Development of the Best Practice Guidance on Optimising Human Behaviour for Small and Medium Sized Enterprises

for

The PRISM Project

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Management Summary

This report is one of the documents issued as part of the deliverables of the PRISM project. It is accompanied by application guides which detail best practice in training, procedures, task design and human - computer interaction, and training material in support of each of the application guides.

PRISM (or Process Industries Safety Management) is a three year research programme established by the European Commission with the aim of creating a network within which representatives from industry, academia, research centres and consultancies could co-operate to improve the flow of knowledge and practical experience in human factors and identify areas for improvement by collaborative effort. Several focus groups were established, each concentrating on a different area of safety management in the process industry, each producing best practice guides.

The second focus group (FG2) concentrates on optimising human performance. In attempting to find the current state of play of practice in this area, a robust approach was taken to collect information. This included a questionnaire survey, a review of current literature, a seminar meeting and internet seminar, and gathering input from all members of the focus group.

The results of the information gathering exercises are given in this report, and the best practice guidance is attached in four annexes. Further details are given in Section 1 of the report.

Glossary

CIPD	Chartered Institute of Personnel and Development
DNV	Det Norske Veritas
EPSC	European Process Safety Centre
EUA	End User Advisor
FG	Focus Group
HCI	Human Computer Interface
MMI	Man Machine Interface
OJT	On the Job Training
PRISM	PRocess Industries Safety Management
SME	Small to Medium Sized Enterprise
VDU	Visual Display Unit

Contents

Annexes

1. INTRODUCTION

1.1 PRISM

The Process Industries Safety Management (PRISM) thematic network on human factors was set up to create a forum within which representatives from industry, academia, research centres and consultancies could co-operate to improve the flow of knowledge and practical experience in human factors and identify areas for improvement by collaborative effort. The stated objective was formally presented as:

> "The improvement of safety in the European process industries through raising awareness of, and sharing experience in, the application of human factors approaches. In addition the network aims to stimulate the development and improvement of human factor approaches in order to address industry-relevant problems in batch and continuous process industries."

The network is co-ordinated by the European Process Safety Centre (EPSC) and the work has been split into four focus groups (FG):

- FG1: Cultural and organisational factors
- FG2: Optimising human performance
- FG3: Human factors in high demand situations
- FG4: Human factors as part of the engineering design process.

1.2 Focus Group 2

DNV are the principal contractors for FG2, with the role of co-ordinating the seminars and producing the reports. In this they are assisted by Chinoin Rt as end user advisors. The aim of the focus group is the development of a best-practice guidance document for each of the four key topic areas and also the production of training support materials. The key topics, within the area of optimising human performance are:

- Task design;
- Man machine interface (MMI) and human computer interaction (HCI);
- Procedures;
- Training.

1.3 Report Format

This document and its annexes form the main part of the written deliverables from DNV for PRISM. It was developed with support from the end-user advisor and using information gathered from focus group participants at the seminars and from the questionnaire sent to all PRISM members. The report has evolved during the lifetime of the PRISM programme as each element has been added. At time of first issue, the guidance on training and procedures were included. The remaining sections of the report are described below.

1.3.1 Section 2: Approach

This section states the approach taken, detailing the activities undertaken and the inputs received from other PRISM participants.

1.3.2 Section 3: Results

This section describes the information that was obtained from the questionnaire study, review of the literature and seminars

1.3.3 Section 4: References and Glossary

This is a list of documents referenced in this report, and a definition of acronyms used.

1.3.4 Annex A: Training

Application guide for training best practice

1.3.5 Annex B: Procedures

Application guide for best practice in development of procedures

1.3.6 Annex C: Task Design

Application guide for best practice in task design

1.3.7 Annex D: HCI / MMI

Application guide for best practice in interface and interaction design.

These annexes are the application guides for the four key topics covered by FG2.

2. APPROACH

2.1 Questionnaire Survey of SMEs

The initial step of the PRISM programme was to ascertain the current state of play regarding human factors in small & medium sized process enterprises in Europe. Within the scope of the FG2, a questionnaire was developed with the aim of identifying the degree to which human factors were considered in the design of training programmes, procedure design, control & interface design and task design. The questionnaire examined two factors: the range of application of human factors; and the depth of understanding of human factors issues within companies. The questionnaire was mailed to all members of the PRISM network and was made available through the PRISM website. It was also distributed to a selection of DNV Consulting clients who fell within the scope of this research.

