

CAENZ

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

CAENZ as a Think-Tank

Foremost among the roles for CAENZ is the role of the think tank. CAENZ facilitates the cross-pollination of knowledge across disciplines and institutional boundaries, as well as contributing to projects of national importance.

CAENZ as an Integrator

CAENZ plays a strong integrating role within New Zealand's engineering and technology sectors. Our work is characterised by networking and collaboration which, through broad participation, is addressing some of the most difficult challenges of our time.

CAENZ as an Awareness Raiser

CAENZ provides expert commentary and interpretation on major issues of the day, and highlights the vital importance of engineering thinking and technological advance for a strong and growing society.

20
Years of
Achievement
1987-2007

COLLABORATIVE ACTION ► ADVANCING SOLUTIONS ► PROGRESSING KNOWLEDGE

CAENZ Approach

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

Information is Key - to allow informed decisions

- ConstructingNZ Newsletter
- Providing forums for debate and knowledge transfer
- Interaction with Associations
- Providing measures for comparison and discussion



COLLABORATIVE ACTION ► ADVANCING SOLUTIONS ► PROGRESSING KNOWLEDGE

Brief History

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

- *Built infrastructure underpins national economy*
- *Construction Industry is main contributor*
- *A lot of issues but no way of quantifying the problems or prove performance improvement*

2004 CAE report

“An analysis of the Contribution of New Zealand's Construction Sector to the National Economy”

COLLABORATIVE ACTION ► ADVANCING SOLUTIONS ► PROGRESSING KNOWLEDGE

International Examples

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

Looked at international improvement programmes and compared approaches

UK Constructing Excellence stood out

COLLABORATIVE ACTION ► ADVANCING SOLUTIONS ► PROGRESSING KNOWLEDGE

UK Constructing Excellence

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

Stand out points

- Government commitment
- Industry buy in
- Created a measurement culture - KPI's


Applied here

- Government support unlikely
- Industry has lack of cohesion
- No measurement culture

COLLABORATIVE ACTION ► ADVANCING SOLUTIONS ► PROGRESSING KNOWLEDGE

CAENZ **Creating NZ's KPI's**
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

- Opportunity to work with UK Constructing Excellence
- A willing Funder who saw the possibilities
- Steering group
- Training NZ based analysts




FUNDED BY
THE BUILDING
RESEARCH LEVY
BUILDING RESEARCH

COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

CAENZ **NZ's KPI's**
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

- Selected by steering group
- Based on the UK economic KPI's
- Key Performance Indicators are a measure of critical construction project success factors



COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

CAENZ **Data Collection**
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

First we gather data through the KPI supply chain....

For one, the data already exists....

But often it must be obtained by asking a question on a KPI survey.....

COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

CAENZ **Producing the KPI's**
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

Percentage	Performance Scores	Benchmark Scores
0	5	5
20	7	7
40	8	8
60	8.5	8.5
80	9	9
100	10	10

Performance Scores

Benchmark Scores

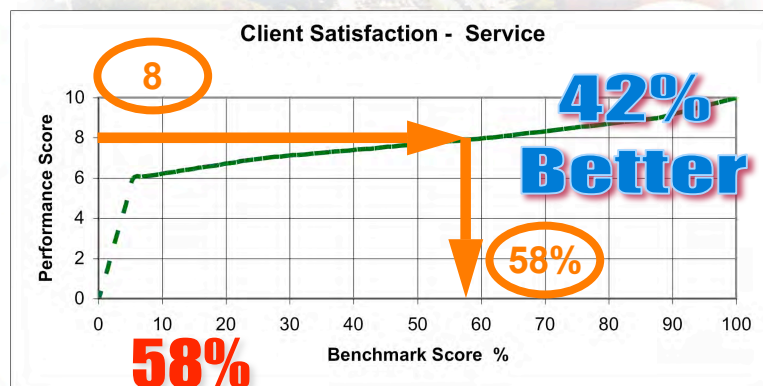
COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

