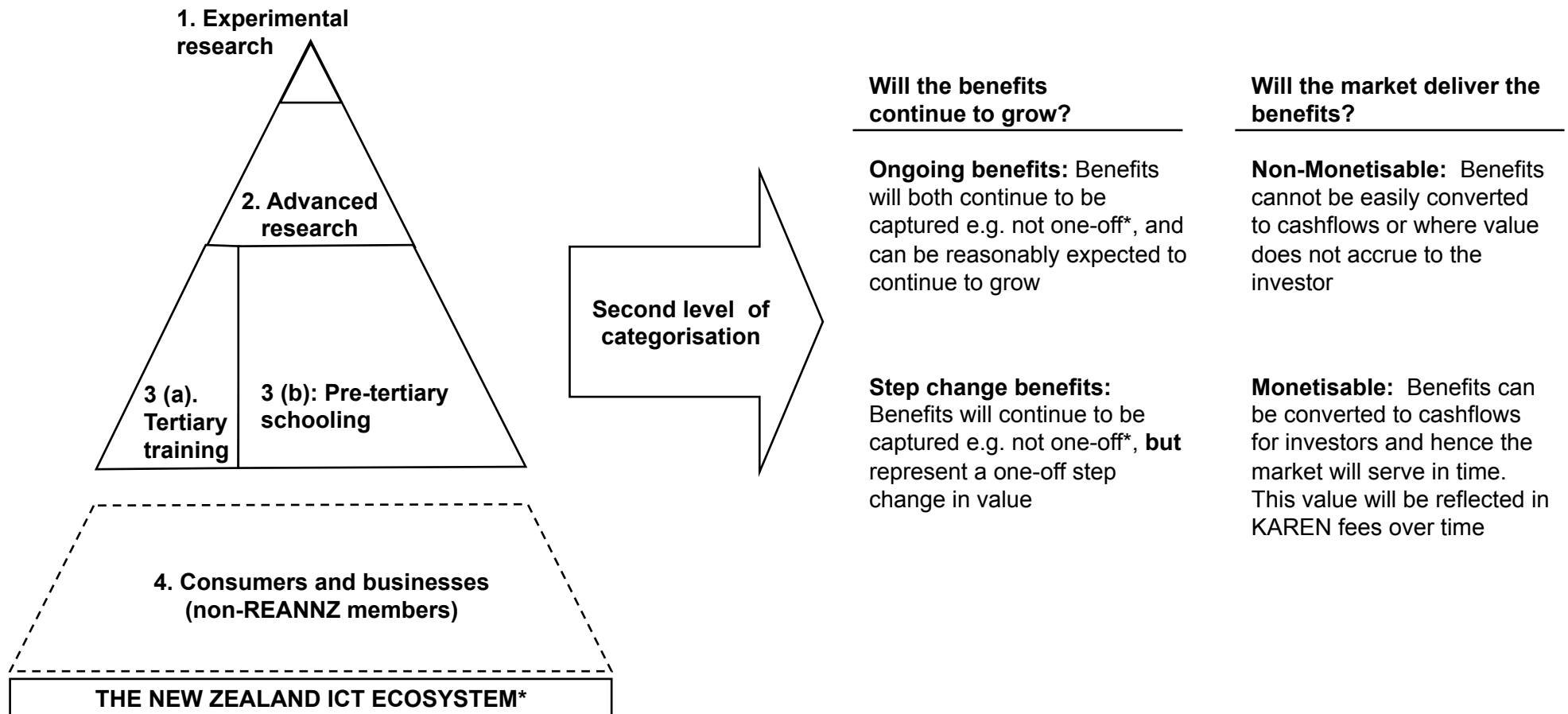
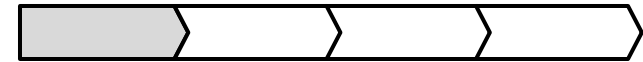
- | | | | |
|--|---|---|--|
| <ul style="list-style-type: none"> • Economic value framework that considers where members are in the ICT ecosystem and whether the value is monetisable • Decision to focus on non-monetisable benefits | <ul style="list-style-type: none"> • A list of 38 sources of value categorised by likely value recipient and estimated value (L/M/H) | <ul style="list-style-type: none"> • Four segments for analysis <ul style="list-style-type: none"> – Sector: University research productivity – Sector: High school teaching productivity – Sector: High schools teaching quality – Public: Accelerated uptake of ICT | <ul style="list-style-type: none"> • Estimate of annualised economic benefits to 2015 • Quality framework and quality assessment |
|--|---|---|--|

