

MULTISKILLING: IMPLICATIONS FOR SAFE OPERATIONS

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Recent research funded by the Health and Safety Executive has produced a characterisation of “good practice” in the introduction of multi-skilling. The work was commissioned following the fire and explosion at the Texaco Refinery, where concerns were raised about the impact of multiskilling on the adequacy of the emergency response in the control room. The study included a review of published audits and of the causes of major accidents to identify the impact of multiskilling. The study reports on six case studies from high risk industry, including a rail control centre, nuclear power generation and chemical manufacture. A life cycle model was developed which provides practical advice to all those involved in the conception, planning and assessment, implementation and audit of multiskilling, and the ongoing skills maintenance and review. This paper covers research based on six industrial case studies, and describes the subsequent findings that will assist companies during the implementation of multiskilling. The practical guidelines and life cycle model provide a sound basis to aid companies undergoing these types of changes in terms of planning and implementing.

Multiskilling, organisational change, life cycle model.

INTRODUCTION

Multiskilling is part of a raft of changes that organisations may introduce with the aim of improving efficiency and competitiveness, reducing costs, improving quality, increasing production and so on. Research was commissioned by the Hazardous Installations Directorate of the Health and Safety Executive to:

- find evidence of the safety impacts of multiskilling;
- review previous accidents and incidents, as well as high profile audit reports to identify the role of multiskilling;
- give examples of how the health and safety aspects of multiskilling are managed in a number of case studies;
- develop management and implementation guidelines on empirical research;
- identify improvements to current HSE guidance.

This research on which this paper is based, will be published as a Contract Research Report by the HSE in Spring 2001.

DEFINITIONS OF MULTISKILLING

The Oil Industry Advisory Committee (HSC, 1998) define multiskilling as ‘a way of working where the traditional divisions between work areas and separate disciplines are removed, and individuals are given responsibility for a range of different types of task.’ Fundamentally we consider multiskilling as:

- increasing the range and scope of people’s skills and competencies, and
- enabling and allowing them to carry out tasks previously or traditionally carried out by another function.

Organisations typically multiskill with the intent of removing functional barriers and increasing the flexibility of the workforce. Multiskilling can be either:

- Vertical multiskilling– where supervisory support tasks are learned by individuals;
- Horizontal multiskilling – where skills from another discipline are learned;
- Depth multiskilling – where more complex, specific skills within a trade are acquired.

Some organisations multiskill to ensure that incident management is adequate and appropriate. In these situations individuals are equipped with the skills, knowledge and expertise to competently handle an abnormal or emergency situation. This type of multiskilling is used in incident management scenarios, where it is imperative that there are appropriate skills to manage an incident or event at all times. This means that there must be flexibility within the team to ensure competent cover for lunch and other breaks, as well as for training and holidays. For incident management multiskilling can involve all forms of multiskilling.

ACCIDENTS & HSE AUDIT REPORTS – LESSONS FOR MULTISKILLING

A sample of major accident reports and public domain HSE Audit Reports were reviewed to identify if and how multiskilling contributed. The following accidents were reviewed where multiskilling had a role in the causation:

- Southall Rail Accident
- Fire at the Texaco Refinery
- Collision of mv Sand Kite with the Thames Flood Barrier
- Hickson and Welsh fire and explosion.

The review of these accidents indicates that the introduction of multiskilling has been associated with a number of serious safety problems. These problems relate to:

- workload problems arising from the reduction in staffing ‘made possible’ by multiskilling;
- the loss of coordination, error checking and supervision arising from deficient teamwork within multiskilled ‘leaderless’ teams;
- failure to support the introduction of multiskilling through appropriate staff training and performance monitoring.

Thus the problems arose from either the way in which multiskilling was implemented or by changes made possible by multiskilling, rather than by individuals committing errors in tasks previously carried out by other trades and disciplines.

HSE published audit reports on BNFL (2000) and British Energy (1999) and these provide insights into the impacts of multiskilling and the importance of the management process. The main concerns about BNFL were:

- the possibility of supervisory problems arising from vertical multiskilling;
- resource problems arising from staff reductions made possible by multiskilling;
- inadequate planning and assessment;
- a failure to support multiskilling through training etc.

The British Energy audit does take the point further by relating these types of problems to the integration of safety management into corporate decision-making, i.e. ensuring that corporate business plans make proper allowance for staffing and workload considerations.

The outcome of this review of accidents and audit reports suggests that the introduction of multiskilling per se does not create a risk. Rather it is the manner in which multiskilling is implemented.

