New Products, Improved Processes –

Real Jobs

by

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The Manufacturing Multipliers

(1) Value added Multiplier M_V:

$$\frac{\text{Value added}}{\text{Design* cost}} \sim 10\text{-}18$$

(2) Job Creation Multiplier M_L:

$$\frac{\text{Self-sustaining jobs (man years)}}{\text{Design* effort (man years)}} \sim 20\text{-}40$$

* Design of product and production plant. Excludes research costs.

Solow (Nobel Prize 1987)

Of real growth (1929-69):

Technology contributed about 60%

Labour 20%

Capital 20%

Japanese Ministry of International Trade & Industry (1986)

Britain contributed about 25% of the technological ideas used by Japanese Industry (1945-83).

Industrial R&D in Large Companies:

The International Position

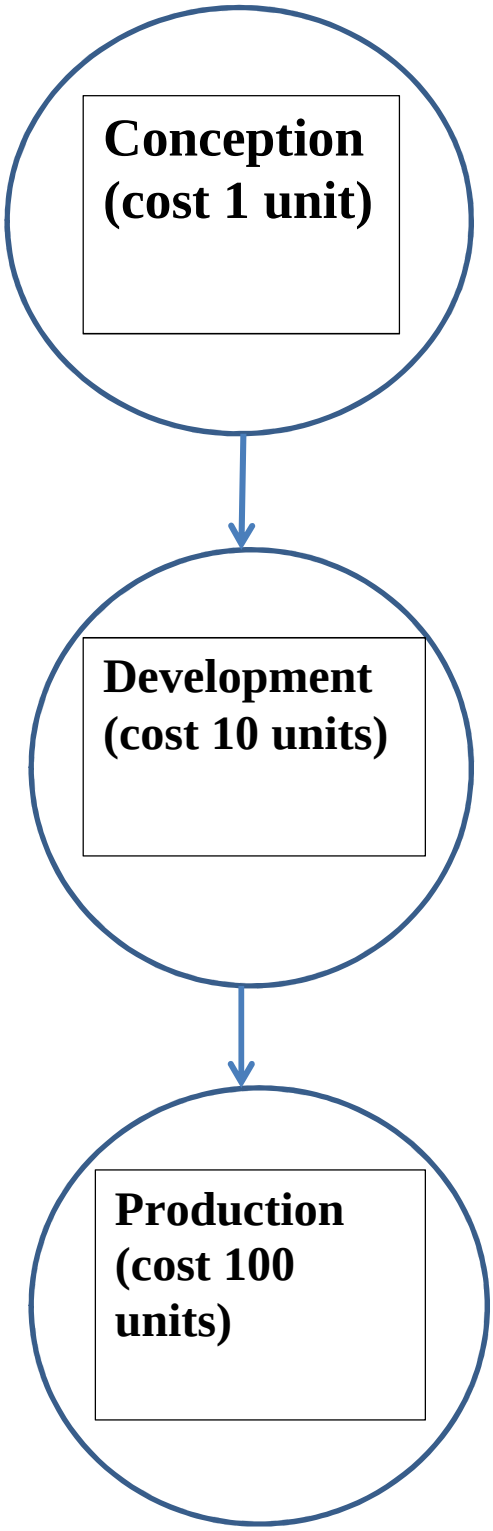
Country	Industry	US patents pa R&D $M pa	Exports pa R&D pa
UK	Chemicals	1.6	16
Germany	Chemicals	1.8	18
Italy	Chemicals	1.6	23
Switzerland	Chemicals	3.5	17
Japan	Chemicals	2.1	9.3*
UK	Cars	1.0	20
Germany	Cars	1.4	37**
Italy	Cars	0.3***	27
Switzerland	Cars	-	-
Japan	Cars	0.6	19

