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# Managing the implementation ergonomics in small/medium sized organisations

## Tutorial - Ergonomics Society Conference 1995

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### Objectives:

At the end of the tutorial those attending should be able:

- To improve the match between ergonomists and business to their mutual benefit
- To improve the marketing of their particular style of ergonomics
- To increase the chance of successful incorporation of ergonomics into workplaces, products and services
- To be able to instigate an approach by which the benefits from the application of ergonomics might be quantified

### How large is “small”?

	Small	Medium
Turnover	<£1.4M (£2.23M)	<£5.75M (£9.16M)
Assets	<£0.7M (£1.12M)	<£2.80M (£4.46M)
Employees	<50	<250

The first financial figure is by the Companies Act (1995) and the latter has been inflated to 1995 prices. A more useful definition might concern the availability or not of in-house ergonomics advice.

The larger/largest companies might also behave as if they are in these categories. Hewlett Packard, for example, maintains central services, style and cultural but splits activities into virtually autonomous units when they grow to about 250/300 employees. Thus this Tutorial might also be appropriate to larger organisations with particular macro-corporate structures. Typically, the “Monolithic” will be largely self sufficient and will generally seek to deal with equivalent suppliers of consultancy. Organisations with “Endorsed” or “Branded” structures might, however, be appropriate for the approaches dealt with in this Tutorial and appropriate opportunities might occur. (Terminology - Olins 1989)<sup>1</sup>

**“Monolithic”** Where the organisation uses one name and visual style throughout.” (Eg British Airways, IBM and Nissan (both of which have also tried “Branded” in the past),

**“Endorsed”** Where an organisation has a group of activities/companies which it endorses with a group name and identity.” (Eg General Motors, P&O and Royce Rolls)

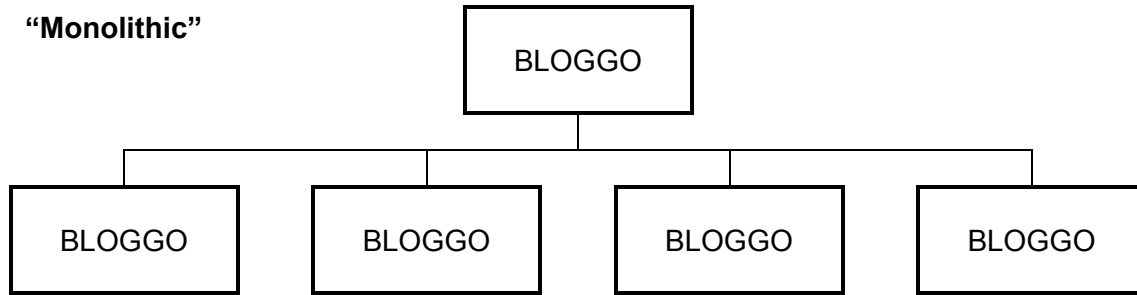
**“Branded”** Where the company operates through a series of brands which may be unrelated either to each other or to the corporation.” (Eg Proctor and Gamble, WHSmiths and Kingfisher.) Following acquisitions activity this form will exist but might not be stable in the long term. (Watch, for example, BMW and Rover or Ford and Jaguar)

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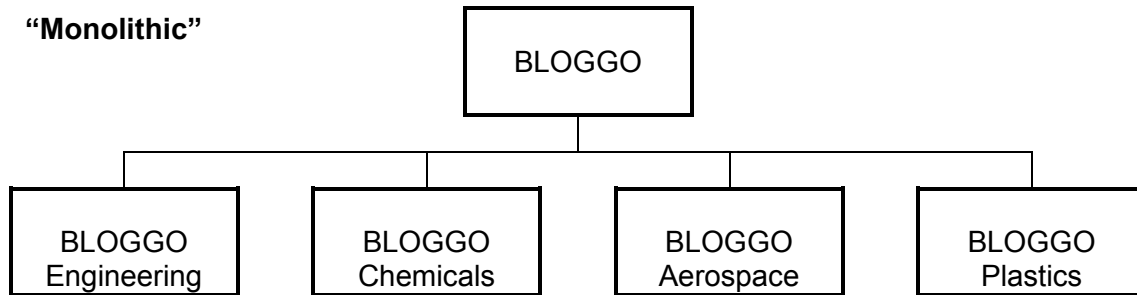
<sup>1</sup> Olins Wally (1989), Corporate Identity, Thames & Hudson

