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S SASAKI

THE DEVELOPMENT OF A SUSTAINABILITY TOOL

SCHOOL OF INDUSTRIAL AND MANUFACTURING
SCIENCE

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CRANFIELD UNIVERSITY

SCHOOL OF INDUSTRIAL AND MANUFACTURING
SCIENCE

MRes THESIS

Academic Year 2004-2005

S SASAKI

The development of a sustainability tool

Supervisor: Dr. Emma Dewberry

September 2005

This thesis is submitted in partial fulfilment of the requirements for the degree of
Master of Research

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ABSTRACT

This study examines the potential for ICI Paints, a paint and coating manufacturer, to move their products towards greater sustainability. A brief review of the tools and techniques currently in use to encourage sustainable outputs is given. A new tool is proposed and developed that combines the principles from The Natural Step (TNS) and the streamlined life-cycle analysis concept. Using a matrix to contain TNS's four system conditions, which measure sustainability in four scientific principles, against five life-cycle stages, a 'snapshot' of the sustainability profile of paint can be efficiently determined.

Study methods included semi-structured interviews with ICI Paints employees representing different stages of the paint life-cycle. Significantly, despite being a leader in paint innovation and a Dow Jones Sustainability member, ICI Paints had performed very little life-cycle work in the past few decades.

The development of the snapshot tool was made up of three areas: setting the context by understanding ICI Paints sustainability needs; meeting the sustainability needs through the development of the snapshot tool; finding where and how the snapshot tool could be useful to ICI Paints.

By extracting common themes from interviews and secondary data, the main finding which over-arched all three objectives was the tool's potential in communicating sustainable messages to generalist and specialist audiences. Other themes included the usefulness of the tool in sustainability focused risk management strategies.

Future work includes reviewing and testing the snapshot tool in workshops.

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1. INTRODUCTION

This research project has been a collaborative venture with a shared vision in finding ways of moving towards sustainability. The principle aim has been to stretch the sustainability boundaries in the paint industry, through the use of a tool which takes into account all the sustainable parameters of paint. The project's principle investigator has been Sylvie Sasaki, and academic supervision has been provided by Dr Emma Dewberry. The collaborating partners have been Forum for the Future, The Natural Step and ICI Paints which are formally introduced in the following chapter. Here the thesis structure, project aim and objectives are explained.

1.1 Principal investigator

Sylvie Sasaki holds a BSc (Hons) in Environmental Science from the Chemistry, Physics and Environmental Science (CPES) department at Sussex University. Her undergraduate dissertation, entitled '*Investigating the Simultaneous Use of Wind and Solar Power*' was an investigation centred on alternative technologies and concerned their economic viability and benefits with regard to sustainable development. Since then, Sylvie has been keen to integrate her technical knowledge into the wider sustainability picture, by developing sustainable strategies which encourage positive actions to be made towards a sustainable society. This interest motivated her decision to become involved in this project.

1.2 Academic supervisor

The project has been supervised by **Dr Emma Dewberry**, who gained her PhD in Ecodesign from the Design Innovation Group at the Open University. Dr Dewberry moved to Goldsmiths College, University of London, in October 1998 where she was employed as a research associate on a project entitled DEMI (Design for the Environment Implementation) which directed her interests into the design for sustainability field. As lecturer and MSc Course Director for the Sustainability and Design course at Cranfield University, Dr Dewberry has provided the knowledge and necessary experience for supervising this project.

1.3 Thesis structure

The following section gives an outline of the chapters contained in this thesis.

Chapter 2 Introduction to Project Stakeholders

Forum for the Future, a sustainable research and consultancy organisation, and ICI Paints, a paint manufacture, are introduced as the project stakeholders. Background information on each of these organizations is given and their relationship and involvement in the project is explained.

- Chapter 3 Project methodology**
Here the chosen research strategies and methods for this project are addressed by answering, why and how they facilitate the most productive processes for achieving the stated aim and objectives.
- Chapter 4 Literature review**
This chapter tunes into the projects key topics, and illustrates the research paradigm underpinning the project aim and objectives.
- Chapter 5 Sustainability and ICI Paints**
An assessment is made into what sustainability means to ICI Paints. Here the context is set for the following two chapters.
- Chapter 6 The snapshot tool**
This chapter shows how the snapshot tool was developed by drawing on TNS and SLCA principles described in chapter 4. The tool's potential in helping sustainable decision making is also discussed.
- Chapter 7 Implementing the snapshot tool**
The questions, how and where the tool should be used, are addressed.
- Chapter 8 Discussion**
The collective findings are discussed along with the tools usefulness in providing ICI Paints with a competitive edge.
- Chapter 9 Conclusion**
This chapter provides a brief summary of the research findings, and describes how ICI Paints will make use of the snapshot tool in the future.

1.4 Project aim

To develop a strategic tool that will encourage movement towards more sustainable solutions, using The Natural Step framework and streamlined life cycle analysis methods, for ICI Paints.

The project aim was broken down into three objectives.

1.5 Project objectives

Objective 1 - to assess the needs of ICI Paints in respect to sustainability by understanding their current and future vision.

Objective 2 - to analyse ways of integrating TNS and SLCA to develop a strategic tool which will encourage movement towards sustainability.

Objective 3 - to assess how the tool can be useful to ICI Paints.

2. INTRODUCTION TO PROJECT STAKEHOLDERS

2.1 Introduction

This chapter introduces the project stakeholders – ICI Paints, Forum for the Future and The Natural Step. A background to the organizations is given, along with the history and relationships which exist between them and the dialogues which sparked off this project.

2.2 Introduction to ICI Group

'The ICI Group is a thriving international business, strongly led, technologically sophisticated and with some of the most successful and highly recognizable products in the industry' [www.ici.com]. ICI Group create, develop and market specialty chemical products and ingredients for food, electronic equipment, fragrances, decorating and personal care. They have over 5,000 products within their range and employ more than 33,000 people around the world. ICI Group has locations in 50 countries across Europe, as well as multiple locations in North and South America, Africa, Asia and Australasia. The figure below shows the turnover by each business for 2004 [www.ici.com, ICI Sustainability Review 2004].

Turnover by business 2004

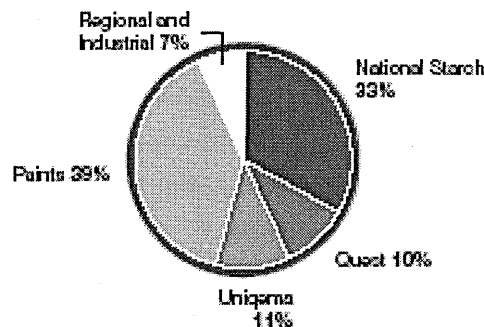


Figure 1: Turnover from each of ICI's four business areas in 2004 [ICI Sustainability Review 2004].

The group is made up of four core businesses with each one having a distinct area of expertise:

- *ICI Paints* – supplying some of the world's top paint and decorative brands;
- *National Starch & Chemical* – supplying adhesives, starches, synthetic polymers and electronic and engineering materials;
- *Quest International* – creates and markets flavours, food ingredients and fragrances;
- *Uniqema* – provides 'special effects' to improve the performance of products as diverse as skin creams, refrigerants, cars and babies' nappies.

2.3 Sustainability at ICI Group

ICI's sustainability principles have been based on safety, health and environment (SHE) policies, employee values and stakeholder interests which have been formalised into a sustainability policy. The policy joins principles and responsibilities from the SHE policy and standards, ICI's Code of Conduct in respect to human rights and the Global Reporting Initiative (GRI), a standardized reporting mechanism. This makes for a comprehensive policy which endorses sustainability in every area of ICI's manufacturing processes and beyond.

2.3.1 ICI's sustainability policy

"ICI's policy is to conduct its business responsibly, with integrity and with respect for the interests of all those affected by our operations. We believe that our activities should generate economic benefits; create opportunities for an enhanced quality of life; respect the environment; and be a positive influence in the communities in which we operate. In particular, to deliver this policy we endorse the following principles. We will:

- Comply with all relevant laws and regulations and take any additional measures we consider necessary.
- Meet all the commitments in our Safety, Health and Environmental Policy and Standards.
- Apply Responsible Care® principles wherever we operate throughout the world.
- Conduct our business with integrity, respecting human rights wherever we are active, as set out in our Code of Conduct.
- Create a working environment for our employees which is based on mutual trust and respect, and in which diversity and inclusion are valued.
- Strive to develop new products which have increased benefit for our customers and the environment throughout their life cycle.
- Be a role model and build long term partnerships, founded on trust and mutual advantage, within the communities in which we operate, and support our employees to be active in local communities.
- Communicate openly and actively encourage dialogue on all issues relevant to this policy.
- Establish, publicise and deliver against challenging performance targets and report our progress in the format developed by the Global Reporting Initiative (GRI).
- Provide appropriate training for our employees and information for all who work with us, to facilitate implementation of this policy.
- Require everyone who works for ICI to live up to these commitments.
- Build long term relationships with our suppliers choosing as business partners those with standards and ethical practices compatible with our own.

This policy and principles, in conjunction with our Safety, Health and Environment Policy and Code of Conduct, apply throughout ICI and our subsidiaries worldwide. We encourage our related companies to adopt policies which accord with this policy" [ICI Sustainability Policy, 2004].

2.4 Product stewardship at ICI Group

On a product level, commitment to product stewardship is important for managing the sustainability impacts of product life-cycles. As ICI's products contain a range of chemicals, risks have to be managed responsibly which requires all those involved in the product's life-cycle to work together in applying safe and environmentally sound practices. Some examples of product stewardship at ICI can be found in the following case studies.

- *Natural Starch* was the first company in the world to produce organic functional native starch.
- *ICI Paints* identified an internal business need for clearer understanding and communication of what product stewardship means and what it can deliver, so produced a brochure called 'Product Stewardship – what's it all about' which was distributed throughout the global business.
- *ICI Paints* produced a new paint which uses corn starch instead of oil-based materials.
- *Quest International* has included sustainability in its purchasing strategies. It requires an assessment of suppliers on issues such as resource depletion, climate change, waste emissions, effects on biodiversity, and supplier records on human rights, as well as other social issues such as poverty and illiteracy.
- *Uniqema* have developed Washpoint™, a new system that allows dry cleaners around the world to switch from traditional methods of dry cleaning (which rely on chlorine based solvents), to safer and environmentally friendlier methods using CO₂ recycled from industrial emissions [ICI Sustainability Report, 2003].

2.5 ICI Paints

Of ICI's four core businesses, ICI Paints has expressed a need and interest to assess the sustainability of their products, which led to the development of this project. As a leading international coatings business, ICI Paints has manufacturing facilities in 26 countries in Europe, North America, Latin America and Asia, with headquarters situated in Slough, UK. It's portfolio of products concentrates on decorative paint and coatings for food and beverage cans, and develops strong, well-established brands such as 'Dulux', 'Glidden', 'Valentine', 'Coral', 'Alba' and 'Color Your World'. The acquisition in 1998 of the European Home Improvement business of Williams Plc added further brand names such as 'Hammerite', Cuprinol, 'Polyfilla', 'Polycell', 'Xyladecor', 'Molto' and 'Alabastine'. The acquisition broadened and strengthened ICI's decorative product range to include wood care, metal care, adhesives and fillers. The Decorative market in total comprised over 90% of the Business's turnover in 2000 [www.icipaints.com].

2.6 Making paint

Despite the numerous brand names which ICI Paints supports, this report focuses solely on decorative paint. Paint in general contains varying amounts of similar ingredients; pigments, film formers, solvents and additives. Each of these materials contribute to paints fundamental properties which are that it must be applied in a fluid state, and later form a solid film. The importance of each of these materials is explained:

- **Pigments** – these are fine powders which give the paint film its colour, and help hide the surface underneath. Pigments are chemically inert, colourfast when exposed to light and are insoluble in water. Coloured pigments range from simple inorganic compounds such as red iron oxide (Fe_2O_3) to complex organic pigments such as dioxazine violet. The most commonly used white pigment is titanium dioxide (TiO_2).
- **Film formers / binders** – this component binds the pigment particles to the surface to be painted. Binders many of paints' properties such as hardness, toughness, flexibility, durability and speed of drying.
- **Solvents** – this is the volatile component of paint and is used to bring the paint to the correct consistency.
- **Additives** – these are used in small amounts to 'improve' paint, for example by encourage the flow-out of brush marks or hastening the drying process.

2.7 Forum for the Future – The Natural Step

The Natural Step (TNS) is an international sustainable development charity that helps organisations and communities move towards a just and sustainable future. The UK office operates under licence of Forum for the Future, an educational charity which engages in training and R&D. TNS uses a science-based framework to help individuals and organisations understand sustainability. This framework is a well developed planning methodology used for assessment, visioning and action, which is explained at depth in chapter 4. The approach has assisted many companies and organisations from across the world to develop strategic sustainability initiatives, which in turn have helped them achieve greater effectiveness, security, employee satisfaction and public acceptance. In the UK, companies have included BP, Carillion Construction, Co-operative Bank, Interface Inc., Sainsbury's and Yorkshire Water [www.forumforthefuture.org.uk].

2.8 Forum for the Future and ICI Paints (Decorative) working together

ICI Paints is a corporate partner of Forum for the Future, and their interest in tackling the sustainability challenge has led them to embrace TNS and its principles. Recently, ICI Paints' European Decorative team partook in a workshop, facilitated by Forum for the Future, to ascertain the sustainability issues concerning them. By breaking down the paint life-cycle into different stages, (design, raw material extraction, raw material and pack conversion, manufacture, sale, painting, transport and waste disposal), the workshop enabled the team to rigorously assess the potential risks and opportunities within the paint life-cycle. Figure 2 shows the workshop outcomes. Some of the risks highlighted were labour practices, ICI brand image, transport costs, volatile organic compounds (VOC's) while some of the opportunities were biodegradable raw materials, bio-fuels and energy reduction. These risks and opportunities are looked at in greater depth in chapter 6.

	Product, Pack design	RM extraction	Transport	RM & Pack Conversion	Transport	Manufacture	Transport	Sale	Transport	Painting	Transport	Waste disposal
ENVIRO.		waste energy	Emissions	waste emissions energy	Emissions	waste emissions energy	Emissions	Emissions	Emissions	emissions waste	Emissions	landfill incineration emissions
SOCIAL		employee welfare health employment	congestion	pollution health employment	congestion	pollution health employment	congestion	congestion	congestion	health pride	congestion	recycling pollution
ECONOMIC		Env. costs licenses	Road taxes	Env costs	Road taxes	Env. costs License to operate Formula costs	Road taxes	Road taxes	Road taxes	Brand share	Road taxes	eco taxes
RISKS		Labour practices Mineral depletion	Costs	Labour practices	Costs	Pollution ICI image recruitment	Costs	Brand image	Costs	VOCs Harmful chems Paint removal Indoor air qua	Costs	Waste regs Take-back Haz disposal Recycling
OPPORT.	New/lower impact products	Renewable RMs Compostable RM Supplier assess Energy red'n	Bio fuel	Bio plastics Compostable/recyclable packs Sustainable paper Energy reduction	Fuel efficiency	Energy/ emission reduction Biodiversity projects Land remediation	Transport plan	Brand Image Trained sales staff	Direct selling	Prolongs life of wood/metal Creative activity!	Costs	Recyclable/compostable paint & packaging

Figure 2: The paint lifecycle risks and opportunities [ICI Paints Decorative Europe Activity document, 2005]

The workshop addressed other issues such as sustainable initiatives that ICI Paints should continue to support or undertake, for example, Community Re-Paint – a paint take back scheme. The team also identified the need for one vital ingredient; *‘senior commitment for improvement!’*

3. RESEARCH METHODOLOGY

3.1 Introduction

This chapter relates **what** research strategy was used, **how** the research was conducted and **why** the selected research methods were used. The strengths and weaknesses of the chosen methods are also considered. The research methods used to meet each objective are made explicit, and an in depth look is made into the development of the sustainability snapshot tool. The final section shows when the events which made up the research programme happened and how they were managed.

3.2 Research strategy

As the title of this project suggests – ‘Developing a sustainability tool for paint’, the research has largely involve the understanding and application of existing knowledge and theories to create new tools and thinking. As this research was centred on ICI Paints sustainability needs, it was decided that an explorative case study strategy would be most appropriate as this would provide room to design in maximum flexibility, allowing the research to ‘*unfold, cascade, roll and emerge*’ [C. Robson, 1993].

To provide rigour and grounding to the research outcomes, most of the guiding principles used came from previous research – namely Karl-Henrik Robert’s work on TNS, and Thomas Graedel’s work on SLCA’s. Analysis of similar case study work and workshops also contributed significantly to the development of a new sustainability tool which would help identify the sustainability of products, referred to in this report as the sustainability snapshot tool. The model of a similar tool, which was developed by Forum for the Future to help Nike with their sustainable purchasing decisions, was used as the basic framework for the snapshot tool (see section 3.10). Also, primary research was used to sense the live and pressing issues concerning particular areas of the paint life-cycle.

3.3 Strengths and weaknesses of exploratory case studies

Although this research strategy was the most appropriate for the project brief, it was necessary to bear in mind the strengths and weaknesses of this approach.

Strengths

- It is real life (not simplified);
- It creates a deeper understanding of the company processes and culture;
- Trust can be formed through greater familiarity between parties;
- Change can be facilitated through quick responses and interaction;
- Observations are easier;
- It allows the researcher to delve deep into complexities and processes;
- It allows the researcher to explore where, why and how.

Weaknesses

- It is only one company, so may not be fully representative;
- It is conducted by only one researcher adding bias and subjectivity;
- The length of time allocated to the project was limited [J. Lambert, 2002; C. Marshall, 1989].

3.4 Research methods

To compliment the exploratory research strategy, a combination of the following techniques was used.

3.4.1 Semi-structured interviews

Interviews were carried out to gain qualitative information from those closely involved in the paint life-cycle at ICI Paints. The interviews needed to be productive by retrieving as much information as possible in a short space of time. For this reason open questions were devised to encourage conversation. The questions were designed to have a certain amount of flexibility within them, allowing for movement between topics and particular avenues to be explored further. The flexibility also allowed the interview to be tailored to the individual's knowledge and experience and entice true opinions, views and thoughts.

Despite the obvious element of bias, the questions were structured within a simple framework which consisted of three parts, each representing the research objectives (see section 3.9). Each interview lasted for approximately one hour with 15 minutes allocated to part 1, 30 minutes to part 2 and 15 minutes to part 3.

ICI Paints took responsibility for identifying individuals to represent the different parts of the paint life-cycle. Altogether eight people were interviewed.

- | | |
|---------------------------|---|
| 1. Jamie Pelts (US based) | <i>Director of Marketing and Innovation (Phone interview)</i> |
| 2. Jerry Hodge | <i>Global Packaging Development Manager</i> |
| 3. John Wright | <i>Product Stewardship</i> |
| 4. Marina Poza | <i>Innovation Manager for Trade Business</i> |
| 5. Phil Taylor | <i>Paints Research Associate</i> |
| 6. Ray Leggetter | <i>European Innovations Manager (Phone interview)</i> |
| 7. Stephen Davis | <i>European R&D Manager</i> |
| 8. Sue Vel | <i>Trade Market Data Manager</i> |

The interview questions were sent to the interviewees a few days prior to the interview (see Appendix A for interview questions). The interviews were held at ICI Paints headquarters in Slough, either face-to-face or by telephone.

3.4.2 Formal meetings

This technique was used to gain a greater understanding of the project context and theories behind the main topics. Meetings were organised with the project stakeholders to draw on their expertise. Section 3.11.1 shows when these meetings took place in the research programme.

Meeting attendee	Organisation	Expertise
Dr. Chris Sherwin	Forum for the Future	Eco-design tools
Keith Le Page	ICI Paints	ICI Paints sustainability needs
Peter Price-Thomas	Forum for the Future / TNS	Eco-design tools and ICI Paints sustainability needs
Steve Evans	Cranfield University	LCA's and SLCA's

Figure 3: A table to show the expertise of meetings attendees

3.4.3 Secondary sources (documents and records)

A range of secondary resources were used to build up the case for the project and gain an understanding of the project's core issues. These resources were used to construct a **literature review** to illustrate the research paradigm underpinning the project aim and objectives.

3.5 Literature review

Previous research and existing knowledge concerning the project topics were assessed to identify the gaps and weaknesses the aim and objectives will address. The secondary information was split into five key topics:

- **Sustainability and eco-design** – an introduction into sustainability and eco-design. Sustainability is put into the product and innovation context;
- **Eco-design tools** – explains the tools and strategies used for measuring and improving product sustainability for example, software, matrices and spider diagrams;
- **The Natural Step (TNS)** – introduces TNS principles which are needed for development of the snapshot tool explained in Chapter 6;
- **Life-cycle analysis (LCA)** – introduces LCA and streamlined life-cycle analysis (SLCA) principles which are which are also needed for development of the snapshot tool explained in Chapter 6;
- **Other ways of modelling product sustainability** – explores other eco-design tools which have been recently developed. The weak points of these tools are

highlighted leading to the project aim which is to develop a robust, stand alone tool which will give a quick and easy snapshot of a product’s sustainability.

3.6 Interview analysis

After recording and writing up the interviews, the transcripts were used to sift out any issues pertinent to the project objectives. An assessment of any regularities and anomalies was then made to draw out themes for each objective. Finally, a thematic analysis was made to understand the links between the issues for the objectives individually and collectively.

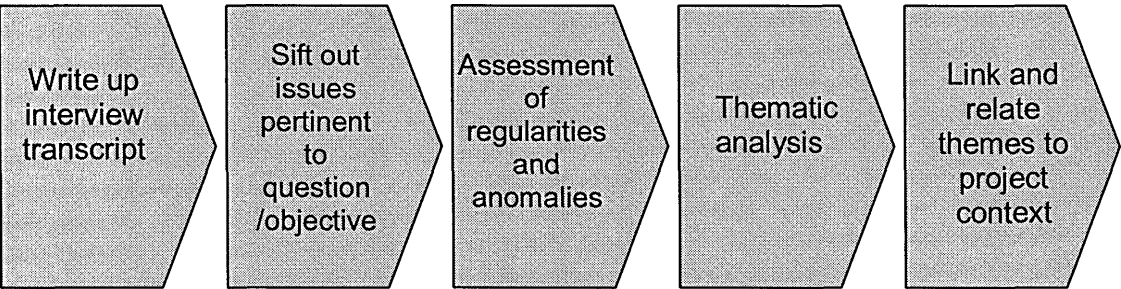


Figure 4: The interview analysis process

3.7 Validation

The information collected for this research can be put into three groups; literature review, TNS and ICI information. These groups provide essential back-up for each other, and ensure confidence in the information and its validity.