Producing a Graph

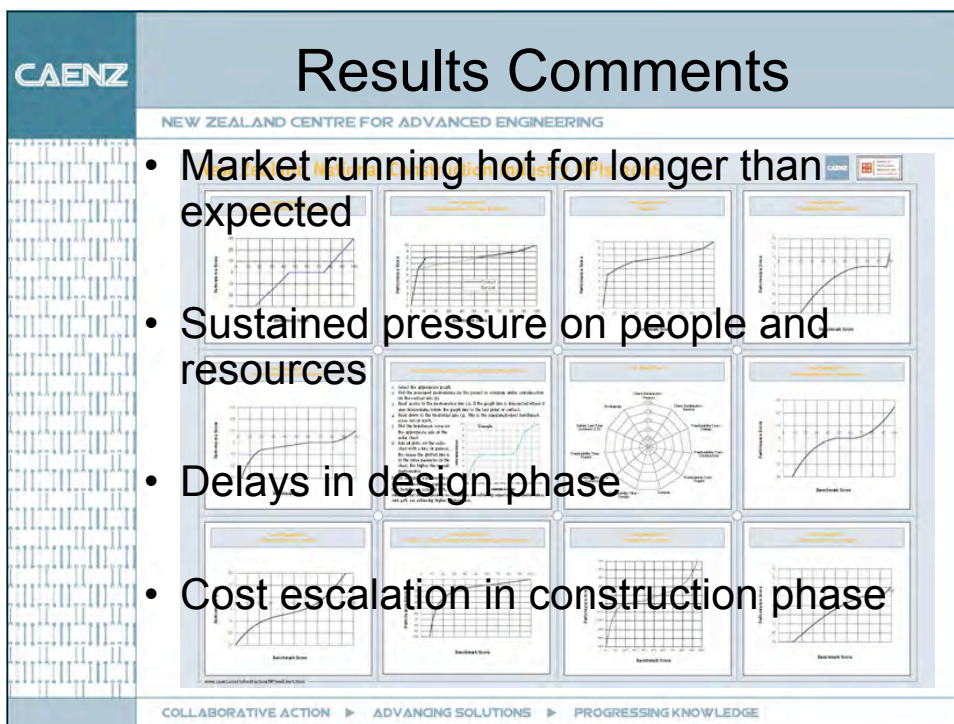
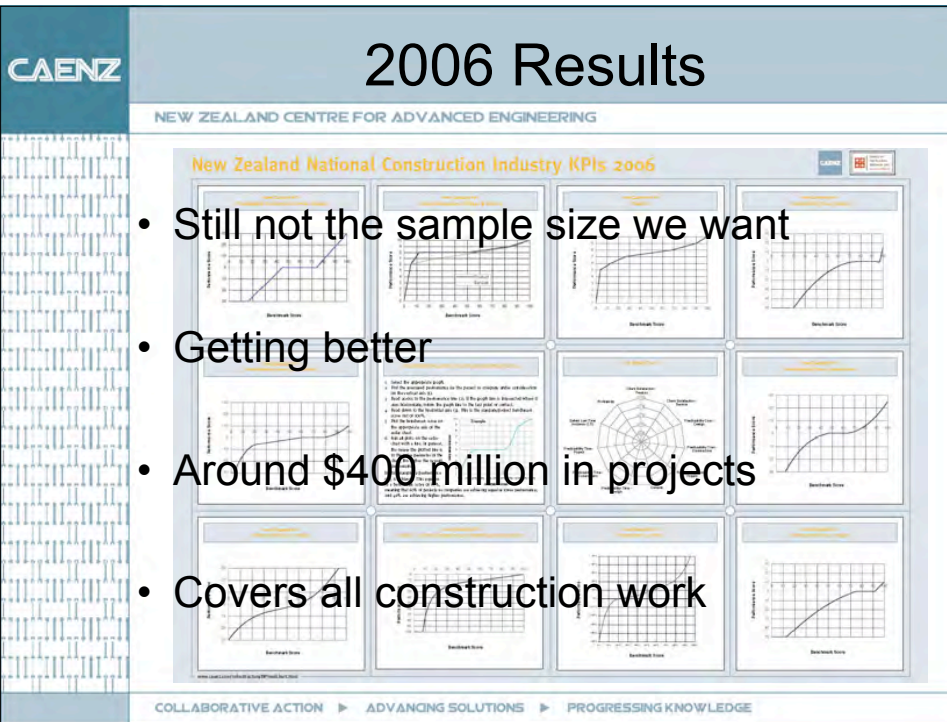


A KPI graph line is a graphical representation of industry performance from worst to best

Using the KPI's



Equal or Worse



Client Survey

15. How satisfied were you with the finished product? *(please circle one number)*

Totally dissatisfied	Mostly dissatisfied	Neither satisfied nor dissatisfied	Mostly satisfied	Totally satisfied
1	2	3	4	5
6	7	8	9	10

- Results Summary
 - Average = **8.0**
 - % Projects scoring 8/10 or better = **88%**

Client Satisfaction - Product



Client Survey

17. How satisfied were you with the service obtained (i.e. how well they actually worked with you): on/from: (please circle one number)

a) the overall project (i.e. the construction consultancy team and the main contractor together)

Totally dissatisfied	Mostly dissatisfied		Neither satisfied nor dissatisfied				Mostly satisfied		Totally satisfied
1	2	3	4	5	6	7	8	9	10

b) the construction consultancy team?