The study was undertaken early in the PRISM project, and the response was limited. The analysis showed that the results were mixed; while many companies felt that the number and level of detail, of their procedures were appropriate, only about half involved operators in the creation or review process. The survey showed a wide range of training methods are used, and on the job training is the most common form in practice. Mostly, the trainers were assumed to be competent to train and systematic planning and control of training was weak. Very few companies had a methodical approach to human factors in the design of tasks or interface control systems and while most companies considered themselves to be aware of human factors issues (which is unsurprising, considering that most were members of the PRISM network), few employed qualified human factors staff or used the services of a human factors expert.

The results from the questionnaire are described in more detail in Section 3.1.

2.2 Literature Search

In order to establish current good practice, a detailed search was made of academic and process industry literature. Many publications were found which cover the four topics of the FG2, including:

- Procedure management
- Design of procedures
- Training systems
- Training methods
- Task design
- Job design
- HMI / MMI

The following sources of information were used for the literature review:

- Ergonomics Information Analysis Centre (University of Birmingham).

- HSELINE.
- British Library– various databases.

Internet searches also provided useful sources of good practice, an inexpensive option companies may want to try. The results of the literature search were used to inform the best practice guidance and are described in Section 3.2.

2.3 Contributions from PRISM members

During the course of the programme, many helpful comments, suggestions and contributions were received from members of the network. Some offered access to sites for study, some access to specific tools and research and others offered examples of good practice from their companies. These inputs were highly valued and used in the development of the best practice guides. Some of the information presented by members at the first seminar in Hungary has been presented in section 3.3

2.4 Focus Group Seminars

2.4.1 Good Practice Generation Seminar

The first of two seminars arranged as part of the focus group strategy, took place in Budapest in March 2002 and was hosted by Chinoin, our partners in FG2. The aim of the seminar was to promote discussion around the four core topics and to encourage members to share with each other their experience of good practice in their industry. Introductory presentations were given on each of the four topics, followed by an extended discussion period. Smaller breakout groups then discussed the issues defining and limiting good practice. Additionally, the proposed format of the application guides was discussed to ensure they would be most useful to small and medium sized enterprises.

2.4.2 Good Practice Dissemination Seminar

The second seminar took place in Athens, in September 2003, at the research campus of Demokritos, and was a forum for the sharing of human factors best practice in the control of major hazards. A secondary aim of the seminar was to showcase how the focus groups within PRISM interacted and also how PRISM as a whole interacts with other collaborative projects.

Throughout the seminars, dialogue was encouraged in both discussion groups and in plenary sessions. The discussions were recorded on flip charts and have been used as inputs into the best practice guidance. The notes from the group discussions have been included in section 3.3 of this report.

2.5 Internet Seminars

The presentations from the seminars were put on the PRISM website for review and for exposure to a wider range of members. A discussion area was added and was made active for a two week period, allowing members to comment on the papers and ask questions of the authors.

The presentations from the seminars are included at Appendix II of this report.

2.6 Deliverables

Aside from organising the "live" and internet seminars, DNV was tasked to deliver documentation to support the four subject areas of Focus Group 2. These were to include a report, an application guide and training material.

2.6.1 Report

The report (this document) describes the activities that were conducted in order to gather the materials and information used for the development of the application guides. As well as a description of the events, material collected during these has been included. This contains results from the literature search and outputs from the seminars.

2.6.2 Application guides

Four application guides have been developed. These cover training, procedures, task design and HCI / MMI and are attached as annexes to this report. The guides contain the information drawn from the data gathering exercises, distilled into concise best practice guides, aimed at small to medium sized enterprises.

2.6.3 Training material

The best practice guides are supported by training material produced in PowerPoint format. These are located on the PRISM website, along with electronic versions of the best practice guides.

