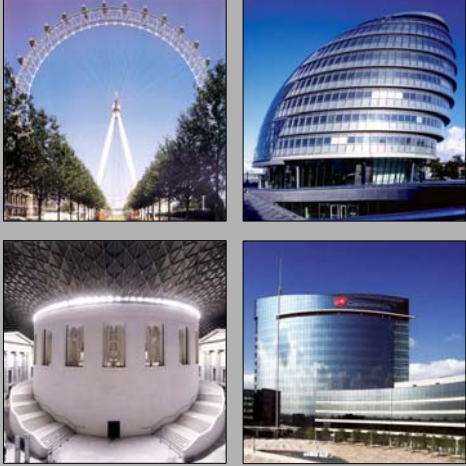


**'FACTOR 10' ENGINEERING FOR SUSTAINABLE CITIES – CONSTRUCTION  
EFFICIENCY**

**Bob White**


Chairman, MACE Limited, UK.

'PowerPoint' Slides from Colloquium Presentation



## Factor 10 Engineering for Sustainable Cities – construction efficiency

**Bob White**  
Chairman, Mace Limited  
Deputy Chairman, Constructing Excellence  
Chairman, nCRISP  
11 July 2006



### Structure of UK construction industry

- Narrow definition – 80% of workforce in SME's (CITB 2004)
- Large firms employing over 1 200 people produced 12% of contractor output (Pearce 2003)
- Broader definition – 80% of professional services firms >10 employees (Pearce 2003)
- In architectural profession, 86% of practices are sole practitioners (DTI 2001)

Resultant concerns:

- Ability to benefit from the economies of scale?
- Efficiency?
- Competitiveness?
- Little influence
- Inability to invest/innovate/r&d
- Small number of large firms with increasing influence

But – smaller firms are more customer focussed?



## Agenda for change

- Latham (1994)
  - Inefficiency and waste amounts to as much as 30% of the capital cost of construction.
  - Much of this is avoidable through co-operative working.
  - Result: integrated team work.
- Egan (1998)
  - Construction rarely provides value for money for clients of either private or public sector.
  - Best value is not lowest price.
  - Lean construction and a culture of performance measurement.
  - Result: demonstrations, KPI's and culture of measurement.



## The reform movement and public sector procurement

- Biggest building programmes in public sector history.
- The Private Finance Initiative (1992) – PPP.
- Improve delivery, quality and value – involve private sector providers.
- Innovative environments in education, housing and health.
- Construction industry as enabler of these programmes.
- Vital that capacity and performance of industry is optimised.
- Reform programme in construction in search of world class benchmarks.
- Added value service offer - total solutions.



## Demonstration projects – year on year comparisons

KPI	Measure	Performance						Trend	
		2001	2002	2003	2004	2005	2006	Last Year	All Years
Client Satisfaction - Product	% scoring 8/10 or better	93%	84%	90%	90%	89%	86%	↓	↓↓
Client Satisfaction - Service	% scoring 8/10 or better	79%	79%	86%	94%	88%	83%	↓↓	↑↑
Defects	% scoring 8/10 or better	82%	88%	87%	75%	84%	78%	↓↓	↓
Environmental Impact Product	% scoring 8/10 or better	-	-	62%	71%	82%	93%	↑↑	↑↑
Environmental Impact Process	% scoring 8/10 or better	-	-	76%	82%	83%	89%	↑↑	↑↑
Safety - Project *	Accident incidence rate	569	605	428	435	458	425	↑↑	↑↑
Safety - All projects *	% scoring zero accident incidence rate	-	-	-	78%	78%	76%	↓	↓
Predictability Cost - Design	% on target or better	67%	77%	71%	69%	86%	82%	↓	↑↑
Predictability Cost - Construction	% on target or better	59%	67%	64%	60%	81%	73%	↓↓	↑↑
Predictability Time - Design	% on target or better	74%	79%	66%	62%	78%	81%	↑	↑↑
Predictability Time - Construction	% on target or better	69%	67%	69%	69%	85%	79%	↓↓	↑↑
Profitability**	Median % profit before interest & tax	6.0%	5.0%	6.0%	6.5%	7.0%	10.0%	↑↑	↑↑
Productivity	Median value added/employed (£000)	37.0	35.0	36.0	55.0	60.7	70.0	↓↓	↑↑
Cost	% change compared with one year ago	0.1%	2.0%	-3.2%	0.5%	-7.0%	-7.0%	→→	↑↑
Time	% change compared with one year ago	0.1%	-10.0%	-1.5%	-7.0%	-10.0%	-9.0%	→→	↑↑
Employee Satisfaction	% scoring 8/10 or better	-	-	-	80%	92%	88%	↓	↓
Staff turnover	Median % staff turnover	-	-	-	2.0%	3.0%	4.0%	↓↓	↓↓
Qualifications & Skills	Median % employees qualified to NVQ Level 2 or higher	-	-	-	100%	93%	96%	↑	↓