* Reflects relatively poor research targeting

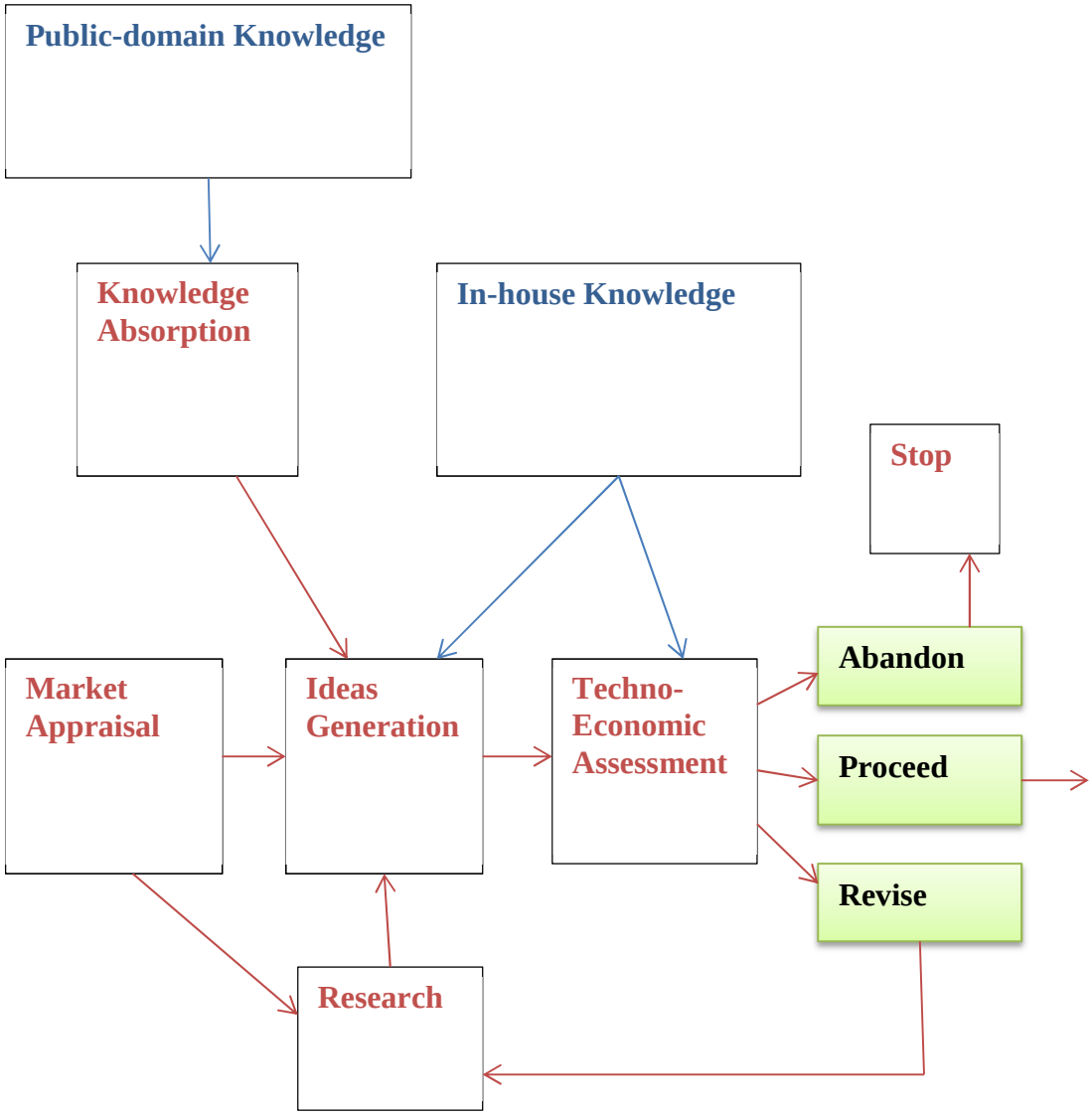
** Reflects effects of production scale

*** Reflects concentration on process/product development

The New Product Generation Process: Rule of 10s



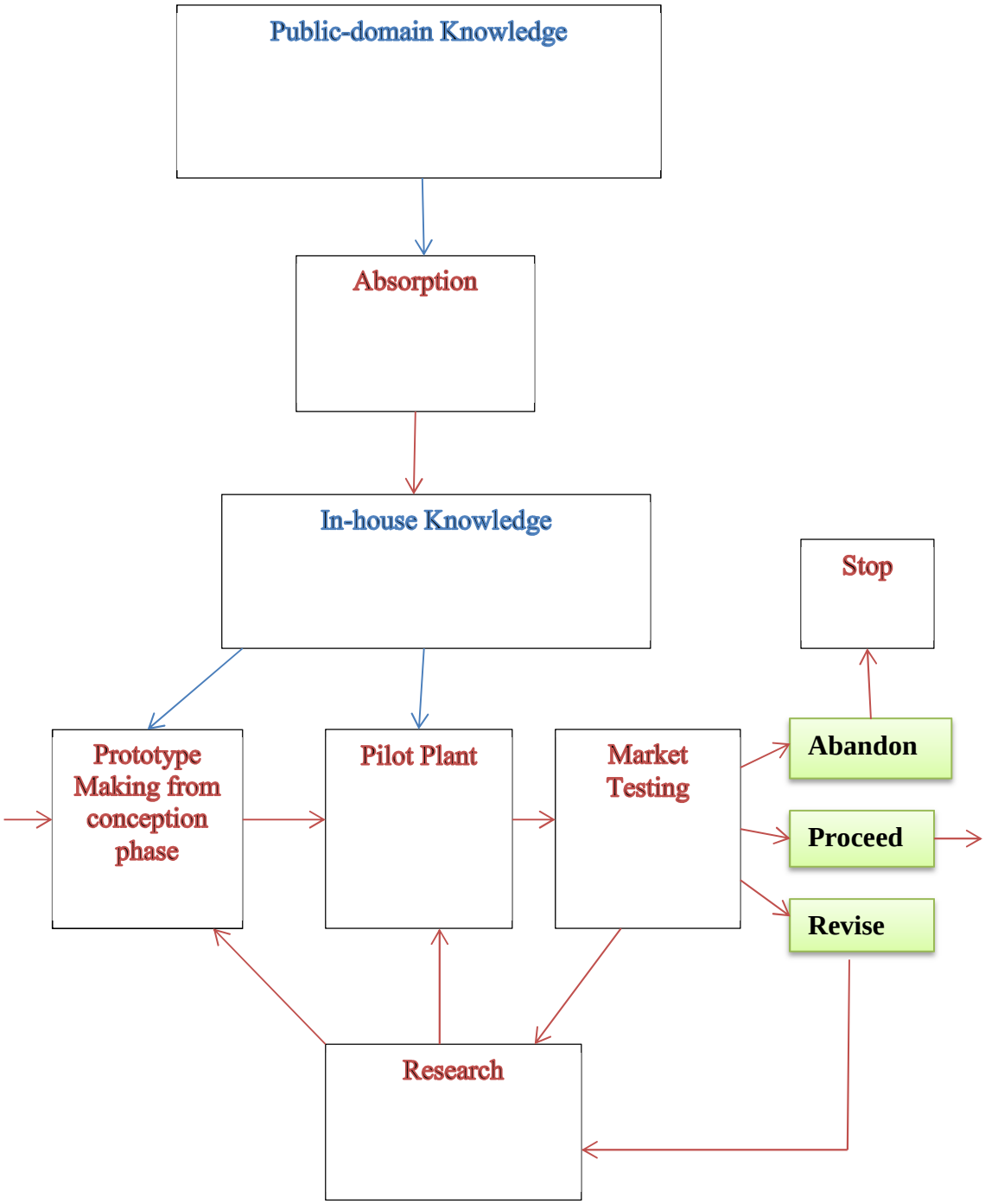
New Products: Conception Phase