Totally dissatisfied	Mostly dissatisfied		Neither satisfied nor dissatisfied				Mostly satisfied		Totally satisfied
1	2	3	4	5	6	7	8	9	10

c) the main contractor?

Totally dissatisfied	Mostly dissatisfied		Neither satisfied nor dissatisfied				Mostly satisfied		Totally satisfied
1	2	3	4	5	6	7	8	9	10

- Results Summary
 - Average = **7.7**
 - % Projects scoring 8/10 or better = **39%**

Satisfaction - Service



Defects

Client Survey

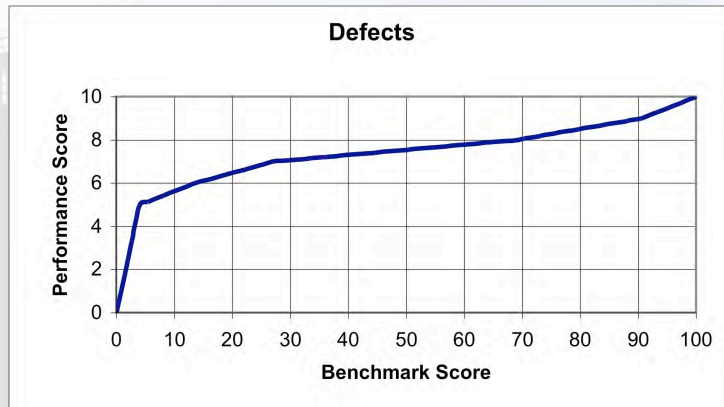
16. At the time of handover, what was the condition of the facility with regard to defects?
(please circle one number)

Totally defective	Major defects with a major impact on the client	Some defects and some impact on the client	A few defects and no significant impact on the client	Apparently defect free
1	2	3	4	5
6	7	8	9	10

- Results Summary
 - Average = **7.6**
 - % Projects scoring 8/10 or better = **31%**

Defects

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING



COLLABORATIVE ACTION ► ADVANCING SOLUTIONS ► PROGRESSING KNOWLEDGE

Predictability - Cost of Design

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

Client Survey

	Date (dd.mm.yy)	Construction Cost \$'000	Consultants' Cost \$'000
Stage A: Commit to Invest			
14.1	Date of decision for scheme to proceed, anticipated construction cost and anticipated fees A		
14.2	Anticipated start on site date at A		
14.3	Anticipated construction completion date at A		
Stage B: Commit to Construct			
14.4	Construction contract start on site date and construction contract sum B		
14.5	Construction contract date for completion at B		
Stage C: Available for Use			
14.6	Actual construction completion date C, actual construction cost, actual fees		
14.7	Final certificate date (if known)		

COLLABORATIVE ACTION ► ADVANCING SOLUTIONS ► PROGRESSING KNOWLEDGE

CAENZ Predictability - Cost of Design
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

- Results Summary
 - Average = **0%**
 - % Projects on target or better = **55%**

COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

CAENZ Predictability - Cost of Design
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

Predictability Costs - Design

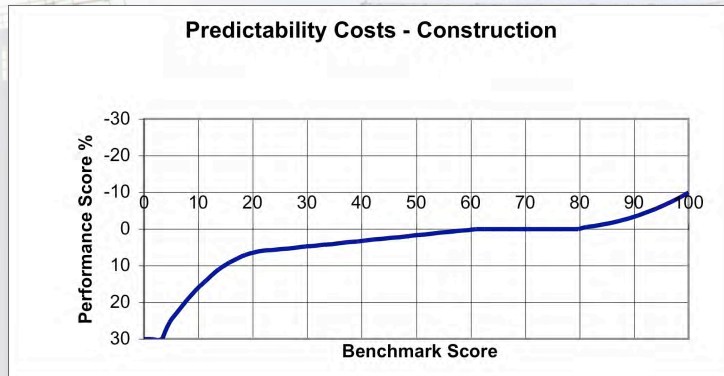
Benchmark Score	Performance Score %
0	-30
15	-30
45	0
75	0
100	-30

COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

Client Survey

		Date (dd.mm.yy)	Construction Cost \$'000	Consultants' Cost \$'000
Stage A: Commit to Invest				
14.1	Date of decision for scheme to proceed, anticipated construction cost and anticipated fees A			
14.2	Anticipated start on site date at A			
14.3	Anticipated construction completion date at A			
Stage B: Commit to Construct				
14.4	Construction contract start on site date and construction contract sum B			
14.5	Construction contract date for completion at B			
Stage C: Available for Use				
14.6	Actual construction completion date C, actual construction cost, actual fees			
14.7	Final certificate date (if known)			

- Results Summary
 - Average = **1.7%**
 - % Projects on target or better = **39%**



Client Survey

	Date (dd.mm.yy)	Construction Cost \$'000	Consultants' Cost \$'000
Stage A: Commit to Invest			
14.1	Date of decision for scheme to proceed, anticipated construction cost and anticipated fees A		
14.2	Anticipated start on site date at A		
14.3	Anticipated construction completion date at A		
Stage B: Commit to Construct			
14.4	Construction contract start on site date and construction contract sum B		
14.5	Construction contract date for completion at B		
Stage C: Available for Use			
14.6	Actual construction completion date C, actual construction cost, actual fees		
14.7	Final certificate date (if known)		

CAENZ **Predictability - Cost of Project**
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

- Results Summary
 - Average = **2.8%**
 - % Projects on target or better = **40%**

COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

CAENZ **Predictability - Cost of Project**
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

Predictability Costs - Project

Benchmark Score	Performance Score %
0	-30
10	-25
20	-20
30	-15
40	-10
50	-5
60	0
70	5
80	10
90	15
100	20

COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

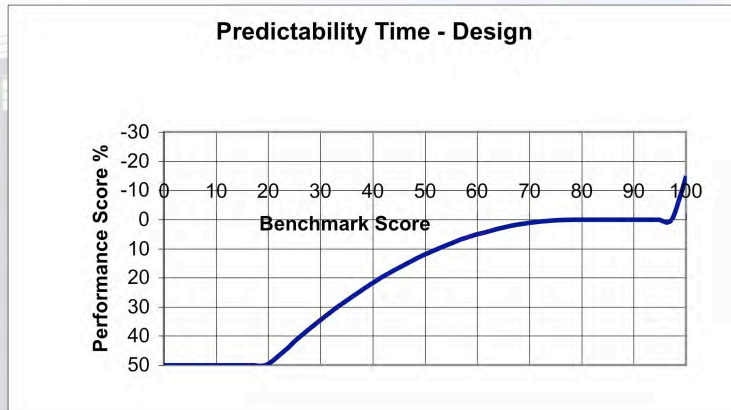
Client Survey

	Date (dd.mm.yy)	Construction Cost \$'000	Consultants' Cost \$'000
Stage A: Commit to Invest			
14.1	Date of decision for scheme to proceed, anticipated construction cost and anticipated fees A		
14.2	Anticipated start on site date at A		
14.3	Anticipated construction completion date at A		
Stage B: Commit to Construct			
14.4	Construction contract start on site date and construction contract sum B		
14.5	Construction contract date for completion at B		
Stage C: Available for Use			
14.6	Actual construction completion date C, actual construction cost, actual fees		
14.7	Final certificate date (if known)		

- Results Summary
 - Average = **11.9%**
 - % Projects on target or better = **22%**

Predictability - Design Time

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING



COLLABORATIVE ACTION ► ADVANCING SOLUTIONS ► PROGRESSING KNOWLEDGE

Predictability - Construction Time

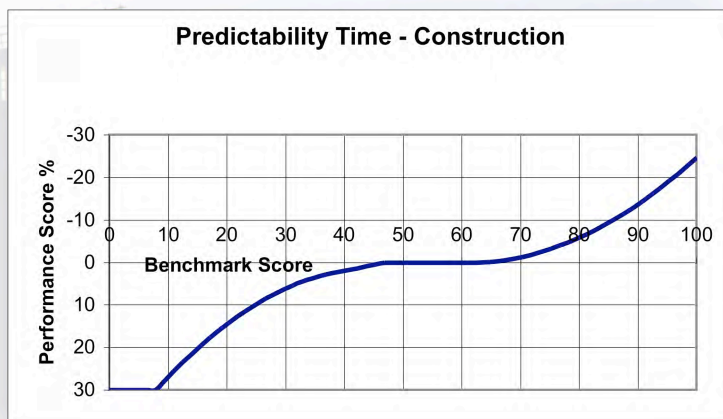
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

