

Transformation Template TT©

Ken Taylor – January 2008

The Promise

The effectiveness of an R&D organisation can be substantially increased by identifying, scrutinising, benchmarking and improving the performance of the key parameters that impact on effectiveness. These parameters include organisational issues, covered fully in EIRMA **Working Group 62 – Assessing R&D Effectiveness**, and the people issues developed by ETN and brought together as the **Transformation Template** or TT©.

What is Effectiveness?

Effectiveness is the measure of an organization's ability to fully utilize all its assets for the competitive benefit of that organization. It can only be determined by considering R&D's integration into the business as a whole and ensuring that it is looked at in sufficient depth.

This report presents a template on how to assess and improve R&D effectiveness arising from the integration of the EIRMA study and the ETN approach.

It presents a new model that focuses on the conditions necessary for good performance, rather than the performance *per se*. It shows that these conditions are a pre-requisite for achieving good performance.

A major objective is to draw out all the skills and abilities of the people, the principal assets an R&D organization possesses, and direct them to productive activities:

“A learning organisation with a spirit of vitality will use profitably all the potential abilities of its people. By doing this it will create an enterprise that evolves in a synergistic fashion, using the complex undercurrents of uncertainty to innovate, thrive and prosper.”

Short description of EIRMA approach in WG 62

Whereas we wish to see R&D as an investment into our companies' futures, in fact it is often seen as a cost. Demonstrating the value of this investment requires convincing evidence of short- and longer-term business impact, based on credible data. The difficulty is that this impact is usually indirect and hard to quantify. R&D creates and pulls together new technologies and ideas, and thereby contributes new and better products, processes, and services. It acts as an integrator of knowledge and technology, combining scouting, negotiating, and management skills. Impact relates as much to the unnoticed elimination of inappropriate paths as to the parameters of the individual technologies and products that emerge. The time lag between investing in people, capabilities and knowledge, and obtaining tangible results is often considerable. There are well-established methods for managing R&D, such as road mapping, Stage- Gate® and portfolio management, supported by comprehensive information systems and management portals. These provide some of the data from which to gauge effectiveness.

But the most important criteria are the quality of links to capabilities, business goals and strategy, to other business functions outside R&D and to the market. In other words, R&D effectiveness cannot be assessed in isolation. It must take place within the complex business and company context in which the R&D is embedded.

Working Group (WG 62) was established to find ways to assess the effectiveness of the processes by which business R&D creates value and lasting competitive advantage. Its brief was to look across the value chain from vision and strategy formulation, at current company capabilities, through to final outcome in the form of increased profits and other stakeholder benefits. WG 62 describes the resulting assessment methodologies, which the Working Group believes are capable of

producing the convincing evidence that R&D is playing a vital role in value creation for the company and that it is well situated and equipped to help shape business vision and strategy. The audience for this evidence includes top management and, indirectly, the financial markets and shareholders of the company. The starting point is the strategic context in which R&D takes place. A number of possibilities exist, for example:

- the company seeks industry leadership in a specific sector
- it wishes to maintain the position of a (fast) follower
- it intends to leave the sector altogether so it can strengthen the position in a different one or open up a new sector

Whereas there is always an opportunity to use R&D to improve short- and longer-term profitability, this strategic context inevitably affects the focus of R&D. Decisions about how much to focus on short-term product improvement, on cost cutting measures, and on longer-term needs like introducing new technology platforms and using R&D to change the basic focus of the business are a direct consequence of an explicit or implicit strategic focus.

Short description of ETN approach

Most organisations have lost much of their ability to hold their peoples' performance at or near its full potential. Only very young companies at an early stage in their growth manage to extract their employees' full potential as performance. As they grow many companies succumb to the withering effects of complexity, structure and discipline; brought about in large part by the absence of clear objectives and the presence of ever-multiplying bottlenecks.

These barriers to top performance clearly do not arise as a deliberate policy of obstruction, in all good faith many are introduced as positive benefits to the organisation. The problems stem largely from the belief that an organisation operates to some degree in a mechanistic fashion with linear and predictable cause and effect relationships at work. This assumption then requires hierarchical structures with command and control systems and attitudes in which individuals are treated like mechanistic entities with some reluctant allowance for statistical variation.

