The Abdus Salam
International Centre for Theoretical Physics

United Nations
Educational, Scientific
and Cultural Organization

International Atomic
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SCHOOL OF NUCLEAR KNOWLEDGE MANAGEMENT

18-22 September 2006

Knowledge Transfer in the Nuclear Sector

A. JACKSON
National Nuclear Corp (NNC) Ltd.
Reactor Services Group
Booths Hall. Chelford Road
Knutsford WA16 8QZ
Cheshire
U.K.

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International Consulting

Knowledge Transfer in the Nuclear Sector

School of Nuclear Knowledge Management
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Andy.Jackson@amecnnc.com

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British Energy & AMEC NNC

BENIC dedicated team

British Energy	amec nnc
Operator of 8 Power Stations (nuclear & thermal)	Design, commission civil NPPs Engineering support to nuclear, transport, defence, oil & gas industries
>5000 staff	>1200 staff
Largest Electricity Generator in UK • Turnover £1.5 billion • Generation 72 TWh (out of 300TWh)	Largest Technical Support to British Energy & BNG • Turnover - £85M • Canada – Ontario Power Generation • South Africa – ESKOM
Moved from state ownership to private company traded on stock market,	Now part of the AMEC Global Construction Group with turnover of £5 bn
Future • New Build • Resume International Presence • Horizontal Diversity (Wind Farms)	Future • New Build • Global International presence • New technology

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British Energy AMEC NNC International Consulting (BENIC)

BENIC combines the unique expertise, experience and resources of British Energy and AMEC NNC to create a premier power engineering and commercial consultancy.

Its strength is in the benefits gained through the skill transfer of tried and tested products and services through its 'operational' staff.

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Knowledge Transfer in the Nuclear Sector

Why are We Here?

Significant challenges facing the Industry, such as:

- Ageing workforce
- Ageing NPP fleet
- Extended lifetime of plants
- Workforce retention and recruitment
- Managing limited SQEP expertise

All these require Knowledge Management

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Our Challenge

- Its crucial to address these challenges as we move forward with plant life extensions, into a new generation of nuclear power
- help bridge the gap between current ways and the future ways of working
- strive to embed knowledge management techniques into our own organisations to help access the **right information at the right time**

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Learning Organisations

- Recognise the need to identify knowledge requirements and knowledge as an asset
- Strive to adapt their culture to ensure knowledge is better mobilised and applied
- Our willingness and ability to capture and reuse knowledge within any business is a critical factor for its success

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Knowledge is an Asset

- Some of the most important assets the nuclear industry has are its staff and their:
  - know-how
  - experience
  - knowledge
- Formal training can develop knowledge but know-how and experience are best developed via doing work

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Knowledge Retention

- One approach is to adopt multi-skilling in a workforce, this has clear commercial benefits, and can provide:
  - greater flexibility to match workload to the resource available with the necessary skills
  - an increased pool of specialised experience available
  - ability to multi-skill has become more important as too often the same 'expert' is used to the exclusion of others

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Effective Training

- Experience identifies that most effective training takes place on the job, under the supervision of a suitably experienced mentor
  - ability of staff to absorb knowledge is often underestimated
  - especially younger staff who have been doing just that recently at University
  - recipient should be keen to learn new skills
  - sufficient budget is required to fund the learning curve

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Explicit Knowledge

- Information that can be explained and captured in calculations, reports and stored in databases or manuals
- In some cases, lessons-learned databases and other technical tools are the only means of keeping information at hand for future use
- Caution: experience shows us that databases, portals and other electronic repositories are often ignored by workers who would rather get information from colleagues

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Tacit Knowledge

- Tacit knowledge is much harder to capture and pass on because it includes SQEP knowledge, such as stories, impressions and judgemental solutions
- Tacit knowledge is also much harder to get from people because it accumulates over years of experience, and a scientist or engineer may not know how to describe it

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Knowledge Transfer in the Nuclear Sector

Knowledge Capture

- Cataloguing key information as a reference can help cushion the blow of loss of staff, through moves, retirements, re-organisation etc.
- Common search tools and storage databases can then help retain such explicit knowledge
- Effective mentoring does not come naturally to all, and training in mentoring may be required

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Knowledge Road Blocks

- Effectiveness of the knowledge transfer is very dependent upon the attitudes of the individuals involved
- Cultural attitudes can also be an impediment, such as the role of an Individual Contributor, can stifle the spread of knowledge and opportunities
- Mistaken belief by some that retaining knowledge by an individual makes that individual of more value to the organisation

