Some Operational Aspects of BRR's Management System with respect to the Code of Conduct

S. Tőzsér, F. Gajdos, K. Késmárky, G. Tóth

MTA KFKI Atomic Energy Research Institute, Budapest, Hungary

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Topics

- **Background information (overview):**
  - Facility history, main data, utilization.
- **Highlighted operational issues of the BRR's MS:**
  - Operation and utilization practice;
  - Conformity and Safety reviews;
  - Safety culture focusing on human factors;
  - Demonstrating safety.
- **Conclusions.**

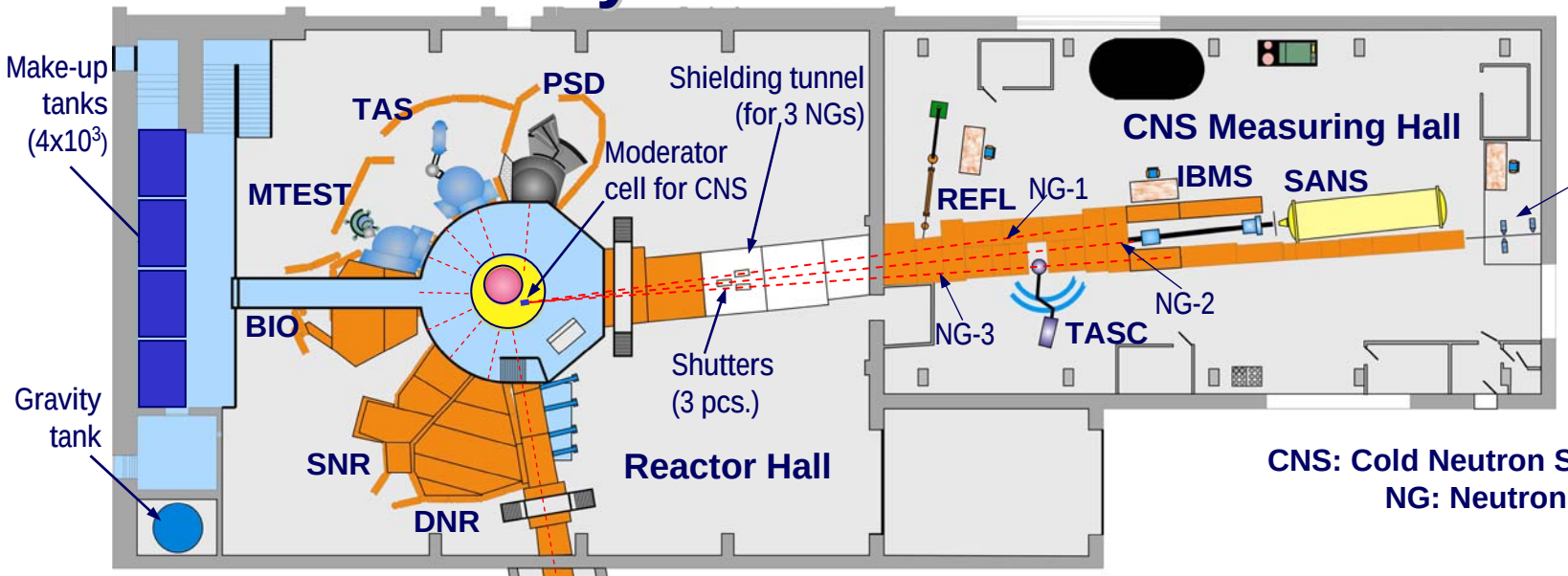
Bird's eye view of BRR site

BRR history

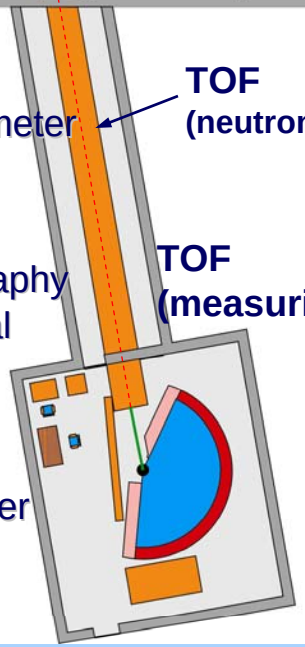
Tank-type reactor, moderated and cooled by light water