THE ECONOMIC VALUE FRAMEWORK CONSIDERS FOUR BENEFIT GROUPS



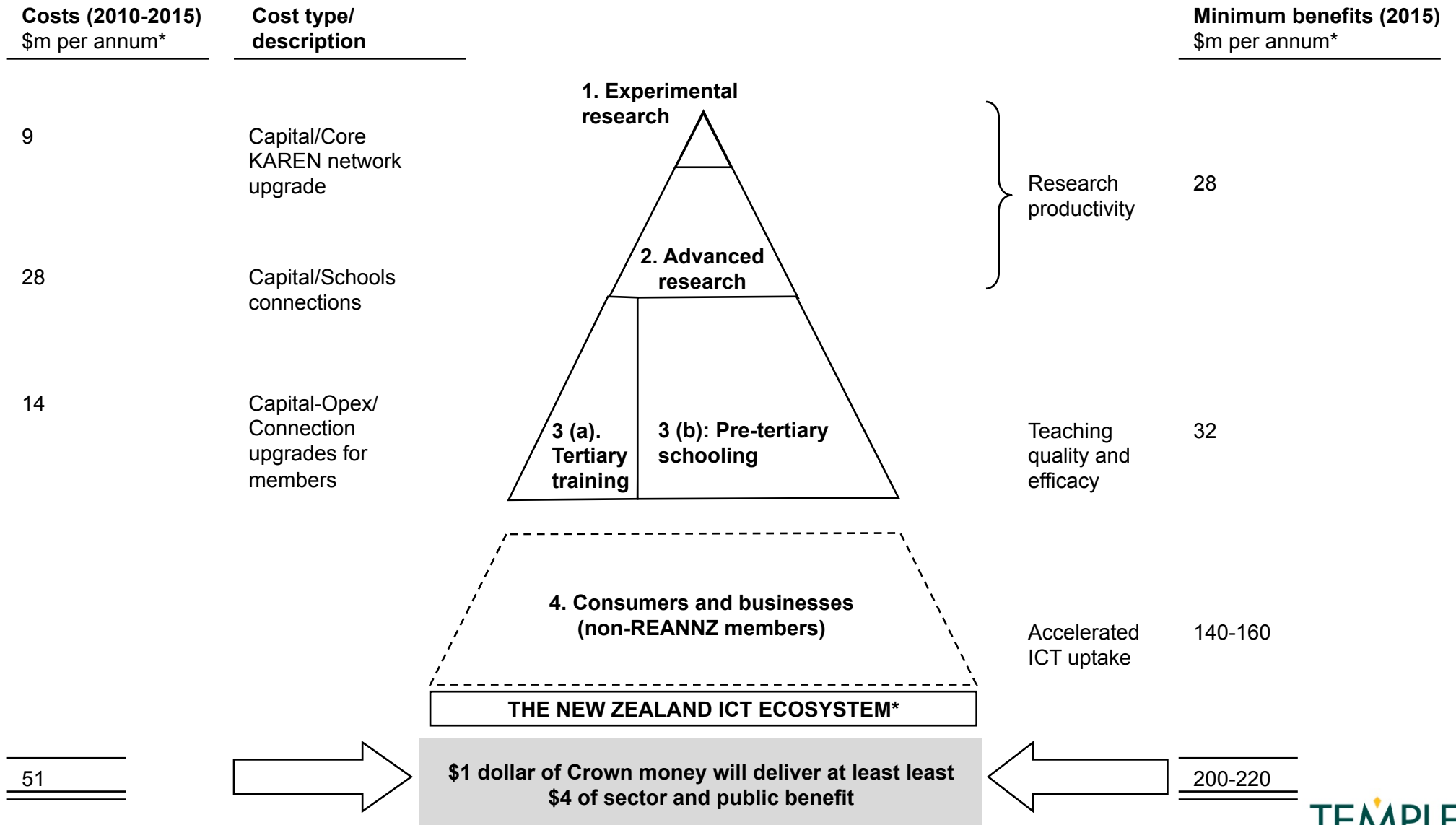
* See Appendix p.46 for a more complete view of the ICT ecosystem
Source: Interviews