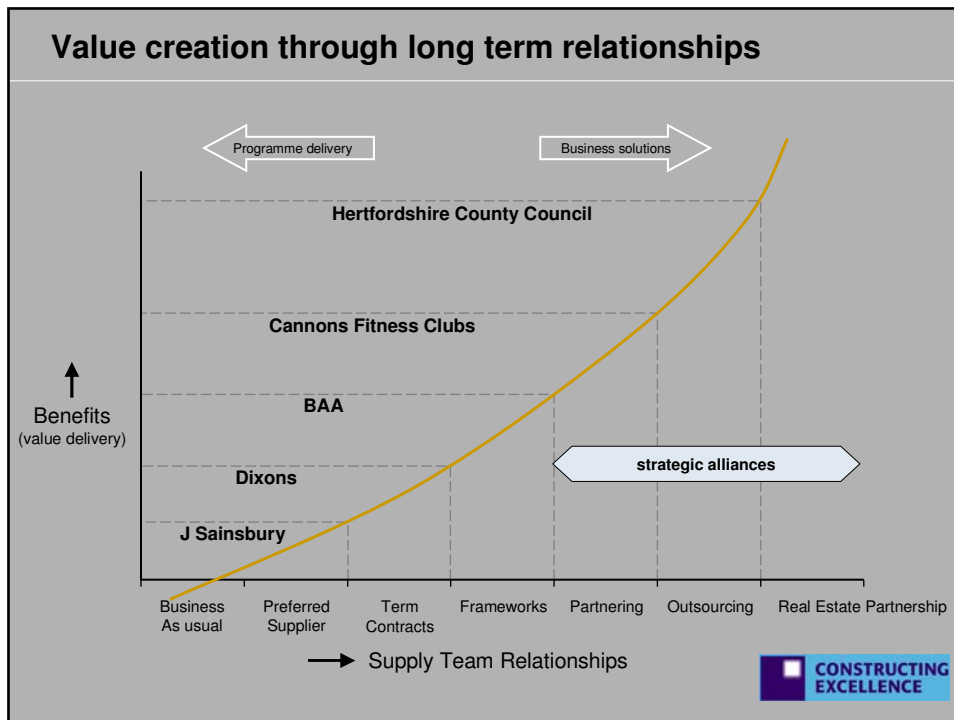
\* CE safety data is project based while KPI safety data is company based  
 \*\* Some of the data sets which show a 0% profit have been excluded as they are from the clients point of view and therefore, no profit would be made