3. RESULTS

3.1 Questionnaire Results

3.1.1 Procedures

Mostly, respondents reported that their organisations had what they felt was the right number of procedures, which broadly represented the easiest way of performing the tasks. These were generally felt to be in sufficient detail and were easy to understand. About half the respondents reported that operators were involved in writing the procedures while another third involved operators in reviewing procedures.

	Too low	Ideal	Too high	No response
No. of procedures	1	11		1
Level of detail		10	2	1

	Yes	No	No response
Easy to understand	10	2	1
Easiest safest way	10	2	1

	None	At review	When writing
Operator involvement	2	4	7

3.1.2 Training

Most respondents used a formal process for recording training and offered refresher training when needed. Many measured the effects of the training; however few set training objectives in advance. Evidence that a good mix of training methods were used was shown, with most companies using more than one method. The most commonly used training methods were classroom and on-the-job training (OJT). While most respondents systematically planned OJT training, allowed time for training and kept records of the activities, only half gave training to the employees who would be responsible for training others, exposing themselves to the risk that OJT training might be ineffective.

	Yes	No	No response
Formal process	9	2	2
Refresher training	10	3	

	Set ahead	Recorded	No
Systematic objectives	4	7	2

	Classroom	CBT	OJT	External	Other
Training forms used	10	6	13	12	1
Most common	4	1	5	2	1

OJT:	Yes	No	No response
Systematic planning?	11	2	
Trainers trained?	7	6	
Time allowed?	11	2	
Training recorded?	9	4	

3.1.3 Task design

Most respondents reported having good practice for task design issues, although only half attempted to optimise activity levels to avoid boredom as well as overwork.

	Yes	No	No response
Operators choice of action is clear	9	3	1
Given help when workload is high	12	1	
Activity level is optimised	6	6	1
Allocation of roles is clear	10	2	1
Operator has personal responsibility	11		2
Incidents are followed up	11	1	1

3.1.4 HCI / MMI

Contrary to a suggestion that this section would cause everyone to tick in all the "yes" boxes, only about half the responses were positive. Most reported that operators were supplied with all necessary controls and that information was easy to obtain. However, very few considered human factors issues in the design of their control systems.

	Yes	No	No response
Operators supplied with necessary controls	11	1	1
Free from distractions	7	3	3
Information easy to obtain	10	1	2
Information memorising not required	6	5	2
Failures are easy to identify	5	3	5
Operators gain feedback from actions	6	2	5
Changes easy to interpret	8		5
Layout conveys consistent information	8		4
Human factors was considered in the design	2	8	3

3.2 Literature Search Results

The main input from the literature has been used in the development of the best practice guides and comment from some papers has been included in this section. Many publications were found which cover the four topics of the FG2. However, the academic literature revealed little current good practice and the bulk of the references ultimately used in the development of the application guides came from auditing tools e.g. ISRS (DNV, 1994), management guides e.g. Heller, 2002, Bird & Germain 1996, and established methodologies such as Training Needs Analysis. Key examples of the standards used are given below:

ISO 10015:1999 "Quality management – Guidelines for training" has the following definitions:

- ***Competence*** – application of knowledge, skills, and behaviours in performance.
- ***Training*** – process to provide and develop knowledge, skills and behaviours to meet requirements.

It states that the organisation should define the competence needed for each task that affects the quality of products, assess the competence of the personnel to perform the task, and develop plans to close any competence gaps that may exist. The definition of competence should be based on an analysis of present and expected need of the organisation compared with the existing competence of its personnel.

ISO 11064 "Ergonomic design of control centres" states that the objective of a human centred approach to design is to design adequate working conditions with regard to human safety, health & wellbeing, whilst taking into account technological and economic efficiency. By integrating ergonomics into the design management process, ergonomic issues and principles can be taken into account in the planning, design, implementation and functional audit of a control centre,

ISO 9241 "Ergonomic requirements for office work with visual display" deals with both the hardware and software aspects of an ergonomic approach to the use of and interaction with computer systems. It provides specific recommendations on hardware and input device requirements, how information should be displayed, how operators should navigate and manipulate an interface and how they should be supported in this through provision of guidance, help and a suitable environment.