**Corporate Identity structure (Olins Wally (1989) Corporate Identity Thames & Hudson)**

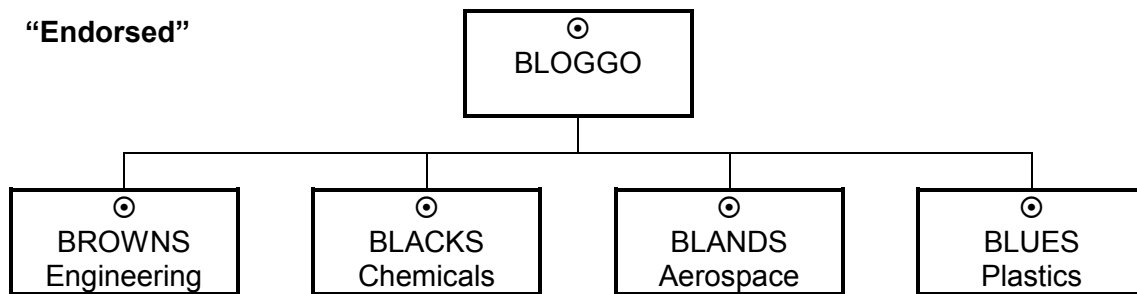
**“Monolithic”**



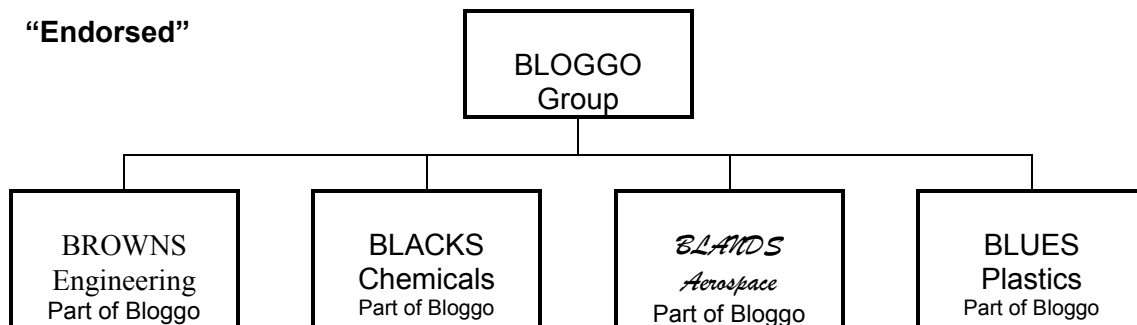
**“Monolithic”**



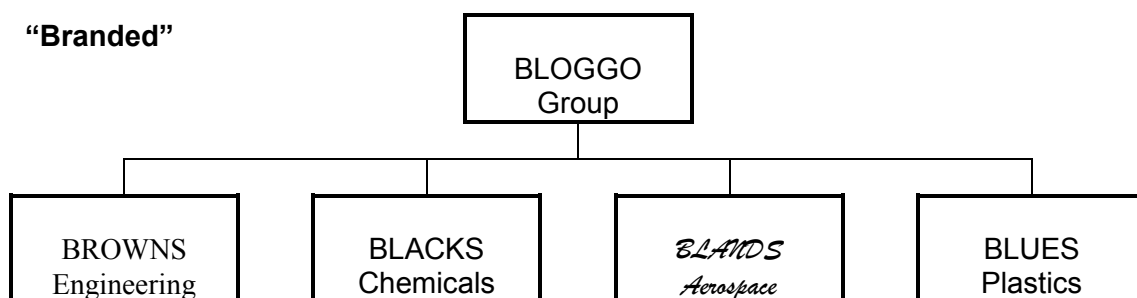
**“Endorsed”**



**“Endorsed”**



**“Branded”**



## ***What am I offering?***

### **The Four “P”s (together the “marketing mix”)**

- Product (or Service)
- Price (Currency/barter)
- Promotion (Marketing - advertising/informing & Selling persuasion (direct/indirect))
- Place

### **And a fifth “P”**

- Project Control      Feedback  
                                    Feedforward

**Solution Timescale**    **Short term (within the current Financial year)**  
                                    **Medium term (next Financial year)**  
                                    **Long term (estimates now, future financial years)**

**Setting the Price -**    cost of making/selling plus...  
                                    price opportunity for the customer and image desired  
                                    constraints of the market-place  
                                    level of profits required  
                                    negotiable?

