"Assessing the Risk of K-loss within the Belgian TSO"

Benoît BERNARD (Bel V)

IAEA Third International Conference on Nuclear Knowledge Management

November 2016
Outlines

I. Bel V KM building blocs
II. The “Knowledge Critical Grid”
III. Conclusions

Paper:
I. Bel V KM building blocs

- Bel V:
  - Belgian TSO
  - Subsidiary of the FANC (Federal Agency for Nuclear Control)
  - +/- 70 engineers

- 3 technical departments
  - Nuclear Safety and Radiation Protection Inspection
  - Nuclear Safety and Radiation Protection Assessment
  - Nuclear Safety and Radiation Protection Projects

- Technical Responsibility Centres (TRCs)
  - Attached to a branch manager but Non-hierarchical
  - Typically 4 to 8 persons
  - Responsible for developing and maintaining expertise in specific domain
  - Integrated in QMS (ISO 9001)
I. Bel V KM building blocs
<table>
<thead>
<tr>
<th>Code</th>
<th>Technical Responsibility Centres</th>
</tr>
</thead>
<tbody>
<tr>
<td>0200</td>
<td>Site analysis, external hazards, meteorology, atmospheric diffusion models</td>
</tr>
<tr>
<td>0308</td>
<td>Civil engineering + hydrology, geology, seismology</td>
</tr>
<tr>
<td>0310</td>
<td>Environmental and seismic qualification of electrical equipment</td>
</tr>
<tr>
<td>0400</td>
<td>Core design (neutronics and thermal-hydraulics) and reloads</td>
</tr>
<tr>
<td>0500</td>
<td>Mechanics</td>
</tr>
<tr>
<td>0690</td>
<td>Safeguard systems, auxiliary and secondary fluid systems, fuel handling and storage</td>
</tr>
<tr>
<td>0700</td>
<td>I&amp;C and safety critical software</td>
</tr>
<tr>
<td>0800</td>
<td>Electrical systems</td>
</tr>
<tr>
<td>0905</td>
<td>Fire protection, ventilation</td>
</tr>
<tr>
<td>1100</td>
<td>Waste management and releases, chemistry, decommissioning</td>
</tr>
<tr>
<td>1201</td>
<td>Radioprotection, ALARA, radiation measurements</td>
</tr>
<tr>
<td>1301</td>
<td>Management of safety</td>
</tr>
<tr>
<td>1303</td>
<td>Emergency planning</td>
</tr>
<tr>
<td>1306</td>
<td>Nuclear Security</td>
</tr>
<tr>
<td>1501</td>
<td>Accident analyses, thermal-hydraulics, simulator models</td>
</tr>
<tr>
<td>1502</td>
<td>Accidental radioactive releases, confinement systems</td>
</tr>
<tr>
<td>2000</td>
<td>PSA, including human reliability</td>
</tr>
<tr>
<td>2100</td>
<td>Severe accidents</td>
</tr>
<tr>
<td>3300</td>
<td>Special mathematical methods</td>
</tr>
<tr>
<td>4100</td>
<td>Accelerator technology</td>
</tr>
</tbody>
</table>
What we must know (present and future)

What we know / do not know

K identification
TRCs Objectives
+ Values and Mission Statement
+ R&D Strategy

K goals
TRCs Objectives
+ Values and Mission Statement
+ R&D Strategy

K acquisition
TRCs as COPs (K inside TRCs)
+ Collaboration with Universities
+ Coaching
+ Mentoring
+ K book

K sharing
TRCs as COPs (K between TRCs)
+ Training program
+ Reports circulation
+ Intranet

K development
R&D programme within TRCs

K utilisation
Multidisciplinary Safety Analysis (several TRCs)
+ Inspections

K retention
TRC documentation within an EDMS (Hummingbird)
+ Training programme evaluation
+ KPI related to KM
+ Documentation Users Group (DOCUS)

Links with Competence-based Management
(Training, Staffing, Recruiting)

Generate

Distribute

Apply

Store

Tacit knowledge

Explicit knowledge

K transfer
TRC as COPs (K inside TRCs)
+ Coaching
+ Mentoring
+ K book

K transfer
TRC as COPs (K between TRCs)

K transfer
K book
Outlines

I. Bel V KM building blocks

II. The “Knowledge Critical Grid”

III. Conclusions

Paper:
## II. The “Knowledge Critical Grid”