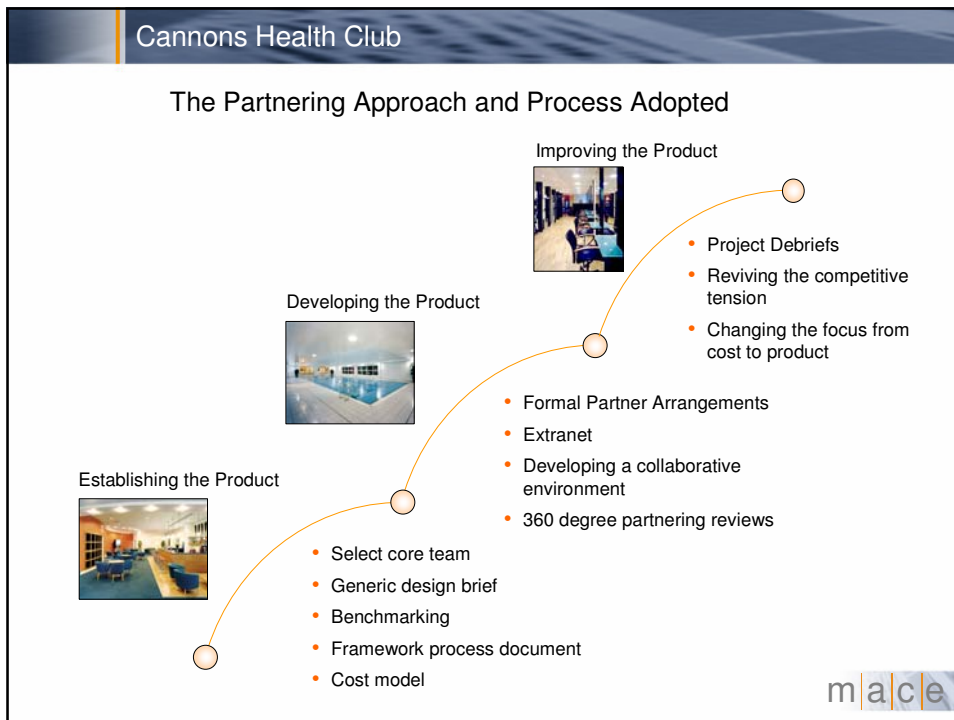
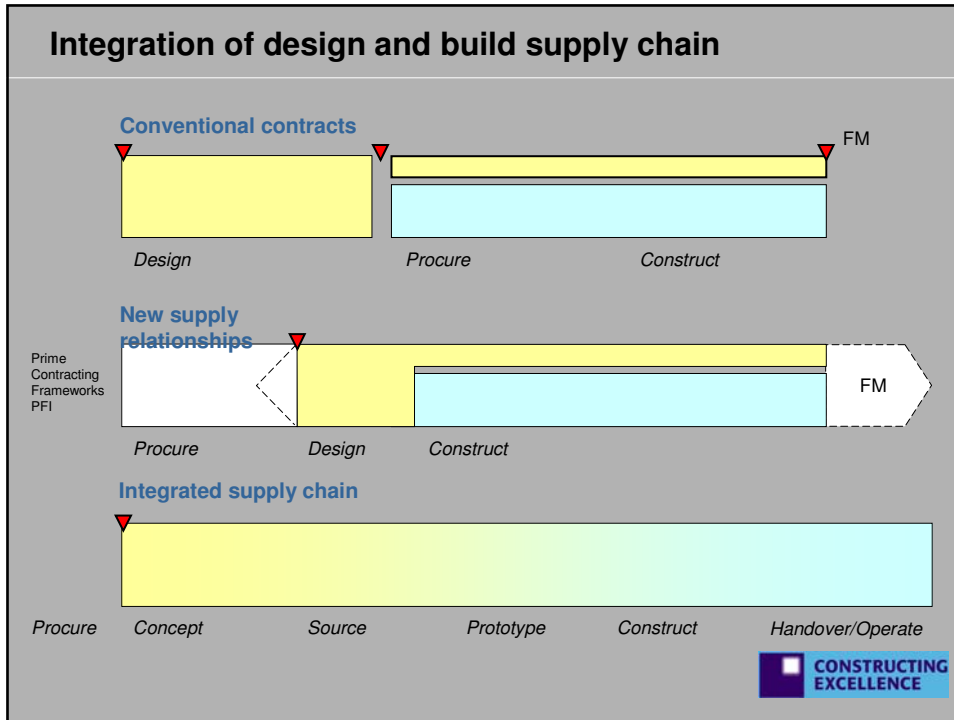
## UK construction industry trends