BENEFITS HAVE BEEN CATEGORISED BY GROWTH AND MONETISABILITY



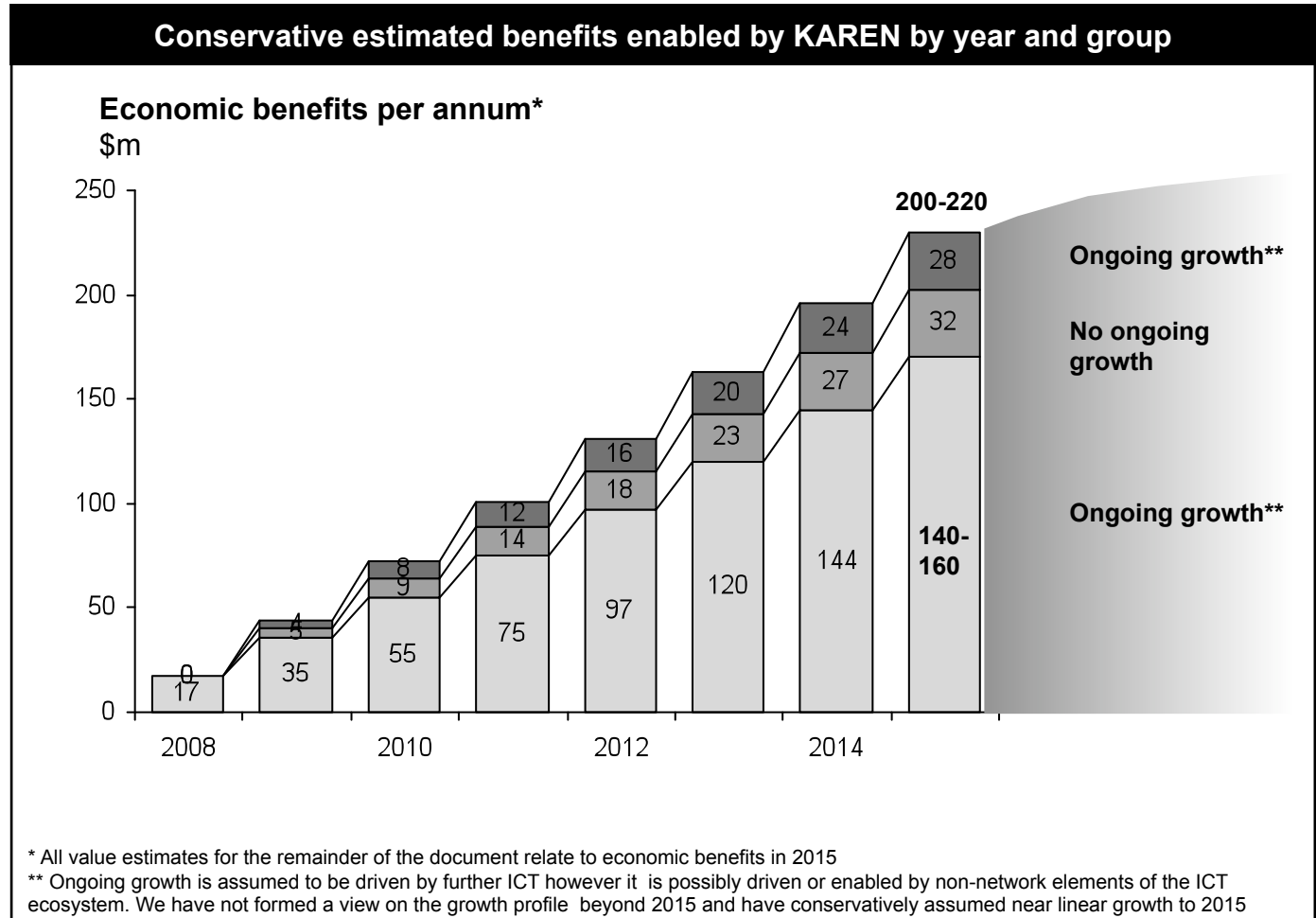
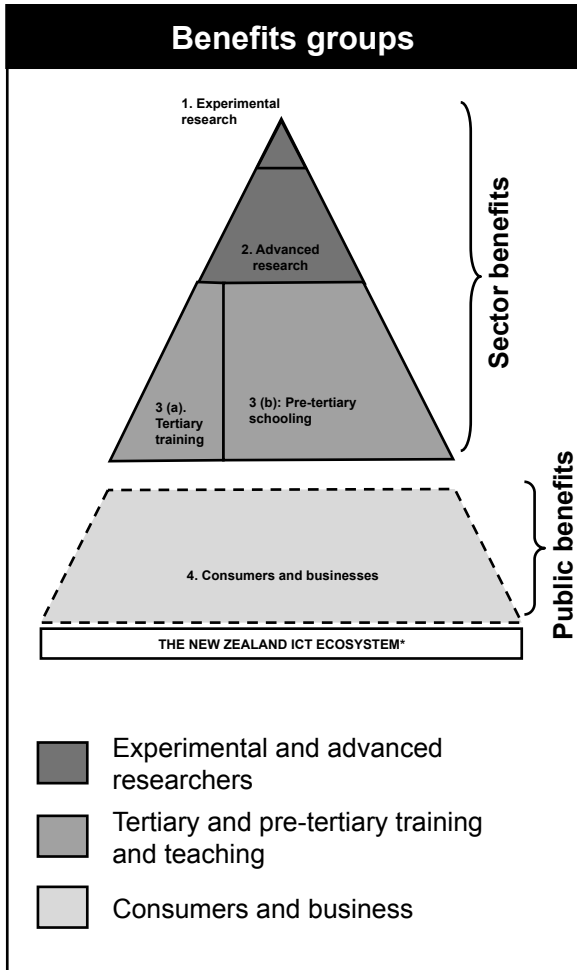
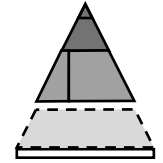
*One of benefits might include one-off releases of working capital or assets or temporary cost reductions

\$1 OF CROWN INVESTMENT DELIVERS AT LEAST \$4 OF ONGOING PUBLIC AND SECTOR BENEFIT

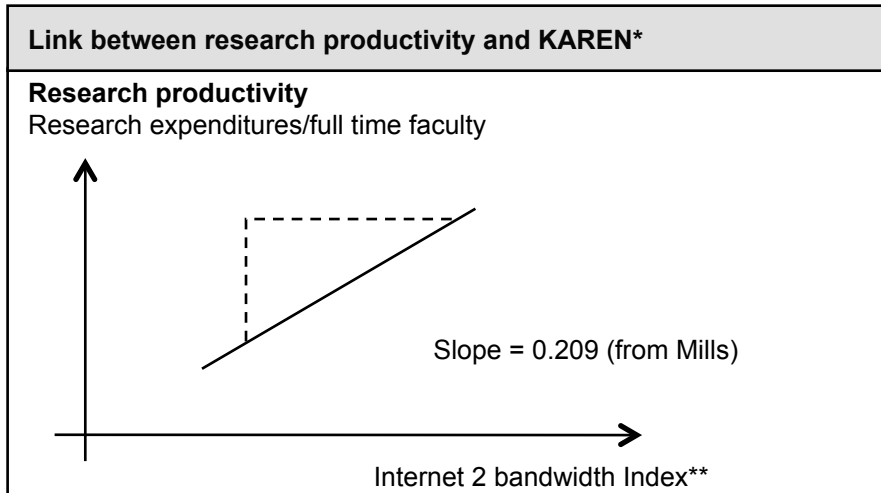
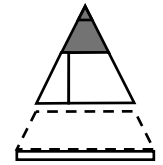


* Annualised – five year period
 ** Run rate benefits by 2015

ANNUAL MINIMUM BENEFITS REACH AROUND \$200M BY 2015 WITH SOME CONTINUED GROWTH THEREAFTER



THIS RESEARCH SHOWS MOVING KAREN TO THE NEXT GENERATION WILL INCREASE RESEARCH PRODUCTIVITY BY ~\$28M PER ANNUM



We have assumed New Zealand's value is lower

New Zealand's capabilities are lower

- Mill's study showed that IT capacity has a significant correlation with research productivity. Because of lack of funding for high speed internet in New Zealand over the past decade there is reduced IT capacity

We have taken a conservative view

- To ensure estimates are conservative we have halved the link between KAREN and research productivity (i.e. assumed 1:0.1 rather than 1:0.209)