Consider - The separation of contractual negotiation and service/product supply

## ***A Systems Viewpoint/Approach***

- Weltanschauung
- Drawing the Boundary
- The Environment, The wider System, **The System/Cluster of Choice**, The Sub System

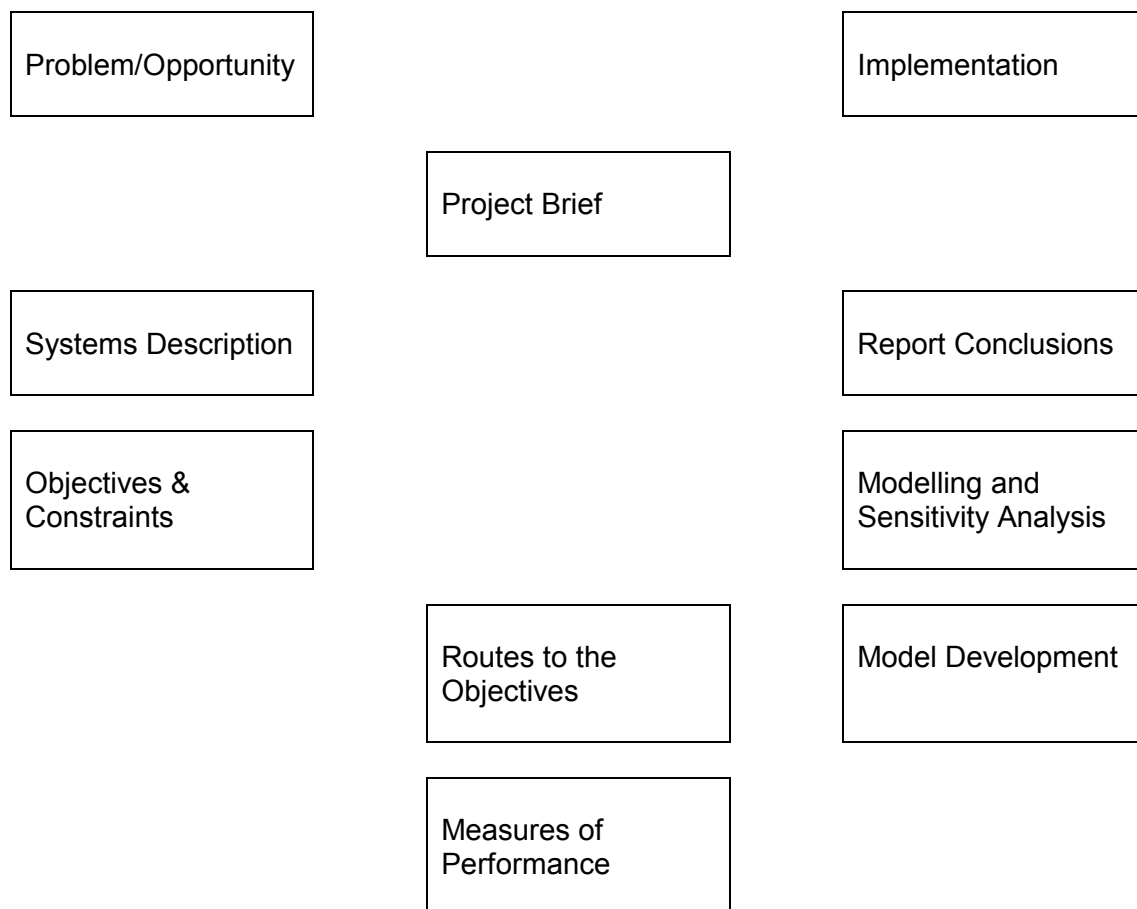
### **Definition of a System**

1. A System is an assembly of components which are connected in an organised way to some purpose - it does something.
2. Each component is affected by being in the system and the behaviour of the whole system is changed if any component leaves/is removed.
3. The assembly has been identified by somebody as being of particular interest

Soft -v- Hard Systems

Human Activity Systems -v- Technological Systems

### **The “Hard Systems Approach”**



## ***What does the market place want?***

Find out what the potential customers want (benefits not products!)