POTENTIAL IMPACTS OF MULTISKILLING ON HEALTH AND SAFETY

Potential health and safety impacts of multiskilling from previous research, along with past incidents and audit reports include:

- the job scope exceeding the credible ability of an individual to learn and carry out tasks – leading to error and omission;
- failure to retrain staff adequately means they lack competence;
- overloaded staff can not manage workload so make errors and violations or omit tasks, especially during periods of high workload, emergent work and staff absence;
- vertical multiskilling in crisis management situations can lead to a loss of independent oversight.
- no one stands back to have an overview of an event during emergencies, which could lead to mindset and groupthink;
- insufficient exposure to a task to maintain adequate skills leads to error, lack of competent staff, and overload of those individuals who have maintained their skills.

CASE STUDIES: GOOD PRACTICE IN MULTISKILLING

The aim of the case studies was to identify how contemporary organisations have implemented multiskilling. Six case studies were carried out from the following industrial sectors:

- Nuclear;
- Major hazard/ chemical;
- Manufacturing;
- Rail.

Three case studies are described here in the form of examples of good practice.

RAIL COMPANY

This case study examined the control centre responsible for the control and monitoring of all rail operations on its network. Its role is to control and monitor all activities under normal, abnormal and emergency operating conditions. There are six posts in the Control Centre. Multiskilling was introduced as a means of providing cover within the team for lunch and other breaks on shift, without having too many under-utilised staff in the team. A number of changes have been introduced as a result of a recent incident and its subsequent investigation. For multiskilling, this company uses the same processes of selection and training as those used initially to equip personnel with their primary skills. For example, those personnel recruited for higher ability posts with stringent selection criteria can be multiskilled in any task, whilst personnel in other posts will only be multiskilled in less complex tasks. The training provided is the same as that for originally learning the roles. Management formally assess an individual's competence by means of practically demonstrating the skills. Refresher courses are run, and all posts are re-certified every 3 years by means of an exam and practical assessment.

Their key safety concern is the competence of staff and handovers between posts on shift. Competence is assured by providing identical levels of training for the additional skill

and identical competency criteria, as for the single skill. Rigorous training, refreshers and re-certification are the chief mechanisms to achieve this, with competence being assured through on and off-the-job testing and demonstration of both skills and knowledge. As the multiskilled person provides cover for the team, crucial to the continued safety of the concession is the quality of this handover. This is recognised and a formal mechanism is used to ensure that handovers are properly carried out. During the survey the importance of handovers and the critical role of the log to document all issues was emphasised.

CHEMICAL PLANT CONTROL OPERATION

This case study studied multiskilling at a company that operates a main production site, and a number of unstaffed satellite sites. The company employs 80 people. In light of their high profile customers, continuity of supply and high quality products are their primary objectives. The majority of their staff are multiskilled, and the central control room on site monitors the process both on the main site and on the satellites.

The company originally started multiskilling about 20 years ago with the aim being to equip engineers with sufficient all-round skills to be able to address most of the issues arising at the satellite sites. Out of normal hours a single engineer is responsible for all on-site needs. Hence they need to be multiskilled to identify early indications from the control room, diagnose the problem, locate the problem and tackle it (either remotely or on site). The role of engineers has gradually evolved with the role being predominantly control room based with on-site activities being coordinated and carried out by multiskilled control room staff. Multiskilling is being pushed forward now within the main site to improve organisational efficiency and responsiveness, in part this is linked to the increase in organisational demands and a recruitment ban.

A matrix has been developed for all posts and roles on site. This is based on a task analysis of the different activities and the training and knowledge requirements to carry out these. All staff have a Training Needs Schedule where they are reviewed against the matrices relevant to their role every 12-18 months. This provides an opportunity for the management and workforce to identify training needs and skill gaps, as well as competence. The schedule lists the skills and knowledge required for each job and its constituent tasks. Training is typically on the job and supported by a log book, documenting practical experience. Competency decisions are made by management against a schedule and discussions held with the trainee about their confidence in their skills and abilities, as well as competence at executing them.

This company ensures that risk assessments are carried out for all activities, and through this ensures that only competent individuals carry out certain activities. Particular emphasis is placed on individuals understanding their personal competence limits, and they are encouraged to stand back and think about a job before undertaking it.

NUCLEAR POWER GENERATION

This case study examined multiskilling at a UK nuclear power station. Nuclear power generation is highly regulated in the UK and their activities are closely monitored and scrutinised by the Nuclear Installations Inspectorate. The multiskilling initiative was commenced in 1997.

The site employs approximately 800 people, and most staff are multiskilled to carry out radiological self monitoring. Furthermore most staff are cross-trained to carry out other tasks. The purpose of multiskilling was to:

- Streamline operational tasks; and
- Reduce the headcount.

The site recognised the importance of workforce ownership and involvement in nuclear power generation, to achieve this they:

- Ran a suggestion scheme to identify appropriate tasks
- The whole process was coordinated by a steering group who reviewed the appropriateness of multiskilling certain tasks;
- Negotiated with the trade unions and provided a monetary carrot to aid workforce buy-in.