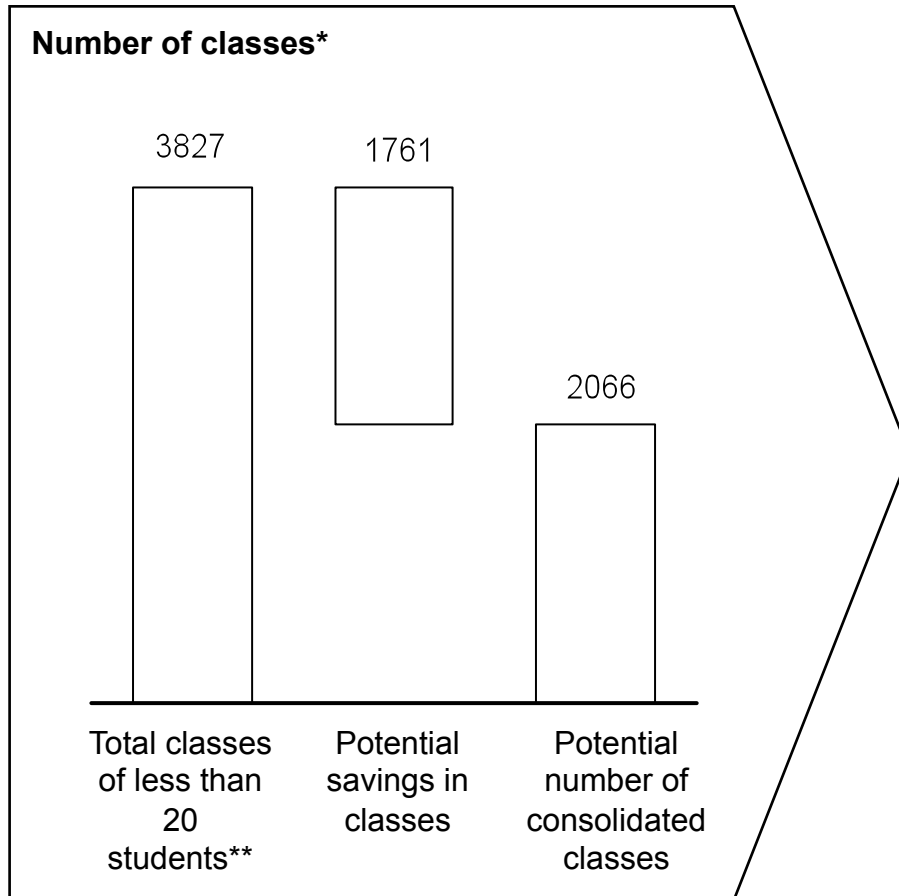
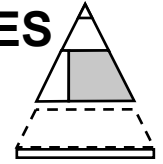
Benefits to the Research Sector (non-monetisable)		
<p>These benefits are non-monetisable... Research productivity gains can be captured as savings through headcount reduction or increases in output for constant staffing.</p> <p>We have assumed these benefits are the former and therefore represent increased outcomes for constant cost to the Crown. We assert this will allow New Zealand research institutes to maintain the same relative position against international peers who are also investing heavily in leading edge ICT.</p> <p>Source: NZ Library Statistics</p>	... and worth ~\$28m / annum to New Zealand	
	Academics in New Zealand***	: 4,000
	÷ Effective increase due to KAREN	: 10%
	Effective new researchers	: 400
	Benefits (FTE)	<u>400 FTE</u>
	Economic value (@\$69,423/FTE)	<u><u>\$27.8m</u></u>

* Assumes similar probabilistic relationship in New Zealand to Internet 2. This is supported by the analysis of EU countries that shows a similar (0.27) correlation

** The index can be considered a shift in 'generation' of Internet 2 i.e. to next generation. For the purpose of value estimation we have assumed only one generation change. In practice this evidence suggests remaining advanced will provide additional benefits

*** This is a conservative estimate of researchers in New Zealand given FTE at universities is ~11,000 (Library Statistics New Zealand) and some experts estimate ~20,000 researchers in New Zealand. Additionally this does not factor in the wider benefits of increased research capacity to New Zealand. As such, this may undervalue research by a factor of 10+

LIVE CONTENT WILL INTRODUCE EFFICIENCIES FOR STAFF IN SMALL CLASSES AT A MINIMUM OF \$27M



Discussion and benefits

- If in-class video conferencing could be run efficiently ~2,000 classes of teaching time could be freed up
- At current salary this creates at least \$27m in labour savings (~4% of current teacher costs) that could be redeployed to other higher value activities
- Additional non-quantified benefits include selecting best-of-breed teachers for specialised topics, expanding the potential curriculum to all schools and allowing foreign i.e. offshore teachers to work in NZ remotely

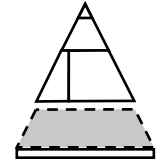
A minimum of \$27m in productivity from in-class video conferencing to create economic class sizes