<table>
<thead>
<tr>
<th>TRC 0</th>
<th>K Domains</th>
<th>K Documentation</th>
<th>K Complexity</th>
<th>Number of possessors</th>
<th>Volatility level</th>
<th>Profile Rarity</th>
<th>Risk of loss</th>
<th>Vulnerability level</th>
<th>K critical level</th>
<th>Actions proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Roles and responsibilities

<table>
<thead>
<tr>
<th>TRCCs Proposal</th>
<th>Date and signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>MID validation</td>
<td>Date and signature</td>
</tr>
<tr>
<td>PM07 validation</td>
<td>Date and signature</td>
</tr>
<tr>
<td>SC validation</td>
<td>Date and signature</td>
</tr>
</tbody>
</table>
II. The “Knowledge Critical Grid”

<table>
<thead>
<tr>
<th>Volatility</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Action</td>
<td>Action</td>
<td>Priority Action</td>
<td>No action Recommendations possible</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Vulnerability

<p>| 1 | 2 | 3 | 4 |</p>
<table>
<thead>
<tr>
<th>K-domains</th>
<th>Documentation</th>
<th>K Complexity</th>
<th>Number of possessors</th>
<th>Volatility level</th>
<th>Volatility level</th>
<th>Risk of K-holder loss</th>
<th>Vulnerability level</th>
<th>K critical level</th>
<th>Actions proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-domain 1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2,3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>No action</td>
</tr>
<tr>
<td>K-domain 2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Priority Action</td>
</tr>
<tr>
<td>K-domain 3</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1,5</td>
<td>Monitor</td>
<td>Opportunity to reinforce training</td>
</tr>
<tr>
<td>K-domain 4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>2,5</td>
<td>Action</td>
<td>Nominate or recruit a back-up Provide training Develop documentation</td>
</tr>
<tr>
<td>K-domain 5</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3,6</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Action</td>
<td>Action</td>
</tr>
<tr>
<td>K-domain 6</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3,6</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>Priority Action</td>
<td>Codification of accumulated K by leaving expert</td>
</tr>
<tr>
<td>K-domain 7</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>Priority Action</td>
<td>Expert shadowing and coaching Capture of best practices by younger employees</td>
</tr>
<tr>
<td>K-domain 8</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3,6</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>Priority Action</td>
<td>Action</td>
</tr>
<tr>
<td>K-domain 9</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Action</td>
<td>Action</td>
</tr>
<tr>
<td>K-domain 10</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2,3</td>
<td>2</td>
<td>1</td>
<td>1,5</td>
<td>No action</td>
<td>Action</td>
</tr>
<tr>
<td>K-domain 11</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2,5</td>
<td>Action</td>
<td>Attention to K codification Set a succession planning</td>
</tr>
</tbody>
</table>

**Roles and responsibilities**

<table>
<thead>
<tr>
<th></th>
<th>Middle Management validation</th>
<th>Date and signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Process Manager 06 validation</td>
<td>Date and signature</td>
</tr>
<tr>
<td></td>
<td>Steering Committee validation</td>
<td>Date and signature</td>
</tr>
</tbody>
</table>
Outlines

I. Bel V KM building blocks
II. The “Knowledge Critical Grid”
III. Conclusions
Conclusions

• Within a K-driven organisation as a TSO, knowledge challenges are connected to identifying what essential knowledge is at risk and which solutions are useful to address K-retention issues.

• Limit: the KCG is not an engineering tool – using validated mathematical formula – but a support to decision-making.

• KCG enables to deal with three fundamentals K-loss questions corresponding to three pivotal managerial steps.
  – Diagnostic step: Which key knowledge may be lost?
  – Assessment step: How critical the K is?
  – Action step: Which best relevant K recovery initiatives?
Appendix

- **K documentation**
  - **Aim:** Identify the availability of documented resources concerning the K domain
  - **Question:** Do we have internal guidances or procedures defining our assessment methods in this K domain?

- **K complexity**
  - **Aim:** Assess the difficulty of appropriation
  - **Question:** How much experience is required to apply this K domain?

- **Number of internal possessors**
  - **Aim:** Identify the availability of Bel V experts concerning the K domain
  - **Question:** How much experts are able to deal with the K domain?

- **Profile rarity on the job market**
  - **Aim:** Assess the availability of expert on the job market
  - **Question:** Could we find an external expert able to deal with the K domain?

- **Risk of loss**
  - **Aim:** Identify a risk of loss that could cause problems in terms of K retention or workload management
  - **Question:** Is there a risk of loss?