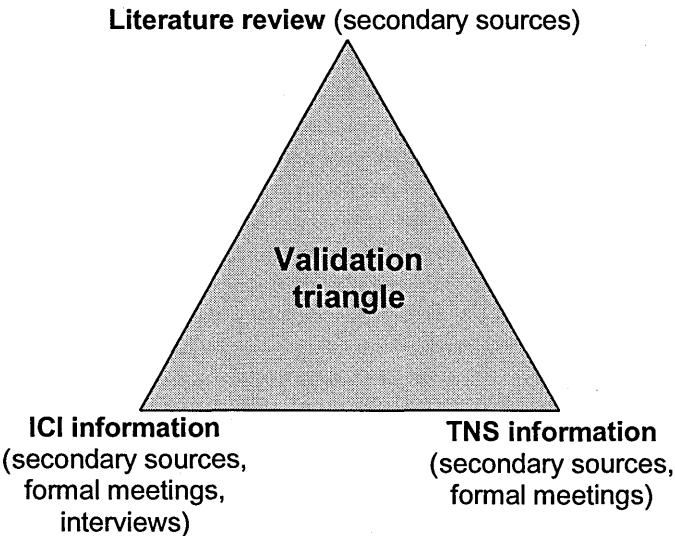


Figure 5: The validation triangle shows how the three research sources will support or contradict arguments

3.8 Bias

When conducting research bias often creeps in to affect the results in some way. Techniques which centre on collecting and analysing qualitative information will bring with it biases which have to be taken into consideration. The following list addresses some of the areas for concern:

- **Data overload** – there will be limitations on the amount of data that can be dealt with;
- **Information availability** – information that is difficult to get hold of gets less attention than that which is easier to obtain;
- **Positive instances** – there is a tendency to ignore information conflicting with hypotheses already held, and to emphasize information that confirms them;
- **Uneven reliability** – the fact that some sources are more reliable than others tends to be ignored [C. Robson, 1993].

3.9 Research aims and objectives

The research aim was to develop a strategic tool that will encourage movement towards more sustainable solutions, using The Natural Step framework and streamlined life cycle analysis methods, for ICI Paints. To achieve this aim, three objectives were set which are outlined below along with the corresponding information collection techniques.

Objective 1 - assess the needs of ICI Paints in respect to sustainability by understanding their current and future vision. This was met through secondary sources, meetings and interviews. The first part of the interview was designed to meet this objective. The part 1 interview questions were:

- How long have you been at ICI Paints?
- Could you briefly summarize what your position at ICI Paints involves now?
- Where do you feel the pressures for tackling sustainability are coming from?
- How do you feel ICI Paint's sustainability performance compares to other companies in your sector?
- Where do you feel there's scope for improvement?

Objective 2 - to analyse ways of integrating TNS and SLCA to develop a strategic tool which will encourage movement towards sustainability. This was met through secondary sources, meetings and interviews. The second part of the interview was designed to meet this objective. The part 2 interview questions were:

- With which parts of the paint life-cycle are you most familiar?
- What do you think the sustainability issues are in these parts?
- Can you see any solutions to these sustainability issues?
- What questions would you like to ask concerning the sustainability of paint?

Objective 3 - assess how the tool can be useful to ICI Paints. This was met through interviews. The third part of the interview was designed to meet this objective. The part 3 interview questions were:

- How do you think a snapshot tool, which efficiently helps determine the sustainability of paint, would be useful?
- Where do you think a snapshot tool would be best placed (in the innovation process)?

The diagram below gives an overview of the research methods used for each objective, and shows how the information flows logically from objective 1 to 3.

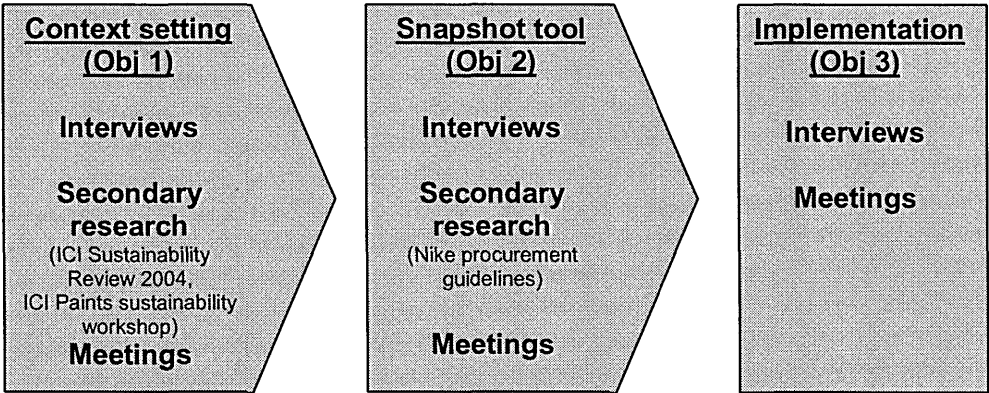


Figure 6: A diagram to show the research techniques used for each objective and how these outcomes feed the research design

3.10 The snapshot tool methodology

The over-arching aim of the project was to develop a snapshot tool that would efficiently assess the sustainability of paint. It should be made clear early on in this report that a basic framework for the snapshot tool had already been decided by Forum for the Future and ICI Paints. It was to use the outline of a similar tool Forum for the Future had developed for Nike, which used a combination of SLCA and TNS principles inside a matrix. The system conditions from TNS formed one axis of the matrix, while the life-cycle stages used in SLCA techniques formed the other axis (see section 4.4 and 4.5). A meeting with ICI Paints and TNS was set up to determine the five life-cycle stages in figure 7.

	System condition 1	System condition 2	System condition 3	System condition 4
Raw material extraction				
Paint synthesis				
Packaging and distribution				

Use				
End-of-life				

Figure 7: Snapshot tool framework

3.10.1 Populating the matrix

Each matrix square represents one part of the paint life-cycle in relation to the system conditions of TNS. The sustainability impacts arising from the techniques outlined in objective 2, were applied to specific parts of the paint life-cycle. Questions addressing these impacts were designed for each matrix square. Chapter 6 explains the snapshot tool development process.

3.11 Project brief

It was necessary from the start of the project to clarify the boundaries, expected deliverables, constraints and assumptions to ensure a shared vision for all those involved in the project. To manage these expectations a project brief was drawn up after an introductory meeting. The programme of project events is shown in figure 8.

Month	June				July				August				Sept	
Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2
Activity	Literature Review								Interview write up / Discussion				Submit / Presentation	
			Holiday		Project brief drawn up	Method write up			Interviews					
							Development of snapshot tool							
	M1				M2	M3	M4	M5				M6		

Project meetings (M)

- M1 LCA – 13th June 2005 (SE)
- M2 Project introduction – 7th July 2005 (PP)
- M3 ICI Paints introduction – 14th July 2005 (PP, PT, KL)
- M4 Project catch-up – 20th July 2005 (ED, PP, CS)
- M5 Snapshot tool – 28th July 2005 (PP, PT)
- M6 Project catch-up – 23rd August 2005 (PP)

Meeting Attendees

- CS Dr. Chris Sherwin – Forum for the Future
- ED Dr. Emma Dewberry – Cranfield University
- KL Keith Le Page – ICI Paints
- PP Peter Price-Thomas – Forum for the Future
- PT Dr. Phil Taylor – ICI Paints
- SE Prof. Steve Evans – Cranfield University

Figure 8: The sequence of events

The following table expands on the issues and actions which arose from the meetings highlighted in figure 8.

Meeting	Issues addressed	Meeting actions
M1	An introduction to LCA and SLCA.	Research into LCA's and SLCA's (literature review).
M2	Official introduction to project (scope, boundaries, assumptions, budget etc).	Project brief.
M3	Official introduction to ICI Paints and their requirements for the snapshot tool.	Develop snapshot tool framework (objective 2).
M4	Review of snapshot tool framework to Forum for the Future and TNS.	Further development of snapshot tool objective 2).
M5	Review of snapshot tool to ICI Paints. Interviews arranged.	Interview questions set and sent to interviewees (objectives 1, 2 & 3).
M6	Review of project to TNS.	Continue work with thesis.

Figure 9: The issues addressed and actions arising from the project meetings.

4. LITERATURE REVIEW

4.1 Introduction

This chapter distils the rapidly growing amount literature and research on the project's key themes; sustainability and the ways to achieve it. First, the sustainability scene is set with an introduction to systems thinking and its rationale on a product level. The various ways of implementing sustainability are examined, and the myriad of tools used to accomplish or head towards sustainable objectives highlighted. The focus then zooms in to examine two concepts in depth; TNS and LCA, where case studies are used to help frame the purpose, implementation and appropriateness of their use. Finally, less conventional ways of addressing the sustainability of products, which have been developed to overcome the weaknesses of more conventional tools and methods, are explored and critiqued.

4.2 Sustainability and Eco-design

This section introduces the sustainability concept through a systems thinking perspective, carrying it forward into the business, product and innovation context. The section concludes with a look at the various tools that are used to implement sustainability on a product level.

4.2.1 Sustainability

A regular starting point for sustainability can be taken from Our Common Future which broadly defines sustainability as "...development which meets the needs of the present without compromising the ability of future generations to meet their own needs" [World Commission on Environment and Development, 1987]. The first seminal text on sustainability was 'Silent Spring', written by Rachel Carson in 1962 which highlighted the damage agricultural pesticides were causing to eco-systems. Since then, various forums have developed and evolved with the purpose of bringing world leaders together to discuss the pressing issues on the sustainability agenda. Most recently, climate change and the elimination of third world debt dominated proceedings at the G8 Summit held in Scotland, 2005. This example stresses how sustainability discussions have increasingly had a part to play in high level debates, as leaders try to mitigate the issues characteristic in various parts of the world.

4.2.2 Sustainability in a business context

Until fairly recently, addressing environmental issues has been the predominant focus of sustainability. But, it has now come to be regarded in a more holistic manner, and the expression '*triple-bottom line*', coined by John Elkington in 1998, has been fully incorporated into the business language. The three bottom lines represent the economy, society and ecology with all three interacting to formulate the complex system, sustainability.

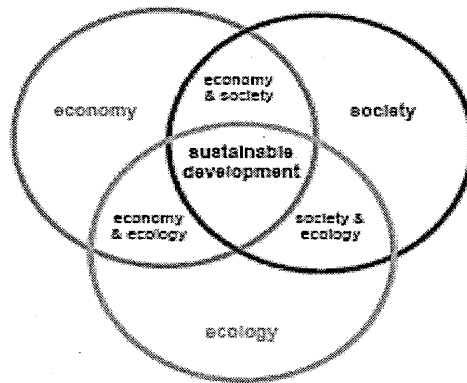


Figure 10: The three domains which make up sustainability

Looking at a more radical stance on sustainability, John Ehrenfeld has reframed the triple-bottom line to help shift businesses from ameliorative strategies to deeper, more meaningful, truer sustainability strategies. Here the term environment is replaced with nature to connote our existence within nature's holistic systems. Economics is important to understand the metabolism of human societies, and equity gives way to the more deep rooted term, ethical, which encompasses equity, justice and responsibility [J. Ehrenfeld, 2004].

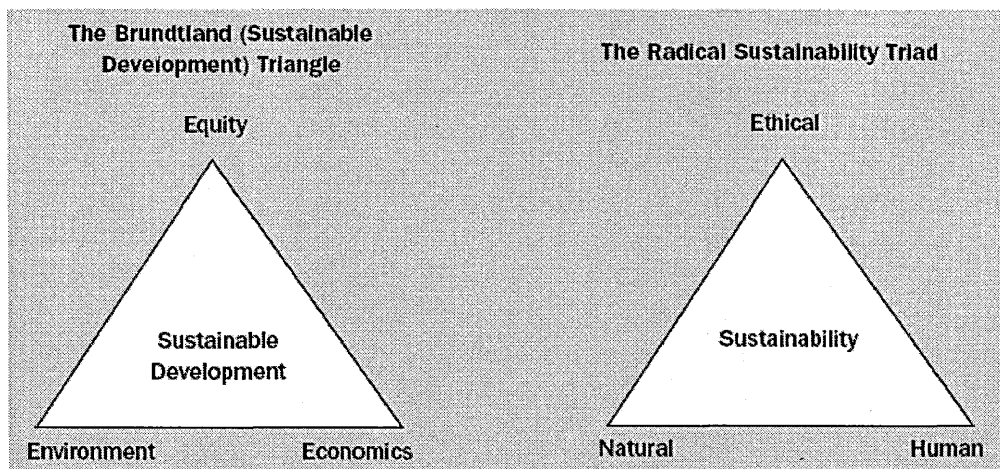


Figure 11: John Ehrenfeld's radical sustainability triad [J. Ehrenfeld, 2004]

4.2.3 Systems thinking

When considering complex subjects such as sustainability, it's usual to harness a 'systems thinking' mindset to appreciate the inter-connectivity of the issues that lie within it. The world can be thought of as a large, complex system containing subsystems such as ecology, weather, society and economy. It is therefore useful to have a multi-dimensional framework in which information from different disciplines and domains which make up these systems can be integrated. Therefore, a systems approach to sustainability entails considering the various agents interacting in the world as inter-connecting subsystems [M. Clayton et al, 1997]. The ways of dividing up the subsystems can vary according to the individual, as William McDonough and Michael Braungart demonstrate in their book *Cradle to Cradle*. Instead of breaking

sustainability up into the conventional three domains shown in figure 10, they prefer to see two discreet metabolisms. *'The first being the biological metabolism – the cycle of nature, and the second being the technical metabolism – the cycles of industry.'*

4.2.4 Sustainability pressures

In today's world organisations are put under increasing pressure to operate within sustainable guidelines. These pressures may be explicit, such as compliance with legislation or pressure from NGO's, or implicit such as the resulting impacts of an organisation's activities on an ecosystem. The figure below represents the range of stakeholders an organisation will interface with, and hence the potential pressures an organisation could face concerning sustainability.

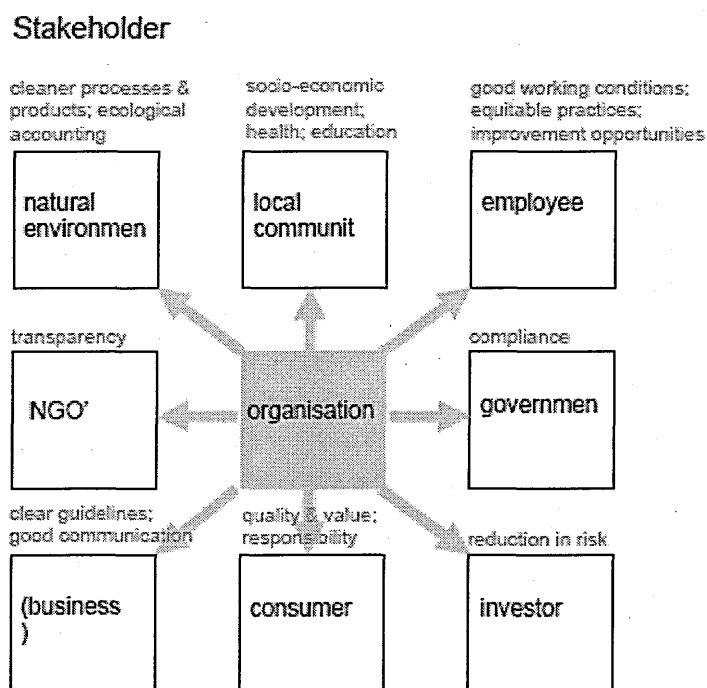


Figure 12: Stakeholder pressures [www.Sustainability.com]

4.2.5 Sustainable products and innovation

Injecting sustainability into products is seen as either a design opportunity or constraint. Van Hemel and Cramer [2002], studied the eco-design¹ behaviour of 77 small-medium enterprises in Holland to identify the barriers and stimuli for actively pursuing eco-design. Their findings concluded that the four most successful design solutions were: recycling of materials; high reliability/durability; recycled materials and low energy consumption. The study also confirmed that internal stimuli are a stronger eco-design force than external stimuli. The most influential internal stimuli were the opportunities for innovation, an increase in product quality and the potential market opportunities, whilst the most influential external stimuli were customer demands, governmental legislation and industrial sector initiatives. These findings are summarized in the following figure.

¹ Eco-design is design which minimizes the impact on the environment [www.unep.org/PDF/sc/Eco-design_resourcekit-2]

Internal stimuli	External stimuli
Environmental benefit	Government
Cost reduction	Industrial sector
Image improvement	Customers
New market opportunities	Environmental action groups
Increase of product quality	Suppliers
Synergy with other product requirements	Competitors
Other commercial benefit	
Innovation opportunities	

Figure 13: A summary of the internal and external stimuli for greening products in Dutch, small-medium companies [Van Hemel C, et al, 2002]

The study also identified 11 barriers. Of these, the three which obstructed eco-design improvement the most were: no clear environmental benefit; it's not perceived as the designer's responsibility, and there's no alternative solution.

Frans Vollenbroek's research [2002] assesses the challenges of sustainable development and product innovation on a more strategic level by pointing out the need to switch from technology-push policies (scientific led progress) to society-pull policies (society decides which balance of economic, ecological and social goals are to be met). Vollenbroek's research takes a process approach by using innovation to move towards sustainability with the crucial aspect being *'that innovation is no longer driven by the past, but attracted by the future'*.

Although Vollenbroek identifies two factors influencing innovation, Frieder Rubik [2001] identifies another; policy push and pull. As businesses are still awakening to the pressures and need for greening products, the Integrated Product Policy (IPP), a policy area which arose during the late nineties, has acted as a wake up call to design and innovation teams. The policy is orientated towards products and services and their environmental features throughout the life-cycle, and aims to improve environmental performance and promote innovation. Rubik concludes his study of environmentally sound product innovation and IPP with four messages:

1. The role of IPP is to arrange stimuli for stakeholders and supply and demand side actors, to facilitate environmental orientation of their activities;
2. IPP provides a more systematic view on the economic and environmental life-cycles of products;
3. IPP is a new way of thinking and co-operating;
4. Functional and system innovation requires networking to encourage new ideas and long-term strategic thinking.

4.2.6 Implementing sustainability: the sustainability toolkit

A number of scientists have pioneered an array of tools and approaches to develop sustainability. These can either be voluntary standards which use benchmarks and auditing schemes to measure progress, labels which symbolise various environmental or social criteria and principles which provide non-binding recommendations. A selection of these tools and processes are described in the following figure.

Standards		
BS7750 British Standard	First published in 1992, BS7750 is a specification for environmental management systems.	www.bsi-global.com
EMAS Eco-Management and Audit Scheme	Established by the European Community in 1993, EMAS is a certification scheme for environmental management and auditing systems. EMAS certification is the European equivalent of British Standard 7750. Its aim is to improve companies environmental performance.	http://europa.eu.int/comm/environment/emas
ISO 14001 International Standard Organization	ISO 14001 is an international standard governing the requirements of an environmental management system. It does not set any actual environmental objectives other than strict compliance with environmental legislation. It does, however, stipulate how any applicable goals are to be achieved. As such, the main emphasis is on the means rather than the ends. The dynamic nature of the environmental management system allows for continuous improvement.	www.iso.org
SA8000 Social Accountability	Published by Social Accountability International (SAI) in 1998, this was the first international standard governing social accountability auditing.	www.cepaa.org
AA1000 AccountAbility 1000	This international standard, published in 1999, is the work of the Institute for Social and Ethical Accountability (ISEA), also known as AccountAbility. It is a benchmark of ethical performance in business, measured according to ethical, social and, indirectly, environmental criteria. Transparency is a key criterion.	www.AccountAbility.org.uk

Labels based on environmental and social criteria		
FSC Forest Stewardship Council 	The FSC label is a wood quality standard. The FSC's main aim is to promote the environmentally and socially compatible management of the world's forests.	www.fscoax.org
Eco-label (EU) 	Through its eco-labelling scheme for staple consumer goods, symbolized by the EU Flower logo, the European Commission aims to encourage greener consumption. The Eco-label is based on a 'cradle to grave' approach, taking into account a product's entire lifecycle.	http://europa.eu.int/comm/environment/ecolabel/index.htm
The Blue Angel(D) 	The Blue Angel was launched by the German government in 1977. The scheme was created with the aim of promoting green products over other, less environmentally friendly equivalents.	www.blauer-engel.de
Principles and codes of conduct		
Global Compact	The Global Compact is a 1999 UN initiative designed to raise corporate awareness of fundamental social and environmental values, thereby humanizing the rationale of the global markets. The three key areas covered by the Global Compact are human rights, rights at work and environmental protection.	www.unglobalcompact.org
The International Chamber of Commerce (ICC) Business Charter for Sustainable Development	The 1991 ICC Business Charter for Sustainable Development sets out 16 principles for global business. The aim of the Charter is to continually raise standards of environmental management and promote their integration into business practices across the board, from senior management through to the wider workforce and suppliers.	www.iccwbo.org/home/environment/charter.asp

The Natural Step	The Natural Step provides a framework for sustainable development comprising a raft of practical criteria and operational measures based on four fundamental scientific principles. The aim is to guide companies as they put in place environmental management systems in line with ISO 14001 or EMAS.	www.naturalstep.org
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Figure 14: Examples of standards, labels and principles used to measure sustainability [UBS, 2002]

Karl-Henrik Robert’s paper on strategic sustainable development demonstrates how some of these tools and processes can work together, either concurrently or side-by-side to address the basic principles and requirements of sustainability in a systemic way, for example using eco-labels in a process approach such as The Natural Step to help achieve sustainability.

4.2.7 Product sustainability: eco-design

The World Business Council on Sustainable Development (WBCSD) defines eco-design as design which minimizes the impact on the environment. Taking this definition a stage further Birkeland shows that eco-design stems from design concepts, practices and ethical frameworks based on ecological principles, putting eco-design under the generic heading, ecological design. The table below describes architects, Sim van der Ryn and Stuart Cowan’s guide to the design process from an ecological perspective.

Solutions grow from place	Ecological design begins with the intimate knowledge of a particular place.
Ecological accounting informs design	Trace the environmental impacts of existing or proposed designs.
Design with nature	By working with living processes we respect the needs of all species while meeting our own.
Everyone is a designer	Listen to every voice in the design process.
Make nature visible	De-natured environments ignore our need and our potential for learning.

Figure 15: Design principles from Sim van der Ryn and Stuart Cowen [J. Birkeland, 2002]

Work in ecological design, has branched out to infiltrate every stage and scale of development, from termite control to bioregional planning. The figure below

demonstrates how eco-logical design can exist at each of these stages, and sets the context for this project's concern; eco-design.