Source: Ministry of Education

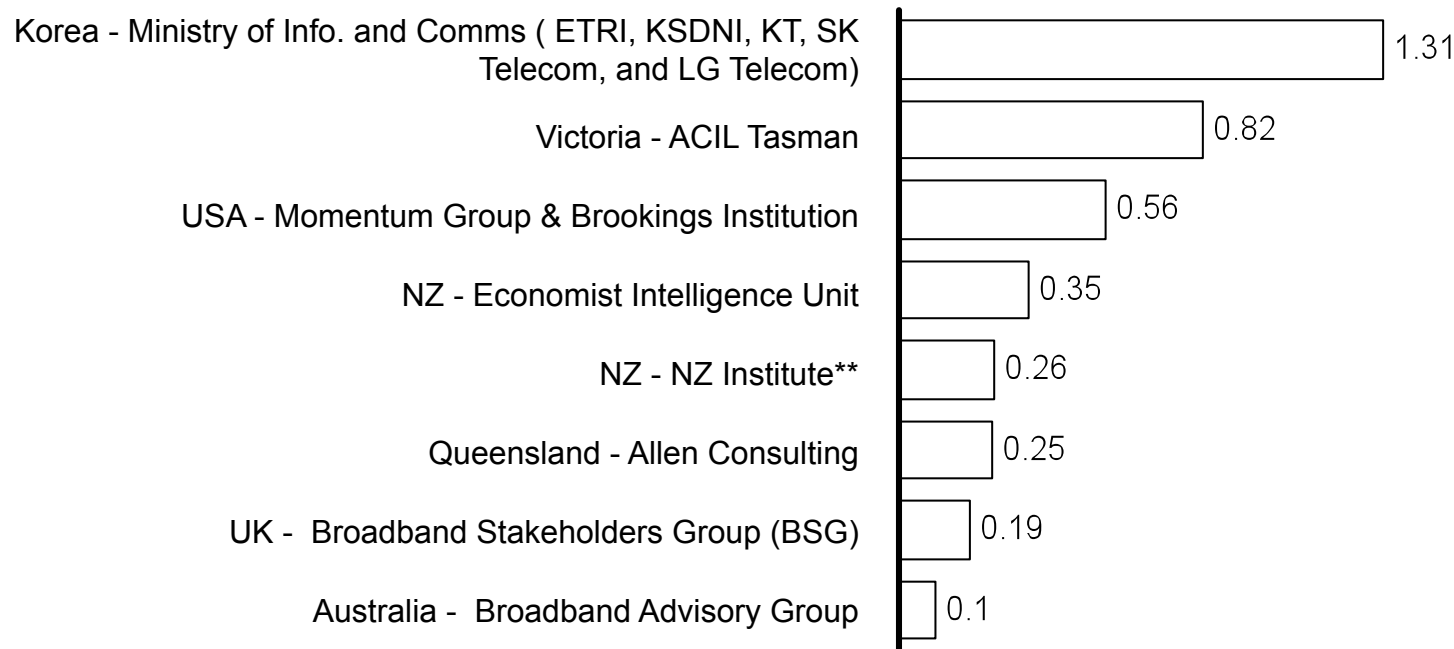
* Assumes a subject with less than 20 people can be taught by one person today, average salary \$65,000, 5 subjects per teacher, teacher cost is salary x 1.2

** 20 students is considered to be a minimum economic class size

EIGHT OTHER STUDIES SUGGEST BROADBAND-ENABLED ICT GROWS GDP BY A MINIMUM OF \$170M PER ANNUM (0.1-1.31% INCREASE IN GDP CAGR)



Estimated impact on GDP*
Percent CAGR (2007-2015)



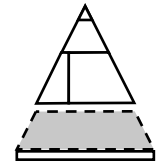
Eight independent studies into the GDP impact of consumer and business broadband suggest a contribution to growth of 0.1-1.31% over the period 2007-2015. 0.1% growth represents ~ \$170m per annum

* Synthesis of results converted to common measure over the period 2007-2015

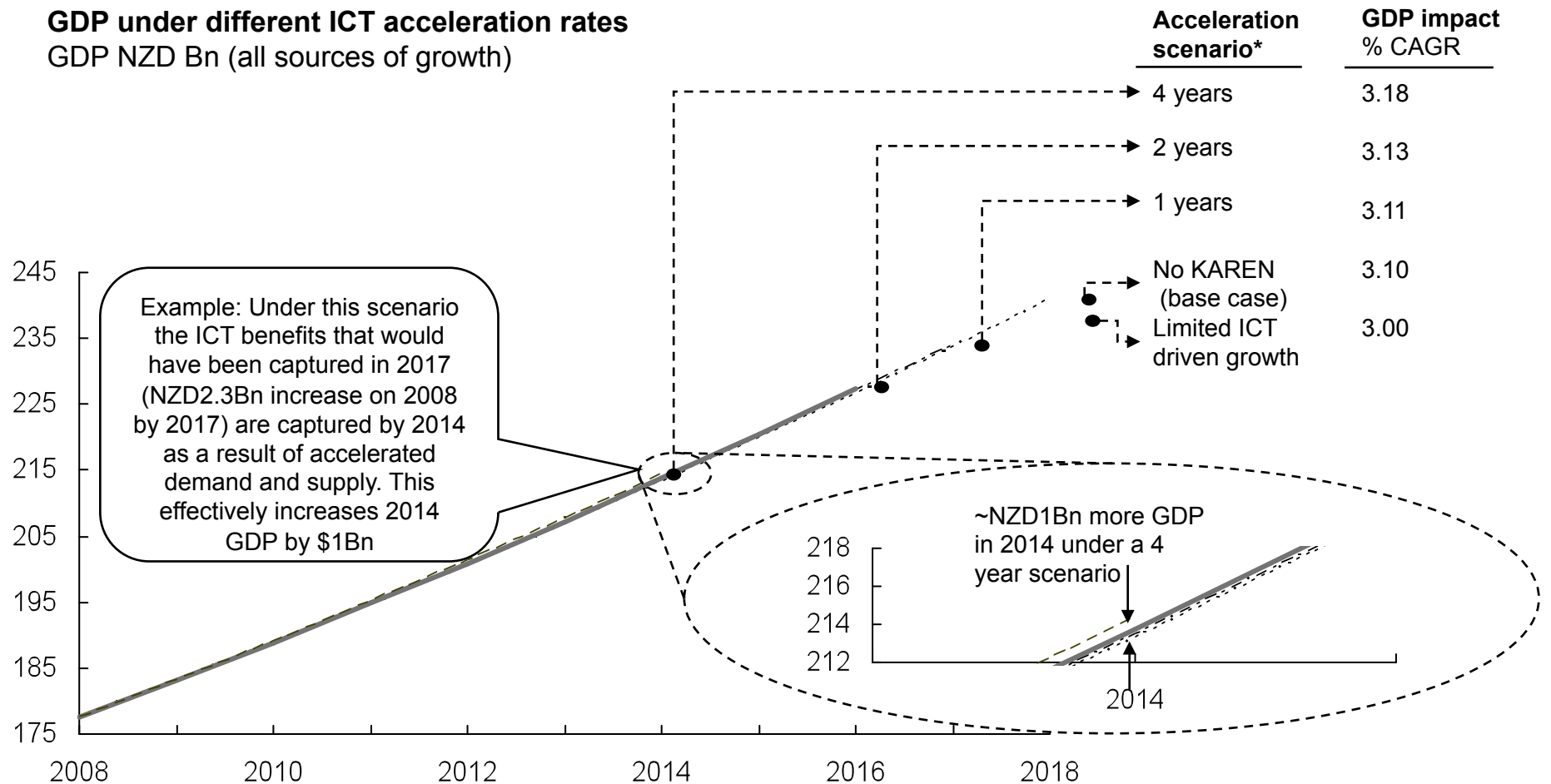
** Mid range estimate.