- Name of Product
- Image (Product/service and Corporate)
- Functional Performance
- Technical Features
- Design/Service Factors
- Sizes/formats
- Company Representation
- Before-Sales Service
- After-Sales Service
- Reliability of Delivery
- Price
- Packaging

## ***Doing Business***

- Develop products/services to satisfy these wants at an appropriate price/benefit mix
- Establish routes of distribution (logistics)
- Communicate with effective customers
- Expect customers to:

**Gain Awareness ← Trial ← Order ← Repeat Order(s)**

- **Warning** - Pareto effect (20/80 rule)

## ***Developing New “Services/Products”***

Markets	Existing	Market Penetration	Product Development
	New	Market Extension	Diversification
		Existing	New
		Products	

**The “Ansoff”  
Matrix**

### ***The Product Life Cycle***

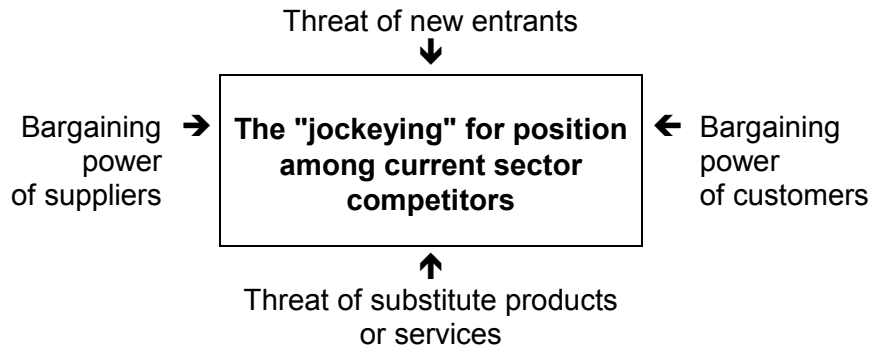
	<b>Development</b>	<b>Introduction</b>	<b>Growth</b>	<b>Maturity</b>	<b>Saturation</b>	<b>Decline</b>
Cash Flow	High negative	Negative going positive	Positive and growing	Positive and stable	Positive (jockeying for position)	Falling positive going negative
Product variety	Great (but not all will launch)	Great	Increasing Standardisation	Increasing Standardisation	Dominant design with differentiation	High Standardisation
Volume		Small	High growth	High Growth	High but stable	Decline
Industry Structure		Small Competitors	Initially large number of entrants then fall-out and consolidation	Supplier “shake-out” & increasing sophistication of buyers	Few large suppliers/major players only	Survivors (End strategies)
Basis of competition		Product characteristics (Perceived)	quality and availability (lead time)	Price differentiation, reliability and life cycle costs.	Price differentiation, reliability and life cycle costs.	Price (But reducing competition)
Product or service provision flexibility		Quick response to rapidly evolving product/service/ market conditions	Ability to cope with rapid changes in volume growth	Ability to manage transition between volume growth and variant growth	Ability to cope with a large number of variants required, product/service tailoring	Volume instability

### **Competitive Management**

- Awareness of the Competitive Environment
- Anticipation of the Changes
- Action - timely and appropriate

## What's happening in the competitive environment

The model Michael Porter devised is shown below.



Michael Porter's Model of Competitive Advantage (1979)<sup>1</sup>

## Michael Porter's Generic Strategies

Competitive focus	Broad target	1. Cost Leadership	2. Differentiation
	Narrow target	3a. Cost focus (Product ranges)	3b. Differentiation focus (Uniqueness)
		lower cost	differentiation
		Competitive advantage	

(Pursue singly or in combination)

<sup>1</sup> Porter, Michael, 1979, *How Competitive Forces Shape Strategy*, Harvard Business Review, March/April.



## Risks of the three generic strategies

<b>Risks of cost leadership (1)</b>	<b>Risks of differentiation (2)</b>	<b>Risks of focus (3a &amp; 3b)</b>
<i>Cost leadership is not sustained:</i> <ul style="list-style-type: none"> <li>• competitors imitate</li> <li>• technology changes</li> <li>• other bases for cost leadership erode</li> </ul>	<i>Differentiation is not sustained:</i> <ul style="list-style-type: none"> <li>• competitors imitate</li> <li>• bases for differentiation become less important to buyers</li> </ul>	<i>The focus strategy is not imitated</i>  <i>The target segmentation becomes structurally unattractive:</i> <ul style="list-style-type: none"> <li>• structure erodes</li> <li>• demand disappears</li> </ul>
<i>Proximity in differentiation is lost</i>	<i>Cost proximity is lost</i>	<i>Broadly targeted competitors overwhelm the segment;</i> <ul style="list-style-type: none"> <li>• the segment's difference from other segments narrow</li> <li>• the advantages of a broad line increase</li> </ul>
<i>Cost focusers achieve even lower cost in segments</i>	<i>Differentiation focusers achieve even greater differentiation in segments</i>	<i>New focusers sub-segment the "industry"</i>