Three distinct maintenance disciplines are maintained and follow the 80/20 rule to avoid the loss of core skills. The principle adopted is that only those jobs where less than 20% of the task is carried out by another discipline will be multiskilled. Training is thorough; an exam has to be passed following completion of formal training. Competency is then assessed following several weeks on the job, and involves observation and a decision is made jointly between the individual and their manager. The organisation has monitored the radiological cleanliness and contamination reports to ensure that health and safety has not suffered as a result of multiskilling.

MULTISKILLING LIFE CYCLE MODEL

Many of the issues which emerged from the case studies and the review of audit reports and major accidents, were linked to reduction in headcount, staff not being competent to carry out their requisite activities, an organisational culture which supported risk taking, and potentially 'macho' and 'can do' cultures. A life cycle is described which was developed based on information from the case studies, a review of accidents and audits, as well as published material to describe the features that need to be considered at each stage of the multiskilling life cycle. Due to the findings from the accident review and the case studies the life cycle model places particular emphasis on management of change, training and competence assurance. See Figure 1 for a representation of the life cycle model.

STARTING OUT

This is the point in time when the prospect of organisational change has just been recognised and the form of such changes is being conceived. The management objectives are to:

- recognise instances of multiskilling;
- identify the key risks and assess the importance of these;
- specify as a matter of policy / principle the need to ensure that health and safety requirements are considered during the multiskilling process, and;
- define safety criteria and factors to be taken into account during the multiskilling process.

PLANNING AND ASSESSMENT

The next step involves considering in detail the steps required prior to implementation. This stage is where decisions are being made on details of multiskilling such as:

- which individuals will be multiskilled;
- which tasks will be included in the remit of multiskilling;
- how will people be trained and supervised;
- how procedures and working practices are to be changed;
- staff headcount reductions.

The objectives of this stage in the life cycle is to:

- ensure that due account is taken of workload, competence, supervision and other factors when making specific decisions about multiskilling;

- ensure that suitable and sufficient risk assessments are completed, and;
- ensure changes are developed in a planned and systematic manner, including identification of all actions necessary to enable change to be made successfully.