This older view of corporate life still prevails in many companies but the more enlightened have embraced the current view of the company as a self-organising system more akin to biological paradigms and operating chaotically with complex-adaptive control. Many companies have responded to this by creating networked cross-functional teams with fluid boundaries and flexible leadership. These are then infused with delegation of responsibility, continuous improvement, life-long learning and knowledge management. This flux of new ideas will, it is believed, enable the company to evolve and adapt like an organism, surviving and expanding as a testament to its fitness in the competitive environment.

We have to take care that we do not swing the pendulum too far in one direction or the other. The seductive nature of the biological model can often hide from our sight that most powerful and effective of human drivers - Common Sense.

What do we see if we take care to look in the right place? People who are clearly not giving their full capabilities to the organisation. Not because they don't want to: most people are working longer hours, at a faster tempo and under more pressure than ever before: but because the organisation won't let them. To challenge people to substantially increase their effective performance by telling them to use more of their unused potential is not fruitful. It represents a threat to their professionalism and self-esteem. It implies they have been under performing and they are likely to react

negatively. People will react positively when the company recognises their imprisoned extra potential; and then accepts that it has put so many bottlenecks in the way that they are unable to release it on behalf of the company. Employees will identify lack of clear objectives, absence of suitable tools, inadequate training, slowness of decision taking and stultifying bureaucracy as the factors the company has to tackle in order for them to operate at or near their full potential. It is entirely within the power of the enterprise to take responsibility for this and create an environment free of bottlenecks where peoples' full potential is converted to profitable performance.

Where can we see clear, understandable examples of performance that are using all the potential available to them? We see it in organisations operating in a crisis (and in world-class sporting teams). In both cases the criteria for success are well known. Objectives are made crystal-clear and bottlenecks are removed or pushed aside. This is Common Sense, we all know and understand it. Why then is it so difficult to extract the lessons learnt from crises (and sport) and apply them to the normal life of the company? If so much potential is available to us, and can be utilised by the application of common sense, why do we allow the organisation to settle back to operate as it did before the crisis occurred?

Are we fearful of anarchy, of operating outside the rules, being wasteful with company resources, creating highly effective teams outside the established boundaries? Teams do not operate anarchically in a crisis; the objectives are too clear and well exposed. The rules are simplified not thrown aside. Company resources are focused for maximum effect; and we do want teams of supreme effectiveness using their full potential. Crises create islands of outstanding performance in an ocean of average delivery. If we can retain this high performance between crises we will eventually drain away the ocean and replace it by a continent of excellence.

Value of linking them

The integration of the EIRMA and ETN models is critical if the full potential of the organisation is to be identified and applied for business benefit. Further more the ability to position the organisation relative to other companies in similar industrial sectors is markedly improved if the parameters used are comprehensive and enriched by the indispensable interactions between people and the systems and process they operate with. Finally this model allows an organisation to identify where it needs to improve and what it has to do to get closer to all-round world class performance

The tools and measuring systems

The essence of an effective measuring system is simplicity, clarity and integrity. Users must be able rapidly to understand and then use the scoring/assessing parameters in a robust and reproducible fashion. They should arrive quickly at a set of scores for their own organisation, and with sensible benchmarking be able to chart their own course for improvement.

The assessment is based on scoring a number of excellence indicators, the organisational ones classified under three major phases in the innovation process:

- 1) Company and Top Management strategic Input for R&D,
- 2) R&D processes,
- 3) R%D output and business outcome.

For the people indicators these are classified in two phases:

- 1) Clear Objectives,
- 2) Removal of bottlenecks.