3.3 Input from FG Members

Members of the focus group have made various contributions and helpful suggestions during the course of this programme. The following sections contain input that was made by participants at the seminars. These points have all been used as valuable inputs to the best practice guides, along with contributions received from DNV offices throughout Europe.

3.3.1 Joel Quintart, Solvay

Question: Why are procedures not correctly respected?

a) Accuracy :
- Procedures are sometimes not correct or are not updated

b) Practicality :
- They make the work more complicated
- They are too restrictive
- They do not allow to do the work in the time allocated

c) Optimisation :
- They do not describe the best way to do the job

d) Presentation :
- They are too complex or not easily understandable
- They are not correctly structured: "you can not find what you need"

e) Accessibility :
- The correct procedure is not easily available (structure of the documentation system difficult to understand)
- Operators think that there is no procedure that describes the action they have to perform

f) Politics :
- The operators do not understand why they should use these procedures
- There is no clear politics requiring the compliance with procedures

g) Uses:
- Operators suppose that they know everything included in the procedure
- Operators do not appreciate it when somebody tells them how to do their work
- Operators prefer to rely on their own judgement and competencies.

Question: What should we do to get the workforce to respect procedures?

a) Procedures should be written
- In language that is clear and understandable to the operator
- Complete and in a concise form
- In a well adapted format

b) Operators should be involved in the writing of the procedures to allow them to take ownership
c) Procedures should be kept up to date when the work methodology or when installations have changed
d) Training of operators should incorporate the use of procedures as a tool
e) Working groups should be set up to discuss about work methodology related to procedures and should integrate the suggestions of the workers
f) Procedures should be made available (files or network).

3.3.2 Hans-Juergen Labudde, Dupont

3.3.2.1 Training and Performance

Principle
Properly trained and performing personnel are a requirement for keeping process equipment and machinery operating safely. Employees must also be physically able,

mentally alert, and capable of using good judgment to properly follow prescribed practices.

All other elements can be in place - but without properly trained and performing personnel, the chances of safe process operation are greatly diminished.

Features

- Initial training:
  Employees should be trained in an overview of the process and in specific safety and health hazards, procedures (including emergency operation and shutdown) and safe practices before working in a process
- Refresher training:
  To be provided at an appropriate frequency, not to exceed three years
- Training program includes
  - Adequate budget forecast
  - Qualified instructors
  - Adequate personnel to conduct and receive training
  - Basic knowledge and skills, task-specific skills, regulatory requirements
  - Classroom training, field training, and skill demonstration
  - Qualification testing
  - Records of training
- Performance of personnel
  Site program established to enable site employees to recognize and deal with cases of "diminished capacity" to perform jobs safely
- Training & Performance Audit.

3.3.2.2 Plant training management

Overview

- All jobs in the plant have been assigned a description including safety requirements.
- An employee is considered under training whilst he/she has not passed all curriculum requirements.
- Cross training is initiated when a tutor is assigned, who will be responsible for the curriculum tracking.
- The training completion is approved by the training attendant, the tutor and the function leader.

Assumptions for the training plan

- Analysis of the actual plant capacity
- Cover the plant needs as well as the individual development plans
- Perform a tracking, that is, a series of checks such as:
  - planned training was provided at expected date
  - the training was attended by all expected people.
  - the trainer was adequate or better
  - the course objective has been met
- Logging of the training information (TRAQS)

- Use metrics to show the development and distribution of the time spent training.

Annual training plan management

- It will be managed by a training team
- This team will consist of a training co-ordinator, a training auditor, a shift team leader, a shift and a day leader
- The team will have weekly meetings
- They will be responsible for deciding which training is included into the annual training plan
- Any training given in the plant must be recorded in this annual training plan.

Assumptions in NOMEX®

- An analysis of the training capacity of the plant shows a value of 8% from the journal timetable
- This is equivalent to 17.6 days per person
- Maximum number of training hours to schedule: 25 344 hrs.

Approval criteria

- Training priorities will be defined on an annual basis and the plant training needs will be managed as a function of the needs found in the plant (leadership)
- All training courses requested will be validated by the training team using these criteria
- The request sheet will be accessible for all people on the intranet.

