

IRSN

INSTITUT
DE RADIOPROTECTION
ET DE SÛRETÉ NUCLÉAIRE

Faire avancer la sûreté nucléaire

From Science to Safety

The long way to risk management assessment in
nuclear industry

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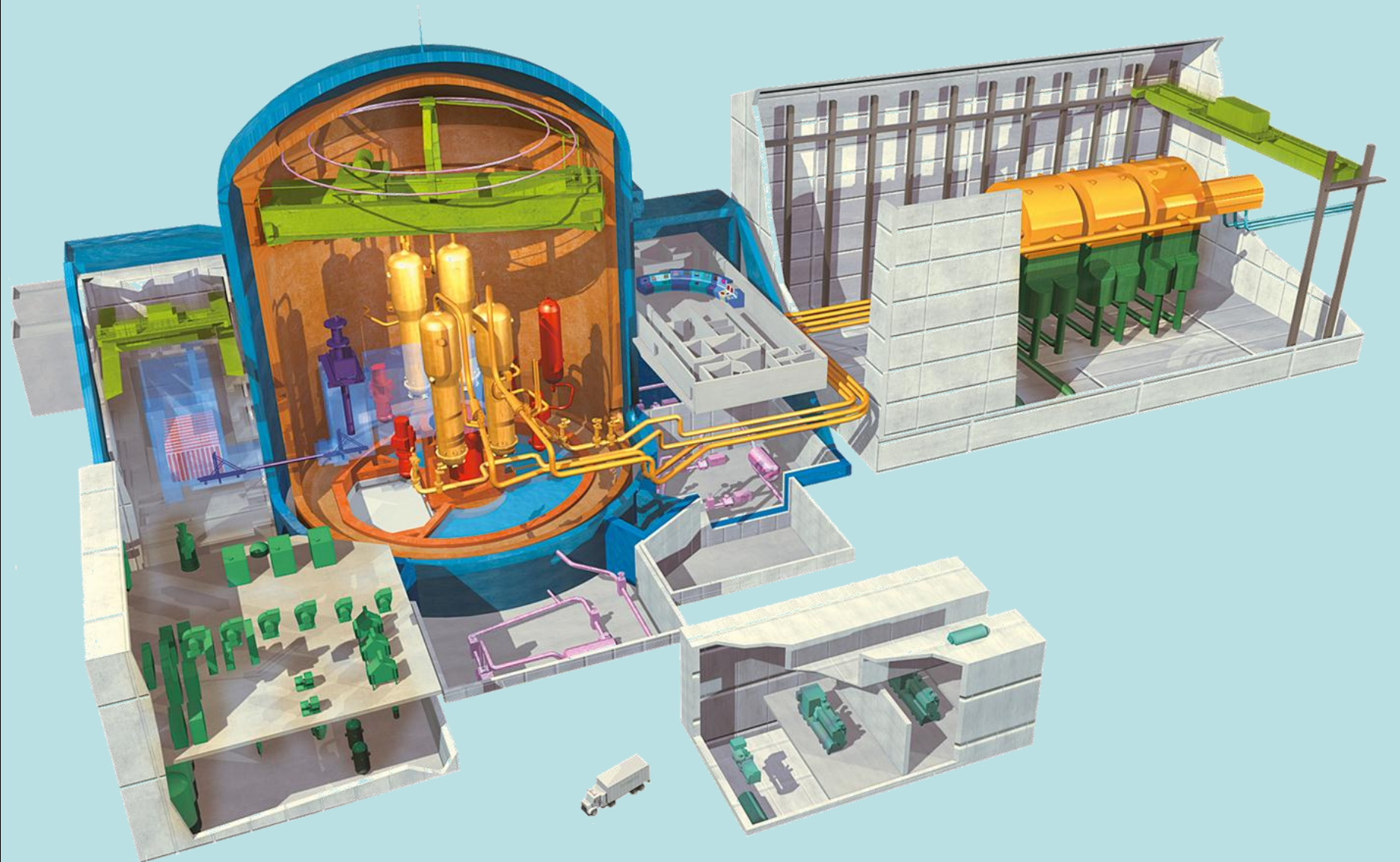


ECOLE DES MINES DE NANTES



TRAINING & TUTORING NUCLEAR SAFETY

What is a safety analyst?..