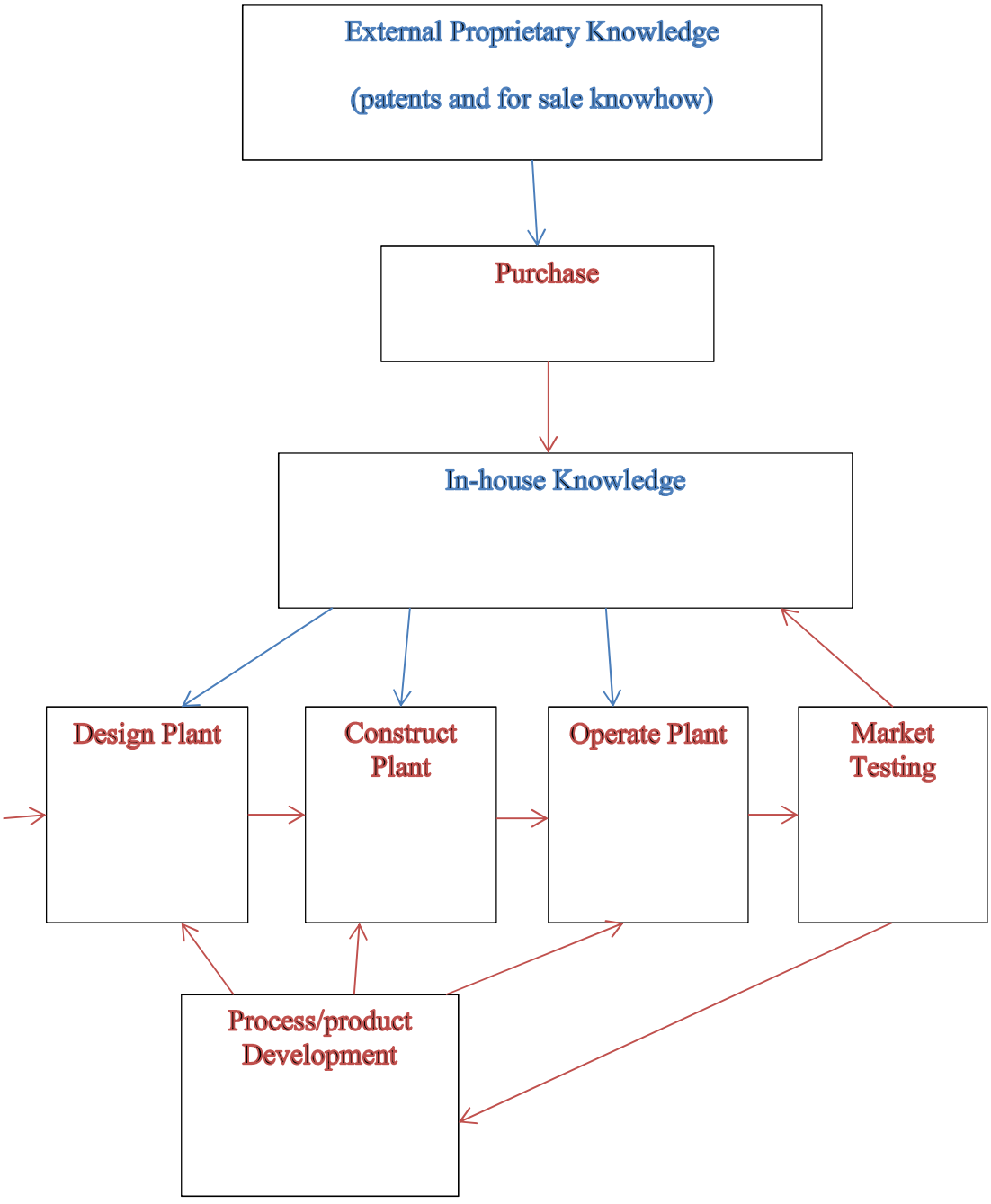
Key:

Knowledge
Information flow
Decisions

New Products: Development Phase



New Products: Scale-up Phase



There is a continual process of cycling round the loop to maintain competitiveness of products and processes.

Innovation Problems for Small and Medium-sized Enterprises*

(1) The Development phase is often beyond their means.

(2) They lack the requisite effort for the research and design activity.

(3) They have little or no experience of managing the three phases as one process

* Small: usually under £5 million turnover or fewer than 50 employees.

SME: usually under £30 million turnover or fewer than 500 employees.