(After Porter 1985)

Porter M. E. Competitive Advantage: Creating and Maintaining Superior Performance  
Free Press New York

***How does my service/product fit with the competitive environment now and in the future***

**External Environment - The STEP Factors**

- Sociological - Values, lifestyles, demographics
- Technological - R & D , new products/processes/services
- Economic - GNP growth, inflation, interest/exchange rates
- Political - competition policy, legislation, Governmental philosophy

**SWOT Analysis**

- **Strengths**
- **Weaknesses**
- **Opportunities**
- **Threats**

***Marketing - What is the message? How should I be Communicating it?***

**Communication of the right message in the right language to the right segment**

- Customers/consumers (actual and prospective)
- Competitors
- Government
- Suppliers
- Employees
- Media
- Banks/Financial Institutions
- Shareholders
- Trade Distributors

## **Who are the “Customers”**

Thirteen “Customer Groups” can be identified, all of which should be considered during the development, evaluation and modification of any product, service or system.

- **Bystanders** - These people have nothing to do with the product but are affected by it.
- **Figurehead** - The Company or Charity President, who undertakes no day-to-day activities for the organisation.
- **Signature** - A person who settles the account, on the advice of others.
- **Owners** - Those that make the rules by which the product or service must abide.
- **Customer Representatives** - Those individuals or groups, possibly self appointed, who decide what the actual customer may be exposed to and thus have the option of buying.
- **Customers** - Those that buy the product or service but do not, necessarily, use it regularly.
- **Users (regular)** - Those that use the product or service as intended by the designer/supplier and who will seek guidance before going outwith the specified limits.
- **Users (normal)** - Unlike the “Regular” customer these people will “misuse” the product or service but in a predictable and acceptable (although not necessarily advisable) way.
- **Users (abusers)** - Unlike the “Normal” customer they will exceed what could be regarded as “acceptable misuse” use of a product/service.
- **Users (explorers)** - Given a product they will see what it can do, unlike abusers they are not unthinking but investigating.
- **Wreckers** - These are not, in any real sense, users and are generally known as vandals!
- **Installers** - Those that install products may be “naive” or “professional” depending upon the complexity of the product and level of experience they have.
- **Maintenance** - Those that fix it when it has gone wrong. Depending on the product they too can be either “Naive” or “Professional”.

***The Boston Matrix (But which has the greatest sales volume)***

Market Growth Rate	High	Stars Cash Flow Neutral	Problem Children Cash Flow Negative
	Low	Cash Cows Cash Flow Positive	Dogs Cash Flow Neutral
		High	Low
		Relative Market Share (or Business Strengths)	

Market Growth Rate	High	<b>Invest for Growth</b>	<b>Opportunistic development</b>  Decision - Rising or Fading stars
	Low	<b>Maintain market positioning</b>  Manage for earnings	<b>Modify or cut</b>  Decision - Cash or Genuine Dogs
		High	Low
		Relative Market Share (or Business Strengths)	

Solution Timescale    Short term (within the current Financial year)  
                                  Medium term (next Financial year)  
                                  Long term (estimates now, future financial years)

## Managing Risk

*The prudent Directors and Managers will consider what risk the company should bear, not what it could bear.* (Shapiro and Titman 1986)<sup>1</sup>. The degree to which a company chooses to cover a risk by insurance will be based upon the “answers to two major questions:

1. What factors should management consider in deciding the firm’s optimal risk profile?
2. What are the relevant trade-offs involved in choosing among the various risk-reducing or hedging mechanisms available?” (Shapiro and Titman 1986)

D I R E C T	INSURED				I N D I R E C T
	eg	employer's liability and public liability claims damage to buildings damage to vehicles	eg	business interruption product liability	
	eg	sick pay repairs product lost/damaged	eg	investigation costs loss of good will loss of corporate image hiring and training of replacement staff	
	UNINSURED				

### Insured and Uninsured costs (HSE 1993)<sup>2</sup>

Number and severity of injuries per event (incident/ accident)	high numbers/ “severe” injuries (death)	Major Accident/ Catastrophe		Catastrophic failure with significant impact
	low numbers/ “slight” injuries	“Counted” Accidents and Incidents		“Hyped” (“Human Interest Story”) Accidents
		low emotive incidents/ little engagement		highly emotive incidents or accidents/ high degree of concern

### Emotive rating (“newsworthiness”!)

“Hard” (severity) v “Soft” (emotive) classification of accident events.

