Industry response to risks emerging from human and organisational changes

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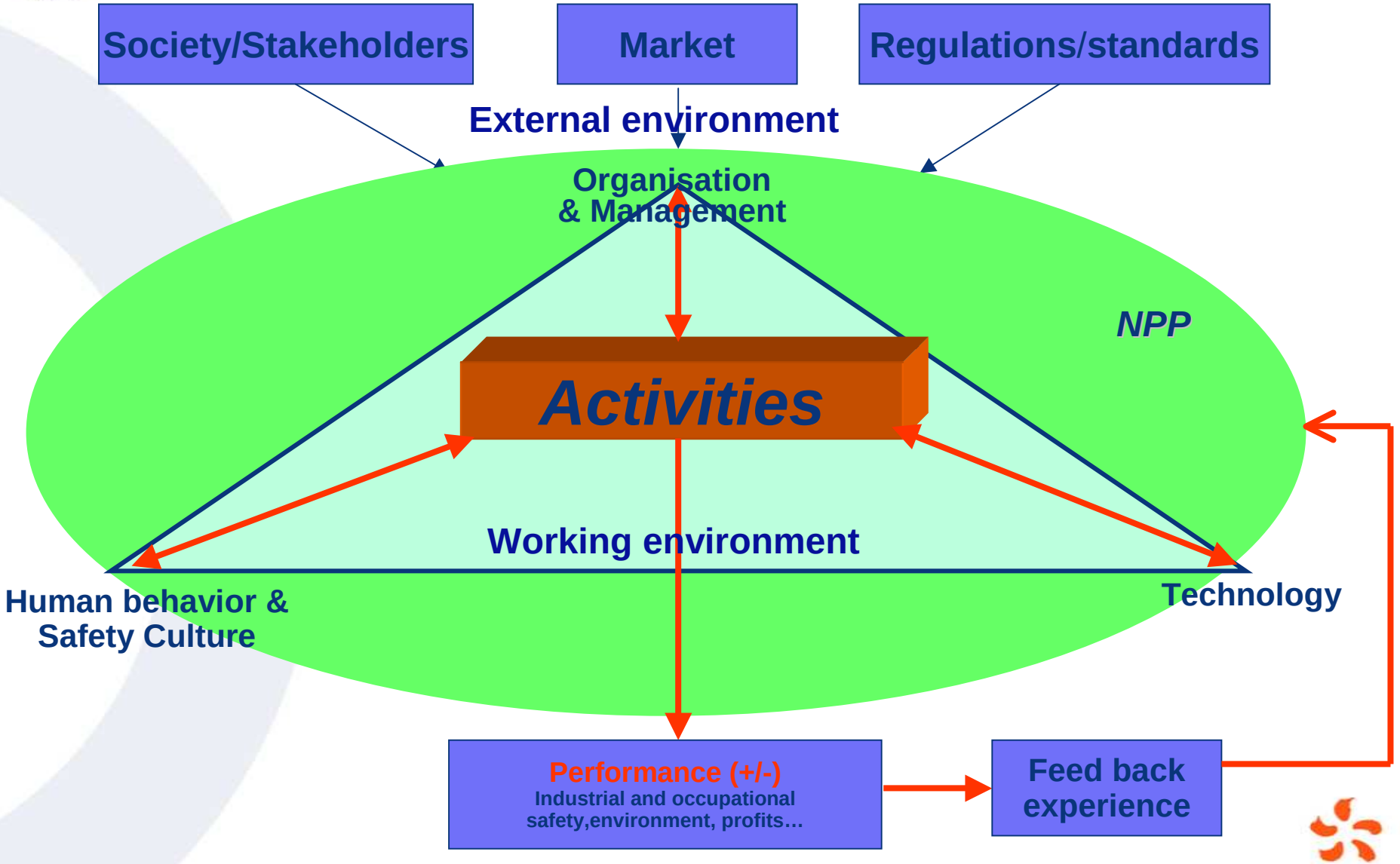
The environment of the nuclear sector is deeply changing, introducing internal transformations or new constraints