- **Went critical in 1959**
  - Fuel: EK-10, thermal power: 2 MW.
- **1st upgrade in 1967**
  - Core surrounded with beryllium reflector;
  - Fuel changed: EK-10 → VVR-SM; Thermal power: 2 MW→ 5 MW;
  - Stopped for partial decommissioning in 1986.
- **2nd Upgrade (full scale reconstruction) from 1986 … to 1990**
  - With the exception of the civil engineering construction all equipment was replaced; Thermal power: 5 MW→10 MW;
  - Physical start-up in December 1992; ← 2 years are missing!
  - Energetic start-up procedure from March…to October 1993;
  - Operating licence: 25th November 1993;
  - Since that time the BRR operates on average ≈3500 hours/year;
  - PSR 2002-2003: New operation licence valid for another ten years.

Utilization – Layout of Neutron Beam Facilities



CNS: Cold Neutron Source
NG: Neutron guide



Facilities in Reactor Hall

TOF Time-of-flight spectrometer

DNR Dynamic neutron radiography

SNR Static neutron radiography

BIO Port used for biological experiments

MTEST Materials testing diffractometer

TAS Triple axis spectrometer

PSD Powder neutron diffractometer

Facilities in CNS Measuring Hall (with 3 NGs)

REFL Reflectometer

TASC Triple axis spectrometer on CNS

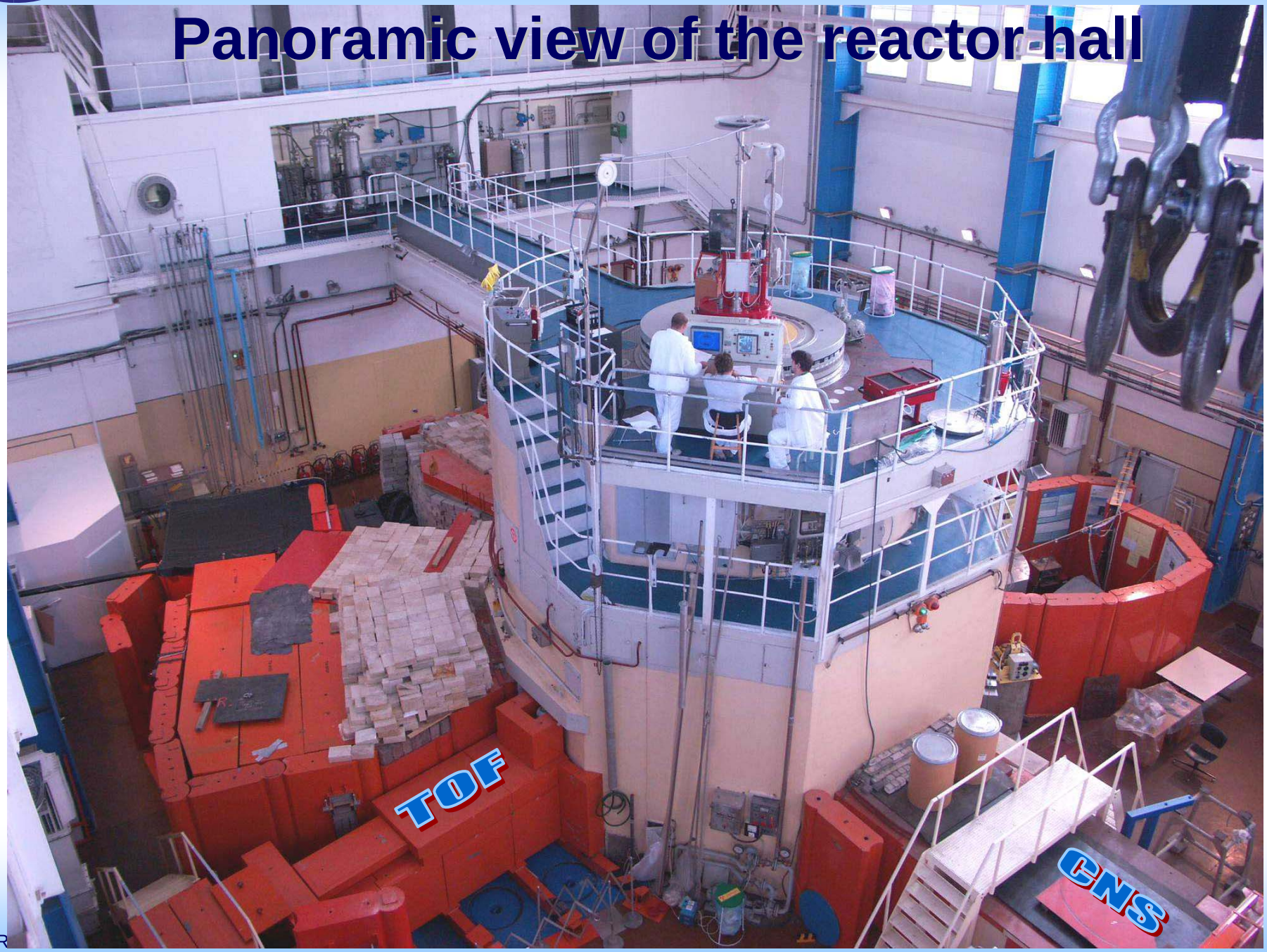
SANS Small-angle scattering spectrometer