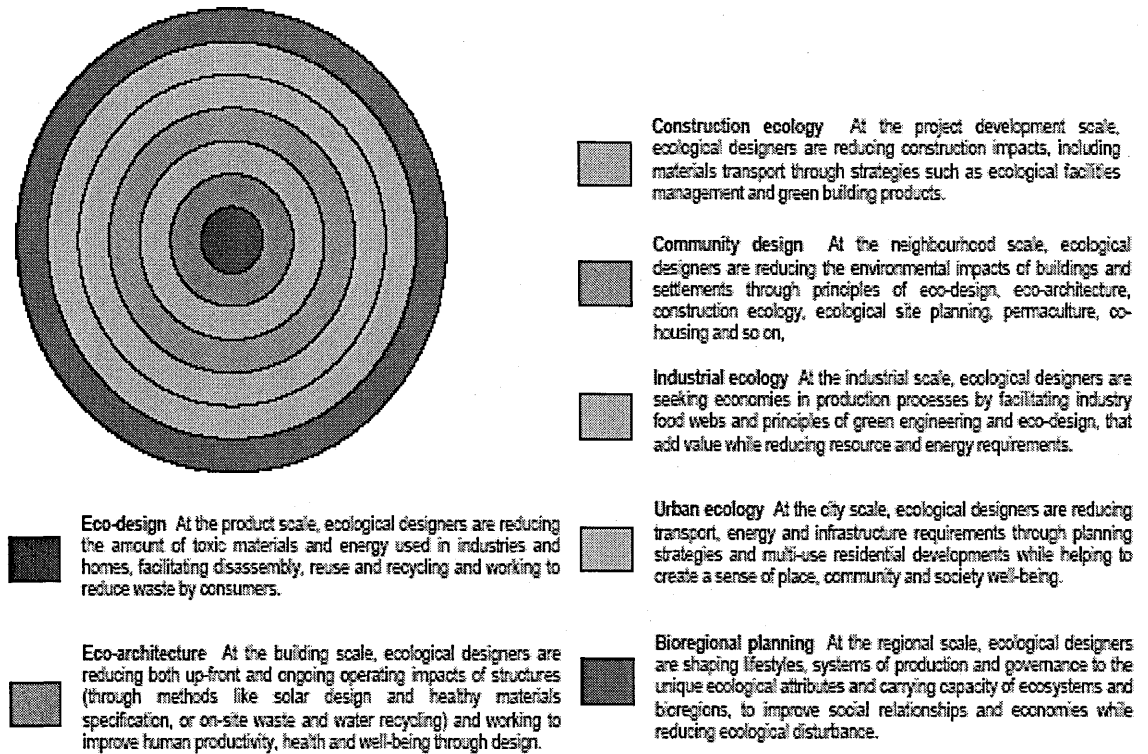


Figure 16: The scales at which ecological design can exist [J. Birkeland, 2002]

4.2.8 Implementing product sustainability

The United Nations Environmental Programme (UNEP) identified three different eco-design strategies.

- The first is to use a product focused approach which will render existing goods and services to be more economical, more efficient and less harmful to the environment, as well as improving after-sales, and end-of-life collection and processing.
- The second is a results focused approach, which pursues the same objectives from a different angle, for example, by selling not the product itself but its use (rental).
- The third is a needs focused approach which studies the needs and expectations that a product or service must fulfil, then looks for the best way to satisfy them using a product, or a service, or both [UNEP, 2004].

The UNEP has also set up the Life Cycle Initiative, whose remit is to develop and disseminate practical tools for evaluating the opportunities, risks and trade-offs associated with products and services over their entire life-cycle².

When planning and implementing eco-design, Martin Charter highlights a number of considerations which need to be taken into account, in his article 'Managing the eco-

² '...production that begins with an input of materials followed by creation, packaging, distribution and use of the product, and ending with disposal, recycle, or reuse of remaining materials.'
(www.chemistry.org/portal/a/c/s/1/acsdisplay.html)

design process', in The Journal for Sustainable Product Design, 1997. The following five points outline some of the eco-design planning issues.

1. Analysis of strategic / tactical / operational issues;
2. Establishing eco-design objectives;
3. Developing appropriate organizational structures;
4. Undertaking training;
5. Establishing information and support systems.

The article also stresses the need for senior level commitment and motivation, as well as organized structures and systems to plan, co-ordinate and implement eco-design.

Implementation of eco-design is also branching out to newly industrialized countries, and the Ecodiseno CentroAmerica programme, which was set up by Delft University of Technology, aims to disseminate and implement the practice and concept of eco-design into small-medium sized companies in Central America. To generate experience and show the potential benefits of eco-design in this part of the world, nine demonstration projects were undertaken in design companies to show how it can be integrated. Some of the methods demonstrated were eco-design manuals, project tools and internet websites [Diehl et al, 2001].

4.3 Eco-design tools

This section provides a brief overview of some of the tools currently in use in the eco-design field, and addresses some of the pitfalls when using these tools.

4.3.1 Tools used in eco-design

Eco-design tools can be considered as anything that supports eco-design, so could be software based assessment tools, paper based analysis wheels, information resources or tools for idea generation. The figure below provides an overview of the choices of tools currently available, as given by Tischner.

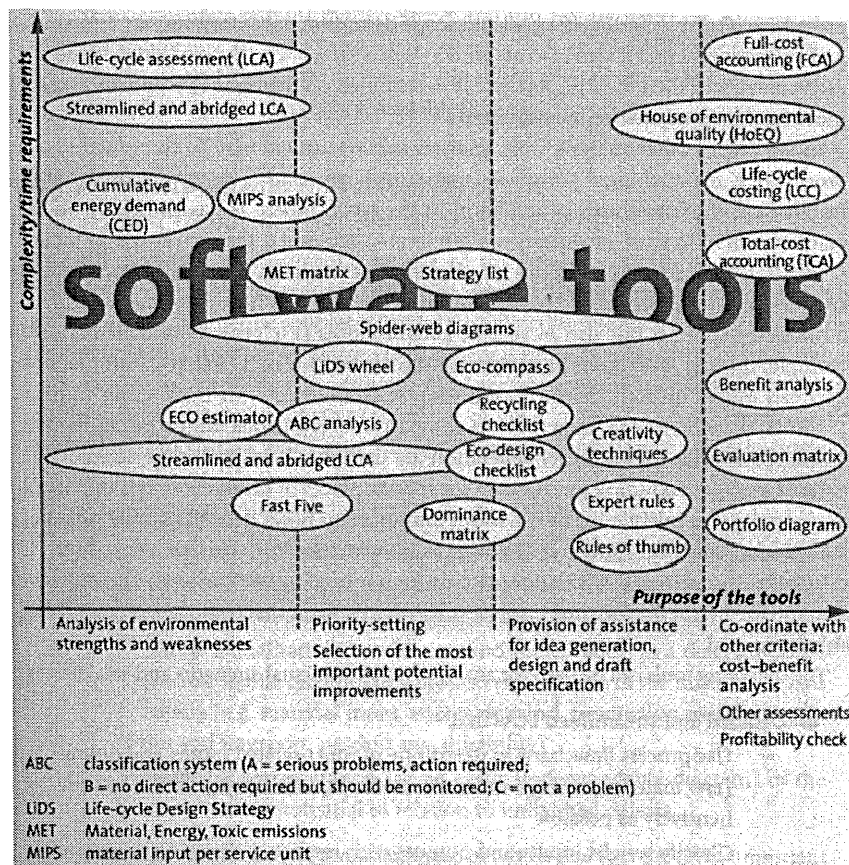


Figure 17: Classification of tools which are used for eco-design and their role within the product development process [Tischner, 2001]

The tools within the first three categories of Tischner's diagram have the potential to influence products.

The first category, analysis of environmental strengths and weaknesses, mentions LCA tools among others. LCA tools were among the first types of modern eco-design tools to be developed, and are popular because they allow companies to identify environmentally damaging problems. LCA's do not provide the answer to eco-design problems, but are reflective, with their strength being to direct iterative design [V. Lofthouse, 2001]. (Section 4.5 introduces and describes LCA's in greater depth.)

The second category, priority setting, features tools such as LiDS, spider webs and strategy lists. All these tools respond to the recognition that eco-design should not be bolted on to product development, but should be inherent in product development strategy by providing a framework around which companies can identify and set priorities for product improvements [V. Lofthouse, 2001].

The third category, provision of assistance for idea generation, design and draft specification, includes elements of spider-web diagrams, eco-compass (discussed in section 4.6.2), recycling-checklists, creativity techniques, rules of thumb and expert rules.

4.3.2 Using eco-design tools to tackle sustainability

Some eco-design tools or metrics, such as LCA's and Factor X, which measure and monitor activities can be used in a general framework to plan for sustainability. Using a set of basic principles for sustainability, such as those prescribed by TNS (see section 4.4), it is possible to define a favourable outcome, and then back-cast from these defined goals to identify the current problems. Metrics can then be used to measure the alignment of activities with the principles contained within a framework for sustainability [K-H. Robert, 2000].

4.3.3 Eco-design tool concerns

A literature study carried out by Baumann et al [2002], on a database of 650 articles taken from the engineering, management and policy disciplines assessed the product development processes in companies, the product chain and society. The research identified *'several white spots on the map of research on environmental product development. These seem to be the understanding of the use and role of tools on a micro level (within companies), and an understanding of how this micro-level interacts with the macro level (between companies and policies)'*. By looking more holistically at these concerns it is also suggested that to optimize resource use and minimize emissions, a systems approach is necessary, both in research and in practice *'...a strategic orientation on the product development process within companies is under-developed.'*

4.4 The Natural Step (TNS)

This section introduces TNS principles which are referred to again concerning the development of a new eco-design tool to measure the sustainability of paint (see chapter 6). Also discussed through two case studies is TNS's wide spread application in business

4.4.1 Introducing TNS

The Natural Step (TNS) is an international sustainable development charity that helps organisations and communities move towards a just and sustainable future. The Natural Step in the UK operates under licence of Forum for the Future an educational charity. Having worked for over a decade, TNS has gained international recognition for its work, and has nine offices around the world including Australia, Canada, Israel, Japan, New Zealand, South Africa, Sweden, UK and USA [www.forumforthefuture.org.uk].

The Natural Step provides a framework for working towards sustainable development and comprising of practical criteria and operational measures based on four fundamental scientific principles called the system conditions [www.naturalstep.org]. The story and growth of TNS can be attributed to Dr. Karl-Henrik Robert whose profession as an oncologist, (the study of cells and tumours), led him to the evolution of the system conditions. The system conditions explain what a sustainable society should look like, and as sustainable development is all about making progress, it is necessary to devise policies and strategies that can move organisations in a sustainable direction. The system conditions are set out in the following section [D. Cook, 2004].

4.4.2 The system conditions

The system conditions define the final sustainability goal. The following table describes the system condition, the objective and some suggested practices.

	System condition	Objective	Suggested practices
1	In a sustainable society, nature is not subjected to systematically increasing concentrations of substances extracted from the Earth' crust.	Eliminate our contribution to systematic increases in concentrations from the Earth's crust.	Substitute minerals that are scarce in nature with others that are more abundant. Use mined materials efficiently and systematically reduce dependence on fossil fuels.
2	In a sustainable society, nature is not subject to systematically increasing concentrations of substances produced by society.	Eliminate our contribution to systematic increases in concentrations of substances produced by society.	Substitute certain persistent and unnatural compounds with ones that are normally abundant, or that break down more easily in nature, and use all substances produced by society.
3	In a sustainable society, nature is not subject to systematically increasing degradation by physical means.	Eliminate our contribution to systematic physical degradation of nature that we bring about through over-harvesting, introductions and other forms of modification.	Draw resources only from well managed eco-systems, systematically pursue the most productive and efficient use both of those resources and of land, and exercise caution in all kinds of modifications of nature.
4	In a sustainable society, human needs are met worldwide.	Contribute to meeting human needs in our society and worldwide, over and above all the substitutions and measures taken in meeting the first three objectives.	Use all our resources efficiently, fairly and responsibly so that the needs of all people on whom we have an impact now, and the future needs of those not yet born, stand the best chance of being met.

Figure 18: A table showing TNS's four system conditions, objectives and suggested practices [K-H. Robert, 2002]

'Once we know where we are today and where we need to get to, it is possible to 'back-cast' from this vision and identify the incremental steps necessary to reach that sustainable future' [2020Vision series – TNS 2003].

TNS framework is a comprehensive and robust set of principles, and sceptics who wonder whether the TNS framework is an over belief in the role of science would be met with the following answer:

'Distinction must be made between the mode, and the art of using it. It is designed to be a shared mental model for cooperation around sustainable development that is generic enough to be applied to any activity at any scale. To make this possible, we have utilized scientific thinking, methodology... Applying the framework is where the art begins. It's about community building, genuine creativity, ethics, group dynamics, common sense and psychology. It's the musicians and chess-players mastering the basics who can improvise [D. Cook, 2004].

4.4.3 TNS Metaphors: the funnel and tree

TNS has within it a number of metaphors. Two of the most widely used are the funnel and tree which are explained below.

The funnel: We all acknowledge that we live in a fast-changing world, in which the pace of change is accelerating. Although the pressures that have forced these changes may appear random or unforeseeable, many stem from the 'squeeze' of a world with a rising population – which is consuming more and more per capita – and a diminishing resource base. TNS uses the metaphor of the funnel to describe how decreasing environmental and social headroom, the 'license-to-operate' granted by society, will impinge upon the freedom of operation of an organisation.

As the walls of the funnel are approached, impacts on an organization will manifest in diverse ways, including resource scarcity and costs, more stringent regulations, reputation with markets and the public [2020Vision series – TNS 2003].

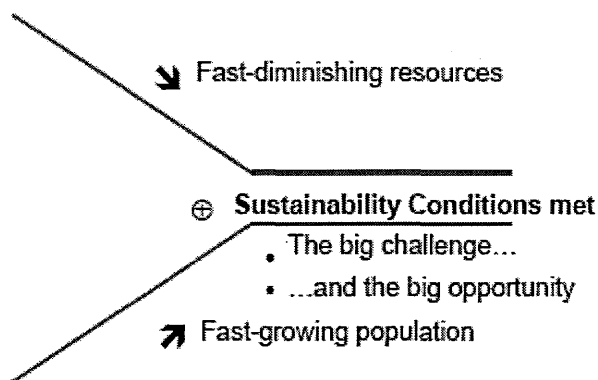


Figure 19: The TNS funnel [2020Vision series – TNS 2003]

The tree: The tree metaphor is often used to illustrate simplicity without reduction. This means understanding the principles that govern a system, it's first order principles, to make handling the complexity and detailed level of the system easier.

Using the tree, the trunk and branches can be likened to the first order principles or system conditions, and the leaves likened to the consequences and activities of the system [B. Goran 2000].

4.4.4 TNS case studies: Interface and Mitsubishi

TNS has been incorporated into a large number of businesses strategies. Here are the case studies of two multi-national organizations who have actively pursued TNS and it's principles.

Interface Inc is a leading manufacturer of carpet and fabrics for commercial and residential interiors with 20 facilities in four continents, and annual sales of US\$923 million. Interface developed a shift in strategic orientation which focused on seven key 'fronts' for approaching sustainability, based on the four system conditions of TNS. These fronts included:

1. Eliminating waste, not just physical waste, but the whole concept of waste;
2. Eliminating harmful emissions;
3. Using only renewable energy;
4. Adopting closed loop products and processes;
5. Using resource-efficient transportation;
6. Energizing people (all stakeholders) around the vision;
7. Redesigning commerce so that a service is sold that allows the company to retain ownership of its products and to maximize resource productivity.

By heavily engaging its employees with the importance of the seven fronts in achieving sustainability, and through its wide array of programs, many variable ideas have emerged that enable Interface to move forward with its vision to *'lead others forward through power of influence'* [WBCD 2004].

'Sustainability doesn't cost; it pays'
[Founder of Interface Inc, Ray Anderson, 2004]

The second case study looks at Mitsubishi Electric's adoption of TNS and highlights the challenge of bridging the gap between the environmentalists and the corporate community. In 1990, the Rain Forest Action Network (RAN) introduced a consumer boycott on all Mitsubishi products because of their alleged exploitation of logging in old forest areas in Borneo. Tachi Kiuchi, Managing Director of Mitsubishi Electric decided to create a business opportunity from the conflict. They decided to use TNS framework because it tied together lots of separate sustainable initiatives which they had been wishing to implement. Some of these improvements have included a joint venture with the Japanese government for the installation of take-back centres to receive and recycle used electronic and electrical equipment. Mitsubishi is also developing software to analyse all of it's products, and has integrated quality management and environmental management programmes. It has also been implementing industrial ecology concepts by linking product take back programmes with better designs of it's own products [P. Asmus, 1998].

4.5 Life-Cycle Assessment (LCA)

Here one of the most widely known eco-design tools, LCA's is described along with it's limitations. A refined version of the tool, streamlined LCA's is introduced through Thomas Graedal's work.

4.5.1 Introducing LCA's

Life Cycle Analysis (LCA) is a means of evaluating the performance of a product from 'cradle to grave' by examining the product's environmental impacts from the extraction of raw materials through to disposal, and has gained kudos through the professional society, the Society for Environmental Toxicology and Chemistry (SETEC) [F. Duchin et al. 2003]. The figure below summaries the flows of energy, materials and emissions accounted for in a standard LCA.

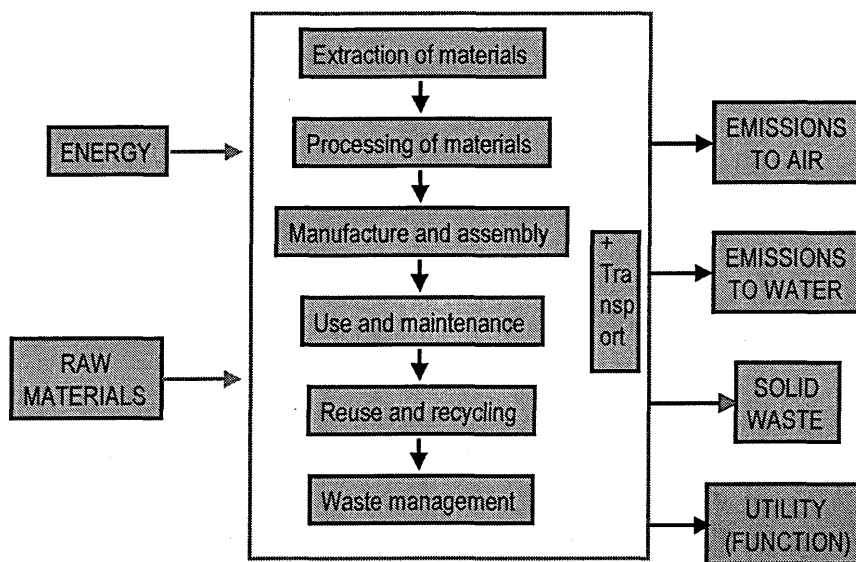


Figure 20: Flows of energy, materials and emissions accounted for in a LCA [S. Evans 2005]

LCA's emergence rose through studies to optimise energy consumption, which began as straightforward comparison studies before evolving into more complex studies where inflows and outflows of material and energy were assessed. The first non-published study was carried out for Coca-Cola in 1969 which looked at the difference between glass and plastic bottles. This study sparked questions into result validity, and the science community entered into a process of standardisation whereupon LCA's began to form a permanent fixture in sustainability measurement ,and was accompanied by the ISO14040³ in 1997 [www.Ecobilan.com, 2004].

By examining the accountability of a product from cradle to grave, each location and operational process is considered, making it a much more practical tool compared to strategic tools such as TNS.

There are four main stages in an LCA, which are clearly defined in the ISO14040 standard.

³ ISO 14040,41,42,43, international series of standards defining the different stages of the LCA methodology

1. Defining the goal and scope – This is the point at which decisions are made concerning the purpose of the LCA and what it will cover. Questions to be considered at this stage are:-

- what is the LCA going to deal with?
- is the LCA going to compare similar products, competitors products or be entirely on one product?
- what is the product used for?
- what environmental issues are of concern to the organisation and it's stakeholders?
- what are the boundary conditions? (For example, would the environmental impacts of the manufacture of a truck used to transport a product be considered?)
- what is the functional unit? (For example, time, weight etc.)

2. Inventory analysis – This phase involves the collection of data on environmental burdens associated with the subject in question, and involves a list of how much energy, materials and waste is produced at each stage of the life cycle. An inventory will contain data such as:-

- the energy used in the process;
- the fuel used in transport;
- the gases emitted to the air, e.g. SO₂ and CO₂;
- waste water for disposal;
- solid waste to be sent for disposal.

3. Impact assessment – This phase uses the data from the inventory analysis phase to assess the environmental impacts.

4. Interpretation – This is the process of reviewing the results of the inventory analysis and impact assessment with possible revision of the scope of the study, if appropriate [S. Evans, 2005].

4.5.2 Life cycle thinking

This helps the designer to understand the impacts of a product or product-service-system on the environment throughout it's lifetime, i.e. from cradle to grave or materials extraction to disposal. The traditional relationship with products is to loose responsibility after the product has been brought. Innovative organisations are now looking to extend this responsibility by taking ownership of the product throughout it's lifetime. Examples include hiring and leasing arrangements between the organisation and customer. In this way the organisation still owns the product and takes care of it throughout its entire life-span. Other ways are to consider the product beyond manufacture and to think of the product life-cycle as cyclical rather than linear [M. Simon et al, 1998].

4.5.3 Limitations to LCA's

In practice, it has proved difficult for organizations to carry out detailed life-cycle assessments, and the list below states why:

- Comprehensive life-cycle inventories are expensive and time consuming, partly because the acquisition of quantitative information may require on-site analytical measurements or detailed reviews of files and records;
- Many LCA methodologies in current use are applicable to a limited subset of commercial products. For example, techniques appropriate for assessing hot drink cups and nappies are not readily transferable to complex items such as computers;
- Impact assessments are inevitably contentious, in part because they involve value judgments in comparing and balancing different impacts;
- It is difficult to rank one new product design against another, an old product against a new product based only on sporadically-performed life-cycle inventory analyses and impact assessments with different approaches;
- Doesn't address non quantifiable or subjective impacts;
- Does not consider social or economic factors;
- Data issues, such as, resources for obtaining information for the inventory analysis are not always available causing inaccuracies in life-cycle inventories. Data can become obsolete and cause distortions in data. Data will differ depending on geographical location and what energy source is dominant in that country, e.g. coal or nuclear;
- The results can only be interpreted within the context of a very specific goal and scope [T. Graedel et al,1995, www.co-design.co.uk].

4.5.4 Streamlined Life-Cycle Assessment (SLCA)

Due to the limitations and weaknesses just described, an abridged or streamlined LCA has evolved which eradicates some of the complexity involved in a full LCA.

Graedel and Allenby introduce the Environmentally Responsible Product Matrix, in their book *Industrial Ecology*, which is an abridged assessment system using five life-cycle stages of a typical manufactured product and five environmental concerns to form a matrix. These categories are shown in the table below.

		Environmental concern				
		Materials choice	Energy use	Solid residues	Liquid residues	Gaseous residues
Life-cycle stage	Resource extraction					
	Product manufacture					
	Product packaging and transport					
	Product use					

Refurbishment, recycling & disposal						
---	--	--	--	--	--	--

Figure 21: The environmentally responsible product matrix [T. Graedel et al, 1995]

Each element of the matrix is assigned a rating from 0 (highest impact, a very negative evaluation) to 4 (lowest impact, an exemplary evaluation). Using surveys and checklists a semi-qualitative analysis can be made. An example of a possible check list for the environmentally responsible product matrix would be:

Life-stage: resource extraction
Environmental concern: materials choice

- Are all materials the least toxic and most environmentally preferable for the function to be performed?
- Is the product designed to minimize the use of materials in restricted supply?
- Is the product designed to utilize recycled materials wherever possible? [T. Graedel et al, 1995]

4.5.5 Life-cycle management

A study which was made into the improvements in the life-cycle of electronic products in the USA, found that three of the biggest electronics companies; Hewlett-Packard, Nortel and Compaq Computer have adopted product stewardship and design for environment programmes to enhance their products environmental and economic performance. The study concluded that all three companies recognised the economic advantages of life-cycle management and had begun to focus their creativity and competitive spirit on eco-efficiency throughout the product life-cycle. Examples of some of the performance objectives set by the companies were:

- Upgradeable designs can slow product obsolescence, increase customer loyalty, lower cost of product ownership and improve product serviceability;
- Designing products with reuse and recycling in mind can lead to lower manufacturing costs and improved manufacturability due to parts consolidation and reduction in material variety;
- Extending product life through asset management strategies may improve the service function, lower disposal costs, create new revenue streams and introduce products to new markets [P. Dillon, 1997].