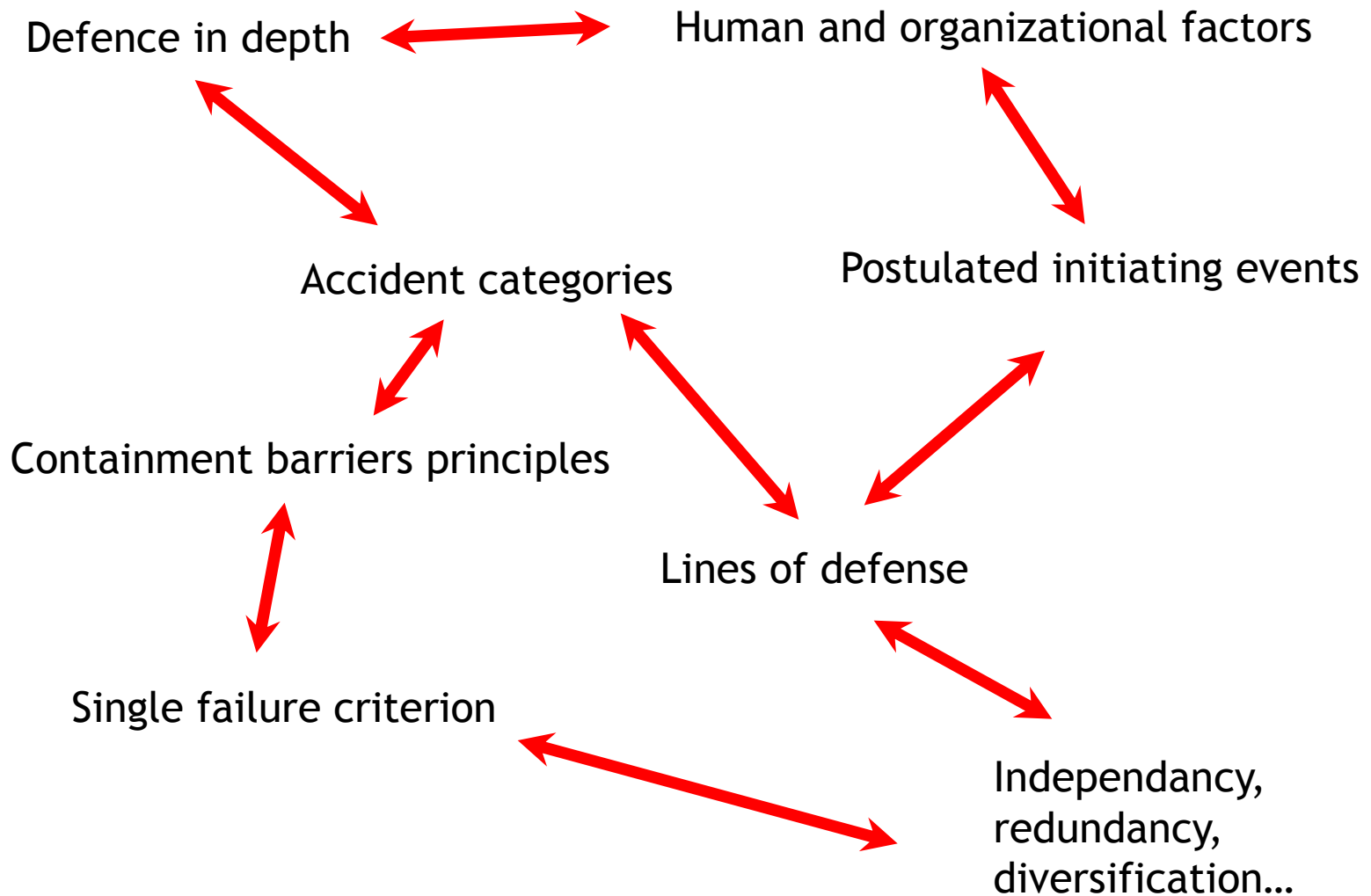






SKILLS	TYPES	LEVEL REQUIRED
<ul style="list-style-type: none"> ▪ Know-how 	<ul style="list-style-type: none"> ▪ Analyse with a critical point of view operator's hypothesis, demonstration and solutions ▪ Identify and organize issues ▪ Write scientific and technical advices intended to safety authority ▪ Public speaking 	<ul style="list-style-type: none"> ▪ Proficiency ▪ Proficiency ▪ Proficiency ▪ Proficiency
<ul style="list-style-type: none"> ▪ Knowledge 	<ul style="list-style-type: none"> ▪ Engineering sciences ▪ Safety analysis ▪ Risk analysis 	<ul style="list-style-type: none"> ▪ Detailed ▪ Operational ▪ Operational
<ul style="list-style-type: none"> ▪ Behavioural competences 	<ul style="list-style-type: none"> ▪ Communication ▪ Relational dynamics ▪ Analytical skills ▪ Ability to synthesize ▪ Ability to coordinate 	<ul style="list-style-type: none"> ▪ Very high ▪ Very high ▪ Very high ▪ Very high ▪ Very high





Content

✓ **Safety analyst specificities**

✓ **French experience**

✓ **Research reactors**

Experts point of view:

- HR manager
- Engineering school
- Tutoring programme manager



Safety analyst specificities

Safety analyst specificities

➤ Missions

- Evaluate any nuclear operator's request regarding a creation or a modification of a nuclear installation
- Lead the ten-year periodic safety reviews
- Define the needs regarding research and development
- Provide public authorities with advice in case of accident

➤ What does it mobilize?