In order to face these recent evolutions while keeping a high level of industrial safety in the context of a competitive international market, some of the nuclear sector utilities have launched deep modernisation initiatives which include all or parts of the following aspects:

- design and construction of more competitive plants, giving a larger place to automation and NTIC,
- introduction of new technologies in existing plants,
- restructuring of the operational documentation,
- industrial policy changes (outsourcing, scope of the services…)
- organisational and practice changes

Nuclear Power Plants are socio-technical systems producing performance



The performance of socio-technical systems depends on several dimensions

- Evolutions of the external environment (market, laws, public opinion, technological innovations…) might introduce changes or new constraints in high-risk industrial installations

- The performance of the safety management systems within high-risk industrial installations, which are socio-technical systems, are closely linked to several dimensions (technology, human, organisation…)

- Any change on these dimensions or on their interactions might have +/- impacts on working activities hence on industrial safety performance

➡ Modernisation initiatives must be implemented carefully considering all dimensions of the socio-technical systems.

Thrusts in research on Human and Organisational Factors are based on operational needs

- Considering the results of the analysis of the Operating Experience Feedback, EDF attaches much importance to the socio-organisational and human impacts of its modernisation approach for optimizing the performance of its installations.

- Therefore, EDF has closely linked its modernisation approach to research and actions concerning H&O Factors and research programs have been launched :
  - to better understand operational requirements
  - to solve present or future operational difficulties

EDF Strategic Research Agenda on H&O Factors (1)

- Improvement of the Operating Experience Feedback process by better integrating H&O factors in the process through the development of knowledge and methods for
  - ✓ plant operation and design,
  - ✓ resilience and vulnerability evaluation of organisations

- Socio-organisational and human impacts of organisational changes or introduction of new technologies in the existing plants, such as the implementation of :
  - ✓ a new Outage Operation Centre coming from USA
  - ✓ a Radioprotection Supervision Centre,
  - ✓ new computerized tools and automation in the control rooms or NTIC on the field operators,
  - ✓ new organisations : deep evolution in the Maintenance and radiation protection process or evolution of team organisations for new plants

EDF Strategic Research Agenda on H&O Factors (2)

- Improvement of the Safety Management by developing knowledge and methods to upgrade existing systems and assist managers in decision making
  - ✓ adapting and developing WANO's Human performance tools
  - ✓ development of an integrated approach of Safety Management.
- Assessment of the Safety Culture and impacts of the change on the safety culture, measure of the occupational safety perception
- Extension of the application of the Human Reliability Assessment (HRA) up to the probabilistic safety assessment. Application to:
  - ✓ incidental and accidental operation,
  - ✓ reliability of the H&O barriers
  - ✓ safety impacts of the design or operational choices linked to H&O factors in order to provide tools and methods for decision making.

How does the iNTeg-Risk project contributes to answering these multiple questions?

- Improvement of the Operating Experience Feedback process:
  - Aims: better integration of H&O factors, development of knowledge and methods, for plant operation and design, resilience and vulnerability evaluation of organizations
  - **in the iNTeg-Risk project:**
    - stabilization and distribution of knowledge on organizational safety
    - by building H&O indicators
- Improvement & Development of an integrated approach of Safety Management:
  - Aims: better knowledge and methods to upgrade existing systems and assist managers in decision making
  - **in the iNTeg-Risk project:**
    - Studies and integrated actions are carried on

      eg. **characterization of outsourced actions critical to safety** and identification of best practices according to these actions
    - Risk analysis methods integrating different types of risks are developped

Others questions remain outside the iNTeg-Risk project

- Socio-organisational and human impacts of organisational changes or introduction of new technologies in the existing plants
- Improvement of WANO's Human Performance tools
- Extension of the application of the Human Reliability Assessment (HRA)
- Assessment of the Safety Culture, impacts of the change on the safety culture and measure of the occupational safety perception