PGAA Prompt gamma activation analysis

NIPS Neutron-induced prompt gamma-ray spectrometer

IBMS In-beam Mössbauer spectrometer (under construction)

Panoramic view of the reactor hall



Operation and Utilization

❖ BRR organization

Operation → **Licensee holder**
Atomic Energy Research Institute

Utilization

Budapest Neutron Centre

(BNC)

Founded by 4 academic institutes in 1992

Reactor Department
Organization for reactor operation

Operation issues

Consortium for reactor utilization

Utilization issues

Operation and utilization (cont'd)

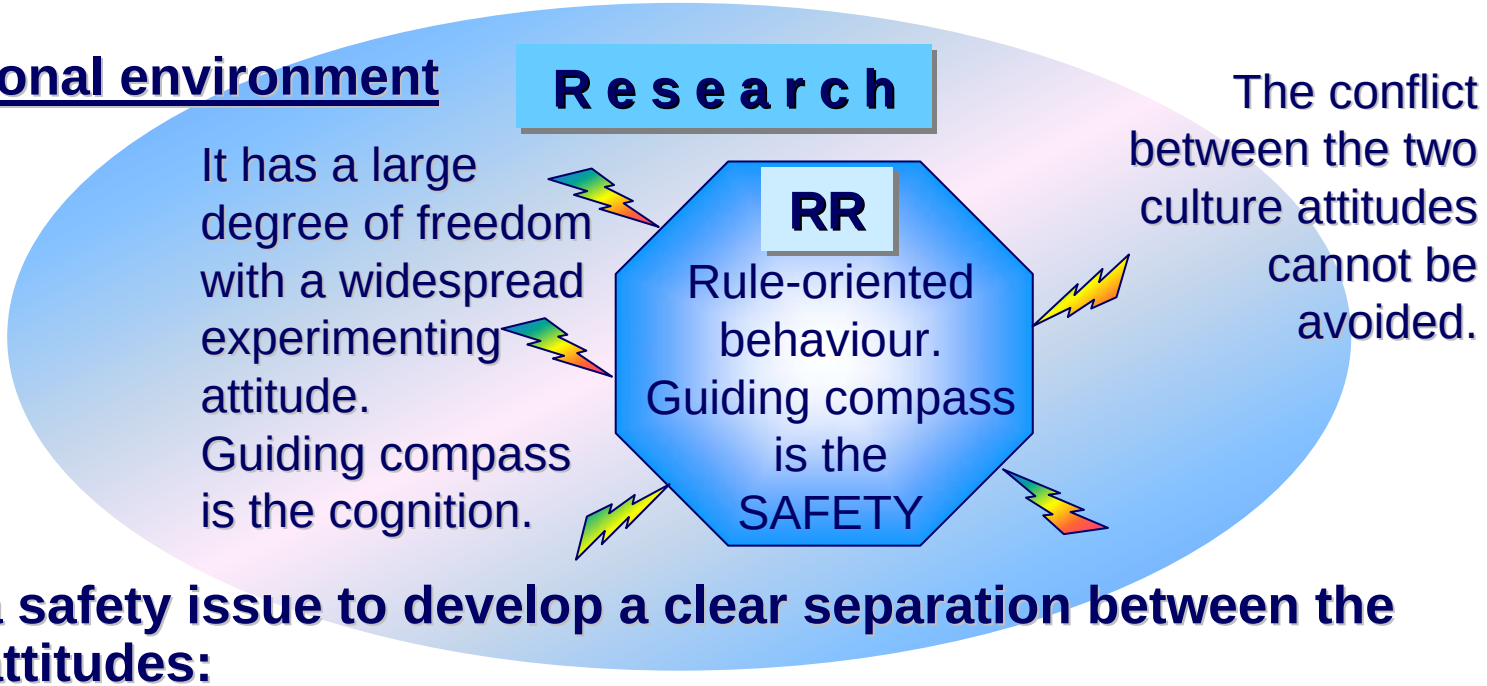
- **Conflict of OP&UT demands:** fulfilling the service duties of a well-utilized RR requires a tight reactor operation, which may sometimes conflict with safe operation requirements.