Source: Company sites; press clippings.

USING THE LOWEST ESTIMATE OF ICT IMPACT, ACCELERATING OUTCOMES BY ONE YEAR OVER TEN CAN ADD 0.01% CAGR TO GDP GROWTH



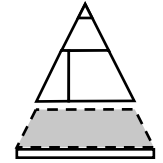
GDP under different ICT acceleration rates
GDP NZD Bn (all sources of growth)



* We have considered scenarios where 2018 GDP growth resulting from ICT would be achieved 1, 2 and 4 years earlier under the accelerative effects of KAREN. For each scenario we have used the year in which ICT contribution to GDP (2018) is brought forward and estimated the effective GDP growth rate from accelerative effects. Our 'No KAREN' scenario assumes the minimum GDP growth from the eight studies (+0.1% CAGR) in addition to base GDP growth. We have further assumed all ICT growth is additive to historical growth. We have chosen 3% CAGR for baseline growth

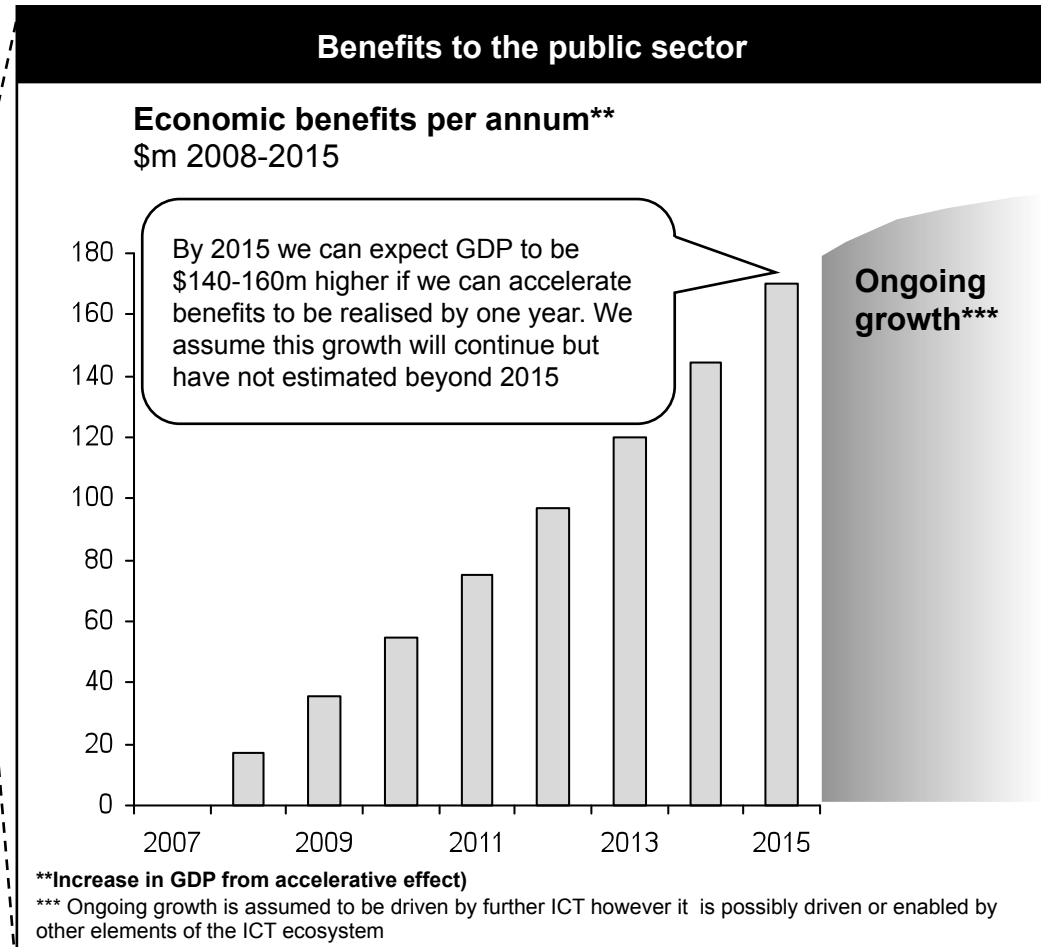
Source: Statistics New Zealand, Temple analysis

A 0.01% INCREASE IN GDP GROWTH LEADS TO TOTAL ANNUALISED NON-MONETISABLE PUBLIC BENEFITS IN 2015 OF \$140-160M



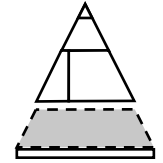
	Percent*	\$m
Non-monetisable	75-67	160-140
Monetisable	25-33	94-114

GDP increase to 2015 from accelerative effect of KAREN*: **\$254m**



* Based on a one year acceleration of a ten year timeline, 0.1% GDP growth in addition to historical growth. An examination of underlying value drivers suggest a large proportion of the benefits are not monetisable e.g. time saved traveling to work may not be captured by the employer, health benefits cannot be captured due to funding disconnects. We have used New Zealand Institute estimates to guide this assumption. We have further assumed that there are no KAREN GDP benefits in 2007, that growth is realised by 2015 and growth is linear.