Training course request

Any training must include the following information:

- Who is the requester
- Who will provide the training
- Adequate numbers of people to receive the training
- Duration and date
- Cost and payment way
- Where the training will be provided
- Course objective
- When and who will evaluate that objective achievement
- Who authorizes this training
- Criticality of the training which is being requested.

Giving priority to the requested training courses

1) Essential training to cover a function of first or second assignment
2) Essential training to meet a plant variable
3) Training focused to extend the plant management
4) Training focused to meet personal development plans
5) Training does not impact on other people or scheduled training courses

Training classification

The training team checks the classification of all given training courses. The groups are as follows:

- critical training (included in COT of the current year)
- non critical training (to do if there is capacity)
- training which will not be planned (rejected)

Training plan

- The plan will be divided in two periods in order to exclude holidays:
  - January to June
  - October to December
- All training performed will be logged by the shift training leader or day function leader.

3.4 Seminar Breakout Sessions

The following sections contain the information gathered from the breakout sessions held at the first seminar, in Budapest. The first section contains points that came out of the sessions on training and the second section from the sessions on procedures. Any repeated ideas are because more than one discussion group raised the issue. This can be seen as showing the relevance of those issues to the subjects.

3.4.1 Training

- Simulator training was thought to be vital for training, especially for emergencies.
- Maintenance of skills and competence was a high priority issue.
- Table-top simulations / walk-throughs were viewed to be equally as effective as simulator training in most cases and are significantly cheaper.
- There was interest in the cost benefit of training. What amount of training input has the optimal performance benefit?
- Refresher training was another big issue. Training formats and frequency of fresher training were discussed but no best practice was established.
- An example of multi-skilling and job rotation for crisis management scenario training was discussed. Key roles are taken on a "first come, first served" basis until all the positions within the crisis management team are filled. This ensures that whoever arrives first will take charge of the situation. The industry representative reported that the trials had been highly effective so far and that this approach helped to avoid issues of authority and hierarchy and produced a faster response. As all members of staff must be familiar with all the required roles, there is no longer a problem covering for absent or injured personnel in emergency situations. Although this approach is only employed for scenarios at the moment, it may be employed for real life situations in the future.

- The training style must be suitable for task and also suitable for personnel.
- Competence assurance was another hot topic. How do you define competence? How do you ensure that staff meet this standard and maintain their competence?
- **Competence** was defined as "*potential based on knowledge / skill (capability)"*

- **Competency** was defined as "*behaviour: how knowledge is used*." This can be assured through observation, gathering evidence and feedback on work completed and independent observations.
- The need to "train the trainer" was recognised as having a huge impact on training success. Not everyone who can perform the job necessarily has the aptitude to train others on that task. It is vital to train them on how to pass on the required information. This also helps to standardise the training given and to specify the scope and objectives of the training sessions. Training, as with plant operation, needs to be properly trained.
- One delegate reported that they have simulators available on their plant for regular training opportunities and emergency scenario training (abnormal conditions).
- There was a need to distinguish between training for normal conditions vs. abnormal working. The training needs are very different. More information was required on training formats and schedules for each type.
- Learning styles are often not considered. Different people learn in different ways and this is often not taken into account when formulating training programmes.
- On the job training (OJT) was though to be an effective way to train the workforce. However, a pre-defined programme with structured objectives and an objective form of assessment must be in place. Scheduling of OJT must not interfere with normal operations and staffing levels. This was highlighted as a problem when shift patterns are in place. Staff are reluctant to come in for training on their rest days and training either before or after a shift is likely to effect on the job performance and the effectiveness of the training itself.
- Literacy is another issue that is often ignored. A basic level is often assumed. Support must be provided for those who experience literacy difficulties. Without this, skill and competence training will not be effective and potential problems in understanding procedures, etc will not be identified.

3.4.2 Procedures

- Maintenance procedures - procedures must exist for maintenance tasks as well as for operational tasks.
- Contingency procedures for abnormal situations need to be considered at least as important as event-based procedures.
- Procedure management will ensure that procedures are logically arranged so that operators and maintainers can identify the correct procedure for the task.
- Document management is important, to ensure that operators are all using the same version of the procedures and that no out of date procedures are being followed.