4.6 Other ways of modelling product sustainability

This final section examines some of the new tools which have recently developed because of weaknesses in existing tools or the desire to cater for certain needs. Finally the use of matrices as a design tool is introduced which is carried through in the development of a sustainability tool in chapter 6.

4.6.1 The proliferation of new eco-design tools

The list of LCA limitations has shown that there is still a desperate need for a tool which will quickly and efficiently highlight or measure the sustainability impacts of

products. A literature review conducted by M. O'Shea of Hamburg University revealed that there was very little integration of environmental aspects in the planning of conceptual design, and that most of the approaches only employed a single environmental aspect, such as recycling costs or waste reduction. This therefore showed a need for a model that spans the entire product life-cycle. The following section presents examples where attempts have been made to fill this gap.

4.6.2 Examples of other tools

Sustainable product design needs tools and techniques to establish which products are sustainable. Peter James' article, *The Sustainability Cycle: a new tool for product development and design*, highlights the need for a tool which translates complex LCA data into simple concepts and criteria which can be used by product designers and developers. Two well known product LCA evaluation schemes are explored in the article; Eco-points and Eco-compass.

Eco-points is a software package which has been developed and used by Volvo and Philips that calculates an eco-score for each part of a product's life-cycle. The value of eco-points schemes is their ability to provide quick analyses of the overall environmental effects of products, and how different elements of the design process contribute to this. Their main disadvantage is that they are ultimately dependent on subjective weightings of different environmental effects, and these are not always transparent to users. Hence, they are particularly well suited to identifying areas for attention and exploring choices between different alternatives. They are not at all helpful for communication, as eco-points are meaningless in themselves and some stakeholders will challenge the assumptions they rest upon.

The **Eco-compass** was developed by Dow Chemical to provide a simple, visual summary of life-cycle analysis data and is based on the indicators of eco-efficiency developed by WBCSD. One of the researcher's who developed the tool, David Russell, saw a need for new techniques to communicate LCA data and integrate them into business decision processes. He wanted to find a multi-level information source that '*...distils all the key environmental points into a few numbers for busy executives. But those who want more information can drill down to find the detailed data and assumptions that lie behind the numbers.*' The Eco-compass works alongside LCA's making them more useful for businesses by:

- condensing environmental data into a simple model to summarize strategic issues, trade-offs and improvement opportunities for lay audiences;
- not over simplifying information and maintaining connections with the detailed LCA data;
- having the capacity to be reliably applied to a variety of business circumstances [C. Fussler et al, 1996]

In essence the eco-compass provides a holistic overview of products using six dimensions; health and environment, energy intensity, materials intensity, revalorization (remanufacturing, reuse and recycling), service extension, resource conservation. However, it requires reasonably complete LCA data to be meaningful and scoring some of the qualitative elements can be difficult.

The Eco-compass

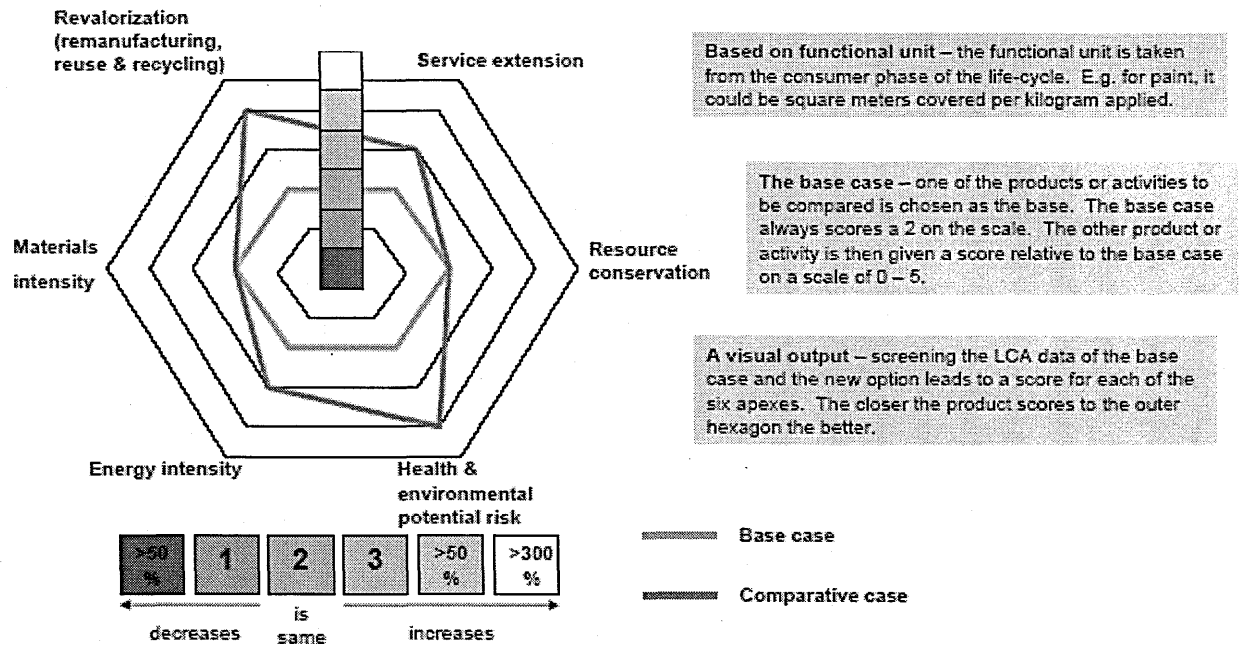


Figure 22: Using the eco-compass [Fussler et al, 1996]

The **Sustainability Circle** is another simple tool which draws key trends and issues from the environmental and social side of sustainability, and is one which can complement the more quantitative approaches such as the eco-compass and eco-points already mentioned. The circle is constructed of four concentric rings representing, customer value, physical environmental impacts, product attributes and social impacts, and each ring is broken down into a number of other elements as shown in figure 23.

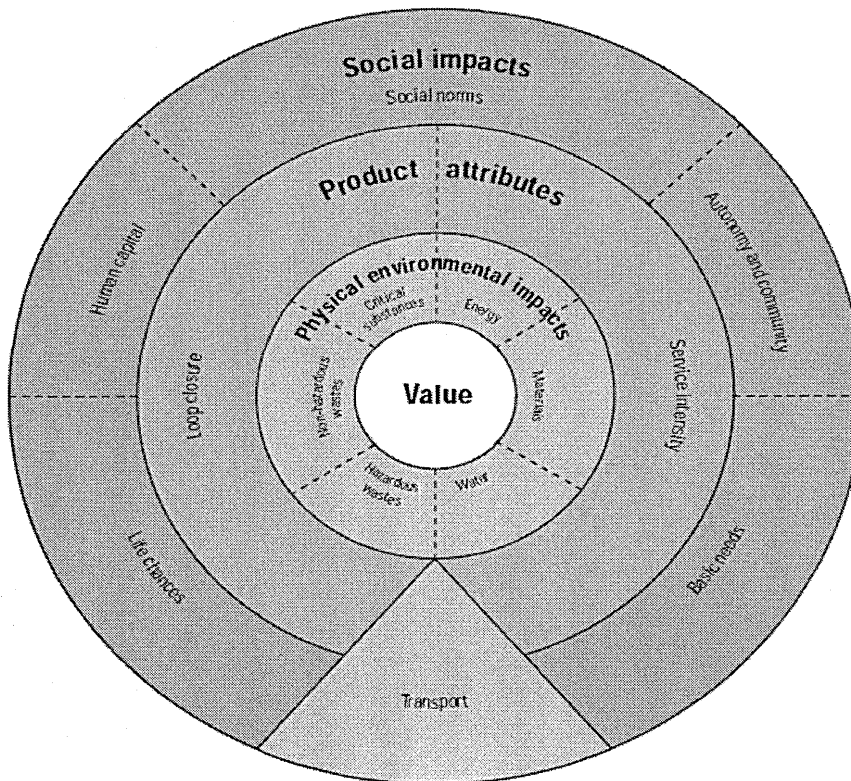


Figure 23: The Sustainability Circle [P. James, 1997]

The purpose of evaluation is then to colour code each of the rings, based on a modified traffic light system. The five scoring colours are:

- **White** - to denote an absence of information, but no indication of serious sustainability problems;
- **Red** - to indicate serious sustainability problems;
- **Amber** - to denote question marks caused by lack of crucial data and / or conflicting interpretations on questions which have environmental significance;
- **Light green** - some modest sustainability advantages;
- **Dark green** - major sustainability advantages compatible with 'factor four' rates of improvement [P. James, 1997].

Caution must be taken when developing or using sustainability tools. The presence of more tools to quantify the sustainable performance of products has received increased attention as more alternatives become available. Xun Jin and Karen High from Oklahoma State University [2004], state that failure to tackle the diversity of these alternatives has given rise to significant difficulties in comparing and interpreting the assessment results obtained from using various tools.

Another tool, which deals with complex data in a qualitative and quantitative style is the Sustainability Dashboard, a non-commercial software package that illustrates the relationships among economic, social and environmental issues. The Sustainability Dashboard has earned international attention and displays the United Nations' core set of sustainability indicators. As a contribution to the World Summit on Sustainable

Development in 2002, the International Institute for Sustainable Development (IISD) expanded the Dashboard to provide users with the functionality to compare 10 years of environmental, social and economic data. The Dashboard also displays the Millennium Development Goals indicator set. The following figure gives a snapshot of the tool [www.iisd.org].

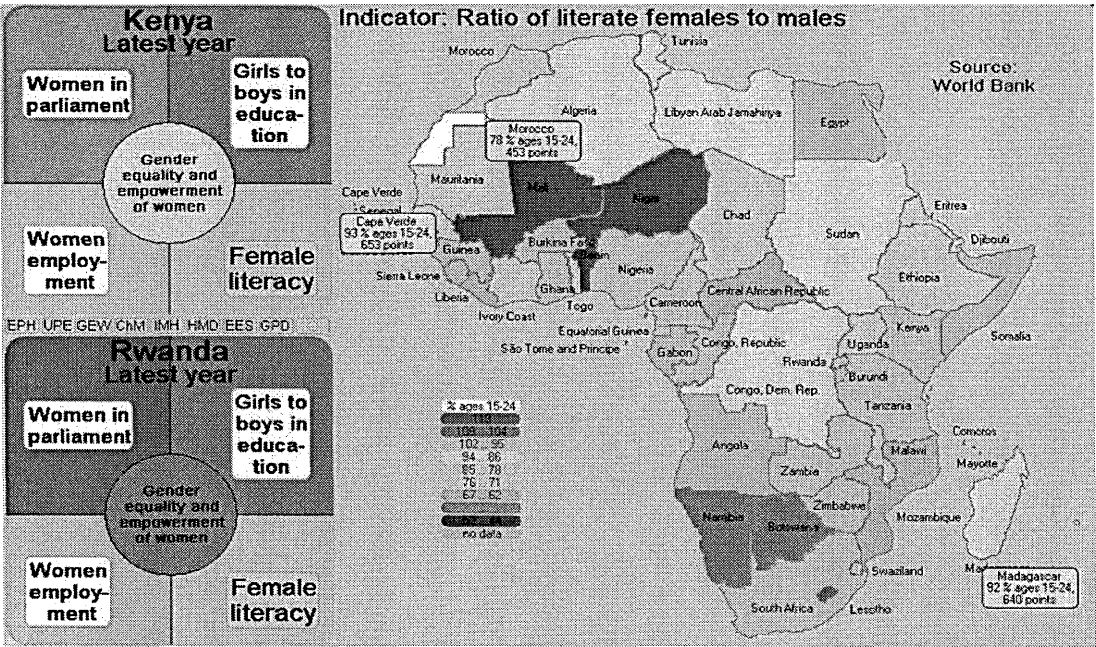


Figure 24: A snapshot of the online Sustainability Dashboard tool, showing the ratio of literate females to males in Africa [www.iisd.org]

4.6.3 Matrices which simplify complexity

Although the tools which have been described aim to reduce the complexity of the final outcome and aid interpretation, an experiment conducted by Delft University of Technology, tested LCA expert and non-expert understanding of eco-efficiency data. The experiments concluded that:

- the concept of eco-costs (a single indicator score for environmental impacts) was accepted by the majority of non-experts; whereas
- environmental experts did not accept the validity of eco-costs data and wanted to stick to the more detailed LCA data [J. Vogtlander et al, 2000].

So, how is it possible to satisfy an expert and non-expert audience simultaneously with one tool? A study carried out by the SustainAbility; an organisation offering management consultancy and think-tank services, examined the business case for sustainability in emerging markets in less developed countries. The study involved qualitative and quantitative analysis of numerous parameters which were simplified into one matrix – the business case matrix. Here the key aspects of sustainability (along the horizontal axis of figure 25) are related to a set of recognised business success factors (along the vertical axis).

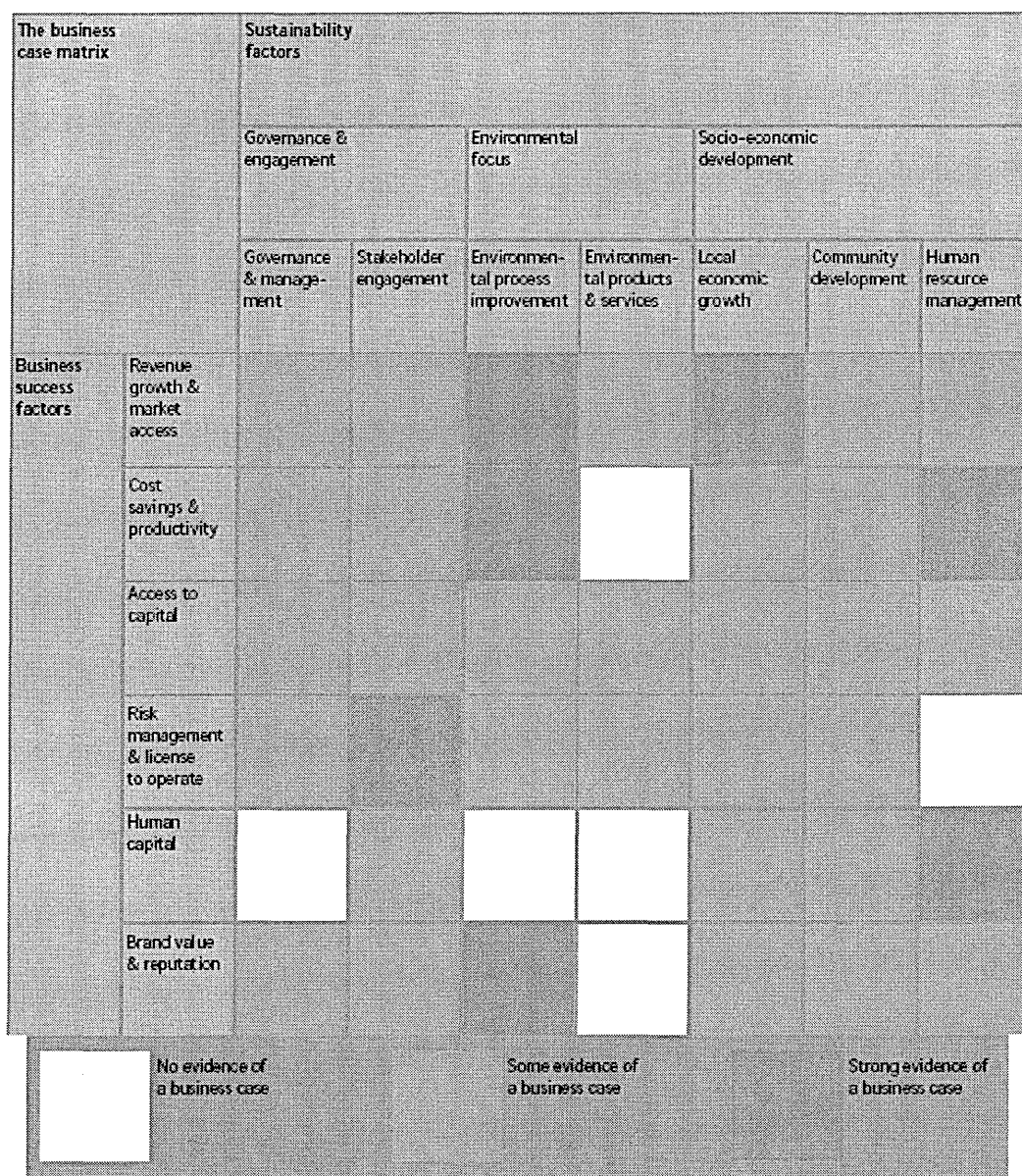


Figure 25: The business case matrix [SustainAbility, 2002]

The output is a smart way of distilling complex issues into a simple format which can satisfy specialist and generalist audiences by using either the single output or the detail behind each matrix square. Using a colour coded scoring scheme enhances the visual output and is effective in relatively summing up the positive and negative elements of the case under consideration.

4.7 Chapter Summary

This chapter has extensively reviewed literature concerning the tools and methods currently in use to either create sustainability or reduce unsustainability on a product level. The weaknesses and constraints of some of these tools has also been highlighted. The concepts of TNS and SLCA's has been introduced which will be heavily drawn upon in the following chapters which go on to describe the development of a tool which gauges the sustainability of paint for ICI Paints.

5. SUSTAINABILITY AND ICI PAINTS

5.1 Introduction

To inform the project context the first objective set out *to assess the needs of ICI Paints, in respect to sustainability, by understanding their current and future vision*. This was carried out through inspection of ICI's Sustainability Review 2004 report, the outcomes from a sustainability workshop, facilitated by Forum for the Future, and the responses to Part 1 of a semi-structured interview carried out on the following interviewees:

Jamie Pelts (US based)	<i>Director of Marketing and Innovation;</i>
Jerry Hodge	<i>Global Packaging Development Manager;</i>
John Wright	<i>Product Stewardship;</i>
Marina Poza	<i>Innovation Manager for Trade Business;</i>
Phil Taylor	<i>Paints Research Associate;</i>
Ray Leggetter	<i>European Innovations Manager;</i>
Stephen Davis	<i>European R&D Manager;</i>
Sue Vel	<i>Trade Market Data Manager.</i>

This chapter reports heavily on the interview findings by extracting regularities, the spectrum of views and opinions from the responses along with a selection of notable quotes. The chapter continues with an exploration and interpretation of the key themes, providing a suitable grounding on which to build the following two objectives.

5.2 ICI's sustainability position

Firstly, assessment of ICI's Sustainability Review 2004 report, and the outcomes from the European Decorative teams' workshop (see section 2.8), held in June 2005 will provide the background information needed to define ICI's current sustainability position. This will set the context of the work on which the interview responses will build upon. It should be remembered that the Sustainability Review 2004 highlights the achievements of the whole ICI group, whereas the workshop outcomes are specific to ICI Paints.

5.2.1 ICI Sustainability Review 2004

The new sustainability report which was launched on ICI's website on 16th May 2005 reviews sustainability developments for 2004. Encouraged by their selection as a Dow Jones Sustainability Index member, the report documents ICI's unwavering commitment to the principles of the sustainable development goals and the UN Global Compact⁴.

⁴ The Global Compact is a 1999 UN initiative designed to raise corporate awareness of fundamental social and environmental values, thereby humanizing the rationale of the global markets. The three key areas covered by the Global Compact are human rights, rights at work and environmental protection. (www.unglobalcompact.org)

More specifically, the report illustrates clearly and concisely their sustainable achievements which have been listed in the following table.

Summary table showing ICI’s sustainability achievements in 2004

Governance	Corporate Governance	<ul style="list-style-type: none"> • Compliance with the Combined Code of Corporate Governance issued by the Financial Reporting Council. • Compliance with the Sarbanes-Oxley Act 2002⁵.
	Code of Conduct	<ul style="list-style-type: none"> • Cover legal, operational, behavioural and human rights issues. • United Nations Global Compact principles endorsed in 2003. • Support United Nations Universal Declaration of Human Rights.
	Responsible Care Management System	<ul style="list-style-type: none"> • International chemical industry’s commitment to continuous improvement in safety, health, environment, product stewardship, transparency in activities and progress.
Environment	Land	<ul style="list-style-type: none"> • Reduced amount put into landfill. • Biodiversity assessments on ICI sites. • Soil and groundwater assessments.
	Water	<ul style="list-style-type: none"> • Reduced water use and any residual impact from water discharges.
	Climate Change	<ul style="list-style-type: none"> • Indicators are ahead of target due to continuous improvements in production processes and efficiencies and investment in new technology. • Measurement of ozone depletory emissions.
	Air	<ul style="list-style-type: none"> • Behind target on air covering hazardous substances and acid gases.

⁵ Because of its US listing, ICI is also required to comply with the provisions of the Sarbanes-Oxley Act 2002 as it applies to foreign issuers. The company continues to monitor its legal and regulatory obligations arising from Sarbanes-Oxley. (ICI Sustainability Review 2004)

Supply chain	Compliance	<ul style="list-style-type: none"> • Fined £40,000 for six environmental, three health and safety and two product infringements.
	Product Stewardship	<ul style="list-style-type: none"> • Core element of Responsible Care Management System – assessment and management of risk from products throughout their life-cycle. • 300 assessments of priority suppliers conducted. • Reduction in distribution incidents.
	Product & Process Innovation	<ul style="list-style-type: none"> • Strengthened integration of sustainability issues into the innovation process. • Improvements in operations and products – reduced energy use, water and raw materials, reduced waste and raw material substitutions. • Products and services which give social and environmental benefits under development.
Employees	Health and Safety	<ul style="list-style-type: none"> • Managed through Responsible Care Management System. • One employee killed while on company business. • Reports of incidents had marginally increased.
	Development of People	<ul style="list-style-type: none"> • Training and development plans are an integral part of the annual performance review process, but currently no indicators to measure overall performance.
	Diversity	<ul style="list-style-type: none"> • The ratio of women managers and minority nationals has increased.
	Respect for the Individual	<ul style="list-style-type: none"> • Training and support provided for issues raised through the whistleblowing programme.
	Work-life balance	<ul style="list-style-type: none"> • Opportunities provided such as flexible and home working, job sharing and career breaks.
	Organisation change	<ul style="list-style-type: none"> • Support still given to those affected by the restructuring due to the consolidation of

Communities		businesses in 2003.
	Communication and consultation	<ul style="list-style-type: none"> • Regular communication with employees through the management cascade system.
	Performance and reward	<ul style="list-style-type: none"> • Global electronic systems used for performance appraisal of which a 95% – 98% completion rate was recorded for 2004.
	Community involvement	<ul style="list-style-type: none"> • Reduction in the total giving of cash and volunteering.
	Community complaints	<ul style="list-style-type: none"> • Reduction in the number of complaints (106 in total).
Stakeholder engagement	Stakeholder mapping	<ul style="list-style-type: none"> • In process of identifying key business stakeholders.
	Investors	<ul style="list-style-type: none"> • Discussions have taken place with Socially Responsible Investment (SRI) analysts associated with investors.
	Customers	<ul style="list-style-type: none"> • Customer feedback and regular contact is maintained through key customer relationship teams, local sales representatives, joint development teams and ICI employees based on customer sites.
	Suppliers	<ul style="list-style-type: none"> • Regular reviews and audits maintain and develop global supplier relationships.
	Universities and research Associations	<ul style="list-style-type: none"> • There are active programmes to develop new technologies, techniques and applications.
	Sustainability Organisations	<ul style="list-style-type: none"> • Challenge ICI to develop sustainable thinking further.
	Government	<ul style="list-style-type: none"> • Contact is made through industry and specialist trade associations. • ICI comment on relevant UK and EU legislation.

