Future Directions for International Safeguards
ESARDA Working Group on Implementation of Safeguards

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ESARDA Working Group on the Implementation of Safeguards (IS WG)

2. Members/observers from many countries (Austria, Belgium, Czech Republic, Estonia, Finland, France, Germany, Hungary, Lithuania, Netherlands, Norway, Slovak Republic, Spain, Sweden, Switzerland, UK, US) and organisations (IAEA, DGTREN (EC), JRC, URENCO)
IS WG: Objective

- To provide the Safeguards Community with proposals and expert advice on the implementation of safeguards concepts, methodologies and approaches aiming at enhancing the effectiveness and efficiency of safeguards on all levels and serve as a forum for exchange of information and experiences on safeguards implementation.
IS WG Experiences

- Inspection Effort under IS
  - Certain reduction in the IAEA verification activities in the field
  - No reduction for State system and/or Regional system, sometimes even an increase
- Total level of inspection effort is at least maintained
- States take serious their non-proliferation obligations by compensating IAEA reduction in inspection effort
- How does the IAEA make use of that attitude?
Most States report their inspection results to the IAEA

- Does the IAEA ignore these findings or consider them?
  - IAEA has many years of experience with State, knows about technical capabilities
  - Does the IAEA also trust the State system?

- Partnership Approach: One person, one job
  - Not always maintained

- Does independent conclusion mean that all source information must be gathered by IAEA itself?

- Is delegation possible?
Physical Model, Basic Scheme

Diagram showing the process from mining to weaponization. Key stages include:
- Mining
- Ore Concentration
- Conversion
- Fuel Fabrication (Fuel Fab.)
- Reactors and CAs
- Reprocessing
- Heavy Water Production
- Spent Fuel Storage
- Nuclear-related infrastructure: research centers and laboratories
- HEU
- WEAPONIZATION
Limitations in the Application of the Physical Model

- If a State has a complete or nearly complete fuel cycle, the Physical model can only provide limited support.
- The Physical Model identifies possible technical pathways.
- What about a State's ability to implement such pathways to conduct a proliferation?
  - Decision making
  - Ownership of facilities
  - Personnel
  - Safety culture, working rules
State Level Approach: 
Top down versus bottom up

- The current safeguards system evolved bottom up
- Inspection effort related to quantities of materials and facilities
- Physical Model should be complemented by a top down assessment of State’s abilities to implement a proliferation
Communication Chain for Implementing a Nuclear Weapons Programme

Phase 1: Formulating interests in nuclear weapons
Phase 2: Political decision
Phase 3: Project and financial planning
Phase 4: Awarding contracts and research
Phase 5: Material procurement etc.
Phase 6: Plant construction and operation
Phase 7: Production of weapons material and other components

[Fischer 2000]
# Measuring Points for the Communication Chain

| A1 | parliamentary control of the military and secret services with the participation of the opposition |
| A2 | audit offices (GAO) with comprehensive opportunities of access (not necessarily associated with sanction power) for all relevant offices etc. |
| A3 | cooperation with international safeguards authorities (IAEA) |
| A4 | constitutional state / prosecution of infringements of the law |
| A5 | openness of government decisions |
| A6 | independent licensing and supervisory authorities |
| B1 | open research community in the nuclear research sector |
| B2 | investigative, professional journalism |
| B3 | independent worker/employee associations in the respective sectors |
| B4 | effective foreign trade statistics (without any gaps) publicly accessible |
| B5 | open company reports / statements (no sectors with exceptions) |

A differentiation must be made between measuring points focusing directly on the communication chain (A1-3, 6; B1-3) and those providing indirect assessments by covering structural control conditions, describing a context in which the measuring points operate (A4-5, B4-5).

[Fischer 2000]
### Observing the Communication Chain

<table>
<thead>
<tr>
<th>Phase in the communication chain</th>
<th>(Groups of) persons involved in the communication chain</th>
<th>Measuring point</th>
<th>Actors in the measuring points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 interest formulation</td>
<td>the military and/or secret services and/or administration and/or government (in each case very small groups)</td>
<td>A1</td>
<td>parliamentary opposition, experts and social groups cooperating with the opposition</td>
</tr>
<tr>
<td>2 political decision</td>
<td>Small circle in the executive</td>
<td>A4, A5</td>
<td>law societies, parliamentary opposition, legal &amp; political experts etc.</td>
</tr>
<tr>
<td>3 planning</td>
<td>the military, secret service &amp; their financial administration &amp; technical staff (small groups)</td>
<td>A1, A2</td>
<td>Parliamentary opposition, audit offices, political / budget experts</td>
</tr>
<tr>
<td>4 awarding contracts</td>
<td>participation of selected research institutes, small group of scientists</td>
<td>A2, A3</td>
<td>Parliamentary opposition, audit offices, budget experts, IAEA staff, scientific experts (national and international)</td>
</tr>
<tr>
<td>5 material procurement</td>
<td>the military and/or secret service and private companies and nuclear facilities</td>
<td>A2, A3, B2, B3, B4, B5</td>
<td>Parliamentary opposition, audit offices, budget experts, specialized journalists, trade unions (in the plant and (inter)nationally), customs authorities and experts</td>
</tr>
<tr>
<td>6 plant construction &amp; operation</td>
<td>see 3 plus designers, engineers and construction workers</td>
<td>A1, A2, A3, A6, B2, B3, B5</td>
<td>Parliamentary opposition, political experts, audit offices, budget experts, specialized journalists, trade unions, economic institutes, stock exchange experts</td>
</tr>
<tr>
<td>7 weapons material pr.</td>
<td>see 3, 4 plus other employees</td>
<td>B2, B3</td>
<td>Specialized journalists, trade unions</td>
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</tbody>
</table>
Summary

- Reductions in IAEA inspection effort are compensated by State system or Regional system
- How to best make use of this effort: delegation of tasks
- Major role of SSAC’s
- The application of the Physical Model shows the technical aspects. An assessment is needed if and in how far a State would be able to implement a proliferation
- The communication chain approach can help in this assessment