- Management of procedures will ensure that procedures are logically arranged so that operators and maintainers can identify the correct procedure for the task
- Regular review / audit of procedures is vital.
- It is useful to nominate an owner & specify a review period for each procedure.
- Version monitoring on procedure update: companies must ensure that all copies of a procedure are up to date.

- Workforce input is vital when developing and managing procedures.
- *"Show me and I'll see; tell me and I'll hear; involve me and I'll understand"*
- Level of involvement should be appropriate to the level of risk and complexity. The procedures should be explained to the people who have to use them. They should be reviewed by those who do the job to ensure they are accurate. Once issued they should be reviewed regularly and updated where necessary.
- Systematic mapping of the necessary involvement in procedures is required - identify stakeholders, mapping verification, stakeholder sign-off, etc
- Don't underestimate the talent of workers to contribute.

- Compliance with procedures as a key performance indicator can be a useful feed into a procedure management system.

Figure 3-1 was produced as a route map to producing effective procedures

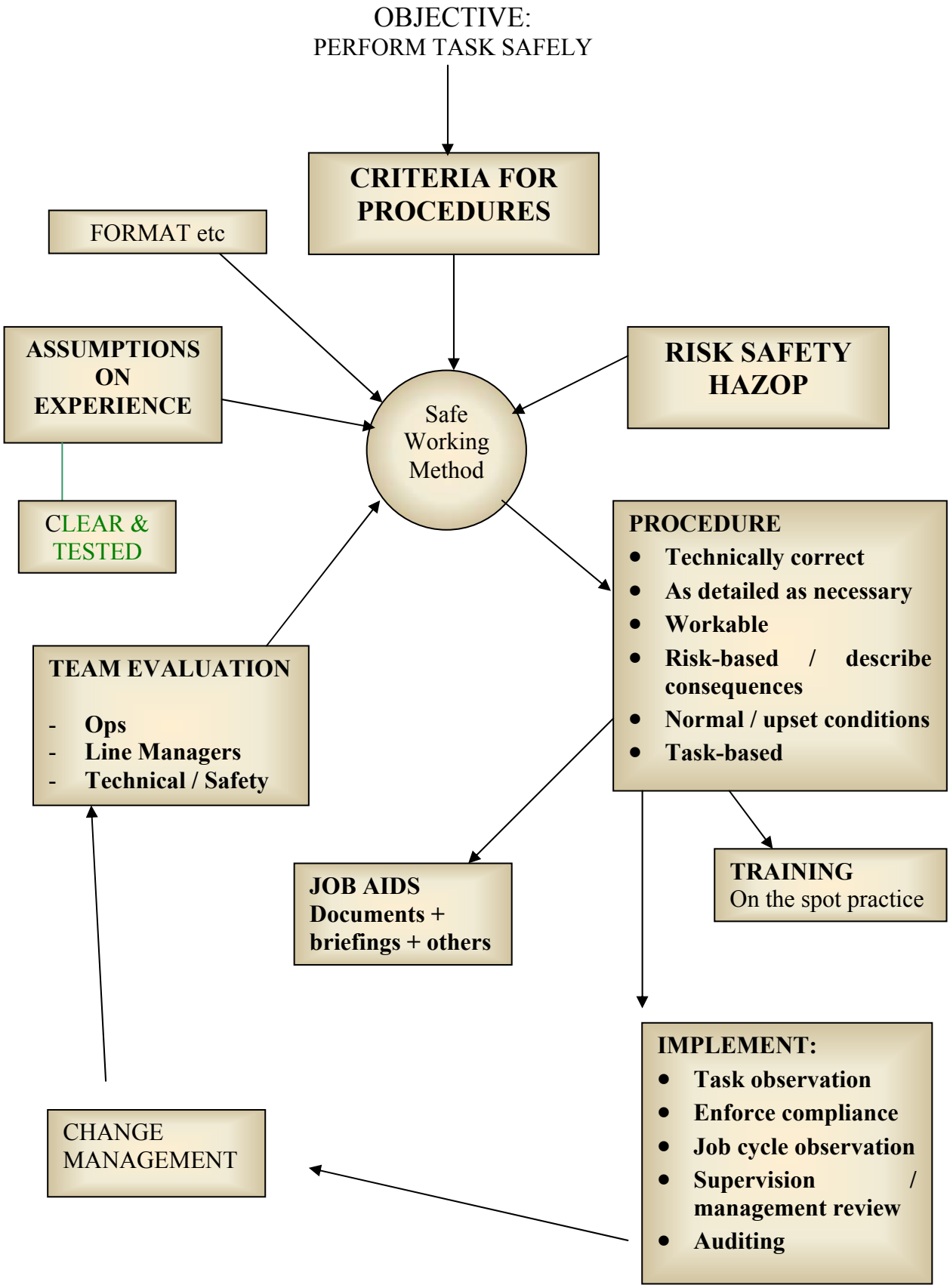

Figure 3-1: Route map for procedure production

3.4.3 Task Design

- This was thought to be the domain of experts. Industry-based delegates would not attempt to tackle this issue without the help of a consultant.
- The topic was thought to be "academic" rather than practical.
- The topic of "task design" was viewed as a catch-all title to cover all the issues that may not sit comfortably within the scope of the other topics being discussed,
- Allocation of function was seen as a major issue in task design.

Elements related to task design:
- Safety system
- Mental workload
- Task requirements

Post-design issues:
- Work environment
- Physical workload
- Work patterns
- Operators
- Design experts
- Skill transfer
- Communication – accurate, timely
- "Failsafe" humans
- Selection criteria

- In some countries, task analysis is required by law and issues relating to task design will surface during this analysis. The issues are then prioritised according to their criticality.
- Noise assessments and lighting assessments are also required.
- PPE requirements should be considered
- Work patterns were viewed to be important. In the EU, shift work is generally organised in an eight hours backward rotating pattern.

3.4.4 HCI / MMI

- Related to task design
- Implications of automation
- Guidelines for reducing human error in process safety (CCPS)

- Alarm handling – timing, acknowledgement, prioritisation
- Information handling in general was highlighted as one of the major issues with respect to MMI