Safety analyst specificities

➤ Skills

- Know-how
- Knowledge
- Behavioural competences

Safety analyst specificities

➤ Skills

■ Know-how

- Critical analysis
- Identify and organize issues
- Write scientific and technical advices intended to safety authority
- Public speaking

■ Knowledge

■ Behavioural competences

Safety analyst specificities

➤ Skills

■ Know-how

■ Knowledge

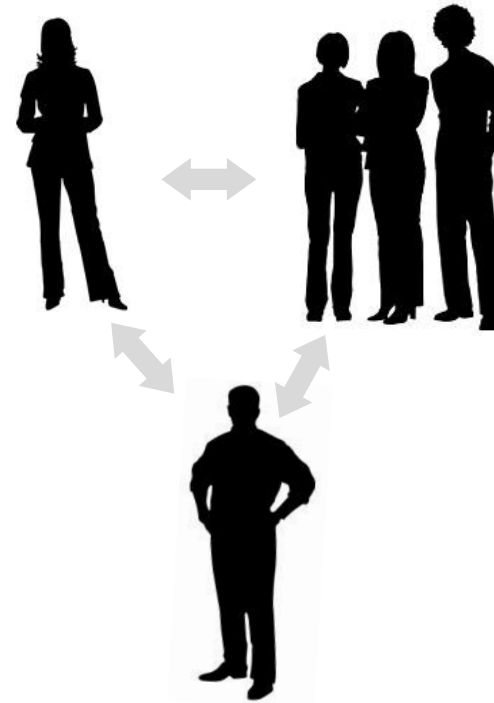
- Engineering sciences
- Safety analysis
- Risk analysis

■ Behavioural competences

Safety analyst specificities

➤ Skills

- Know-how
- Knowledge
- Behavioural competences
 - Communication
 - Relational dynamics
 - Analytical skills
 - Ability to synthesize
 - Ability to coordinate



IRSN RR safety assessment

➤ Practically?

- Collaborative process headed by a safety analyst
- Low regulation (so far...) → Technical dialogue
 - Safety rules → “French cooking”
 - Doctrine
- 1 safety analyst per RR
- Possibility to mobilize specialized engineers (thermohydraulics, neutronics...)

French experience on shaping safety analysts

French experience

➤ Engineering schools

- Historically no dedicated educational programme
- Recently: 4 masters or engineering degrees related to nuclear safety

➤ Ecole des Mines de Nantes

- Dedicated programme
- Introduction of practical safety approaches with TSO support

French experience

➤ TSO Internal « school of expertise »

- Integration of newly recruited analysts
- Development of IRSN safety culture
- Favorizing internal debates

French experience

➤ External tutoring programme: ENSTTI

- An example of European cooperation
- TSOs association with EU & IAEA
- Short & long term training sessions
- Integration of trainees into TSOs operational units

French experience

➤ Internal tutoring & case-by-case analysis

- Bridge the gap between “hard science” and soft skills
- Need to choose instructions to be as educational as possible
- Responsibility of both the tutoring expert and the trainee

French experience

➤ Examples given

- Engineering schools
- Internal school of expertise
- Internal/external tutoring programmes
- Case-by-case analysis

➤ Application on research reactors?

Research reactor A safe step towards a nuclear programme?

Research reactors

➤ A safe step towards a nuclear programme?

- Historically, the choice of most of major countries
 - → 375 in 1975
- Jordan, Poland, Vietnam...

Research reactors

➤ A safe step towards a nuclear programme?

- Historically, the choice of most of major countries
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- Jordan, Poland, Vietnam...



« A focal point of a nuclear science & technology center.
A RR to train next generation experts »

Research reactors

➤ A safe step towards a nuclear programme?

- Historically, the choice of most of major countries
 - 375 in 1975

- Jordan, Poland, Vietnam...



« A RR to serve the nuclear programme »

Research reactors

➤ A safe step towards a nuclear programme?

- Historically, the choice of most of major countries
 - → 375 in 1975

- Jordan, Poland, Vietnam...

➤ A far less complex installation than a NPP

➤ Holding a comprehensive knowledge of the safety demonstration is much more easily achievable

Conclusive elements

- **Examples of French practices emphasized**
 - **Need to localize**
- **Other cooperations: CNESTEN & IRSN**
- **TSOs role to sustain the development of newcomers & safety practices harmonization**