Twenty seven standard key areas are defined for organisational phases

Inputs:

Leadership, vision, mission
Market Intelligence
Technology Intelligence
Societal Responsiveness
Process Intelligence
Competencies & Skills
Radical Innovation
Strategy & portfolio Drivers
Business Alignment

Processes:

Project Management
Budgeting Process
Technical Assistance
External Partnerships
Technology Asset Management
IPM
Idea Management
Portfolio Mgt
Knowledge Mgt

Results:

Options from R&D
Knowledge, know-how, awareness etc
Direct revenues from sales etc
Product leadership
Technology leadership
Innovativeness
Cost Efficiency
Sustainability

Image, Brand and Stock Value

Inputs:

Leadership, vision, mission
Market Intelligence
Technology Intelligence
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Processes:

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Results:

Options from R&D
Knowledge, know-how, awareness etc
Direct revenues from sales etc
Product leadership
Technology leadership
Innovativeness
Cost Efficiency
Sustainability
Image, Brand and Stock Value

Nine standard key areas are defined for the people phases:

Crystal Clear Objectives:

Goals
Communication
Mission
Sharing

Removal of Bottlenecks:

Bureaucracy
Interfaces
Non Value – Adding
Tools
Personal Benchmarking

An assessment using the model requires the selection of typically 10 key organisational areas out of the possible 27 for a specific industry type and competitive strategy.

In the people areas all 9 must be used.

These areas are each given a quantitative score based on the use of a ranking matrix of enablers/results and objectives/responsibilities – fig 1, coupled with a more detailed description of the factors making up each of the areas. Tables 1&2 are examples for Project Management and Goals.

Fig 1

Ranking Matrix

ENABLERS & RESULTS	SYSTEMATIC IMPROVEMENT	3	4	5
	ENABLERS CONSISTENT RESULTS MEASURED	2	3	4
	ENABLERS AND RESULTS IN PLACE	1	2	3
		OBJECTIVES DEFINED	OBJECTIVES COMMUNICATED	RESPONSIBILITIES ARRANGED
OBJECTIVES & RESPONSIBILITIES				

The detailed process indicators underpinning Project Management

Table 1

Typical Process Indicators

Project Management:

- Actual cost vs target
- Deliverable meets spec
- Milestones defined and tracked
- Goals clearly defined
- Empowerment of project manager
- Accountability defined
- Cross-functional project team
- Cost tracking
- Common PM vocabulary
- Communication with stakeholders
- Deliver on time

The detailed people indicators underpinning Goals

Table 2

Typical People Indicators Crystal Clear Objectives

Goals:

- qClearly defined
- qDirect and actionable
- qShared with team members
- qCompatible with team objectives
- qRelevant to business objectives
- qCapable of agreed adjustment
- qEncourage individuality
- qBuild teamness

When this first part of the assessment has been completed you will have a score of between 1 and 5 for each the ten process factors and nine people factors that you chose as representative of your industry. This data is now represented in tabular form together, in this illustrative case, with other companies in the same industry sector.

The first table – table 3, showing the process ranking and the second – table 4, the people ranking.

	Input			Process				Results						
Industrial Sector	Mission	Market Intelligence	Competencies Skills	Project Mgt	IP Mgt	Portfolio Mgt	Knowledge Mgt	Tech Value	Product leadership	Tech LS	Innov	Cost eff	Image	Tot
DSM	5	5	5	4	5	4	5	5	5	5	5	4	4	61
BASF	4	4	4	4	3	4	4	4	3	3	2	4	4	47
ICI	3	4	3	3	3	3	3	3	3	3	3	2	3	39
Danisco	3	3	4	3	3	4	4	4	3	4	4	3	3	45
Borax	5	5	3	4	4	3	3	5	5	5	5	5	3	55