Figure 26: Summary of ICI's sustainability achievements [ICI Sustainability Review, 2004]

5.2.2 ICI Paints sustainability workshop

In June 2005 the Technology and Innovation teams of ICI Paints Decorative (Europe) took part in a sustainability workshop to examine the risks and opportunities of the paint life-cycle, competitor activity and priorities and activities to be continued or considered in the future. The outcomes from the workshop show the team’s comprehensive awareness of the drivers, risks and opportunities for ICI Paints. The table below highlights the outcomes for the three sustainability domains as well as the risks and opportunities for the paint life-cycle.

	Product, Pack design	RM extraction	Transport	RM & Pack Conversion	Transport	Manufacture	Transport	Sale	Transport	Painting	Transport	Waste disposal
ENVIRO.		waste energy	Emissions	waste emissions energy	Emissions	waste emissions energy	Emissions	Emissions	Emissions	emissions waste	Emissions	landfill incineration emissions
SOCIAL		employee welfare health employment	congestion	pollution health employ ment	congestion	pollution health employ ment	congestion	congestion	congestion	health pride	congestion	recy cling pollution
ECONOMIC		Env .costs licenses	Road taxes	Env costs	Road taxes	Env . costs License to operate Formula costs	Road taxes	Road taxes	Road taxes	Brand share	Road taxes	eco taxes
RISKS		Labour practices Mineral depletion	Costs	Labour practices	Costs	Pollution ICI image recruitment	Costs	Brand image	Costs	VOCs Harmful chems Paint removal Indoor air qua	Costs	Waste regs Take-back Haz disposal Recycling
OPPORT.	New lower impact products	Renewable RMs Compostable RM Supplier assess Energy red'n	Bio fuel	Bio plastics Compostable/ recyclable packs Sustainable paper Energy reduction	Fuel efficiency	Energy/ emission reduction Biodiversity projects Land remediation	Transport plan	Brand Image Trained sales staff	Direct selling	Prolongs life of wood/metal Creative activity	costs	Recyclable/ compostable paint & packaging

Figure 27: The paint lifecycle risks and opportunities [ICI Paints Decorative Europe Activity document, 2005]

Using a linear paint life-cycle, from product and pack design to waste disposal, all the stages show adverse sustainable impacts such as pollution, taxes, health and brand image. By fully understanding the risks inherent in the paint life-cycle, the workshop encouraged the teams to turn these risks into opportunities. The results are shown more clearly in figure 28 below.

Paint Life-cycle	Opportunities	Risks
Product and pack design	New lower impact products.	N/A
Raw material extraction	Renewable and compostable raw materials, supplier assessment, energy reduction.	Labour practices, mineral depletion
Transport	Bio fuel	Costs
Raw material and pack conversion	Bio plastics, compostable / recyclable packs, sustainable paper, energy reduction.	Labour practices
Transport	Fuel efficiency	Costs
Manufacture	Energy / emission reduction, biodiversity projects, land remediation.	Pollution, ICI image, recruitment
Transport	Transport plan.	Costs
Sale	Brand image, trained sales staff.	Brand image
Transport	Direct selling.	Costs
Painting	Prolongs life of wood / metal, creative activity.	VOC's, harmful chemicals, paint removal, indoor air quality
Transport	Costs	Costs
Waste disposal	Recyclable / compostable paint and packaging.	Waste regulations, take-back, hazardous disposal, recycling

Figure 28: A table to show the risks and opportunities from ICI Paints workshop activity.

5.3 Interviews – Part 1

Eight interviews were conducted on people who are experts on some or all of the five stages of the paint life-cycle. The first part of the interview concerns personal perception of ICI's sustainability performance. The following table summarises the responses.

5.3.1 Interviewees

JP	Jamie Pelts (US based)	<i>Director of Marketing and Innovation</i>
JH	Jerry Hodge	<i>Global Packaging Development Manager</i>
JW	John Wright	<i>Product Stewardship</i>
MP	Marina Poza	<i>Innovation Manager for Trade Business</i>
PT	Phil Taylor	<i>Paints Research Associate</i>
RL	Ray Leggetter	<i>European Innovations Manager</i>
SD	Stephen Davis	<i>European R&D Manager</i>
SV	Sue Vel	<i>Trade Market Data Manager</i>

5.3.2 Interview results for part 1

	How long have you been at ICI Paints?	Could you briefly summarize what your position at ICI Paints involves now?	Where do you feel the pressures for tackling sustainability are coming from?	How do you feel ICI Paint's sustainability performance compares to other companies in your sector?	Where do you feel there's scope for improvement?
JP	15 years	Director of Marketing and Innovation in US. Have identified platforms to work sustainability into.	Government concerning volatile organic compounds (VOC's).	ICI performing equally with competitors.	Sustainability will play a role, but there is a cost expectation.
JH	22 years	Global Packaging Development Manager. Sustainability issues have just started to kick off again.	Customers.	ICI's performance over the last 5 to 10 years has been class leading, but over the last couple of years has degraded a little and is similar or perhaps just a little bit better than the competition.	Understanding the issue better and getting a reference point. There needs to be a more unified way of looking at the issues.

	How long have you been at ICI Paints?	Could you briefly summarize what your position at ICI Paints involves now?	Where do you feel the pressures for tackling sustainability are coming from?	How do you feel ICI Paint's sustainability performance compares to other companies in your sector?	Where do you feel there's scope for improvement?
JW	25 years	UK Product Steward. Compiles product stewardship policy, looks at impacts of whole product life-cycle, minimizes safety, health and environment (SHE) impacts.	Legislation. Campaign groups.	ICI inline with competitors	Suppliers and raw material sourcing. More could be made of Community Re-paint. Natural paint market is a threat. Accreditation - ISO14001.
MP	8 months	Innovation Manager for Trade Business. Looks at customer trends and behaviour, gaps in the market, innovation platforms - one of them being environment and sustainability.	Customers.	ICI are performing better than competitors	Communication. Accreditation - ISO14001 and BREEAM's eco-efficiency ratings.
PT	23 years	Paints Research Associate. Identification and delivery of innovative technology.	Makes good business sense. Customers.	ICI on a par with competitors.	Understanding the entire life-cycle of paint - looking at renewable resources and end-of-life issues.

	How long have you been at ICI Paints?	Could you briefly summarize what your position at ICI Paints involves now?	Where do you feel the pressures for tackling sustainability are coming from?	How do you feel ICI Paint's sustainability performance compares to other companies in your sector?	Where do you feel there's scope for improvement?
RL	41 years	European Innovations Manager. Targets long-term business needs in technology. Sustainability is a critical element which needs addressing.	Retail customers (e.g. B&Q) and to a lesser extent from NGO's, legislation and public.	ICI are not the best in the world, but sit in the top quarter.	Prioritising areas for improvement and focusing on the future. Communication.
SD	25 years	European R&D Manager for technical function. Involved in product stewardship such as safety health and environment (SHE) information and policies driven by toxicology and health.	Economic, political and social (customer) pressure.	ICI has similar performance to competitors with similar policies.	Packaging and paint formulation opportunities.
SV	23 years	Trade Market Data Manager. Co-ordinates Community Re-paint.	Legislation and customer (trade) pressure.	ICI are leaders in their sector, but not in others e.g. Co-op.	Communication and understanding customer need. More management commitment and enthusiasm.

Figure 29: A table showing the responses from part 1 of the interviews. (See Appendix B for full responses.)

5.4 Interview response summary

As an introduction to the interviewees most had been ICI employees on a long term basis (between 15 years and 41 years). Most did not have sustainability explicitly defined in their job roles, but there was either an implicit need or personal interest which had led them to become experts in specific parts of the paint life-cycle.

When considering where the sustainability pressures were coming from, all stated sources which were either political, economic or stakeholder focused. Customers were frequently given as the primary pressure for tackling sustainability. This response was particularly true from those whose roles involved working closely with ICI's prime business customers such as B&Q. Concerning ICI's sustainability position amongst it's competitors, all interviewees considered ICI to be leading the sustainability agenda within the paints and coatings sector. There was also a definite sense that comfort should not be sought in their leadership status, but that a proactive and revolutionary approach was necessary to keep the pressures for sustainable practices and products within their control. Evidence for this was found in comments such as:

"ICI are leaders in their sector, but not in others such as Co-op."

The scope for improving ICI's current sustainability performance highlighted an array of themes, the most often quoted being the need for better and more transparent communication. It was agreed by many that ICI had in fact undertaken many projects qualified to fall under the sustainability umbrella, but these stories had not been shared either internally or to their external stakeholders. Another issue often raised was the need to tackle the entire life-cycle at once rather than continuing with the existing structure which allows specialist areas to research and develop individually under sustainable remits with little interaction between them:

"There needs to be a more unified way of looking at the issues."

"We need to understand the entire life-cycle of paint by looking at renewable resources and end-of-life issues."

"Prioritising areas for improvement and focusing on the future."

Other areas for suggested improvement included investing more in ongoing projects such as Community Re-Paint – a paint take-back scheme, addressing specific parts of the paint life-cycle such as packaging and transport, re-assessing raw material sourcing and paint formulations. Moving away from the product level, there were also questions regarding ICI's role in relation to sustainable issues.

"We need to understand the issues better and get a reference point."

5.5 *Emerging themes*

Analysing commonalities and irregularities in the information has identified a number of themes:

- Transparency;
- Communication;
- Leadership and risk management;
- Business case.

5.5.1 *Transparency*

The ICI Sustainability Review 2004, a twelve page document packed with successful and a couple of unsuccessful endeavours, is a strong show of ICI's commitment to sustainability as a group. It reports extensively yet concisely across all four business groups and shows great trust and transparency by admitting to failings such as the death of one employee who was killed in an accident while driving on company business. The document also shows a comprehensive set of indicators for measuring the social elements of employee and stakeholder sustainability. The apparently large amount of resources directed to stakeholder causes could be accountable for the high number of years the interviewees had served ICI.

5.5.2 *Communication*

Another emerging theme linking interview and secondary evidence is communication. This is fundamental in all aspects of business, but was brought to light through the interviews in relation to sustainability. Although there was a general consensus that certain sustainability issues were on the road to being addressed and remedied, some thought the effort in relating these stories wasn't penetrating internally or externally. On the other hand, some interviewees were conscious about the consequences of blowing their own trumpet, i.e. if their sustainability status escalated too high and an incident were to occur, the fall would be greater and the position would be difficult to recover from.

Improving communication internally would have benefits by raising the profile of sustainability within the company. Informing employees of on-going projects will also help raise awareness, spur enthusiasm and strengthen the importance of the issues. This would also help ICI Paints to "*...practice what they preach*" a little more. Externally, improved communication would help relieve some of the key pressures which were mentioned in interview question 3. From interviewee conversations it's clear that ICI have trialled and tested a number of initiatives to help improve the sustainability of the paint supply chain, such as the recycling of paint cans, but they've failed because the interest and response was weak. Communicating these messages clearly could help improve stakeholder participation in sustainability schemes.

Increased communication could indirectly bring with it a number of other benefits. An increased kudos in sustainability projects within the organisation may in turn bring investment of resources into new and existing projects. It would also help the need,

which was highlighted in some interview responses, for gluing the various stages of the life-cycle together as it would allow for an area of common ground to initiate work from.

5.5.3 Leadership and risk management

Finally, another commonality stressed through the interviews was ICI Paints' position as a leader within their sector, but there was no complacency in this fact. Instead, they were fully aware of the risks from competitors and other pressures, and wanted to find ways mitigating them to stay ahead of the game by focusing on the future, despite not knowing how the risks would manifest. The workshop exercise lists the potential risks on the product level, and went on to identify how these could be turned into opportunities. The snapshot tool which is explained in the following chapter highlights some of these sustainability risks on the product level.

5.5.4 Business case

Focusing on the irregularities, one of the most glaring were the varying responses from those based in the UK compared to Jamie Pelts – a US based Director of Marketing and Innovation. Jamie's case for sustainability centred very strongly on the economics and business case for sustainability "*sustainability will play a role, but there is a cost expectation*", compared to those interviewed in the UK. The UK based interviewees also stressed the need for a good business case when undertaking sustainable initiatives, but they also demonstrated a greater understanding and sympathy for the environmental and social issues involved.

One weakness with the business case is the lack of senior management commitment, which as Martin Charter states in his article 'Managing the eco-design process' is necessary for planning, co-ordinating and implementing sustainable strategies. Currently most of the pressure is coming from the bottom-up and the need for depolarizing motivation levels within the organization will be important for making significant leaps forward in the future.

"More management commitment and enthusiasm."

5.6 Supporting evidence for the snapshot tool

Justification for development of a tool has been expressed through each of the research techniques. Other than communicating ICI's commitment to sustainability, reference in the Sustainability Review 2004 reports openly about two product infringements which contributed to a £40,000 fine. The existence of a tool which could highlight the problem areas of a particular product life-cycle in respect to sustainability would have avoided such infringements. The comments made during the interviews all stated a need for research and development in the area of sustainability. All accepted the need for a tool which could be used on an equal level amongst the specialists and generalists of ICI Paints. The drivers for pursuing development of such a tool are both external and internal. Although ICI are easily keeping up with external pressures such as legislation, their

desire to be leaders in their field has fuelled an internal drive to push the sustainability agenda forward. Internal drivers were also found to be the stronger driving force in Van Hemel and Cramer's work outlined in section 4.2.4, chapter 4.

The tool needs to easily emphasize the sustainability issues, not be resource intensive, consider the entire product life-cycle, be useful in communicating messages clearly and effectively, and produce an output credible enough to stand up to the experts within the sustainable community. John Wright who works in product stewardship stressed the need for recent up to date LCA's as it had been ten years since any previous work had been performed, because of the LCA's intensive pull on resources. (One LCA on paint which measured the environmental impacts of starch compared to petroleum, cost €150,000 and took 3 years to perform.) Finally, the high level at which the interviewees operate within the business and their influence within the organisation is another demonstration of ICI's enthusiasm to find sustainable product solutions.

5.7 Chapter summary

A number of sources have been drawn upon to access the needs of ICI Paints in respect to sustainability. ICI's Sustainability Review 2004 and the ICI Paints workshop demonstrate how advanced their thinking is. It's not just a case of dealing with the sustainability issues as they arise, but they have been actively seeking ways of turning potential risks into opportunities. For example, a workshop activity (Figure 28) highlighted an opportunity for using renewable raw materials to prevent the risk of mineral depletion.

From the eight people interviewed all expressed a clear need for ICI Paints to move towards sustainability. One of the biggest pressures was from customers such as B&Q who demand certain sustainability requirements for products sold in their stores, and trade customers who look to ICI Paints for advice on disposing of waste paint and containers. There was general feeling for a need to understand the paint life-cycle in its entirety, and that communicating sustainable messages could be improved - a theme which is picked up again in the following chapter.

The analysis brought out four over-arching themes or needs which the snapshot tool will aim to address in the next objective:

- Transparency;
- Communication;
- Leadership and risk management;
- Business case.

6. THE SNAPSHOT TOOL

6.1 Introduction

The previous chapter discussed the need for ICI Paints to move towards sustainability, which was assessed through semi-structured interview questions. The responses revealed a number of needs which included; addressing pressures from customers, improving communication of sustainability issues to do with paint, remaining leaders in their sector by averting risks such as those posed by organic and natural paint companies, maintaining transparency and pursuing sustainability challenges in a cost effective way. These findings led onto the second objective which aims *to analyse ways of integrating TNS and SLCA to develop a strategic tool which will encourage movement towards sustainability for ICI Paints*, and hence address these needs. Using evidence from the second part of the interview which identifies the environmental and social impacts of the paint life-cycle, this chapter shows the development of a snapshot tool which combines TNS and SLCA principles. The tool is designed to give a snapshot of the good and bad sustainability points of a product. The chapter continues with the unique selling points of the developed snapshot tool.

6.2 Framing the snapshot tool

Nike, an international sports equipment manufacturer, realised how integrating sustainability into their purchasing decisions and addressing the issues proactively could become a key business opportunity [The Natural Step, 2002]. Drawing on the help of Forum for the Future, a matrix tool was developed which would help Nike in creating a purchasing process of continual improvement with the ultimate aim of sustainable purchasing. The tool takes the four scientific principles from TNS, and combines them with the SLCA stages for a product, similar to those used by Thomas Graedel (see section 4.5.4). In the case of the Nike tool, the life-cycle was broken into three stages – creation, use and disposal. Creating a matrix with these three stages and the four scientific principles, otherwise known as the system conditions, a 3 x 4 matrix was formed with each square containing a set of questions. A colour-coded system was used to score the matrix qualitatively, with the colour being dependent on whether the majority of the questions were answered positively or negatively. The colours would enable the areas of the life-cycle in greatest need of attention to be clearly seen. Keeping the scoring system qualitative also allows for those with non-specialist knowledge to understand the outcome of the tool. The Nike procurement tool was designed to take only an afternoon of discussions, with a team of people representing different parts of the life-cycle. Figure 31 shows the Nike tool with a sample of questions for square SC1 x Creation.

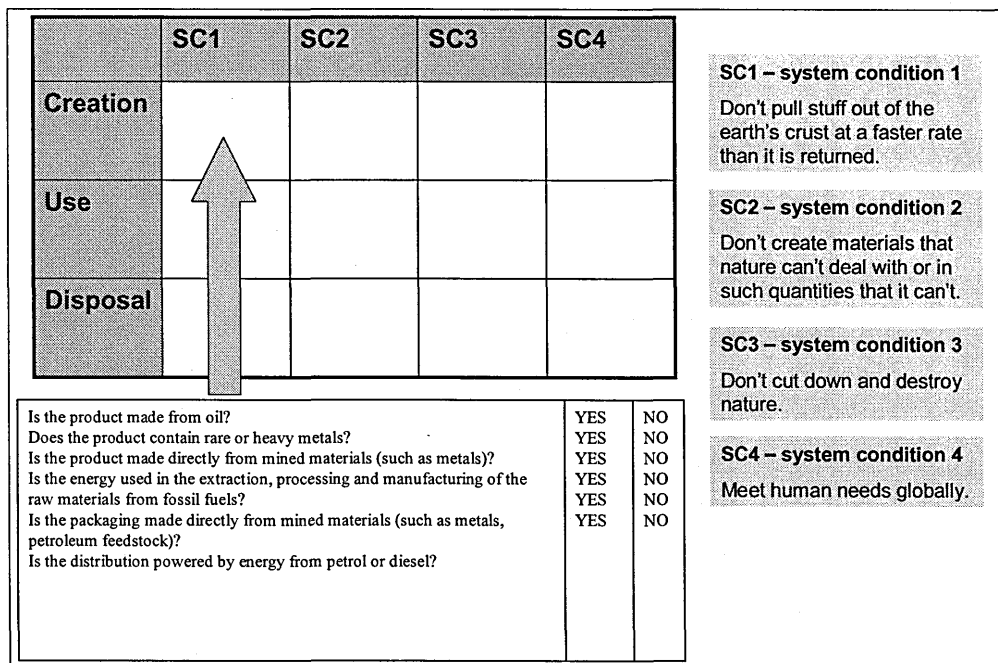


Figure 30: A diagram to show the Nike matrix tool with questions for square SC1 x Creation. (The scoring system has been omitted.) The snapshot tool developed for this project was modelled on this framework. [Nike Purchasing – guidelines and decision making tool, 2002]

6.3 Developing the snapshot tool – stage 1

It was clear from the start of the project that the snapshot tool would work on a similar format to the Nike procurement tool described above. This meant sticking to a matrix with the four system conditions to measure the sustainability of the paint life-cycle. A meeting with ICI Paints was set up to determine the life-cycle stages for the matrix:

- raw materials;
- paint synthesis;
- distribution and transportation;
- use;
- end-of-life.

These combined with the system conditions formed the tool's basic framework.

	SC1	SC2	SC3	SC4	
Raw materials					SC1 – system condition 1 Don't pull stuff out of the earth's crust at a faster rate than it is returned.
Paint synthesis					SC2 – system condition 2 Don't create materials that nature can't deal with or in such quantities that it can't.
Packaging & distribution					SC3 – system condition 3 Don't cut down and destroy nature.
Use					SC4 – system condition 4 Meet human needs globally.
End-of-life					

Figure 31: The framework for ICI Paints’ snapshot tool

With the framework in place, the next challenge was to identify the sustainability impacts for the various life-cycle stages of paint, and devise appropriate questions for each of the matrix squares. It was also necessary for ICI Paints to identify the people who would be qualified to operate the tool. These issues were clarified through Part 2 of the interview.

6.4 Interviews – part 2

The following table summarises the second part of the interview which was performed on eight ICI Paints employees, each representing different parts of the paint life-cycle. It records their thoughts and comments on sustainability issues concerned with paint.

6.4.1 Interviewees

JP	Jamie Pelts (US based)	<i>Director of Marketing and Innovation</i>
JH	Jerry Hodge	<i>Global Packaging Development Manager</i>
JW	John Wright	<i>Product Stewardship</i>
MP	Marina Poza	<i>Innovation Manager for Trade Business</i>
PT	Phil Taylor	<i>Paints Research Associate</i>
RL	Ray Leggetter	<i>European Innovations Manager</i>
SD	Stephen Davis	<i>European R&D Manager</i>
SV	Sue Vel	<i>Trade Market Data Manager</i>

6.4.2 Interview results for part 2

	With which parts of the paint life-cycle are you most familiar?	What do you think the sustainability issues are in these parts?	Can you see any solutions to these sustainability issues?	What questions would you like to ask concerning the sustainability of paint?
JP	The social and economic impacts – no environmental knowledge.	From a financial viewpoint the instability in the oil market. Good quality paint with environmental benefits.	Dependence needs to be shifted to the renewable resource market.	How do we inform the end user in managing paint waste?

	With which parts of the paint life-cycle are you most familiar?	What do you think the sustainability issues are in these parts?	Can you see any solutions to these sustainability issues?	What questions would you like to ask concerning the sustainability of paint?
JH	Whole life-cycle from the packaging perspective.	Use of appropriate materials. Don't over package. Disposability. Are paint cans safe for children?	The 'bag in the box' idea was launched in Germany, so the bag can be thrown away after use and the box reused. Paint refills have been piloted unsuccessfully. Selling paint in one litre cans rather than two and half and five litre cans. With waste issues it is better to work with large building projects and close the loop because the volume and frequency is higher than for DIY / home users.	There is a struggle to engage with sustainability and it is not apparent if the need is legal. What is going to be the pressure that will make the change? There needs to be a firm driver.
JW	All parts of the life-cycle.	Emissions of volatile organic compounds (VOC's) in gloss paint during the use phase. Waste paint and containers. Energy use in TiO ₂ manufacture.	ICI worked with the British Coatings Federation (BCF) to lobby the EU and government on lowering VOC levels. Minimize packaging e.g. reduce the plastic content in paint cans – approx. 90 million cans per year. Producing advisory material such as leaflets to inform customers of issues such as lead in pre-1960 paint. Improve relations with suppliers	How do we achieve a long-term sustainable vision? Also, the fuel consumption of lorries is unmonitored. Could this be a potential opportunity?