<sup>1</sup> SHAPIRO, Alan and TITMAN, Sheridan (1986), *An Integrated Approach to Corporate Risk Management*, in STERN, Joel M and CHEW, Donald H. (1986), *The Revolution in Corporate Finance*, Basil Blackwell: Oxford.

<sup>2</sup> Health & Safety Executive (1993), *The Costs of Accidents at work (HS(G)96)*, (HSE Books, London)

### ***What does an accident/injury cost? Drawing the boundary.***

- **The job, production unit/line direct costs**
- **The job, production unit/line indirect costs**
- **Cost associated with the suppliers and customers of the organisation.**
- **Wider company/corporation strategic costs**
- **Wider Societal costs - not usually accepted by the organisation's**

#### ***The job, production unit/line direct costs***

- Lower output quantities that give rise to increased labour costs.
- Lower output quality involving re-working whenever it is identified, and the risk of customer dissatisfaction.
- Lower output quality and quantity due to "locum"/"stand in" operators replacing those "sick" and temporarily off work. This might show itself as an increase in the variance of quality, possibly subjective.
- Costs associated with the different production rates of injured or replacement workers as well as line inefficiency costs. This is especially important and obvious if Kanban, Just-in-Time (JIT), MRP, MRP II, etc. methods are used to closely monitor production and either require zero "buffer-stocks" or produce data for the stock value "Tied-up".
- Increased labour turnover resulting in significant recruitment and training costs as well as line inefficiency costs (including costs of agency staff to "cover").
- Cost due to damage to plant, work in progress, materials, etc.

#### ***The job, production unit/line indirect costs***

- The cost of Injury claims ultimately causing increased employer liability insurance premiums. (Most policies were for "an indemnity unlimited in amount" rather than a specific agreed sum but this changed from 1 January 1995 when an ordinary, legally required, limit of £2M per event and £10M total became routine. "Top-up" insurance is obtainable but the premiums will be matched to the insured risk and it is unlikely that the basic insurance premiums will drop in line with the reduced cover provided.
- The cost of Injury claims leading to both direct (eg "sick pay") and indirect costs (eg management time used to deal with the situation) and ultimately increased insurance premiums. The impact of the financial costs of "sick pay" have, of course, increased since the responsibility for this largely passed from the State to the organization.
- Costs associated with additional pension payments/lump sum provision for people taking early retirement on "sickness" grounds.
- Reduction in morale and thus the ability to function effectively both at a factory floor and at a plant management level.
- Reduction of the organisation's public image locally affecting recruitment, esteem of staff (including Senior Managers/Directors), etc.
- Administrative costs associated with managing the accident or risk, etc.
- Poor motivation directly increases costs and limits the ability to respond to opportunities (eg staff are less likely to be enthusiastic about additional overtime working).
- Legal costs both for the company and, perhaps, the individual line/factory managers concerned to be blamed for the accident.

***Cost associated with the suppliers and customers of the organisation.***

- The customers lose supplies or receive them late, perhaps after the main buying period (eg Christmas). The quality might be reduced resulting in additional repair/replacement costs. In the extreme the customer might have costs associated with the identification and contracting of alternative supplies. A supplier “rescuing” the original company's customer will probably seek to maximise their gain, perhaps by demanding long term contracts are signed.
- The suppliers might find themselves left with materials that are not required and which they are unable to sell elsewhere. This can lead to cash flow problems, especially for small companies. If sales are possible elsewhere then this might enhance the strength of the competition and make future trading more difficult.
- The confidence of the customer and supplier might be reduced for a considerable period of time, way beyond the time taken to settle the initial incident.