- **Fact: the way how the operation and utilization issues are managed plays a pivotal role in the safe operation.**
- **Benefits: separation of the UT duties from the OP ones:**
  - Independent representation of the interests of both sides;
  - Safety sensitive proactive management approach that **guaranties the priority of safety** and makes appearance of **user interests.**
  - **Consequential benefit:** the ability to lobby either for reactor or utilization has been doubled.

Safety Culture

The CoC emphasises it as an essential aspect of nuclear safety.

Operational environment



- **It is a safety issue to develop a clear separation between the two attitudes:**
  - At the BRR it is obvious to each staff member that the reactor itself is not subject to any research and experiment;
  - Organization guaranties for safe handling of both demands.

The knowledge of how to separate the experimenting attitude from the operation attitude, indicates the maturity of the operating organization.

Safety culture (cont'd)

Anecdote giving two lessons learned:

There is a story that a young married woman would always slice off the ends of a joint of beef before roasting it. Her explanation was that slicing the ends off improved the flavour of the beef. The source of this pearl of wisdom was her mother. Her husband therefore approached his mother-in-law and asked why she sliced the ends off the beef. The same answer was given - it improved the flavour of the meat! This practice had, in turn, been passed on from the grandmother. On asking the grandmother she replied:
"I cut the ends off the beef because my roasting dish was only this big, and I had to cut the ends off the joint to get it to fit in".

Andrew J Nolan: Independent Verification Magic or Myth. In: Towards System Safety. Springer 1999, p. 212.

❖ Lessons learned:

- Important to understand what we are doing!
- Important to revise a procedure from time to time to assess whether the conditions that effected the measure still exist.

Demonstrate the Safety

- **Demand:** RR should not only **be safe**, but also should **be seen to be safe**. → Demonstrate the safety!
- **Key elements of the public information strategy:**
  - Increase the transparency and traceability (avoid secrecy);
  - Justify the conformity and demonstrate the safety in an easily accessible manner.
- **Techniques:**
  - For decades we have maintained a visitor policy on fixed days;
  - We have joined several national and international informative programs (e.g. European Cultural Heritage Days);
  - Using modern mediums of communication offered by internet technologies (home pages, real-time environmental data);
  - Separate operation and utilization management systems increase the transparency.

Demonstrate the Safety (cont'd)

- **Experiences based on feedback from the public:**
  - The information should be authentic, coherent and comparable with previous years;
  - It must also clearly report unscheduled events whilst providing comparison to well-known pointers;
  - Demonstrate operation conformity to regulations;
  - Strong comparison can be made between the safety indicators of the reactor and the appropriate aspects of the IAEA's standards.
- **Shortcomings** (revealed by CoC's self-assessment):
  - The BRR has not been "weighted" by the IAEA for a long time: → INSARR provides trustworthy independent evidence to demonstrate safety (by international public feedback).
  - I have to admit that in the past 15 years we did not take the opportunity and benefit from advantages of this evidence.
  - This omission has denied us an effective driving force for the demonstration of safety. → Take measures to have this support.

Conclusions

To summarize the general management practice with respect to the CoC, two important statements can be made:

- **Firstly: the CoC does not contradict the everyday practices (including the legislative and safety standards and regulation system).**
- **Secondly: the CoC clarifies the duties and responsibilities of all, be they organizations, regulatory bodies, or individuals (regardless of their position relative to the management hierarchy).**
- **Hence: the CoC acts as a compass that harmonizes and directs the safety approach taken at all levels, from the top to the implementation.**
- **It may be said therefore that it shapes the unity of content and form of a RR's safety.**

Thank you for your attention!