	With which parts of the paint life-cycle are you most familiar?	What do you think the sustainability issues are in these parts?	Can you see any solutions to these sustainability issues?	What questions would you like to ask concerning the sustainability of paint?
MP	Whole life-cycle, in particular end-of-life issues.	Packaging issues during distribution phase. End-of-life issues. Paint formulations such as cobalt and synthetic materials.	Advising traders on how to clean cans so they can be classed as non-hazardous waste or cheaper disposal. A pilot scheme has been set up in some stores where cans can be dropped off for reuse / recycling.	Is ICI going to voluntarily take action for waste or are we going to contract or lobby for other schemes to be set up?
PT	Raw materials, polymer synthesis and paint formulation.	Sourcing and choosing a raw material that maintains product quality.	Sourcing raw materials e.g. replacing oil with starch.	We need to obtain the whole picture. What will a sustainability tool look like for the paint life-cycle which is easy to use, is exciting enough for experts and generalists to engage with and provides information that can be communicated to customers?
RL	All stages of the life-cycle, although less on packaging and distribution.	Raw materials, particularly strong dependency on oil. Volatile organic compounds (VOC's) during use phase. Energy and waste from raw material processing and extraction (especially titanium dioxide, TiO ₂). Recycling of paint packaging. Transportation.	Finding a substitute for oil. Increased dialogue with suppliers to fully investigate how their practices measure up to sustainability standards. End of life issues for bigger customers e.g. implementing central collection schemes.	What happens to, for example, windows and doors at the end of their life-cycle? Is a door less recyclable at the end of it's life after painting? Does paint inhibit the recycling of building materials?

	With which parts of the paint life-cycle are you most familiar?	What do you think the sustainability issues are in these parts?	Can you see any solutions to these sustainability issues?	What questions would you like to ask concerning the sustainability of paint?
SD	The formulation, manufacture and use phase.	Waste issues which are shifting to manufacturers. Raw material extraction (TiO ₂ , petroleum, pigments, extenders).	Discovering the building blocks which will provide inbuilt economic and sustainable advantage such as the right kind of packaging.	Nothing
SV	Mostly end-of-life.	Raw material waste from TiO ₂ extraction and effects to the local community. Packaging and distribution.	<p>Packaging issues need to be resolved with marketing. For example, the messiness of the paint makes it difficult to recycle the can. The waste issues have been resolved through a scheme called Community Repaint (CR). CR takes left over paint from local communities and gives it to charities, schools and low income families.</p> <p>www.communityrepaint.org.uk</p> <p>Pilot packaging schemes concerning waste where vouchers or discounts are given on new purchases with every empty can brought back.</p> <p>Advisory guidelines for trade customers on how to clean a can of paint so that won't be classed as hazardous waste.</p>	What is the snapshot tool all about?

Figure 32: A table showing the responses from part 2 of the interviews. (See Appendix B for full responses.)

6.5 Interview response summary

To get the most from the snapshot tool would require the knowledge and input from someone who is expert with specific stages of the paint life-cycle, and it was for this reason that the first interview question was posed. Responses to this question identified the ICI expert for each of the life-cycle stages and the table below summarises the spread of skills. Jamie Pelts (US based) was not included in the table, partly because of the difficulty in integrating her thoughts into a London based team, and partly because of her limited knowledge on the paint life-cycle.

'Snapshot' life-cycle stages	ICI expert
Raw materials	RL, PT, JW
Paint synthesis	SD, RL, PT, JW
Packaging and transportation	JW, JH
Use	SD, RL, JW
End-of-life	SV, RL, MP, JW

Figure 33: A table to show the ICI expert for each of the life-cycle stages for paint.

6.5.1 Awareness and level of expertise at ICI Paints

As we can see from figure 33 the correlation between the interviewees' expertise and awareness of each life-cycle stage, relates strongly to their role within the organisation. For example, the Trade Market Data Manager and Innovation Manager for Trade Business work closely with trade customers, who seek guidance from ICI Paints on issues such as disposing of empty paint cans cheaply, so are very aware of the end-of-life issues. The interviewees operating on a European level seem very aware of the sustainability issues of not just one life-cycle stage, but of a number of stages such as the European Innovations Manager whose expertise spans all the life-cycle except packaging and transport. Those who have to consider more than one or two life-cycle stages in their roles may find the snapshot tool framework an easy concept to handle, but may lack the detail possessed by those dealing with only one life-cycle stage.

6.5.2 Paint life-cycle issues

The following table shows the sustainability issues which were highlighted in the interviews, for each of the life-cycle stages.

'Snapshot' tool life-cycle stages	Sustainability issue
Raw materials	Raw material extraction (TiO ₂ , petroleum, pigments, extenders).
Paint synthesis	Paint formulations (reducing cobalt which is a carcinogen and synthetic material).
Packaging and transportation	Transport emissions.
Use	Volatile organic compounds (VOC's) in gloss paint. Paint container safety for children.
End-of-life	Packaging waste. Waste paint.

Figure 34: A table to show the sustainability issues for each of the life-cycle stages for paint.

When asked what the sustainability issues were for paint, many of the interviewees referred to a past LCA study which had been carried out approximately fifteen years ago. It was an official EU funded study on the paint life-cycle which used ICI Paints data. After two years of extensive work and 15 million francs of investment, three areas of concern were identified. Firstly, the release of volatile organic compounds (VOC's) during the use phase, has a direct effect on the lower atmosphere (troposphere), by reacting with oxides of nitrogen to form ozone, causing asthmatic symptoms. (This is mostly concerned with gloss paint which has a high amount of solvent. Emulsion paints only contain between 2 – 3% of solvent.) The second issue was the disposal of waste paint and containers at the end-of-life phase. Finally, the manufacture of titanium dioxide was highlighted as a significant issue in the raw material phase. Titanium dioxide (TiO₂) manufacture includes the extraction and treatment of minerals, a process which requires an extensive amount of fossil fuels for power. TiO₂ typically makes up approximately 15% of a can of paint. (Further details on the EU paint life-cycle study can be found in John Wright's interview transcript in Appendix B)

Another issue mentioned by a number of interviewees was the use of petroleum which also has a large part to play in a can of paint. Petroleum is not only a non-renewable resource, but the expense and fluctuating price of oil make it one of the riskier elements of the paint life-cycle. Reducing oil dependence is an issue ICI Paints have already started to tackle through better paint formulations which could, for example, make use of starch in crops in place of oil. Other issues highlighted during the interviews included reducing transport emissions and improving the safety of paint cans, particularly for children during the use phase.

The next question intended to assess what efforts ICI Paints had gone through to remedy some of the issues described in the previous chapter. The responses were a mixture of projects already tried and tested, currently underway and possible future projects. The following lists some of the interviewees responses:

- Waste minimization schemes such as 'bag in the box' (similar to boxed wine);
- Paint refills;
- Selling paint in one litre cans rather than two and a half and five litre cans;
- Collaborating with large building projects on waste issues e.g. central collection schemes;
- Production of advisory material such as leaflets to inform customers of waste issues;
- Improving relations with suppliers.

Lastly, the second part of the interview gave interviewees the opportunity to express what they felt the real sustainability issues were, and what questions they would like to pose, if any. The purpose of this was to gauge interviewees personal reaction and feeling towards sustainability. Despite the obvious commitment ICI Paints have towards taking on the sustainability challenge, the responses show that there still appear to be concerns about how sustainability will be achieved.

"How do we achieve a long-term sustainable vision?"

The next statement takes the 'how?' question above a stage further by recognising the value of life-cycle thinking through the use of a tool to understand the issues better.

"We need to obtain the whole picture. What will a sustainability tool look like for the paint life-cycle which is easy to use, is exciting enough for experts and generalists to engage with and provides information that can be communicated to customers?"

6.6 Emerging themes

Analysing commonalities and irregularities in the information has identified a number of themes:

- Proactive approach with raw materials;
- Proactive approach with end-of-life issues;
- Commitment;
- Stakeholder communication;
- Reinforce sustainable vision.

6.6.1 Proactive approach with raw materials

One of the primary aims of the interview was to discover what issues from the paint life-cycle have a negative effect on sustainability. The most frequently raised issues were those found in the EU funded LCA study, which were VOC's during the use phase, the

manufacture of titanium dioxide and the disposal of paint and containers. Other issues were also brought to light, such as the need for an oil substitute. Despite these issues it was clear that ICI Paints had been proactive in their approach to addressing them. Almost all of the stated issues accompanied a solution, or effort had been made in attempting a solution. For example, the Project HYDROSTAR, which was jointly funded by The European Commission, studied the relative sustainability of a modified starch-based vinyl latex compared with a conventional vinyl latex. The project which took three years to complete and cost €150,000, demonstrates the huge amount of resources ICI Paints have invested to finding alternative solutions to oil. The study found some quantifiable ecological and socio-economic gains (although these were hugely dependent on the current EU agricultural subsidies), but the quality of the crop based starch paint was inferior. However, the project did include in its recommendations that if sustainability ever became a key driver for ICI Paints, then starch latexes should be re-evaluated [P. Taylor, 2003].

6.6.2 Proactive approach with end-of-life issues

ICI Paints have also been proactive in the schemes they have tried and tested concerning waste. One particular project which has proved hugely successful is Community Re-Paint which ICI Paints sponsors. The scheme provides a practical solution to the 80 million litres of paint which are either stored in people's homes or thrown into landfill sites each year. It works by diverting surplus paint from the waste stream and redistributing it for reuse by community groups, charities and voluntary organisations, to create both an environmental and social benefit [www.communityrepaint.org].

ICI Paints are also investing resources into the end-of-life issues by collaborating with their trade customers. Large building contractors such as Carillion, make up approximately 30% – 40% of all landfill waste per annum. The cost of putting waste into landfill continues to increase with current land fill taxes standing at £2 per tonne for non-hazardous waste, and £15 per tonne for hazardous waste. Unfortunately empty paint cans fall into the hazardous waste category [www.environment-agency.gov.uk]. As these organizations dispose of paint in such large quantities, ICI Paints have started to pilot take-back schemes at stores which cater for trade customers thereby taking responsibility for another part of the paint life-cycle.

6.6.3 Commitment

ICI Paints' commitment is evident in the high level of engagement demonstrated by the global and European managers and directors on the interviewee list. Involvement at this level will help elevate the importance of the snapshot tool, and the sphere of influence of the interviewees and potential users of the snapshot tool will embed sustainable thinking at a level which will influence practices throughout the organisation.

6.6.4 Stakeholder communication

Having a range of experts working concurrently on the snapshot tool will provoke discussions between people working in different departments at different levels within the organisation. This stakeholder communication and collaboration will aid transparency, foster inclusiveness and help joined-up thinking of the paint life-cycle. The knowledge and experiences of experts coming together to work on a common issue, may also generate momentum and new ideas for further projects. The simple framework of the tool can therefore be seen as an interface through which the various stakeholders from across the paint life-cycle can communicate.

6.6.5 Reinforce sustainable vision

Alongside the enthusiasm, there was also an element of disillusionment and uncertainty which became apparent when interviewees were asked what sustainability meant to them. Responses such as how do we achieve a sustainable vision and what is the *real* driver suggest there is still a need for clarity, targets and enforced strategies to carve out a definitive path.

6.7 Developing the snapshot tool – stage 2

The interview responses enabled a ‘wish list’ of attributes that the tool should possess. These are summarized in the following list:

- Considers the entire paint life-cycle;
- Is easy to use;
- Is not resource intensive (time, cost);
- Can be used as a communication tool;
- Can offer information for a specialist or generalist audience;
- Will help embed sustainability thinking;
- Can be used on a range of products within ICI Paints’ portfolio;
- Is intellectually watertight.

Having assessed the life-cycle issues for paint (figure 34) it was then possible to focus the questions for each matrix square. Developing suitable questions to fit into each matrix square was carried out in three stages. Firstly, the information gathered from the interviews was used to formulate some basic over-arching questions.

	SC1	SC2	SC3	SC4	
Raw materials	What? How?	What? How?	What? How?	Who?	SC1 – system condition 1 Don't pull stuff out of the earth's crust at a faster rate than it is returned.
Paint synthesis	Inputs? Outputs?	Inputs? Outputs?	Inputs? Outputs?	Who?	SC2 – system condition 2 Don't create materials that nature can't deal with or in such quantities that it can't.
Packaging & distribution	How?	How?	How?	Who?	SC3 – system condition 3 Don't cut down and destroy nature.
Use	Other consumables? Other inputs?	Other consumables? Other inputs?	Other consumables? Other inputs?	Who?	SC4 – system condition 4 Meet human needs globally.
End-of-life	How?	How?	How?	Who?	

Figure 35: The first stage of matrix questions

These first stage questions were used to help focus down the second stage of questions into more detail. The following diagram shows the second set of matrix questions.

	SC1	SC2	SC3	SC4
Raw materials	What is in paint? How is raw material extracted – energy requirements? Are any of the components of paint found in the earth's crust?	What is in paint? How is raw material extracted? Are toxins / waste eliminated?	What is in paint? How is raw material extracted – energy requirements? Are any of paints components found in the biosphere and what are the potential impacts?	Who are the stakeholders? What are the workers pay, hours, benefits, conditions like? What is the effect on the community?
Paint synthesis	Are materials from the earth's crust needed?	Are toxins or waste eliminated during or after synthesis?	Are materials from the biosphere needed? Are there any effects on the biosphere or biodiversity?	Who are the stakeholders? What are the workers pay, hours, benefits, conditions like? What is the effect on the community?
Packaging & distribution	How is the paint distributed? How is the distribution powered? How is the paint packaged?	How is the paint distributed? How is the distribution powered? How is the paint packaged?	How is the paint distributed? How is the distribution powered? How is the paint packaged?	Who are the stakeholders? What are the workers pay, hours, benefits, conditions like? What is the effect on the community?
Use	Are materials from the earth's crust needed? Are other consumables needed?	Are toxins or waste needed or eliminated?	Are materials from the biosphere needed? Are other consumables needed?	Is use of the paint offensive to anyone? Are the effects useful? Does it meet the need of the user?
End-of-life	How is paint disposed of? Does it involve materials from the earth's crust?	How is paint disposed of? Does it involve eliminating toxins or waste?	How is paint disposed of? Is it harmful to nature?	Who are the stakeholders? What are the workers pay, hours, benefits, conditions like? What is the effect on the community? Is there disposal control? What are the impacts on the local community?

Figure 36: The second stage of matrix questions

Finally, using these expanded questions as a guide, a third more detailed level of questions was devised for each matrix square, to form the final snapshot tool. To help with the qualitative scoring method, the final questions were closed i.e. yes and no answers. The next section shows and explains the tool.

6.8 The sustainability snapshot tool

Based on the second set of matrix questions in figure 36 and the interview responses, the following figure shows some of the final matrix questions. For copyright reasons only a small section of the table is shown; all four system conditions for the raw material life-cycle stage.

	SC1	SC2	SC3	SC4
Raw materials	Are any of the components in paint not found in the earth's crust? Are any of them not scarce? Is the manufacture and extraction of raw materials not powered by materials extracted from the earth's crust?	Are any of the components in paint man-made, recycled or synthetic? Are toxins or hazardous substances used or eliminated during raw material extraction?	Are any of the components in paint not found in the biosphere? Is a small amount of land used to extract these materials from the biosphere? Does the extraction of the raw material not require materials from the biosphere? Is the extraction process not powered by materials from the biosphere?	Are workers paid fairly for the extraction and manufacture of raw materials? Are the workers local? Have there been any positive changes to the local area in the last 5 – 10 years?

Figure 37: The Snapshot tool showing questions for the raw material life-cycle stage

6.9 Scoring the matrix

Again based on the scoring technique in Nike's procurement sustainability tool discussed in section 6.2, a similar colour coded scoring system has been used for the snapshot tool. A group of people representing the different life-stages of paint would go through each of the matrix questions answering either yes or no. Once all had been answered, the group would count up the yes and no answers and colour the square according to the scoring system shown below.

Good	Quite good	Quite bad	Bad	Don't know
All answers positive. System condition met.	Mostly positive responses. System condition mostly met.	Mostly negative responses. System condition mostly NOT met.	All answers negative. System condition not met.	Insufficient knowledge to make reasonable judgment.

Figure 38: Scoring system for the snapshot tool

The following diagram shows what a possible outcome from the matrix could look like.

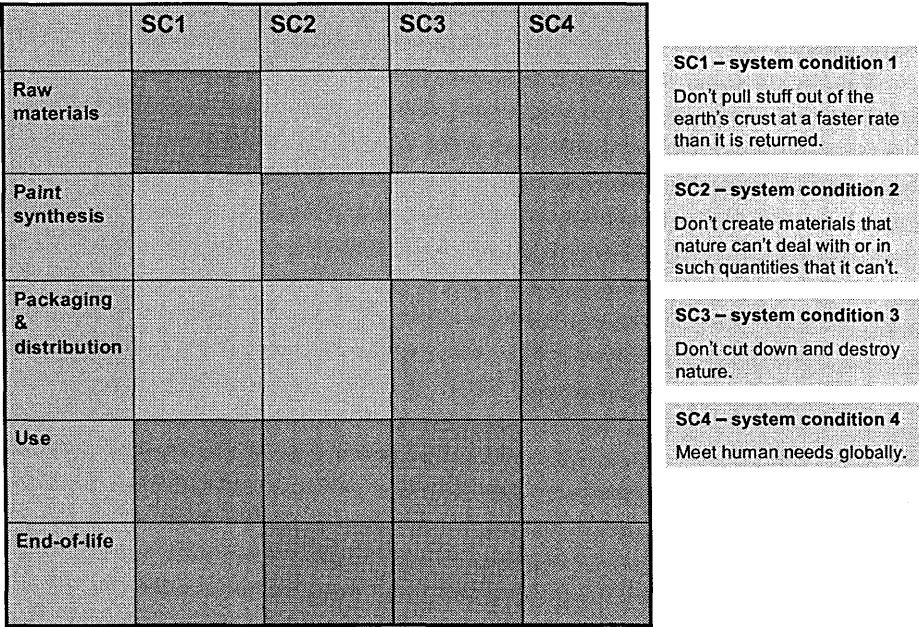


Figure 39: A possible snapshot tool outcome

Figure 39 demonstrates how the use of colour is useful in quickly identifying the largest sustainability issues relative to the other life-cycle stages. In this example, the squares shown in red represent the areas causing the most sustainable damage and could therefore be the areas in which to focus resources for finding solutions.

6.10 Benefits of the snapshot tool

Based on the list of requirements for the snapshot tool given in section 6.7 the following table shows how the developed tool successfully meets them.

Snapshot tool criteria	Meeting criteria
<ul style="list-style-type: none"> Considers the entire paint life-cycle. 	<ul style="list-style-type: none"> Looks at whole life-cycle in five stages.
<ul style="list-style-type: none"> Is easy to use. 	<ul style="list-style-type: none"> Matrix questions expressed in layman's terms.
<ul style="list-style-type: none"> Is not resource intensive (time, cost). 	<ul style="list-style-type: none"> Designed for a team representing the whole life-cycle, and to be completed in a couple of hours.
<ul style="list-style-type: none"> A communication tool. 	<ul style="list-style-type: none"> Colourful matrix to portray messages which require no prior

	knowledge for understanding.
<ul style="list-style-type: none"> • Information for a specialist or generalist. 	<ul style="list-style-type: none"> • Matrix gives overview for generalists and offers detail for specialists.
<ul style="list-style-type: none"> • Embed sustainability thinking. 	<ul style="list-style-type: none"> • The matrix process will tune people into a more sustainable way of thinking.
<ul style="list-style-type: none"> • Can be used on a range of products. 	<ul style="list-style-type: none"> • The tool is generic.
<ul style="list-style-type: none"> • Intellectually watertight. 	<ul style="list-style-type: none"> • Based on TNS principles and Thomas Graedel's SLCA theory, which have stood up to peer review.

Figure 40: A table showing how the snapshot tool meets ICI Paints criteria for enhancing the sustainability of their products

6.11 Matrix pitfalls

To use the tool productively, there is a need for those involved to have a thorough knowledge of the sustainability issues associated with the paint life-cycle. Consequently, there may also be a need to involve suppliers or customers. Some of the more abstract questions in the matrix may have to be answered by drawing on existing knowledge. Although a general consensus would be met within the group, there will always be an element of subjectivity in the final outcome. Also, there is no benchmark for the matrix questions or final output.

6.12 Placing a snapshot tool

Now that the snapshot tool has been developed, ICI Paints propose to test and review the tool in a workshop environment before officially launching it into any processes. But in order to get a sense of how and where people think this tool should be used, the final set of interview questions went about collecting information to draft the possible positioning of the tool within the organisation. The next, final analysis chapter discusses the responses to these questions.

7. IMPLEMENTING A SNAPSHOT TOOL

7.1 Introduction

The report so far has identified the need for a sustainability snapshot tool with it's main function being to highlight potential impacts within the paint life-cycle, and has also described the workings of an actionable tool which will fit this need. This chapter is the final one to analyse the responses of Part 3 of the interviews which sought to *assess how* and *where the tool could be useful to ICI Paints*.

7.2 Interviews – Part 3

The final part of the interview addressed **where** and **how** the snapshot tool should be used. The following table summaries the responses of eight ICI employees.

7.2.1 Interviewees

JP	Jamie Pelts (US based)	<i>Director of Marketing and Innovation</i>
JH	Jerry Hodge	<i>Global Packaging Development Manager</i>
JW	John Wright	<i>Product Stewardship</i>
MP	Marina Poza	<i>Innovation Manager for Trade Business</i>
PT	Phil Taylor	<i>Paints Research Associate</i>
RL	Ray Leggetter	<i>European Innovations Manager</i>
SD	Stephen Davis	<i>European R&D Manager</i>
SV	Sue Vel	<i>Trade Market Data Manager</i>

7.2.2 Interview results for part 3

	How do you think a snapshot tool, which efficiently helps determine the sustainability of paint, would be useful?	Where do you think a snapshot tool would be best placed (in the innovation process)?
JP	It needs to identify how it would impact the end user. It should help address issues such as cost and help find ways of resolving these issues.	It would be most useful to have a tool such as this integrated into the beginning of a decision making process.
JH	It should explain what sustainability is.	It should be at the start of the innovation process.
JW	It could be used to do a SWOT analysis on existing information. There is a need for a review which seeks longer term solutions. It needs to give credibility.	It should be placed at the beginning of the innovation process and should be a design opportunity in the process. ICI have already taken part in packaging design projects such as having a bag in a box (like a wine box) for disassembly ease, but it didn't take off because people couldn't put their brush into it.