- Nuisance alarms were identified and dealt with by systematically screening the alarm system and by encouraging operator feedback. One delegate reported that previously they had 15,000 alarms per month.

- Audible alarms – there were mixed experiences of how to differentiate between alarm types and different priorities. It was reported that more guidance would be useful on this subject. How many different audible alarms can be used before operator workload is increased? What is the optimal number of audible alarms?
- There were mixed opinions about distractions in the control room. Eating, drinking, radio, etc were thought to have a negative impact on operator performance. However, others reported that such activities helped to avoid boredom and kept the operators alert.
- Delegates reported that they had difficulty specifying their system requirements to the software designers. There were concerns that can lead to problems during implementation and operation that can be difficult to rectify.
- There were also concerns regarding system flexibility. Too much flexibility was thought to be as troublesome as insufficient flexibility. It was felt that often the flexibility provided is not even helpful and therefore causes more problems rather than helping to solve them.
- Delegates reported that it was useful to rotate job roles within the control room. This helped the operators to maintain familiarity with different areas of the plant and their skill level. This was especially true for emergency handling scenarios.

- Too much information exists to be able to find anything useful.
- Not enough information exists that concisely states how to improve interfaces.
- A series of short guides, e.g. alarm handling, information display, user specification, would be very useful for SMEs.

4. CONCLUSION

4.1 Where "Good" is better than "Best"

An early question that arose was "what is best practice, who decides it is best and how can it be defined?" Some larger companies have well-developed human factors programmes which cover the design of procedures, training, system and task design, which may be considered to be best practice, and while they may indeed be best in their setting, this will not necessarily hold true across other organisations. Best practice suggests an absolute; so much of what is conducted in the process industries may not be best in comparison with another setting. Therefore, it was decided that the appropriate term should be good practice. This allows for differences in culture between companies of different sizes and structure, whilst acknowledging that often, different approaches to human factors issues can produce solutions that optimise human performance. This paper has therefore outlined key elements of good practice to assist in optimising human performance in the process sector.