EXPOSURE TO LEADING EDGE TECHNOLOGY HAS BEEN SHOWN TO ACCELERATE SUPPLY AND DEMAND

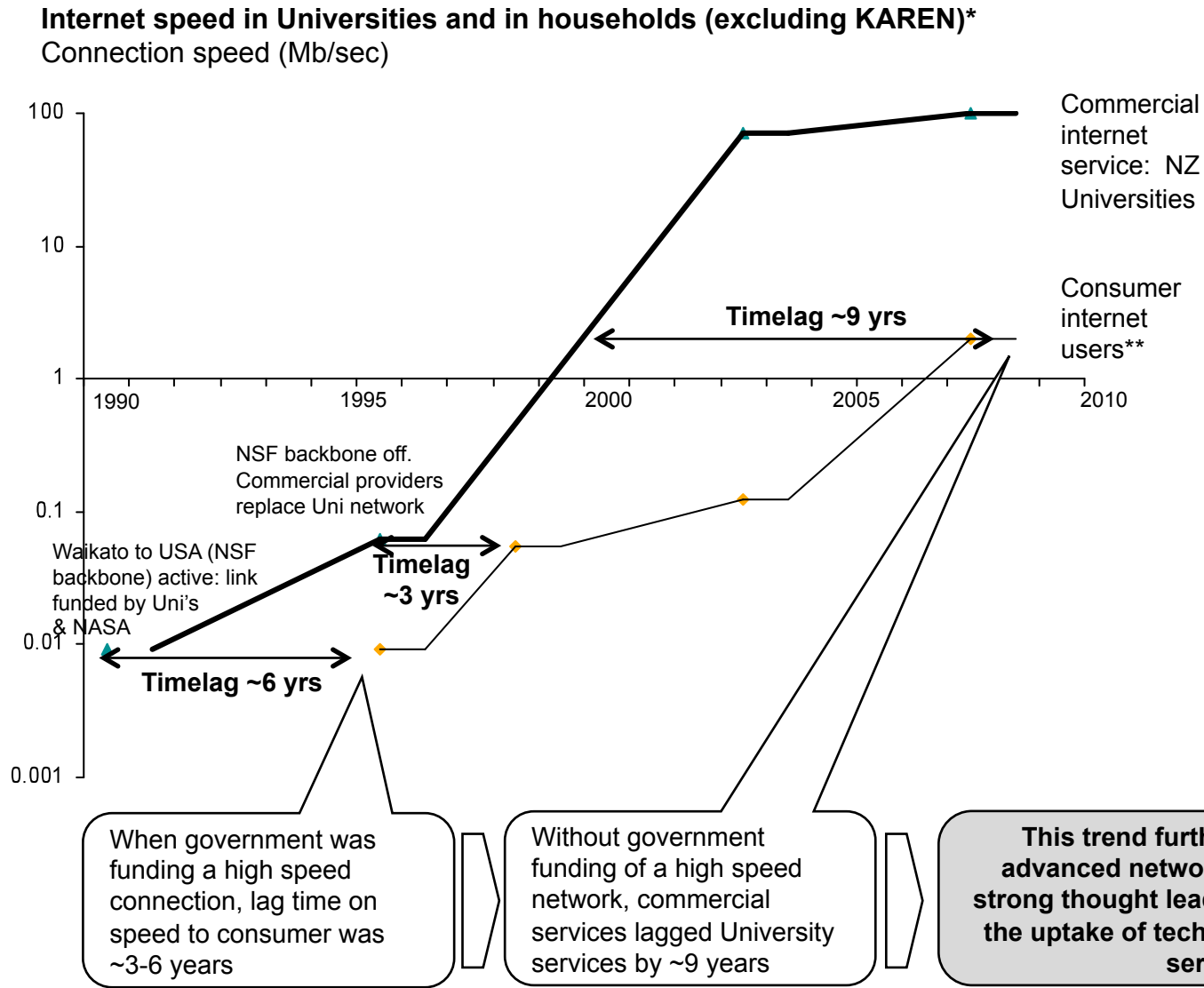
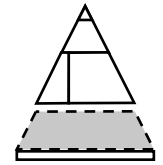


	<u>Beneficiaries of leading edge technology</u>	<u>Four examples of exposure driven ICT adoption</u>
Direct Exposure to ICT	<ul style="list-style-type: none"> • University students and staff • Tertiary students and staff • Potentially non-tertiary students and staff 	<ul style="list-style-type: none"> • Example 1: The use of ICT by schools drives adoption - In an Australian study, the highest broadband penetration occurred in the age group with school aged children. Penetration of technology was “predominantly driven by the presence of children” • Example 2: In the USA, youth are being used as the disseminators of technology. As the ‘natural users of technology’ they are being leveraged to drive uptake in the community • Example 3: On the Yorke Peninsula, Australia, direct exposure to the benefits of technology quickly drove community uptake of broadband services and increased supply / competition
Indirect Exposure to ICT	<ul style="list-style-type: none"> • Individuals who ‘touch’ those with direct exposure • Adjacent groups or communities who see the benefits of those with direct exposure 	<ul style="list-style-type: none"> • Example 4: In the USA, communities adjacent to those with community owned fibre projects have seen the benefits that fibre can bring and have organised their own fibre projects. One such project has been in the process of pre-registration since Feb 08 and expects to start laying fibre in Spring 09 (US)