***Wider company/corporation strategic costs***

- The industry wide impact of a poor claims record concerning any significant company because of the suspicion that all plants operating in this field will be a similar risk.
- If poor management is clearly to blame then the Insurance Company might not fully settle the claim in full; Insurance companies only cover unexpected risk!
- Limitation of options on corporate identity coherence. Should companies link all operating units together and, if so, how closely.
- Reduction of the organisation's public image nationally affecting relationships with clients, financial institutions, etc. and thus the share price (shareholder wealth), rates on loans, bonds and derivatives, etc. These can be major “motivators” for senior staff.
- Concerns of major customers that would not wish to be publicly identified as associated with companies that injure or care little about their work-force; Brand and/or Corporate image congruency especially if members of the Investors In People(IIP) programme.
- The Wider effects of image damage influencing the behaviour of market makers, bankers, etc. This could ultimately influence share price (shareholder wealth) and perhaps rates on loans, bonds and derivatives, etc.
- Possible costs and embarrassment of any uninsured Board liability (civil and criminal) and perhaps, although unlikely, the ultimate DTI sanction of removal from the Board.

***Wider Societal costs - not usually accepted as the organisation's responsibility***

- Costs to those directly involved in the incident - the Dramatis Personae. These costs might be covered by the ultimate legal settlement but this can take several years and, without legal aid or Union backing, it may not be possible to pursue any contested claim.
- Costs to the Kith and Kin of those involved in the incident. These costs might be covered by legal settlement but this can take several years and is, by no means certain.
- Society as a whole will have cost that must be covered by all. These include DSS administrative costs, NHS costs (physical and psychological), loss of income tax, etc.

## ***The Project Brief/Service Specification***

### **1.0 General Details**

- Company structure/mission(vision)/ethics
  - Management context
    - Strategic Monitoring Individual/Team/(Committee)
    - Communications
- Monitoring and control of the Consultant/Ergonomist/(team)
  - Project Monitoring team
  - Communications
  - Contractual & Financial Contacts
  - Communications

### **2.0 Product/Service Specification**

- Project requirements
  - Concept
  - Human Scale
  - Performance Specification
  - Inter-connectability
  - Anticipated production run and rate
  - Project Solution's Design Life
  - Time before re-evaluation/design
- Deliverables
  - Project specific (Report, Sketches, Drawings (CAD Format? BS308?), Models, Prototypes, Test results, Expert opinions, Photographs etc)
  - Project process specific (Raw data, Sources and Review Reports/Database, Interviews, Publicity Photographs
  - Formal Presentations/Conferences etc)
- Evaluation criteria
  - Technical tests
    - Engineering/Technical proving
    - Accelerated Life tests
  - Ergonomic tests (type and methodology)
    - Experts
    - Users
    - User groups
    - Performance tests



### **3.0 Project Context**

- Purchases/Users and their requirements
  - Direct
    - Owners (Eg major retailers, distributors & wholesalers)
    - Customers
    - Actors
    - Support
  - Indirect
    - Bystanders
    - "Watch-dogs" (Govt., HSE, CA, EH, BBC/ITV, MPs,
    - Professional Societies Public and Competitors etc)

### **4.0 Market Context - Project focus (immediate and potential)**

- Marketing team and support available
- Communications
- Marketing context
  - Product (differentiation)
  - Price
  - Place
  - Promotion
- Other known products or solutions
  - This company - now
  - This company - future plans
  - Existing competitors - now
  - Existing competitors - future plans
  - New competitors expected/predicted
  - New technological trends

### **5.0 Strategic Market/Competitor Analysis**

- Predicted response
  - Competitors
  - Market place
- Strategic evaluation
  - Sociological
  - Technology
  - Economic
  - Political

## **6.0 Technology/assembly/production/logistics/implementation requirements**

- Company constraints and preferences
  - In-house
  - Externally available/Sub-contractible
- Technological team and support available
- Communications
- Logistics team
- Communications
  
- Solution Timescale
  - Short term (within the current Financial year)
  - Medium term (next Financial year)
  - Long term (estimates now, future financial years)

## **7.0 Constraints**

- Legal and Statutory
- Resources
  - Internal
    - Available Resources (and charging procedures!)
      - Staff
      - Facilities
  - External
    - Time
    - Initial Brief to "last change" and "hand-over" dates
    - Cost
      - Fee
      - Materials
      - Travel
      - Other allowable expenses

## **8.0 Contractual Details**

- Presentation required
  - Format (Report format, verbal, visual, mixed media, exhibition etc)
  - Solution presentation required
  - Design stage (concept, soft model, prototype, sketch drawings, etc)
  - Quality/quantity thresholds expected(implied?)
- Ethical Constraints
- Intellectual property rights
- Academic publication approval/teaching use approval
- Grievance procedures
  - Legal
  - Arbitration