Schemes to help SMEs

(A) National

Teaching Company Scheme (DTI/EPSRC)*

Engineering Doctorate (EPSRC)*

SMART (DTI)**

LINK (DTI)*

(B) Local/Regional

Business Links

Business and Innovation Centre (BICs)

Training and Enterprise Councils (TECs)*

Technology Networks

* Not only for SMEs, but SMEs strongly encouraged

** Only for small enterprises

What the Schemes do

(A) National

Scheme	Activity	Cost
Teaching company scheme (DTI/EPSRC)	Process & Product Development	Approx £80K over 2 years split 50:50 Company:Scheme
Engineering Doctorate (EPSRC)	Research, Process & Product Development	Approx £80K over 4 years split 20:80 Company:Scheme
SMART (DTI)	Feasibility (TEA) plus some development	£45K per project split 25:75 Company:Scheme
LINK (DTI)	Precompetitive Research for a group of companies	Up to £1.5 million per project split 50:50 Companies:Scheme

What the schemes do

(B) Local Regional

Scheme	Activity	Cost
Business Links	Advice: 1 Business Advisors 2 Design Consultants 3 Technology Counsellors	Free to Companies
Business and Innovation Centres (BICS)	Market Appraisals Advice: 1 Financing 2 Some Technology	Around £400 per day charge to Company
Training & Enterprise Councils (TECS)	Further Education and training courses. May own BICs	Free to most individuals

North of England Plastics Processors' Consortium

NEPPCO

Number of Member Companies **71**

Approximate aggregate number of employees **4000**

Approximate aggregate turnover **£250M**

Integrating the complete manufacturing chain

from raw material to finished product

NEPPCO

OBJECTIVE

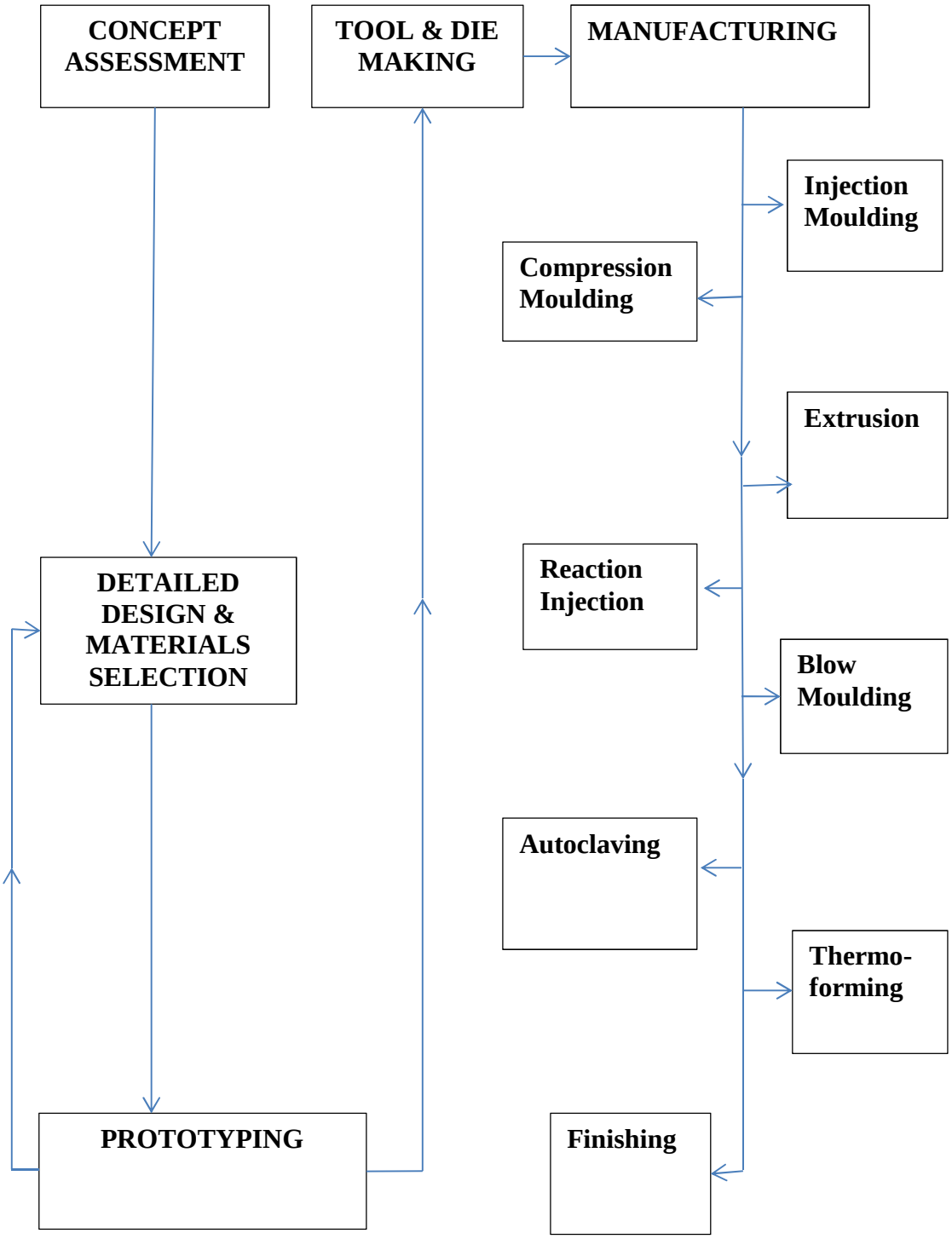
To increase the business and business capability of its Members.