- Internationally exposure to higher levels of ICT through schools, universities or communities drives uptake and supply of technology by consumers and businesses
- Exposure to leading edge ICT through KAREN users institutions can be expected to:
 - drive stronger use of technology by those ‘touched’ by the technology; and
 - drive uptake of technology in the broader community

*Source: Temple Investment research and analysis, Australian Communications and Media Authority, System Knowledge Concepts, One Economy, ECFiberNet

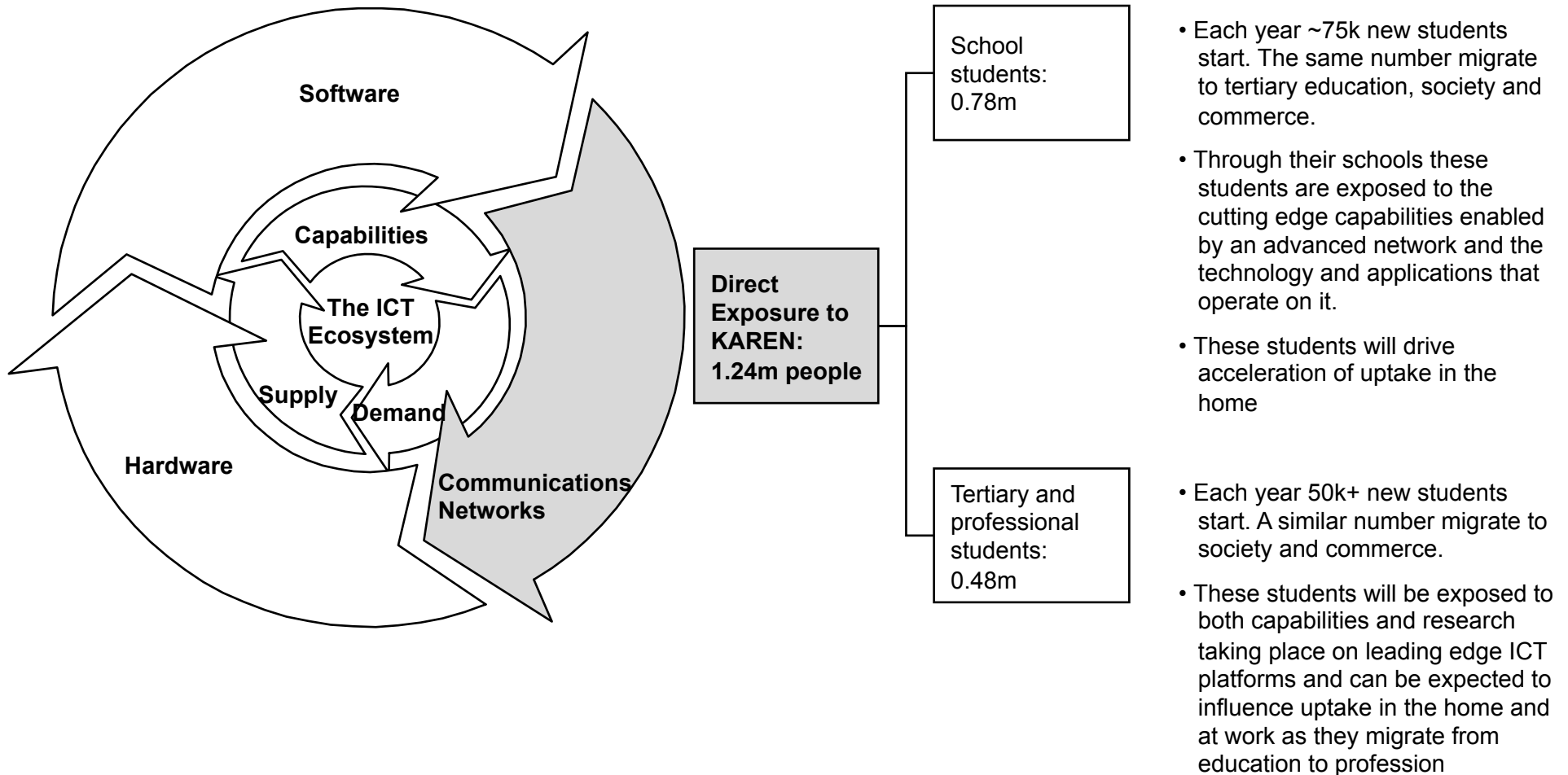
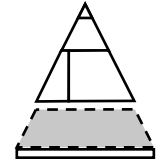
CONSUMER SUPPLY AND ADOPTION WAS FASTER WHEN A HIGH SPEED UNIVERSITY NETWORK WAS IN PLACE



*Source: Expert interviews, Keith Newman "Connecting the Clouds - the Internet in New Zealand" InternetNZ (last accessed 17 Nov 2008)

**This is indicative adoption by the average consumer of the dominant speed available, not the top network speed available

HAVING 1.2M KIWIS EXPOSED TO THIS LEADING EDGE NETWORK WILL BE A POWERFUL DRIVER OF BROADER ICT UPTAKE



AN OBJECTIVE ASSESSMENT OF THIS WORK GIVES CONFIDENCE IN THE ESTIMATES

Segment	Value Estimate \$m	Published research			Demonstrated example		Expert interviews	Analysis tested	Overall
		Source	Scope	Depth	NZ	Int			
Research Productivity	25				• n/a				
Teaching Quality/Efficacy	32		• n/a						
Accelerative Effect	140-160								

Published research: Published research encompasses written and published sources. The subcategories can be described as: Source refers to the credibility of the source of material; Scope refers to the coverage of subject matter and relevance of the information and; Depth refers to the detail in which the publication was covered

Demonstrated example: Indication of whether there exist examples of these value segments in New Zealand or internationally

Expert interviews: Hypotheses and information developed and tested through interviews with experts

Analysis tested: Refers to a triangulation of the prior factors to provide some indication of whether the hypotheses have been well tested in theory & practice



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