	How do you think a snapshot tool, which efficiently helps determine the sustainability of paint, would be useful?	Where do you think a snapshot tool would be best placed (in the innovation process)?
MP	It needs to be in a process, such as The Natural Step (TNS). How can it add value to a company and how would you communicate it?	Sustainability is much bigger than safety, health and the environment, and thought needs to go into it as soon as possible. We need to question why we still make solvent products which release VOC's. The tool needs to be placed in the intermediate steps between now and where ICI have to be in the future.
PT	It would be useful in identifying areas for focusing efforts and could identify new areas of research.	It could be used before work is sanctioned to begin and to set priorities for the research portfolio. Questions such as 'is there a cheaper, better, tougher, more sustainable paint?' should be answered using the tool. Use of the tool should also be made before a product goes into the major development phase. He also feels the tool should be used after the product has been made and could be useful for giving customers evidence on sustainability.
RL	There needs to be a tool, or a suite of tools with specific limitations which assesses current and future technologies overall benefits. There needs to be a tool and common methodology which identifies what is good and what is bad.	At the front-end of the process.
SD	Something that can give information on what will work better and will offer good communication.	It should be used at the beginning and end of the design process to understand it. The tool should help in finding opportunities.
SV	There is a need for sustainability to be more widely understood on a company level and this tool should help towards that.	It should be placed at the front end of the innovation process although it may be difficult to answer some of the questions at that stage. Some products which don't go through stage gates, such as those which are just having minor alterations should also be passed through the 'snapshot tool'.

Figure 41: A table showing the responses from part 3 of the interviews. (See Appendix B for full responses.)

7.3 Interview response summary

Reviewing the interview responses threw up a number of issues concerning how the tool could be used. Some felt the tool would be useful in identifying or clarifying generic issues such as the meaning of sustainability. Others saw its use as a communication tool on a company level by using the matrix output as a sustainability-organisation interface. Some also thought the scope and potential of the tool could be increased to actually provide answers to some of the highlighted issues:

“something that will give information on what will work better”,

“it should help address issues such as cost and help find ways of resolving these issues”.

While other's impressions of the tool and the appropriateness of its use were more reasonably summed up in the following comment:

“would be useful in identifying areas for focusing efforts and could identify new areas of research”.

Finally, the last question discussed where the tool should potentially be placed. All interviewees thought the usefulness would be enhanced if embedded into a process such as TNS or the innovation stage-gate review process. There was a unanimous agreement that integrating it into the innovation process would be the most obvious starting point. Within the innovation process it was thought that the most obvious place for it would be at the start while the product design was being conceived, and at the end so that a comparison could be made between the two snapshots.

7.4 Emerging themes

Analysing commonalities and irregularities in the information has identified a number of themes:

- Solution finding;
- Communication tool;
- Credibility;
- Innovation.

7.4.1 Solution finding

There have been many comments concerning the need for the snapshot tool to have within it a solution finding mechanism, or at least steer the way to solutions in the long or short term. While the tool itself does not find solutions to the issues, the snapshot or matrix outcome has been designed in such a way as to clearly identify the issues concerning the paint life-cycle, to help focus resources in finding solutions in that area. Also, the process of using the tool forces life-cycle thinking, which in turn could form part of a solution finding process once the issues have been officially identified.

7.4.2 Communication tool

Communication has been theme transcending all three objectives, mainly due to the number of times it cropped up in the interview responses. In the previous chapter, many considered the snapshot tool to be filling a gap as the matrix outcomes would help enhance understanding and awareness of the issues throughout the organization. Again, exploiting the tool to communicate messages through the final matrix output was evident in comments made during the final interview questions in how the tool should be used.

7.4.3 Credibility

Lastly, a theme which has remained peripheral to the analysis so far is the issue of credibility, robustness and the tool's ability to produce worthy data which stands up to external, specialist criticism. The snapshot tool methodology must also show thoroughness, transparency and rigour if ICI Paints are to hold their position as leaders and advocates of sustainability. As the tool draws on TNS and SLCA techniques, both of which have withstood many years of criticism and praise in the public domain, any concerns regarding the basic framework of the tool will be possible to justify.

7.4.4 Innovation

At this stage, it seems that ICI Paints feel comfortable with the notion of sustainability entering into their innovation processes. Not only does this show utter commitment to the sustainability challenge, but it also offers an ideal place for making significant changes. Playing with the snapshot tool and testing it on new products will not only alter thinking and allow sustainability to seep and embed itself into these processes, but it will hopefully be the catalyst to some successful ideas and changes which will set them apart from their competitors.

8. DISCUSSION

8.1 Introduction

The last three chapters have looked in depth at the themes which have emerged concerning the development of a sustainability snapshot tool within the ICI Paints context. This discussion uses these themes and snapshot tool attributes to show how ICI can gain a competitive edge in the broader sustainability context. The snapshot tool strengths are drawn out to highlight the ways they address weaknesses of the tools discussed in chapter 4 such as LCA's.

8.2 Themes emerging from analysis

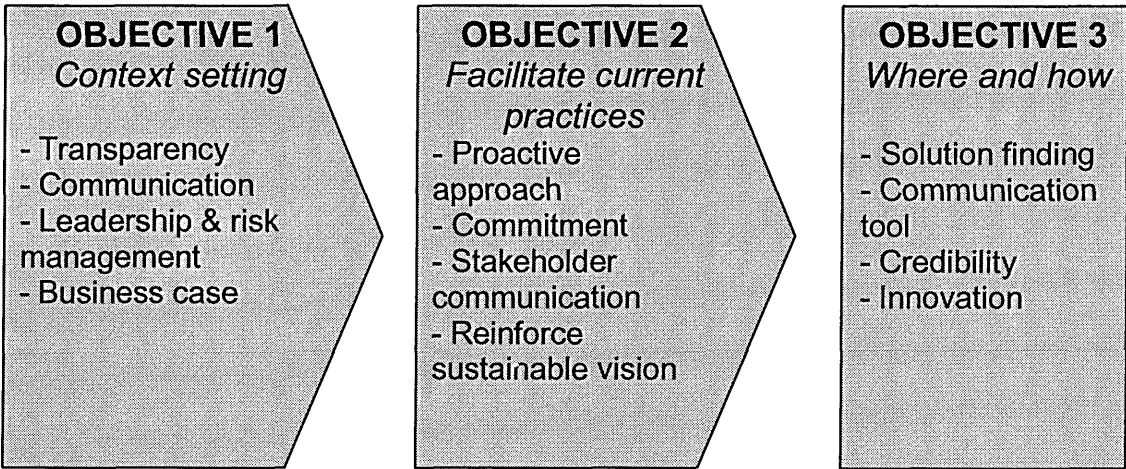


Figure 42: The emerging themes from the objective analysis

Figure 42 summarises the emerging themes from the last three chapters and shows how communication is common to all three objectives, signifying it's importance relative to the other themes. It was through the interviews that the feeling for improved communication would help in relating sustainability stories throughout the organisation. The snapshot tool has tried to relieve this concern by showing it's flexibility in doubling up as a **communication tool** through its visual and easy to understand output. The tool has also shown how it can foster interdepartmental conversations which will increase communication channels and aid **transparency** and understanding of the paint life-cycle process. The tool can also facilitate ICI Paints **proactive approach** to finding sustainable **solutions**, **reinforce and embed sustainable thinking** and act as a catalyst to new ideas and **innovations** through the process of using the tool. This will in turn add more value to ICI's Dow Jones Sustainability Index membership, and support **business case** arguments.

8.3 Internal drivers

The three sets of themes in figure 42 collectively illustrate ICI Paints internal drive and energy in moving towards sustainability. The themes highlight an impressive selection of qualities that, if properly channelled, could mean making significant leaps in finding new sustainable solutions in paint. The snapshot tool offers an ideal catalyst through which to channel this energy. The next section explores how the tool can help ICI find new opportunities to provide the competitive edge within the broader context.

8.3.1 The comfort zone

Chapter 4 introduced sustainability through the concept of systems thinking to help appreciate the inter-connectivity of the issues that lie within it. The snapshot tool facilitates system thinking by breaking the paint life-cycle down into five stages and relating them to four different sub-cycles; the system conditions. Consequently, the holistic nature of the tool can trigger creative and innovative opportunities as it draws experts away from their comfort zones, i.e. normal areas of work, and puts them into an area where they are unfamiliar, i.e. assessing in relative detail the sustainability impacts in the paint life-cycle. The comfort and familiarity exists within the matrix by setting the rules and boundaries, thereby instilling reason, purpose and a common vision into the snapshot tool process.

8.3.2 The competitive edge

An example of how the tool can offer fertile ground for new ideas is demonstrated through the following example. It was during the early stages of developing the idea for a snapshot tool that ICI Paint Research Associate, Phil Taylor saw how his work at the front-end of the life-cycle could become an opportunity at the end of the life cycle.

A paint researcher will be an expert in the issues concerned with the first two stages of the paint life-cycle; raw materials and paint formulation. If the paint researcher considers the life-cycle in its entirety, new ideas can surface as the research scientist understands the implications of actions performed in the early parts of the life-cycle later on. A common sustainability driver are customers, such as those from trade organisations, who have the overhanging threat of increasing landfill taxes with the disposal of each paint can and painted material. From this threat a potential opportunity was discovered. By designing a paint at the beginning of the life-cycle, which once painted onto a material would fall off with a trigger, hence revealing a clean re-useable material underneath, could mean a huge reduction in the amount of material going into landfill (currently between 30% - 40% for construction industry) [www.environment-agency.gov.uk]. Hence, by formulating a paint which has the additional property of falling off surfaces when required would not only provide a valuable sustainable benefit, but could also enhance ICI Paints competitive performance. This is a project ICI Paints' is looking to pursue in collaboration with a leading business and construction company; Carilion plc.

“What happens to, for example, windows and doors at the end of their life-cycle? Is a door less recyclable at the end of it's life after painting? Does paint inhibit the recycling of building materials?”

ICI's risk management strategies have led the organisation to stay on top of sustainability challenges and pressures, and their proactive rather than reactive approach has made them among the leaders in the paint and coatings sector.

8.4 A new age for eco-design tools

The literature review chapter highlights the recent momentum in sustainability tool development through commentators such as O'Shea, James, and Kahn et al (chapter 4). The following section emphasizes how the snapshot tool's attributes make it stand out from other tools through its joint use as a communication tool and its ability to address the weaknesses of LCA tools. Finally, the advantages of a tool tailored to meet specific needs are addressed.

8.4.1 A communication tool

The outcomes from this project have shown the importance of using a tool in which the messages it produces can be easily communicated. Due to the qualitative and visual nature of the snapshot tool, it's possible to see how it meets this need. Also by bringing different stakeholders together and flattening the hierarchical structure in the organisation, new communication networks are encouraged. The business case matrix developed by SustainAbility (section 4.6.3) is another example of using the visual output to communicate information.

8.4.2 Addresses LCA weaknesses

Compared to tools such as LCA's, the snapshot tool offers a valid replacement as it positively addresses its' weaknesses. For example, the tool takes social and ethical values into consideration alongside the environmental issues, it is not resource intensive and the output is understandable to all. Also, unlike LCA's, the completed matrix offers an excellent starting point at the process level. The four system conditions within the matrix lay out the sustainability goals, and while the completed matrix marks the current snapshot of the product, the colours representing the negative impacts act as a guide on where to invest resources to achieve a more sustainable product.

8.4.3 A tailored matrix

The recent increase in the number of sustainability tools have in some way or other tried to resolve the weaknesses of existing tools, such as the eco-compass and eco-point system for LCA's, and a study conducted by Hamburg University (see section 4.6.1) found that a model which spans the entire product life-cycle was still lacking. From this research it seems that it's not possible to find a 'one size fits all' solution, because each case differs vastly, so has to be worked upon individually. Therefore, half the battle is the actual development of a tool suitable for the product or service in question, and building a matrix which is tailored to the case in hand, is a smart way of distilling complex issues into a simple format. The processes and procedures for using the tool i.e.

a group of stakeholders assessing the environmental and social impacts of a life-cycle, may be the only common part of efficient sustainability measuring.

8.5 Maintaining focus

One of the main challenges in developing the tool was integrating the ethical and social elements into the matrix - system condition 4. The questions concerning the life-cycle impacts on the earth's crust, on man-made materials and the biosphere (system conditions 1 – 3), were more objective and factual, and the likelihood of answers being known by the paint life-cycle experts is high. On the other hand, questions concerning the social and ethical issues of the paint life-cycle are more difficult to answer, because they are probably less well known to the experts, have numerous parameters and concern contentious issues resulting in largely subjective responses. For these reasons it was necessary to keep the system condition 4 questions fairly simple and generic. But this challenge did pose the following questions. Does addressing social and environmental issues simultaneously, loose the tool's focus? Could the tool be even tighter and more efficient if this element was taken out and measured in another way? One suggestion which came out of the interviews was to perhaps develop a suite of tools with each tool addressing specific elements of sustainability or the paint life-cycle.

The tool also can also be seen as a point of reference for sustainability and what it means for paint. By using the best possible outcome from the tool could help in centering a sustainable vision which can be susceptible to being swept off kilter by external pressures. Interview comments such as '*we need a reference point*' demonstrate the need for reinforcing sustainable messages to maintain focus.

8.6 Summary

This work has had a significant part to play within a case-study context and in the development of tools and models in the sustainability and eco-design fields. ICI have had a strong common vision in respect to sustainability which has grown and increased in importance as this project has touched various departments within the organisation. They are evidently proud of their position in their industry sector, and have the internal drive and ambition to maintain that partly through addressing the sustainability pressures facing them. Within the sustainability and eco-design fields this project has added a valuable case study which shows a multi-national organisation using eco-design tools to help them move towards sustainability. It has shown how a very simple matrix tool can be used to steer decision making towards sustainability when tailored to specific requirements.

In essence, this tool will be an ideal substitute for the conventional LCA tool, as it tackles the weaknesses which were highlighted in section 4.5.3 of the literature review chapter, i.e. it's resource intense nature and it's inability to assess social issues.

9. CONCLUSION

9.1 Overall findings

This project has worked on two levels. On a case study level this research has introduced a new way of thinking into ICI Paints. It has given the organisation an opportunity to reflect on the work that they've contributed to the sustainability field already, and has brought a fresh perspective and new ideas into their R&D, trade and marketing, innovation and technology teams. From the interviews conducted and the literature studied, a number of key themes have emerged for each of the three objectives. Communication has been a macro issue which warranted a strong emphasis on the tool's usefulness as a communication interface. Other themes such as, commitment and leadership were also useful in framing the snapshot tool and demonstrating how it could be used to give ICI Paints a competitive edge.

9.2 Objective one

To assess the needs of ICI Paints in respect to sustainability by understanding their current and future vision. It was discovered through interviews and secondary research that ICI as group had undertaken a number of sustainable initiatives and had recently been selected as a Dow Jones Sustainability Index member. ICI Paints have also taken a proactive approach such as working with the British Coatings Federation to lobby for lower VOC emissions. The drivers for enhancing sustainability within the organisation are legislative and customer focused, but the interview revealed a real commitment and enthusiasm internally to pursue sustainability. The need for better communication and maintaining momentum on existing sustainability projects such as Community Re-paint was also highlighted.

9.3 Objective two

To analyse ways of integrating TNS and SLCA to develop a strategic tool which will encourage movement towards sustainability. The snapshot tool is developed in a matrix format using TNS and SLCA principles. The tools attributes show how it can help ICI Paints move towards sustainability and help communicate messages to specialist and generalist audiences.

9.4 Objective three

To assess how the tool can be useful to ICI Paints. There was a unanimous agreement that the tool should become a part of the innovation process by being placed at the beginning and end of it. Again, emphasis was placed on using the tool's output as a medium through which to communicate messages.

9.5 Future work

Since the preliminary work on the snapshot tool has been carried out, ICI Paints are keen to continue the work further. ICI Paints, have proposed to put the snapshot tool to the test in a workshop environment which will take place in September 2005. A review of the workshop and tool and consequent revisions will be made before it's integration into innovation process.

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Appendix A

Interview: Helping ICI Paints move towards sustainability⁶ with the aid of a ‘Sustainability Snapshot’ tool. The tool will be a matrix of questions addressing the environmental and social impacts of the paint life-cycle⁷.

Thank you for agreeing to be interviewed. The interview will be in three parts:-

- Part 1 - introductory questions and why you think ICI Paints feel the need to address sustainability
- Part 2 – will involve looking at the sustainability issues within the paint life-cycle
- Part 3 – implementing the snapshot tool

The results of the interviews will contribute to my Masters report and to the development of a ‘Sustainability Snapshot’ tool for ICI Paints.

Part 1 – Introductory questions

- How long have you been at ICI Paints?
- Could you briefly summarize what your position at ICI Paints involves now?
- Where do you feel the pressures for tackling sustainability are coming from?
- How do you feel ICI Paint’s sustainability performance compares to other companies in your sector?
- Where do you feel there’s scope for improvement?

Part 2 – Paint life-cycle

- With which parts of the paint life-cycle are you most familiar?
- What do you think the sustainability issues are in these parts?
- Can you see any solutions to these sustainability issues?
- What questions would you like to ask concerning the sustainability of paint?

Part 3 – Implementing a ‘Sustainability Snapshot’ tool

- How do you think a snapshot tool, which efficiently helps determine the sustainability of paint, would be useful?
- Where do you think a snapshot tool would be best placed (in the innovation process)?

I have attached a table of the paint life-cycle we will be discussing in the interview, so please feel free to jot down any ideas you have on the environmental and social impacts. Thank you.

⁶ Sustainability can be viewed as three interacting domains; environment, economy and society. (Elkington J. 1998)

⁷ ‘...production that begins with an input of materials followed by creation, packaging, distribution and use of the product, and ending with disposal, recycle, or reuse of remaining materials.’ (www.chemistry.org/portal/a/c/s/1/acsdisplay.html)

	Raw materials (extraction and processing)	Paint synthesis	Packaging and distribution	Use	End of life
Environmental impacts					
Social impacts					

Appendix B

Tuesday 2nd August 2005 – phone interview

Interview: Jamie Pelts (US based) – *Director of Marketing and Innovation*

Part 1 – Introductory questions

- **How long have you been at ICI Paints?**
15 years
- **Could you briefly summarize what your position at ICI Paints involves now?**
Jamie is based in ICI America and is Director of Marketing and Innovation and heads innovation from the marketing side. Within her line of work sustainability is an interest and they have already identified certain platforms with which to work.
- **Where do you feel the pressures for tackling sustainability are coming from?**
The pressures are mainly from government concerning volatile organic compounds (VOC's). (Although this is only true for certain regions such as East Coast and California.) Customers are not concerned at all because the quality decreases with more natural based paints.
- **How do you feel ICI Paint's sustainability performance compares to other companies in your sector?**
Jamie feels that all ICI's competitors are about equal, with one of the main competitors being Sherwin-Williams and says 'green' paints are still very niche.
- **Where do you feel there's scope for improvement?**
Sustainability will play a role, but there is a cost expectation. People won't pay more for a sustainable product, instead they want quality and increased performance.

Part 2 – Paint life-cycle

- **With which parts of the paint life-cycle are you most familiar?**
The social and economic impacts – no environmental knowledge.
- **What do you think the sustainability issues are in these parts?**
From a financial point of view she feels it is important to start exploring new ways of making paint because of the instability in the oil market. 'People talk the talk, but don't walk the walk'. Customers need to have a good quality paint with the environmental benefits.
- **Can you see any solutions to these sustainability issues?**

Dependence needs to be shifted to the renewable resource market.

- **What questions would you like to ask concerning the sustainability of paint?**
Addressing issues of waste. How do we inform the end user in managing paint waste?

Part 3 – Implementing a ‘Sustainability Snapshot’ tool

- **How do you think a snapshot tool, which efficiently helps determine the sustainability of paint, would be useful?**
It needs to identify how it would impact the end user. It should also help address issues such as cost and help find ways of resolving these issues. Jamie didn’t feel it would have much use if it just flagged up issues, it needs to do more than that.
- **Where do you think a snapshot tool would be best placed (in the innovation process)?**
It would be most useful to have a tool such as this integrated into the beginning of a decision making process.
- **Any other comments?**
No

Wednesday 10th August 2005 – phone

Interview: Jerry Hodge – *Global Packaging Development Manager*

Part 1 – Introductory questions

- **How long have you been at ICI Paints?**
22 years
- **Could you briefly summarize what your position at ICI Paints involves now?**
Jerry is the Global Packaging Development Manager for ICI Paints and his responsibilities include developing packaging for the regions with respect to customer and environmental needs (among others). Sustainability issues have just started to kick off again.
- **Where do you feel the pressures for tackling sustainability are coming from?**
Customers. Now that the trade customers are being caught out by the cost of disposal and landfill tax. The only pressure from retailers (such as B&Q) is through form filling and checking compliance.
- **How do you feel ICI Paint's sustainability performance compares to other companies in your sector?**
The competitors are Axo Nobel, Sherwin William and Kaylon. ICI's performance over the last 5 to 10 years has been class leading, but over the last couple of years this has probably degraded a little and is similar or perhaps just a little bit better than the competition.
- **Where do you feel there's scope for improvement?**
Understanding the issue better and getting a reference point. What is important and what does this mean for the business? We need an approach for assessing the sustainability in a clear and transparent way. At the moment the decisions are just trade-offs, there needs to be a more unified way of looking at the issues.

Part 2 – Paint life-cycle

- **With which parts of the paint life-cycle are you most familiar?**
Familiar with the whole life-cycle from the packaging perspective. A lot of work e.g. LCA's was performed on packaging about 8-9 years ago, but relatively little has been done since.
- **What do you think the sustainability issues are in these parts?**
Firstly, use of appropriate materials (no mixing of materials or use of more recycle). Secondly, mustn't over package and lastly disposability. Although it is possible to recycle, it is not economically viable. On the social side, there is no sourcing outside of the UK so there are no employment issues to worry about.

However, there are concerns with the consumer's safety during the use phase, for example, should all the cans have child safety closures?

- **Can you see any solutions to these sustainability issues?**

The 'bag in the box' idea was launched in Germany, so the bag could be thrown away after use and the box reused. Paint refills have also been piloted but it wasn't successful. Maybe it is possible to sell paint in one litre cans rather than two and half and five litre containers. With waste issues it is better to work with large building projects and close the loop because the volume and frequency is higher than for DIY / home users.

Secondary packaging is minimal and just involves a palette and some clingfilm.

- **What questions would you like to ask concerning the sustainability of paint?**

There is a struggle to engage with sustainability and it is not apparent if the need is legal. What is going to be the pressure that will make the change? There needs to be a firm driver.

Part 3 – Implementing a 'Sustainability Snapshot' tool

- **How do you think a snapshot tool, which efficiently helps determine the sustainability of paint, would be useful?**

Would hopefully explain what sustainability is. Jerry's department have a guidebook for packaging designers to help them put sustainability into packaging – 'environmental ladder'.

- **Where do you think a snapshot tool would be best placed (in the innovation process)?**

It should be at the start of the innovation process.

- **Any other comments?**

No.