MEANS

- **Integrated Design and Manufacture**
- **Selection of appropriate materials and process route for any potential product**
- **Transfer of technology between members and from research to members.**

NEPPCO IDM
Integrated Design & Manufacture

(Phase 1)



(Phase 2) **(Phase 3)**

Plastics Design and Manufacturing Unit

ACTIVITY	PHASE
Techno Economic Assessment (TEA) (NEPPCO member)	Conception
Targeted Research (University)	Conception, Development
Test Marketing (NEPPCO member)	Development
Integrated Design & Manufacture (IDM) (NEPPCO members)	Development, Scale-up
Process & Product Development (University + Companies)	Scale-up
Build up of in-house knowledge bank (University + NEPPCO members)	All phases

Plastics Design & Manufacturing Unit (PDMU):

Record over 18 months

Ideas submitted to PDMU (two thirds filtered out)	**110**
Ideas passed to product Conception Phase (12-15, some definitely rejected)	**35**
Products in Development Phase	**11**
Products in Scale-up (Production) Phase	**2**

Typical Products in Development or Production

PRODUCT	FUNCTION	INDUSTRY
Polymer composite Pump Impellers	Replace Phosphor Bronze types	Fishing, marine
Break-a-bolt	Controlled access to bathroom & WCs	Elderly care
Electrical “Acupuncture”	Pain alleviation	Medical electronics
Polyethylene ½” and ¾” continuous sheaths	Lining existing domestic pipes	Water
Fibre reinforced polypropylene bobbins	Hold yarn for dyeing	Textile
Fibre reinforced polypropylene filters	Remove particles from hot water and acid flows	Chemicals
Statpad	Static charge dissipation	Office equipment, auto, domestic

Plastics Design & Manufacturing Unit:

Estimated returns over 2½ years

Man years of employment	**approx. 200**
Total Added Value*	**approx. £6M**

From

Conception phase cost	**approx. £100K**
Development phase cost	**approx. £600K**

(3 Design + 4 Admin years)

M_V ~ 9

M_L ~ 30

*** Assumes 10 year product life**

Schemes of Support for

Research and Innovation compared

Scheme	Activity	Approx Annual cost
Teaching Company	Process and Product Development	£12M
Engineering Research Council*	Precompetitive Research	£100M
Structural Funds Priority 2	Mainly support BICs; Technology Advice Networks; IT Networks	£12M in Northwest Objective 2 area
(University Basic Research £900)		
(Manufacturing Industry R&D £5,400M)		

* i.e. the Engineering part of EPSRC.