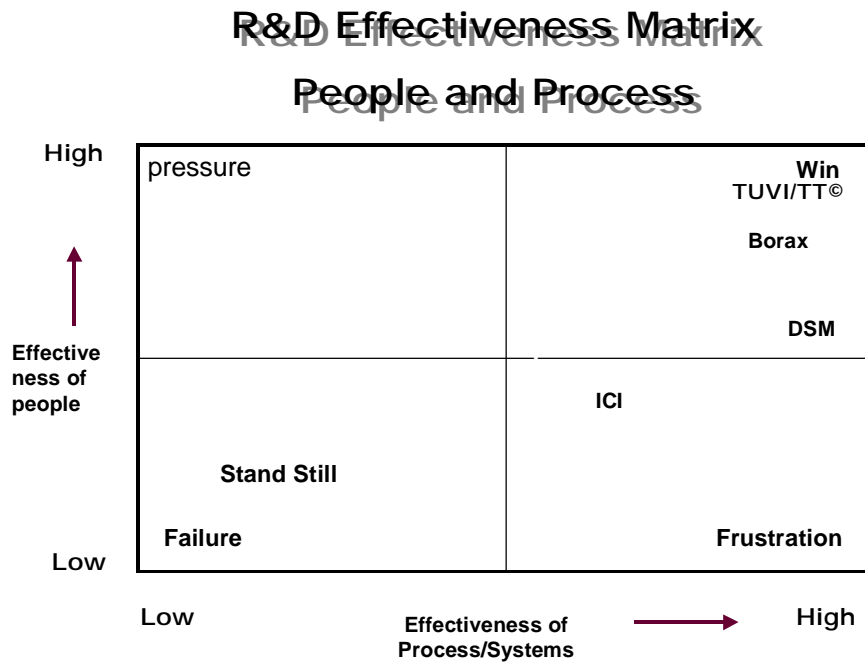
Table 3

	Crystal Clear Objectives				Removal of Bottlenecks					Tot
Industrial Sector	Goals	Communication	Mission	Sharing	Bureaucracy	Interfaces	Non Value-adding	Tools	Personal benchmarking	
Borax before	2	2	4	0	0	0	1	4	0	13
Borax after	5	3	5	4	4	5	4	5	3	38
DSM	5	3	5	3	3	0	1	4	0	24
ICI	4	3	4	2	1	0	1	3	0	18

Table 4

The data is now in a form where it can be transferred to an Effectiveness Matrix – fig 2, to show side-by-side comparisons with other companies and significantly where scope exists for progress towards top performance.

Fig 2 Effectiveness Matrix



In this particular hypothetical example ICI would look to DSM for improvement in process factors and to Borax for people opportunities. Likewise DSM would take note of the Borax performance with people whilst Borax would look for ways of moving closer to the top right hand corner.

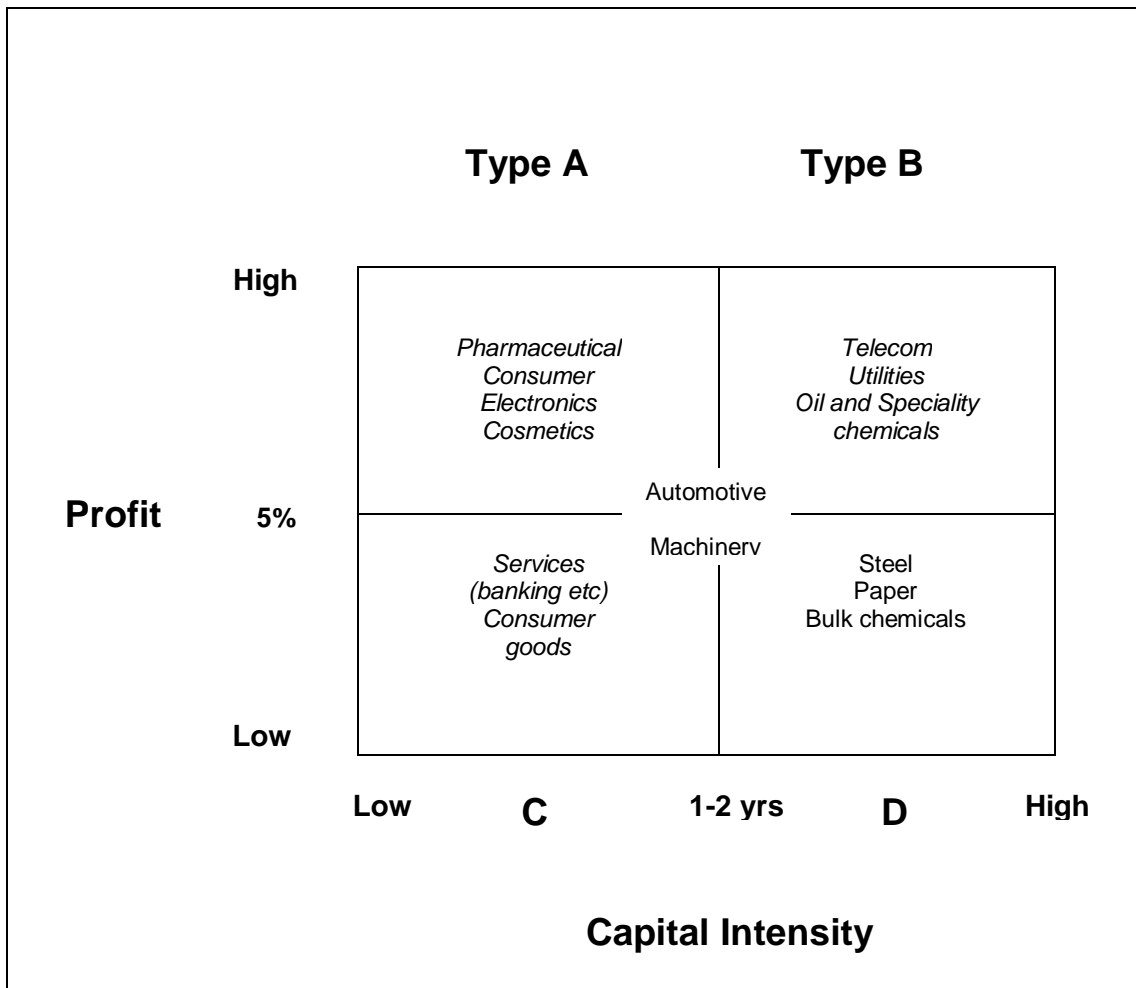
Simple description of how they will be used