4.2 Managing good practice

The PRISM programme has taken three years to reach this point. Some tools and techniques mentioned in the application guides had not been published when the process was started and others are still being produced and published at industry events. The application guides provide examples of good practice for the optimisation of human performance according to currently available knowledge. The value of the project has been in providing a network for discussion of good practice, and in providing concise guidance in key areas of optimising human performance for the process industry. Good practice will continue to evolve in this and other areas of the PRISM project: the network it has created will help to ensure that it also continues to be shared.

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ISO 10015:1999 Quality management -- Guidelines for training

APPENDIX I Questionnaire

IS YOUR HUMAN PERFORMANCE OPTIMISED?

A QUESTIONNAIRE FOR SMALL & MEDIUM SIZED ENTERPRISES

Prepared by
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Exchange Street
Stockport,
SK3 0ET

MANAGING RISK

A. Company details

1. Name of company _____

2. Country _____

3. Number of employees ***(please tick)***

- ❑ <10
- ❑ 11-50
- ❑ 51-100
- ❑ 101-250

4. Ratio of management to workforce split:

____% / ____%

5. Nature of business? *(please tick)*

- ❑ Chemical
- ❑ Chemical engineering
- ❑ Pharmaceutical
- ❑ Food & drink
- ❑ Manufacturing
- ❑ Packaging
- ❑ Agricultural
- ❑ Other: _____

6. Do you use a formal process for considering human factors in the workplace?

Y / N

7. If "yes", what is your source of evaluation? *(please tick)*

- ❑ In-house HF expert
- ❑ External consultancy
- ❑ Advice from HSE

8. How would you rate your business' understanding of human factors issues? *(please tick)*

- ❑ Excellent
- ❑ OK
- ❑ Average
- ❑ Poor
- ❑ Non existent

B. Procedures

1. Is the number of procedures used in your company *(please tick)***:**

- ❑ Too low
- ❑ About right
- ❑ Too high

2. Do the procedures represent the easiest, safest way to perform a task? Y / N

3. Are procedures written in sufficient detail? ***(please tick)***

- ❑ Too little
- ❑ About right
- ❑ Too much

4. Are procedures easy to understand and follow? Y / N

5. Are operators involved in production of procedures? *(please tick)*

- ❑ Not at all
- ❑ At review stage
- ❑ At writing stage

C. Training

1. Is a formal process used to identify training needs? Y / N

2. Is training carried out in a systematic way, with objectives *(please tick)***:**

- ❑ being set prior to training?
- ❑ being measured following training?

3. Is refresher training given at appropriate intervals? Y / N

4. Which forms of training are used *(please tick)***:**

- ❑ Classroom
- ❑ Computer based training

- On the job training
- External courses
- Other

5. Which of the above is the most common form of training used? _____

6. If on the job training is used,

i) is the training systematically planned? **Y / N**
ii) are the trainers trained to train? **Y / N**
iii) is sufficient time allowed for the training **Y / N**
iv) is the training recorded and assessed? **Y / N**

D. Task design

1. Is the operator's choice of behaviour clear and unambiguous? **Y / N**

2. Is the operator given help when faced with high workload? **Y / N**

3. Is the operator's activity level kept at an optimum (avoiding boredom and stress)? **Y / N**

4. Is the allocation of roles and responsibilities clear within teams? **Y / N**

5. Does the work done by operators give them a feeling of personal responsibility? **Y / N**

6. Is there a clear mechanism for following up incidents? **Y / N**

E. HCI / MMI

1. Is the operator supplied with all the displays and controls needed? **Y / N**

2. Is the operator free from distraction from unnecessary controls and displays? **Y / N**

3. Is information easy to obtain and identify? **Y / N**

4. Are VDU displays arranged to avoid the need of operators to remember information from one screen to another? **Y / N**

5. Is it easy to tell if an instrument rather than a plant has failed? **Y / N**

6. Are operators provided with feedback about the affects of their actions? **Y / N**

7. Are changes in instrument readings easy for an operator to interpret? **Y / N**

8. Does the layout of instruments convey consistent information? **Y / N**

9. Is a human factors expert involved in the design of the system? **Y / N**