Client Survey

	Date (dd.mm.yy)	Construction Cost \$'000	Consultants' Cost \$'000
Stage A: Commit to Invest			
14.1	Date of decision for scheme to proceed, anticipated construction cost and anticipated fees A		
14.2	Anticipated start on site date at A		
14.3	Anticipated construction completion date at A		
Stage B: Commit to Construct			
14.4	Construction contract start on site date and construction contract sum B		
14.5	Construction contract date for completion at B		
Stage C: Available for Use			
14.6	Actual construction completion date C, actual construction cost, actual fees		
14.7	Final certificate date (if known)		

COLLABORATIVE ACTION ► ADVANCING SOLUTIONS ► PROGRESSING KNOWLEDGE

- Results Summary
 - Average = 0%
 - % Projects scoring 8/10 or better = **53%**



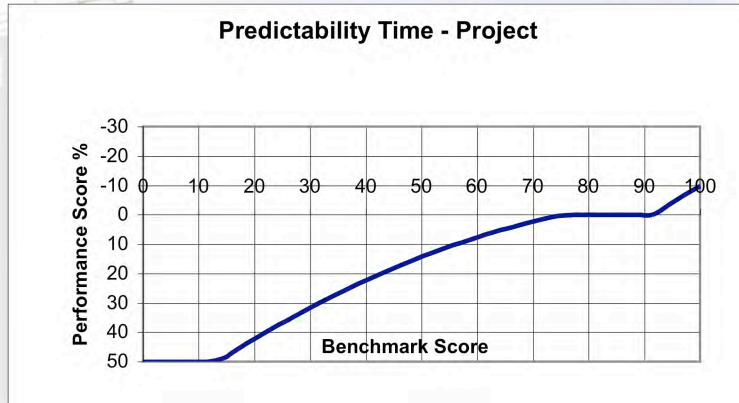
Client Survey

		Date (dd.mm.yy)	Construction Cost \$'000	Consultants' Cost \$'000
Stage A: Commit to Invest				
14.1	Date of decision for scheme to proceed, anticipated construction cost and anticipated fees A			
14.2	Anticipated start on site date at A			
14.3	Anticipated construction completion date at A			
Stage B: Commit to Construct				
14.4	Construction contract start on site date and construction contract sum B			
14.5	Construction contract date for completion at B			
Stage C: Available for Use				
14.6	Actual construction completion date C, actual construction cost, actual fees			
14.7	Final certificate date (if known)			

- Results Summary
 - Average = **14.3%**
 - % Projects scoring 8/10 or better = **23%**

Predictability - Project Time

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING



COLLABORATIVE ACTION ► ADVANCING SOLUTIONS ► PROGRESSING KNOWLEDGE

Safety

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

Contractor Survey

Safety – 1st November 2003 – 30th October 2004

6. Number of lost time injury cases / fatalities for the period

Lost time injury cases are any work related injury that require days away from work. Do not include the day of injury. Include lost time injury cases / fatalities on all projects in progress in the period. (for your company only).

Please enter total number then break down into over 3 days and under 3 days:

a) Total Number _____ Nr
 b) Cases over three days _____ Nr c) Cases of three days or under _____ Nr

7. Number of lost days for the period _____ Nr

Report the number of total lost days from the lost time cases reported above. (for your company only)

8. Number of medical Injury cases for the period _____ Nr

A medical injury is any work related injury that requires professional medical attention. This includes all lost time cases. (for your company only)

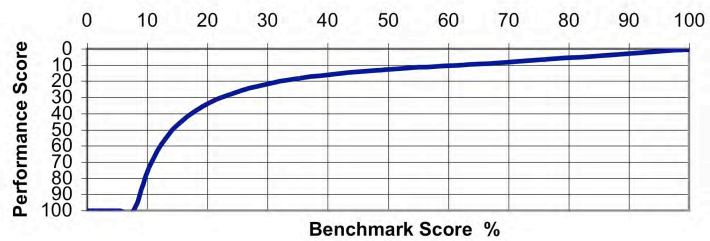
9. Man-hours worked for the period _____ Hrs

Man-hours should include hours worked by all full time equivalent employed on site for your company. Include hours worked on all projects in progress in the period. (for your company only)

COLLABORATIVE ACTION ► ADVANCING SOLUTIONS ► PROGRESSING KNOWLEDGE

- Results Summary
 - Average = **13**
 - % Projects scoring 8/10 or better = **41%**

Safety - lost time incidents per 200,000 hours worked.