The assessment is set out as a step-by-step process that begins with the selection of the key factors and ends with an identification of the company's positioning relative to world-class performance. If other companies are included then a relative benchmarking is also possible.

Step 1

Select Industry Type

Use Profit/Capital intensity matrix



Step 2

Select the key process areas according to industry type

Match the industry type (A, B, C, D) against the key process areas.

	Input		R&D Process		Output & Outcomes
A B C D	Leadership, Vision Mission	A B	Project Management	B	Output: Technology
A	Market Intelligence	C D	Budgeting Process	C D	Knowledge & Know-how
B	Technology Intelligence	D	Technical Service (internal/external)		Direct Revenues
C D	Societal Responsiveness	C D	External Partnerships/networking	A B	Outcome: Product Leadership & Customer Satisfaction
C D	Process Intelligence	B	Technology Asset Management	A	Technology Leadership
A D	Competencies/skills	A	Intellectual Property Management	A C	Innovativeness
B	Radical Innovation	B C	Idea Management (capture, selection,	D	Cost Efficiency

			evaluation)		
B	Strategy & Portfolio Drivers	A	Portfolio Management	D	Sustainability
C	Business Alignment	A	Knowledge Management	A C	Image, Brand & Stock Value

Step 3

Rank the chosen key organisational areas on the 1 to 5 scale

There is a detailed description of each key process factor in Appendix 1. This is used to ensure a full understanding of the elements of each factor can be considered in arriving at the score.

Ranking Matrix

ENABLERS & RESULTS	SYSTEMATIC IMPROVEMENT	3	4	5
	ENABLERS CONSISTENT RESULTS MEASURED	2	3	4
	ENABLERS AND RESULTS IN PLACE	1	2	3
		OBJECTIVES DEFINED	OBJECTIVES COMMUNICATED	RESPONSIBILITIES ARRANGED
		OBJECTIVES & RESPONSIBILITIES		

Step 4

Rank all the people areas on the 1 to 5 scale

All the 9 people factors are used irrespective of industry type. They are fully described in Appendix 2

Step 5

Display these individual scores on the ranking tables

This enables the differences to be highlighted

Step 6

Add up all the scores for the process areas and express as a percentage of the maximum possible score.

Do the same for the People scores.

By expressing as a percentage this normalises the scores and allows direct comparison between different companies and in principle with different industries. It also enables the gap analysis to be made between actual performance and potential performance

Step 7

Locate your company on the effectiveness matrix

The company is now located in a space which allows the gaps to be analysed relative to all round world class performance. If other companies have been similarly analysed then benchmarking is possible

Step 8

Analyse difference between actual scores and maximum and determine areas to be improved.