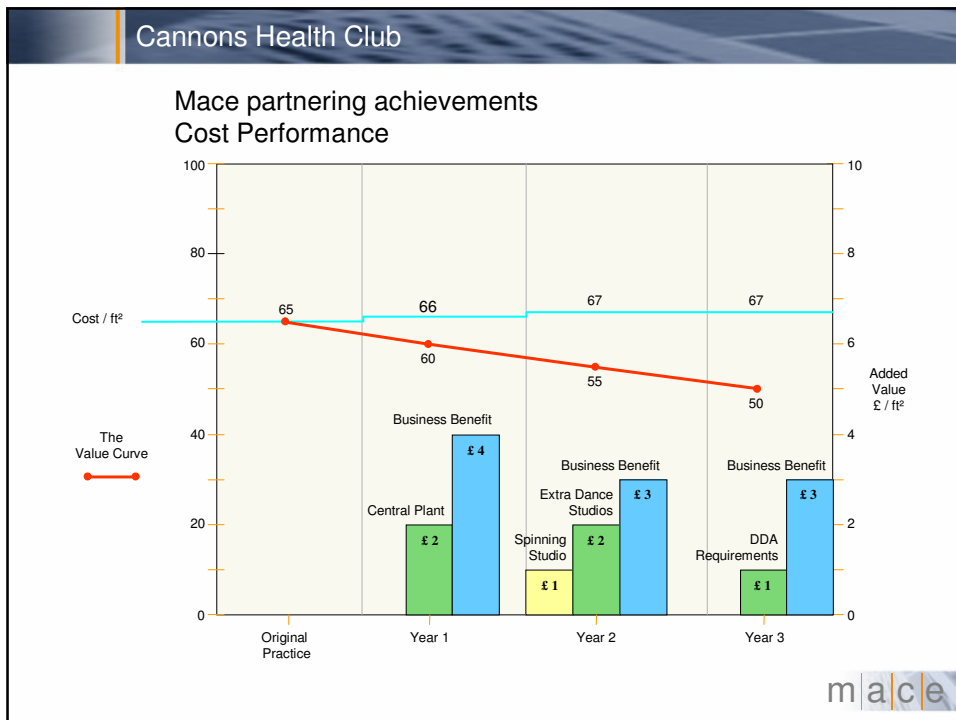
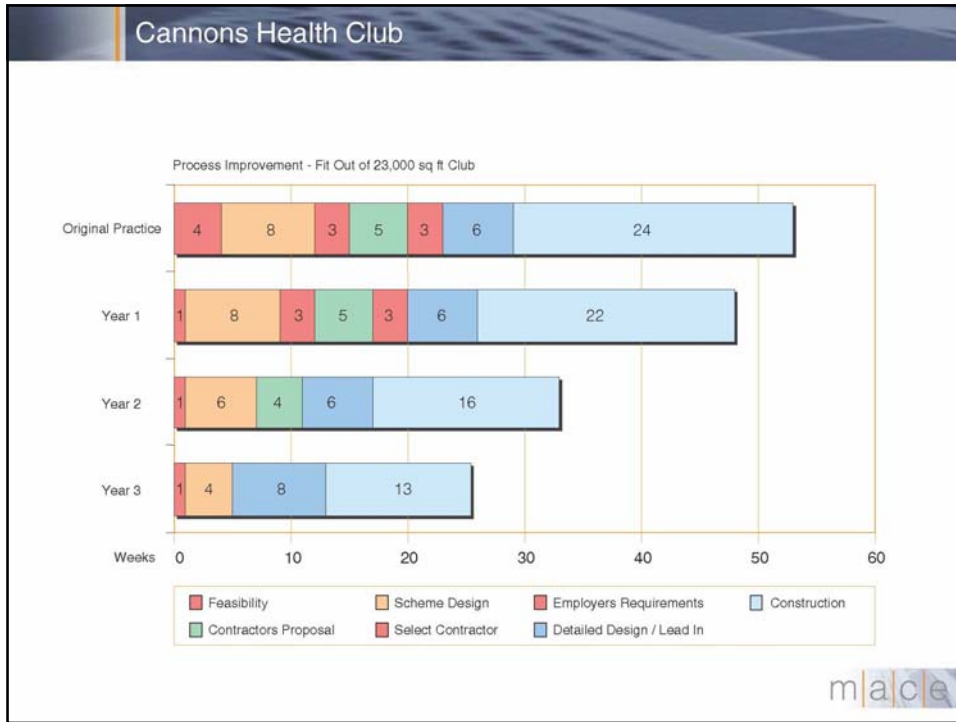
- Consolidation and collaboration – virtual organisations/strategic alliances
- More demanding consumers
- Integrated teams
- Long term supplier relationships (frameworks)
- Performance measurement
- Standardisation and industrialisation
- Knowledge based/demand driven (sectors)
- Risk sharing
- Evidence based design – not outputs but outcomes
- Value driven procurement – not lowest cost
- Facilitated by IT and automation





- ### Integration of design and build supply chain
- Conventional contracts
  - New supply relationships
  - Integrated supply chain
    - Seamless delivery
    - Aligned to business case
    - Designed to cost
    - Single point of contact responsible for the integration and performance of the supply chain
    - Delivering continuous improvement
    - Appropriate standard throughout the supply chain
    - Deliver significant benefit to customer
    - Clear understanding of costs and commercial performance
    - Establishing audits and process demonstrate best price and value
- CONSTRUCTING EXCELLENCE







### Cannons Health Club

#### The Headlines

- **M4i Demonstration project**
- **25% reduction in capital cost**, whilst simultaneously increasing the quality of the product
- **Approaching 50% reduction in speed to market**
- **Approaching 50% reduction in construction time**
- **Approaching 100% predictability**
- **Approaching zero defects at handover**
- **Zero reportable accidents** throughout the entire programme

Generic design brief

Cost benchmarking and cost model

Mapping the supply chain

Implementation process mapping

Product Extranet

Last Planner



“Nowhere in business is there greater potential for benefiting from ..... interdependency than between customer firms and their suppliers.

This is the largest remaining frontier for gathering competitive advantage — and nowhere has such a frontier been more neglected”.

*Drucker 1982*



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