CAENZ **Profitability**

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

- Anonymous information supplied by NZ Department of Statistics
- From Annual Enterprise Survey
- Company profit before tax and interest as a percentage of sales split into bands by size
 - ne 1 FTE
 - over 1 & ne 5 FTEs
 - over 5 & ne 10 FTEs
 - over 10 & ne 100 FTEs
 - Over 100 FTEs

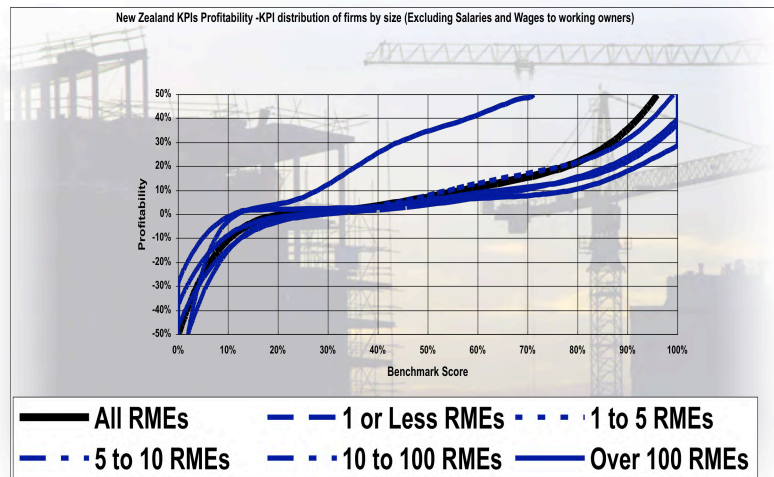
COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

CAENZ **Profitability**

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

ne 1 FTE	Median Profit % 35%
over 1 & ne 5 FTEs	Median Profit % 8%
over 5 & ne 10 FTEs	Median Profit % 4%
over 10 & ne 100 FTEs	Median Profit % 6%
Over 100 FTEs	Median Profit % 5%

COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE



Some best practice highlights:

- Completing design phase on time 22% from 52%
- Project completion on time 23% from 50%
- Median profitability 7% from 10%
- Total project costs 40%

CAENZ **Trends contd.**
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

- Construction costs 39% from 54%
- Defects 31% from 78%
- Product Satisfaction 88% from 82%
- Service Satisfaction 39% from 79%

COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

CAENZ **International Comparisons**
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

Possibilities exist

- Care needs to be taken



COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

Future Approaches

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

- Year round data collection
- Create a web based data entry and analysis environment
- Look to refine the KPI's - safety
- Add KPI's in areas of importance

COLLABORATIVE ACTION ► ADVANCING SOLUTIONS ► PROGRESSING KNOWLEDGE

UK

NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

- Web based delivery system
- Multiple KPI sets
 - Economic
 - Respect for People
 - Environment
 - Consultant
 - Mechanical and Electrical Services
 - Construction Products
- Good support systems

COLLABORATIVE ACTION ► ADVANCING SOLUTIONS ► PROGRESSING KNOWLEDGE

- Australian Procurement and Construction Council (APCC)
- Ministers agreed to develop a national set of KPI's and performance metrics
- To be presented for endorsement in September 2007

- Lags other industries in productivity
- No basis to identify industry improvement
- If performance is not improving, value for money and industry sustainability reduces

CAENZ **Areas of interest**
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

- Safety
- Productivity and competitiveness
- Economic security and rewards
- Skills and training
- Environmental sustainability / Eco-efficiency

COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

CAENZ **Setting Targets**
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

Better than all industries national average

- Safety
- Productivity
- Economic

Increase in services export
Fewer complaints and disputes
Adequate pre-tender notice
Increase in apprenticeship completion/skills
Skill need forecasting
Energy efficient buildings

COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

CAENZ **NZ - how we use them**
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

- Limited adoption, numbers increasing
- Used by clients and contractors
- Limited awareness and lost opportunities
- No all-of government attention

COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE

CAENZ **The End**
NEW ZEALAND CENTRE FOR ADVANCED ENGINEERING

Thank you and remember to send in the survey results as you finish projects

COLLABORATIVE ACTION ▶ ADVANCING SOLUTIONS ▶ PROGRESSING KNOWLEDGE