This analysis enables companies to identify areas needing improvement and gives directional guidance as well as position. Used in conjunction with other companies in the same industry help can be solicited for specific improvement actions subject only to mutual agreements.

This analysis is considerably quicker and more transparent than trying to work through the EIRMA report or Quicksan.

It is possible to do a self-assessment but the power lies in the interpretation of the gaps and how they are used to drive up effectiveness and performance. It is therefore important in the early stages of use that we retain the tool in our own hands so that we can have a dialogue with the corporate users and direct their interests towards transforming opportunities.

Appendix 1

Typical Organisational Indicators for Process Issues

The following tables can be used to select appropriate performance indicators for each key area

R&D Input

Key areas and their indicators

Leadership, vision, mission

number of technology/innovation function holders on Board
% of annual report devoted to innovation
consistency of innovation strategy over number of years
% of employees sharing the vision
overlap between R&D scorecard and corporate scorecard
annual R&D spend as share of revenue (vs. competitors)

Market Intelligence

commercial feasibility of R&D plans
number of staff in market intelligence role
number of subscriptions to market intelligence source
number of visits to trade events, competitors
R&D contact hours with (final) customers

Technology intelligence

technical feasibility of R&D plans
number of staff in technology intelligence role
number of external technology partners

Societal Responsiveness

hours devoted to societal contacts
resources allocated to societal responsiveness improvement programs
frequency of societal feedback (stakeholder query, 360° review)
relative size of environmental/social annual report

Process Intelligence

amount of R&D people involved with process
R&D physical closeness to manufacturing
number of R&D/production cooperation projects

Competencies & Skills

% headcount in R&D
key R&D attractiveness to labour markets, students, scientists.
% key skills mastered by R&D staff
training budget for key R&D skills
R&D staff scientific rating

Radical Innovation

% dedicated resources for radical innovation
number of areas for breakthrough R&D covered
top management support for breakthrough R&D

Strategy & portfolio drivers

number and size of strategic buckets (vs. competition)
% of R&D portfolio selection attributes traceable to business strategy
planning horizon

Business Alignment

business unit involvement in R&D planning (tactical, strategically)
% projects or resources allocated through business unit approval

R&D Process

Key areas and their indicators

Project Management

deliver on time
actual cost vs. target
deliverable meets specifications.
milestones defined and tracked
goals clearly defined and communicated
empowerment of project manager
accountability defined
cross-functional project team
communication inside the project team
cost tracking
common PM vocabulary understood by all
goal adjustment and willingness to kill projects
communication with stakeholders

Budgeting Process

budget aligned to business needs
cost tracking system in place
follow up of actual expenses vs. budget
analysis of information: resource utilisation vs. planned
information communicated to decision makers

Technical assistance

customer satisfaction surveys
number of claims resolved vs. number of claims
speed to respond to customer demand
specific resources allocated in budget
ability to respond to customer demands
R&D associated to customer interface

External Partnerships and Networking

existence of partnerships
existence of partnership management policy
evidence of network contacts
number of external partners per project
partners among market/technology leaders
company capabilities increased
number of technology platforms associating external partners
project portfolio: internal vs. external projects

Technology Asset Management (TAM)

- core competences identified
- existence of a policy to develop core competence
- number of product with embedded technology
- number of product with technological competitive position
- cost reduction due to technology improvement
- competence and career development in place

Intellectual Property Management (IPM)

- existence of patent application strategy
- existence of a patent portfolio management strategy
- existence of reward system for inventors
- number of litigations made vs. made against
- number of patents in portfolio vs. number patents exploited
- ROI of exploited patents (cost of patent + R&D versus return)

Idea Management (IM)

- existence of corporate innovation policy
- existence of a formalised idea management process
- number of ideas submitted
- number of ideas retained vs. submitted
- resources attributed to exploiting ideas (Euro/year, Euro/idea,...)
- value creation from new ideas (cost saving, revenue,...)
- existence of reward system for potentially profitable ideas

Project/Program Portfolio Management (PPM)