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Knowledge Transfer

- KM transfer is applicable to any organization at risk of losing important knowledge, through changes such as:
  - ageing workforce issues
  - greater rotation of personnel
  - staff reduction
  - Multi-skilling
  - cultural changes in the organisation
  - attrition from many other causes

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Knowledge Rewards

- Successfully accomplishing knowledge transfer should be recognised by the company to the same extent as individual contributions by experts currently are

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KM Ways of Working

As part of a systematic Integrated approach,develop:

- A clear taxonomy for helping to navigate knowledge topics
- Ready access to the gathered knowledge
- Good capability to search across bases of information
- Expertise captured and mapped for teaching and mentoring (SQEPS)

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SQEP definition

- AMEC NNC define a Suitably Qualified and Experienced Person (SQEP), as a person who has sufficient qualifications and experience in a defined skill area, to be able to implement that skill, at one of five levels:
  1) Supervised
  2) Unsupervised
  3) Advising and guiding others
  4) Company “expert”
  5) Externally recognised “expert”

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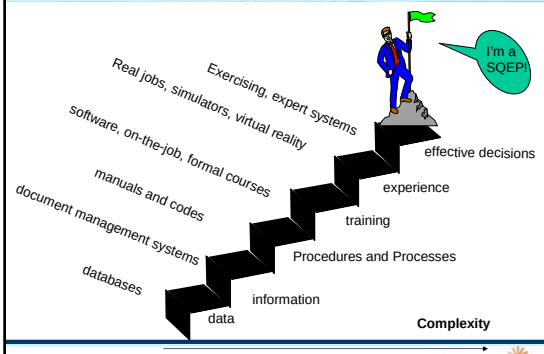
What makes a SQEP?



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The SQEP as an expert

An expert has sufficient confidence, knowledge and understanding to be capable of inventing new and appropriate responses as new demands occur

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Replacing the "Qualified & Experienced"

- Recruit appropriately qualified staff
- Recruit staff with the relevant skills
- Provide necessary On the Job Training (OJT), adopting mentoring and shadowing where appropriate
- Communities of practice can help experienced workers to pass on their know-how

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Tacit Knowledge Capture

- What type of knowledge to record ?
  - Individuals interfaces and networks
  - Specific utility knowledge
  - Safety based knowledge
  - Decision rationale
  - Historic knowledge
- Caution: some of these will not be well defined topics areas

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Capture Scope

- Gather and record Individuals tacit knowledge critical to the Organisation
- Adopt a staged approach
  - map out the individuals high level know-how
  - highlight topic areas which would be at risk of being lost
  - capture the critical subset of knowledge rather than the individuals full breadth
  - include next user in process
  - structure interviews to these needs

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Example Tacit Capture Project

- 1st phase - project scope definition
  - kick-off review for *Employee*
  - interviews with Peers, end users and customers
  - identify common themes across those interviews
  - present findings and obtain agreement of project specification
- 2nd phase Knowledge Capture phase
  - define what structure the deliverable will take
  - plan series of interviews with *Employee* to populate the deliverable
  - interview transcription review and validation
  - review points

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Tacit Knowledge Capture

- Some benefits can be difficult to quantify:
  - risk reduction: maintain safety and commercial focus without loss during change
  - enhance effectiveness and efficiency of the new users of information
  - reduce chance of repeating work
  - provide access to decision rationale, including why some decisions were not taken
  - formalise individuals “array” of information
  - supports succession planning

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End Deliverable

- Design output to satisfy the needs and expectations of the users
- Decide on your ideal medium to share knowledge and deliver the most benefit, examples such are:
  - intranet site for communication / navigation
  - include models of skills and knowledge
  - keyword searchable
  - contain decision rationale trees of engineering judgement
  - records historical specific issues

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Post Implementation

- Continue to test and validate with users, does it meet their needs ?
  - highlight existence of information in the organisation, and monitor access
  - ensure there is ownership / maintenance responsibility for the information
  - clear understanding of the shelf-life information ?
  - storage of recordings and appropriate software as a record for QA purposes

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Practical session

- We will:
  - Break into groups to review the handout
  - pick the job of an *Employee* that you consider is at risk of critical skill and knowledge loss, if the *Employee* leaves the organization
  - develop a questionnaire document
  - be prepared to present & review this document
- Remember as described in the presentations,
  - Tacit capture needs your commitment and goodwill

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Thank you

ANY QUESTIONS?

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