Tuesday 2nd August 2005 – ICI Paints, Slough

Interview: John Wright – *Product Stewardship*

Part 1 – Introductory questions

- **How long have you been at ICI Paints?**
25 years
- **Could you briefly summarize what your position at ICI Paints involves now?**
John is a Product Steward for all UK products (decorative). This entails compiling the product stewardship policy, looking at impacts of the whole life-cycle, minimizing safety, health and environment (SHE) impacts. Most of the work focuses on shorter-term sustainability, i.e. the day-to-day issues.
- **Where do you feel the pressures for tackling sustainability are coming from?**
Health and safety legislation. All products have to be assessed with CHIP 3, e.g. the preparation of the product, the labelling of the product. Legislation is the biggest driver concerning product stewardship.

ICI's SHE management system operates to the EU recommended Responsible Care system which takes into account policy and standards, global management, product stewardship and factories and sites. It also states that best practice is about thinking ahead.

Campaign groups such as Greenpeace also place a lot of pressure into ICI's practices.

- **How do you feel ICI Paint's sustainability performance compares to other companies in your sector?**
Crown have ISO14001 whereas ICI don't.
- **Where do you feel there's scope for improvement?**
With suppliers and raw material sourcing. A lot more could be made of Community Repaint. Also, the natural paint market is a threat.

Part 2 – Paint life-cycle

- **With which parts of the paint life-cycle are you most familiar?**
All parts of the life-cycle.
- **What do you think the sustainability issues are in these parts?**
An EU led study on the life-cycle of paint which took 2 years to perform and cost 15 million francs, was conducted for Eco-label, for which ICI provided the data.

The study set the Eco-label standards and identified three main impacts which are described below.

Firstly, emissions of volatile organic compounds (VOC's) is one of the major issues as it has a direct effect on the atmosphere by reacting with oxides of nitrogen to form ozone in the lower atmosphere causing asthmatic symptoms. This is mostly concerned with gloss paint which has a high amount of solvent in it. Emulsion paints only have about 2 – 3% of solvent in them. Paint contributes to about 2% of VOC emissions. Secondly, waste paint and containers. Thirdly, TiO₂ manufacture which makes up about 15% of a can of paint and is needed for opacity. Extracting and treating TiO₂ requires a lot of energy.

- **Can you see any solutions to these sustainability issues?**
ICI worked with the British Coatings Federation (BCF) to lobby the EU and government on lowering VOC levels, and ICI have gone a step further to decrease the VOC content of their paints. They have done this by replacing white spirit with water in gloss paint, but the quality of the paint does decrease. It is currently difficult to produce a good quality water-based gloss paint. ICI's successful lobbying on VOC's means the legislation will come into effect in 2007.

Minimize packaging by redesigning it to reduce the plastic content in paint cans. There is currently a lot of waste, about 90 million cans per year. Sue Vel helps co-ordinate ICI's Community Repaint project which reuses old paint. In 1991 a survey into waste paint was conducted on households in Leeds and found that an average of 17 cans sit idle in garages.

Producing advisory material such as leaflets to inform customers of issues such as lead in pre-1960 paint.

ICI also have very good communication with their customers such as B&Q, (although the relations on the supplier side may be slightly weaker).

- **What questions would you like to ask concerning the sustainability of paint?**
How do we achieve a long-term sustainable vision? Also, the fuel consumption of lorries is unmonitored. Could this be a potential opportunity?

Part 3 – Implementing a 'Sustainability Snapshot' tool

- **How do you think a snapshot tool, which efficiently helps determine the sustainability of paint, would be useful?**
The 15 million franc study on paint LCA's could have been carried out with the 'snapshot tool', the expense, time involved and expertise only gave it credibility. The tool could be used to do a SWOT analysis on existing information.

Any past LCA work has been carried out with a short-term focus and with a purely environmental focus and there is a need for a review which seeks longer term solutions.

- **Where do you think a snapshot tool would be best placed (in the innovation process)?**

It should be placed at the beginning of the innovation process and should be a design opportunity in the process. ICI have already taken part in packaging design projects such as having a bag in a box (like a wine box) for disassembly ease but it didn't take off because people couldn't put their brush into it.

- **Any other comments?**

Get the SHE checklist off the 'Innovate System'. See product stewardship leaflet.

Every year a risk assessment is conducted for the raw materials in each product, and looks at the current and potential risks within the next 5 to 10 years. Each raw material is categorised in the following way; hazard, risk, cost, emotion (the public opinion) and a scoring system of high, medium or low is given. All the technical managers are there to discuss the ratings and the assessment is carried out on all paints including wood and metal paints. The 'emotion' category is difficult to judge and can be one of the most important, for example a 'gender bender' surfactant being used in an ICI product was spotted by Greenpeace. Before too much damage was done the product was reformulated without the surfactant even though there had been no evidence to suggest it was harmful. The review also looks at business activities.

All new products are SHE tested beyond the legal requirements. The SHE assessment is used in the innovation process at each stage gate with different prompts for each gate.

This will help ICI to be more proactive rather than reactive. The ICI policy consists of a list of toxic chemicals which go beyond the law demonstrating how ICI are setting their own standards.

Tuesday 2nd August 2005 – ICI Paints, Slough

Interview: Marina Poza – *Innovation Manager for Trade Business*

Part 1 – Introductory questions

- **How long have you been at ICI Paints?**
8 months
- **Could you briefly summarize what your position at ICI Paints involves now?**
Marina is Innovation Manager for Trade Business at ICI. She looks at customer trends and behaviour, gaps in the market, innovation platforms - one of them being environment and sustainability.

She is also currently working on a project which is looking at the sustainability needs from the customer viewpoint. The government is pushing sustainability really hard with issues such as reuse / recycle rather than landfill, and waste is the focus in the construction industry. The construction industry have voluntary schemes to reduce waste and it is a particularly big issue for them as they are charged for waste with particularly high penalties for hazardous waste. As trade customers account for about 40% of ICI business, this is an important areas to tackle. Information such as do you have accreditation, natural or renewable paint are being asked. Although ICI have a good level of corporate information this is not useful to the layman.

- **Where do you feel the pressures for tackling sustainability are coming from?**
From customers because they are facing legislation pressures. 'We are market leaders and need to be seen driving the agenda.'
- **How do you feel ICI Paint's sustainability performance compares to other companies in your sector?**
Doing better than ICI's best competitors. Also companies which make natural paint are doing well by playing to the emotions of customers and using buzz words. There needs to be a benchmark.
- **Where do you feel there's scope for improvement?**
Feel ICI does a lot of good things but it could be communicated better. Although sustainability issues don't always make good business sense it is increasing in importance. There is also a need for accreditation such as ISO14001 and BREEAM's eco-efficiency ratings.

Part 2 – Paint life-cycle

- **With which parts of the paint life-cycle are you most familiar?**
Marina has already carried out a project which looked into the environmental issues of the paint life-cycle. One of the big ones was TiO₂ and transport. She feels that fuel and mileage could be cut down, and people who work in ICI should be measured for how many miles they do driving to and from ICI. She feels there is a correlation between energy and cost savings.
- **What do you think the sustainability issues are in these parts?**
Concerning distribution and transport Marina feels there are packaging issues. The amount of wastage in trade is only 1% because trade will reuse paint efficiently particularly whites and magnolia. From a trade business angle, the most important issues are end-of-life.
- **Can you see any solutions to these sustainability issues?**
ICI are already advising traders on how to clean cans so they can be classed as non-hazardous. They are also trying to find ways of recycling metal, but there is currently no infrastructure for recycling plastic. The most important issues which need addressing are the end-of-life ones. A pilot scheme has been set up in some of stores where cans can be dropped off and at the same time buy new cans.
- **What questions would you like to ask concerning the sustainability of paint?**
'Is ICI going to voluntarily take action for waste or are we going to contract or lobby for other schemes to be set up.' ICI also has to look at paint formulations, e.g. cobalt and synthetic materials.

Part 3 – Implementing a 'Sustainability Snapshot' tool

- **How do you think a snapshot tool, which efficiently helps determine the sustainability of paint, would be useful?**
'It needs to be in a process, such as The Natural Step (TNS) to approach sustainability. How do you add value to a company and how do you communicate it?'
- **Where do you think a snapshot tool would be best placed (in the innovation process)?**
'Sustainability is much bigger than safety, health and the environment, and thought needs to go into in as soon as possible. We need to question why we still make solvent products which release VOC's. The tool needs to be placed in the intermediate steps between now and where ICI have to be in the future.'
- **Any other comments?**
No

Tuesday 2nd August 2005 – ICI Paints, Slough

Interview: Phil Taylor – *Paints Research Associate*

Part 1 – Introductory questions

- **How long have you been at ICI Paints?**
23 years
- **Could you briefly summarize what your position at ICI Paints involves now?**
Phil is a Paints Research Associate and his role is identification and delivery of innovative technology. He feels there is potential to implement sustainability into his role and recognises that it is an important parameter which should be taken forward as an important driver. He also feels there are pockets within the business which are facing questions on sustainability from customers. There has also been support from North America, UK, and Europe on this project.

Phil also mentioned that Marina Poza, UK Trade Business Commercial Manager, is working on a project to deliver a suite of products with a sustainable theme. Marina's boss, Steve Snaith, interacts with one of ICI Paint's trade partners, Carillion. Steve Snaith is also looking at the end of life issues of wet paint, i.e. paint that has just come out of the can rather than paint that has already dried onto the surface.

- **Where do you feel the pressures for tackling sustainability are coming from?**
ICI want to be ahead of the game, and maintain their position as world leaders. There is currently no legislation affecting them, although legislation on landfill could mean responsibility for disposal switches to the producer (or consumer). So, although there is no legal obligation, it makes good business sense to tackle sustainability issues in case they are hit. Customers also expect ICI to be at the forefront of environmental issues.

Asia and Latin America are not facing the same pressures concerning sustainability. ICI India, are interested in using cashew nut liquid, but more for the fact that it is plentiful and an indigenous crop than for its sustainability properties.

- **How do you feel ICI Paint's sustainability performance compares to other companies in your sector?**
ICI have 2 main European competitors; Axo Nobel and own brands such as Tesco. ICI Paints feel they are on a par with these companies, but don't know

what they are doing internally. (Phil is aware that Axo Nobel are pursuing research into raw material sourcing.) The natural paint market is expanding as people are attracted to the 'natural' element, but the quality is inferior compared to Dulux paint.

- **Where do you feel there's scope for improvement?**
By understanding the entire life-cycle of paint and looking at renewable resources and end-of-life issues. There needs to be something to help identify where the problem is.

Part 2 – Paint life-cycle

- **With which parts of the paint life-cycle are you most familiar?**
Raw materials, polymer synthesis and paint formulation.
- **What do you think the sustainability issues are in these parts?**
The issues are sourcing and choosing a raw material that maintains product quality. There also needs to be another driver other than sustainability, such as cost or the material offers another property.
- **Can you see any solutions to these sustainability issues?**
Sourcing raw materials is something that has been investigated, e.g. replacing oil with starch, but starch didn't offer the same product quality. The paint synthesis process hasn't been considered or studied in respect to sustainability.

Phil is starting to see suppliers coming to ICI Paints offering natural raw materials, such as Roquett which is a major starch company.

- **What questions would you like to ask concerning the sustainability of paint?**
Phil feels it is most important to obtain the whole picture which hasn't been done before. What will a sustainability tool look like for the paint life-cycle which is easy to use, is exciting enough for experts and generalists to engage with and provides information that can be communicated to customers.

Part 3 – Implementing a 'Sustainability Snapshot' tool

- **How do you think a snapshot tool, which efficiently helps determine the sustainability of paint, would be useful?**
It would be useful in identifying areas for focusing efforts and could identify new areas of research. Phil feels it is important to give sustainability consideration in every product.
- **Where do you think a snapshot tool would be best placed (in the innovation process)?**
He would like to see it used before work is sanctioned to begin and to set priorities for the research portfolio. Questions such as 'Is there a cheaper, better,

tougher, more sustainable paint?’ should be answered using the tool. Use of the tool should also be made before a product goes into the major development phase. He also feels the tool should be used after the product has been made and could be useful for giving customers evidence of sustainability.

- **Any other comments?**

The tool may need more precision or have the potential to build in different levels of output. It also has to have credibility and stand up against the outside world. It needs to be user friendly, perhaps a database.

Monday 8th August 2005 – phone interview

Interview: Ray Leggetter – *European Innovations Manager*

Part 1 – Introductory questions

- **How long have you been at ICI Paints?**
41 years
- **Could you briefly summarize what your position at ICI Paints involves now?**
Ray is a European Innovations Manager and his role is targeting long-term business needs in technology. He feels sustainability is a critical element which needs addressing in his line of work.
- **Where do you feel the pressures for tackling sustainability are coming from?**
He feels most of the pressure comes from ICI's retail customers (e.g. B & Q) and to a lesser extent from NGO's, legislation and public, and feels this pressure is likely to increase in the next five years. He feels younger employees coming into the business have a interest in ICI's sustainability performance. Also, ICI have a good record in addressing and mitigating risks to the business but could be more proactive in having a forward vision, taking leadership and being radical on sustainability issues.
- **How do you feel ICI Paint's sustainability performance compares to other companies in your sector?**
ICI are not the best in the world, but reside in the upper quartile of the competitor scale, Axo Nobel being one of the main competitors. Unfortunately ICI senior managers are not concerned about sustainability, instead they are more risk conscience.
- **Where do you feel there's scope for improvement?**
Prioritising the areas for improvement and focusing on the future. There are currently no suitable processes for saying which sustainability issues are important. Ray also feels that ICI could promote their sustainability achievements better.

Part 2 – Paint life-cycle

- **With which parts of the paint life-cycle are you most familiar?**
Ray is familiar with all stages of the life-cycle, although less so with packaging and distribution.

- **What do you think the sustainability issues are in these parts?**

Some of the issues include raw materials, particularly ICI's strong dependency on oil. During the use phase volatile organic compounds (VOC's) affect the air quality in the lower atmosphere, but it seems that when VOC's are reduced, oil dependency increases. Energy and waste from raw material processing and extraction (especially titanium dioxide, TiO₂). Also, very little paint packaging is recycled (currently only small amounts from trade). ICI has proved the packaging can be recycled, but still waiting for something to be done in this area.

Transportation is also another big issue because everything is centralized. (Raw materials from Cornwall are transported to Slough for manufacture. The product is then transported to a warehouse and then to a store from where it is brought by a customer and transported to the DIYer's home.) Ray feels this is a long term issue particularly with road charging and pollution penalties.

- **Can you see any solutions to these sustainability issues?**

Currently there is a project underway to find a substitute for oil. As for raw materials there are currently no projects to find a replacement and there also needs to be increased dialogue with suppliers to fully investigate how their practices measure up to sustainability standards. Ray feels that there are already decent procedures in place for informing customers about best practice during the use phase. End of life issues are being looked into particularly with the bigger customers. ICI are addressing end-of-life issues and are currently working with their larger trade organizations in implementing central collection schemes.

- **What questions would you like to ask concerning the sustainability of paint?**

What happens to, for example, windows and doors at the end of their life-cycle? Is a door less recyclable at the end of it's life after painting? Does paint inhibit the recycling of building materials?

Part 3 – Implementing a 'Sustainability Snapshot' tool

- **How do you think a snapshot tool, which efficiently helps determine the sustainability of paint, would be useful?**

There needs to be a tool, or a suite of tools with specific limitations which assesses current and future technologies overall benefits. There needs to be a tool and common methodology which identifies what is good and what is bad.

- **Where do you think a snapshot tool would be best placed (in the innovation process)?**

At the front-end of the process.

- **Any other comments?**

No

Tuesday 8th August 2005 – ICI Paints, Slough

Interview: Stephen Davis – *European R&D Manager*

Part 1 – Introductory questions

- **How long have you been at ICI Paints?**
25 years
- **Could you briefly summarize what your position at ICI Paints involves now?**
Stephen is a European R&D Manager for the technical paints function. Sustainability is not explicitly evident in his role but will be implicitly as it becomes increasingly important. Jerry has a personal interest in the latex project which is looking at oil substitutes for paint and is involved in product stewardship such as safety health and environment (SHE) information and policies driven by toxicology and health.
- **Where do you feel the pressures for tackling sustainability are coming from?**
Economics. Directly can economics help save or make money, and indirectly by helping ICI through FTSE4GOOD etc.

Political and social pressure. Responding to customer needs. There needs to be a way of satisfying both drivers.

- **How do you feel ICI Paint's sustainability performance compares to other companies in your sector?**
Competitors are all other paints companies such as Axo Nobel, Sigma Kaylon, Caporal, Ostendendorf – Germany, Dyrup – Danish, Tikkurla – Finnish, Beckers – Swedish. Natural paint companies don't have a sustainable argument but are good at marketing and using ambiguous words such as 'natural' and 'organic'. ICI are performing about the same as their competitors with similar policies.
- **Where do you feel there's scope for improvement?**
There are packaging opportunities. This would be the easiest place to start addressing sustainability with recycling, draining the paint from the can, optimizing space when transporting, better use to be made of re-useable containers. At the moment the 'bag in the box' concept is being used which reduces size in transport and manufacture costs.

There are also opportunities with paint formulation such as decreasing volatile organic compound (VOC) levels and reduce bio-persistent and toxicity concerns while maintaining durability and performance.

Part 2 – Paint life-cycle

- **With which parts of the paint life-cycle are you most familiar?**

The formulation (the design of paint), manufacture (implementation of design) and use phase.

- **What do you think the sustainability issues are in these parts?**

In America at the moment lead in old paint is a major issue. Waste issues are also illegally shifting to manufacturers. DIY customers seem unaware of the issues but large trade organizations such as Carillion are putting the responsibility back on to the manufacturer.

In the manufacturing process waste and energy are kept to minimum, e.g water to wash out vessels is used more than once. There is also a metric system which measures the wastage. There is the SHE policy and ICI's own targets. An issue for local residents has been smell from the manufacturing polymers so ICI make a point of not using smelly products, but on the whole the local community are happy with the ICI's activities.

In paint formulation it's important to get as much as possible from the resource. Everything has to be economically viable, for example there is no point in transporting a cheap material across the globe. All raw material extraction will have environmental impacts (TiO₂, petroleum, pigments, extenders). Suppliers are audited to the Responsible Care standards. The supply chain is global which acts as a back-up for ICI if a supply of raw material runs low in one part of the world they are able to use another. Scarce resources won't be used because it doesn't make economic sense.

- **Can you see any solutions to these sustainability issues?**
Discovering the building blocks which will provide inbuilt economic and sustainable advantage such as the right kind of packaging.
- **What questions would you like to ask concerning the sustainability of paint?**
No

Part 3 – Implementing a 'Sustainability Snapshot' tool

- **How do you think a snapshot tool, which efficiently helps determine the sustainability of paint, would be useful?**

Something that can give information on what will work better, will offer good communication. Things will change when people see the drivers, particularly those which impact or change individual behaviour.

- **Where do you think a snapshot tool would be best placed (in the innovation process)?**

It should be used at the beginning and end of the design process to understand it. The tool should help in finding opportunities.

- **Any other comments?**

A can of paint can contain about 15 – 20 different ingredients and will have very complex supply chains. Perhaps the tool will have a palette of ‘acceptable’ raw materials and some simplifying assumptions.

Some of ICI’s other sustainable endeavours include:

- Minimising waste and loss in production
- Delivery in bulk
- TiO₂ giving better value for money (2,000 tonnes saved between 2004 – 2005 by reformulating paint to use a synthetic version instead)
- Lower hazards with biocides
- Eliminating oestrogen mimics
- Community Repaint
- Paint with higher durability
- Renewable resins

Tuesday 8th August 2005 – ICI Paints, Slough

Interview: Sue Vel – Trade Market Data Manager

Part 1 – Introductory questions

- **How long have you been at ICI Paints?**
23 years
- **Could you briefly summarize what your position at ICI Paints involves now?**
Sue is a Trade Market Data Manager working closely with the marketing teams. She has a personal interest in environmental issues and has voluntarily taken on roles such as Community Repaint and is involved in any environmental elements of trade business, such as concepts for new products and services. She recently took part in a product focused workshop on the environment and has been involved in updating the trade and commercial website; www.duluxtrade.co.uk. She is also doing a part-time Bachelor degree in environmental studies.
- **Where do you feel the pressures for tackling sustainability are coming from?**
Most pressure is coming from EU Directives such as the VOC legislation and customer pressure is coming from the landfill directive angle. Although this pressure is felt, ICI also take the lead in shaping legislation.

Customers particularly from the trade side do look to ICI for help with waste issues and as a consequence ICI are feeling the responsibility will be passed onto them.

- **How do you feel ICI Paint's sustainability performance compares to other companies in your sector?**
The main competitors are Axo Nobel and Kalon both of which are UK based although have a strong presence in Europe, therefore are perhaps more EU driven rather than UK driven. Despite ICI's leadership within its own sector, Sue feels it falls behind with other industries such as the petrochemical industry who are really using sustainability as an opportunity and the Co-op group who really take account of social and environmental aspects.
- **Where do you feel there's scope for improvement?**
Communication and understanding the customer needs more. We currently don't know how much customers are willing to accept responsibility issues such as paint waste. She also feels there should be an environmental element in every role and it needs to be built into jobs across the board. There also needs to be more management commitment and enthusiasm.

Part 2 – Paint life-cycle

- **With which parts of the paint life-cycle are you most familiar?**
Mostly end-of-life.
- **What do you think the sustainability issues are in these parts?**
Raw material waste from TiO₂ extraction, such as the problems locally (with white running rivers), the amount of water used and landscape blight. Packaging and distribution which uses virgin materials and not recycle and waste from packaging. Sue saw the use phase as entirely positive.
- **Can you see any solutions to these sustainability issues?**
Packaging issues need to be resolved with marketing. For example, the messiness of the paint makes it difficult to recycle the can. The waste issues have been resolved through a scheme called Community Repaint (CR).

CR takes left over paint from local communities and gives it to charities, schools and low income families. The scheme is currently in operation in the UK and Ireland and is managed for a not-for-profit organization called SWOP (Safe Ways to Prosper). It is being funded by ICI and the Lottery and has grown from 10 centres to 70. Eventually the centres are to become financially independent by perhaps joining up with trade waste schemes or introducing a levy on each can of paint brought which goes towards CR. This is a good example of social and environmental practices working together. The scheme soaks up 300,000 litres of paint and benefits 7,500 projects annually. www.communityrepaint.org.uk

Other pilot schemes concerning packaging waste have been trialled in Watford and Stratford where vouchers or discounts are given on new purchases with every empty can brought back. John Wright is currently drawing up advisory guidelines for trade customers on how to clean a can of paint so that won't be classed as hazardous waste.

- **What questions would you like to ask concerning the sustainability of paint?**
What is the snapshot tool all about?

Part 3 – Implementing a 'Sustainability Snapshot' tool

- **How do you think a snapshot tool, which efficiently helps determine the sustainability of paint, would be useful?**
There is a need for sustainability to be more widely understood on a company level and this tool would help towards that. There are parts of the company such as marketing which don't have a clue about sustainability issues.

- **Where do you think a snapshot tool would be best placed (in the innovation process)?**

It should be placed at the front end of the innovation process although it may be difficult to answer some of the questions at that stage. Some products which don't go through stage gates, such as those which are just having minor alterations should also be passed through the 'snapshot tool'.

- **Any other comments?**

Generally sustainability is about the way company performs and a large part of that is about 'practicing what you preach'.