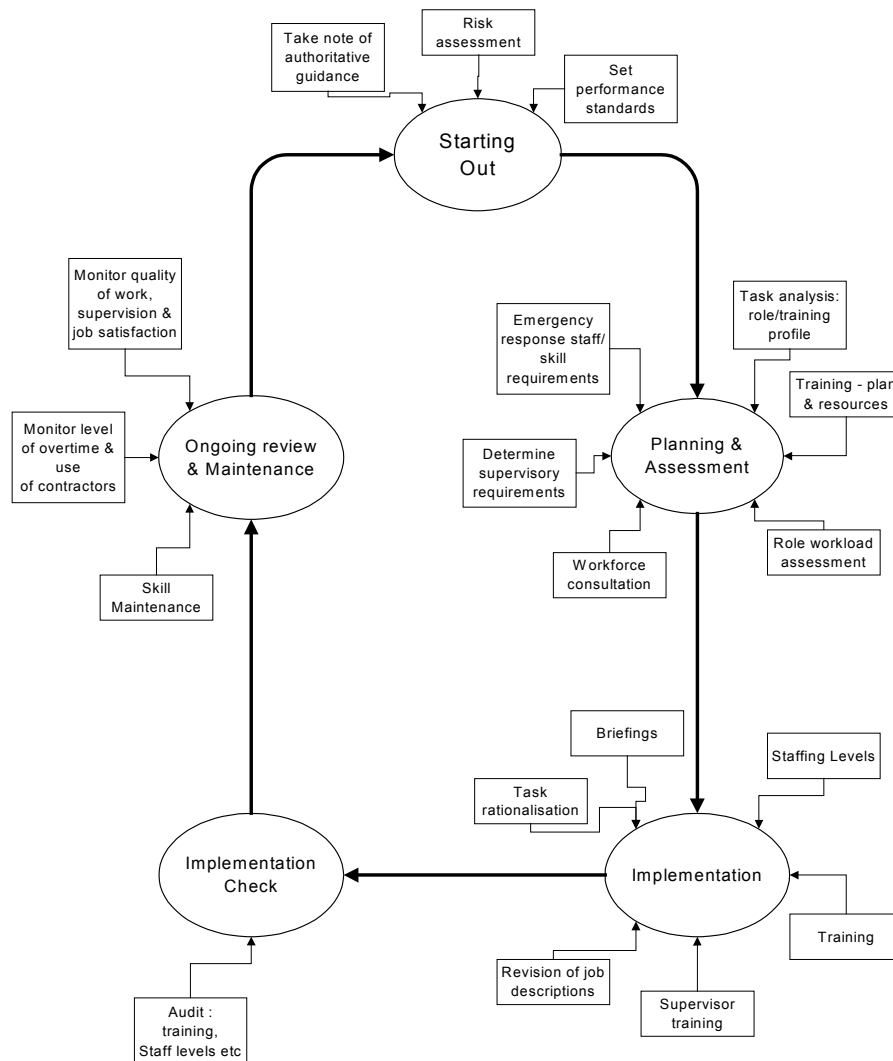


Figure 1: Multiskilling life cycle model

IMPLEMENTATION

This is where changes are implemented, and the detailed planning is turned into operational reality. Possible steps include staff being made redundant, retrained, new ways of working being introduced, and so on. The management objective is to:

- ensure implementation is properly resourced, scheduled and organised – so that planned changes are carried out effectively; and
- ensure flexibility is built in, so that unplanned changes can be dealt with, if training takes longer than originally anticipated the company can still operate.

IMPLEMENTATION CHECK

This is the stage following the implementation process, where changes have been completed, or are well underway. The objectives are to ensure planned training, supervision, etc has been carried out as intended and has achieved its required performance objectives. This stage provides an opportunity to modify implementation, and to take into consideration feedback and issues arising.

Ongoing skills maintenance & review - In the period following implementation it is important to:

- ensure that skills are maintained at both an organisational and individual level;
- detect any latent problems, and;
- seek opportunities to improve safety performance amongst multiskilled staff.

The lifecycle therefore provides a framework in which to consider multiskilling, as well as the different elements that need to be considered at the different stages.

CONCLUSIONS

The research found:

- the potential adverse impact of asking people to work outside of their limits is clear and recognised;
- that on the whole the case study companies recognised the importance of this and imposed clear boundaries on the extent of multiskilling;
- problems with multiskilling appeared to be linked to allied issues such as ‘workload’ and supervision. As such multiskilling guidelines should focus on the management of change issues and ensure that in ‘business-driven’ reorganisations that multiskilling is not overlooked.
- there is evidence to suggest that smaller firms can successfully multiskill and follow good practice guidelines;
- the risk controls adopted should be appropriate for task complexity, frequency, safety criticality etc.

On the whole the conclusions for this report is that multiskilling is typically introduced as part of a series of changes aimed at reducing costs within the organisation, and therefore care must be taken to ensure that safety is not overlooked. Previous incidents and audit reports show that safety can be jeopardised as a result of poorly implemented and managed multiskilling. However the case studies and life cycle show that if multiskilling is implemented systematically then it should not jeopardise safety.

ACKNOWLEDGEMENTS

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APPENDIX

Three aids are provided in the HSE multiskilling report, namely a:

- List of do’s and don’t of multiskilling;
- A characterisation of good and bad practice; and ;
- An Auditor’s implementation checklist.

Some of the Do’s and Don’t are listed below, as is an example of the implementation checklist.

KEY DO'S AND DON'T OF MULTISKILLING

- Do develop and implement a company wide policy to the management of health and safety aspects of multiskilling;
- Do give staff a role in the planning and implementing change process;
- Do ensure you have an accurate estimate of peak and emergency workloads, as well as normal when determining how many posts can be eliminated by multiskilling;
- Do think about the necessary skills and experiences to ensure the relevant mix of expertise is still available within the company;
- Do ensure that staff competencies cover the full range of tasks within their remit by an appropriate mix of training, assessment and coaching, as well as refresher training;
- Do ensure that someone has the role of 'standing back' and taking the wider perspective, especially in emergency management;
- Do schedule hands-on experience, job rotation, refresher training and competence assessment;
- Don't ignore the valuable insights from those who actually do the work;
- Don't multiskill without considering the impact on succession management;
- Don't let the standard of health and safety management become the victim of local business/safety management haggling;
- Don't base resource estimates solely on 'normal' workloads;
- Don't forget that 'groupthink' and 'tunnel vision' can blind people to their mistakes, especially under stress & in emergencies;
- Don't ignore or forget the need for people to practice their skills.

EXAMPLES FROM CHECKLIST FOR IMPLEMENTING MULTISKILLING

This checklist is directed at those decisions and responsibilities that are likely to reside with management and the implementation team, in particular those responsible for planning and implementing organisational change.

1. Has the implementation team recognised which organisational and staffing changes entail the horizontal or vertical multiskilling of staff involved in safety significant work ?
2. Have staff been consulted by management on multiskilling proposals ?
3. Have criteria/guidelines been developed regarding the level of 'on-the-job' experience, refresher training etc required for people to remain qualified in each skill/task area ?
4. Have criteria and guidelines been developed regarding how individuals competence will be monitored and maintained ?