- selection criteria clearly defined and communicated
- prioritisation criteria and process in place
- stage gates criteria and process in place
- deliverables on time and on budget
- resource utilisation
- goal adjustment and willingness to kill projects

Knowledge Management

- existence of reward system for knowledge sharing
- existence of a policy on documenting knowledge and consulting prior knowledge
- existence of formal systems for knowledge capture and sharing
- existence of knowledge stewards
- number of additions to systems for knowledge capture
- number of consultation of systems of knowledge capture

R&D Results, Key areas and their indicators

Output of the R&D function (Options for Implementation)

Technological options generated by R&D function

- number of process improvements
- number of new process concepts
- number of product improvements
- number of new product prototypes
- number of ideas and pipeline projects
- number of defensive products to respond to competitive threat

% of (new) developments implemented successfully (e.g. to BU's operations)
number of patents utilised in-house

Knowledge, know-how, familiarity, awareness, understanding

number and quality of patents
number of publications or conference presentations

Direct revenues from sales of services, patents, licences, etc

% income based upon R&D licenses
% income from technical services

Outcome of Final Results of the R&D

Product leadership and customer satisfaction, preference/market share

proprietary position
number of new products
time to market
change in product portfolio/ BU potential
time to breakeven per new product family
sales and margin generated from products less than five years old
profit from new products

Technology leadership: ahead of competitors, integration of external and internal knowledge

proprietary position
profit from new technologies
less downtime and reduction of transition time
time to breakeven per new technology
ratio between R&D spending versus profit per product family

Innovativeness, new product/service sales, new business models, creation of new businesses

market share improvement
share of sales from new products

Cost efficiency: leaner/cheaper, better/more valuable

improvement of productivity
reduction in capital investment due to R&D
labour reduction, investment reduction
savings in catalyst, additives, energy
higher % of prime quality resulting in additional margin versus off-grade
more output from the same capacity resulting in increased sales
improvement of product consistency

Sustainability, resource use, energy efficiency, social and ethical issues

environment
social
economic (continuity)

Image, brand and stock value; Value of company/product as perceived by customers, employees, shareholders and the community at large

shareholder/stock market value
change in technology asset value

motivation personal
renewal of the company
image of company and/or products

Appendix 2

Typical Performance Indicators for People Issues

The following tables can be used to select appropriate performance indicators for each key area

Crystal Clear Objectives

Key areas and their indicators

Goals

Clearly defined
Direct and actionable
Shared with team members
Compatible with team objectives
Relevant to business objectives
Capable of agreed adjustment
Encourage individuality
Build teamness

Mission

Knowledge of markets
Leadership in markets
Future direction clear
Where the company's going - understood
What the company is - accepted and supported

Communication

Strategic direction –how frequent
Bottom up – does it influence?
Translation of high-level language done
Amount of informal contact
Random collisions encouraged
Information broken into elemental bits
Consistent and persistent messages

Sharing

Objectives encourage knowledge sharing
Company information transparent
Teamness encourages win-win
Knowledge offered not demanded
High levels of mutual trust

Removal of Bottlenecks

Key areas and their indicators

Bureaucracy

% of staff in H/O and support functions
Is there removal as well as addition?
How transparent is it
How much trust is engendered
Are there opportunities for simplification?
Is it increasing or decreasing

Interfaces

Number of disciplines in company or BU
Number of levels
% people administering interfaces
Tendency to attenuate message

Non Value-Adding

Average number of tasks each day
% less than 15 minutes each
Encouragement to identify valueless activities
Encouragement to identify new value adding options
% of time on valueless activities
Is there an "Iceberg Effect"?

Tools

ICT is fit for purpose
Equipment supports fast innovative developments
Space encourages communication and interactions
Days per year spent on training & development
% of time on specific skills training
Days per year spent benchmarking other organisations

Personal Benchmarking

Is there a personal development process?
% internally driven
Are there clear benchmarks for improvement?
How much money does individual have to spend independently on own improvement?
% personal responsibility for own development
Does individual have to identify external exemplars?
Does individual have world-class performance as a measurable goal?

Appendix 3

R&D Effectiveness Matrix People and Process

