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Stimulating innovation
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Analysis of events related to human and organizational factors using different coding systems



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<http://clearinghouse-oef.jrc.ec.europa.eu/>

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- 6. Conclusions and recommendations**

1. Introduction
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IET – Petten/Ispra, The Netherlands/Italy

- Institute for Energy
Staff: ≈ 275 in Petten



IRMM - Geel Belgium

- Institute for Reference Materials and Measurements
Staff: ≈ 345



ITU – Karlsruhe/Ispra Germany/Italy

- Institute for Transuranium elements
Staff: ≈ 325 in Karlsruhe



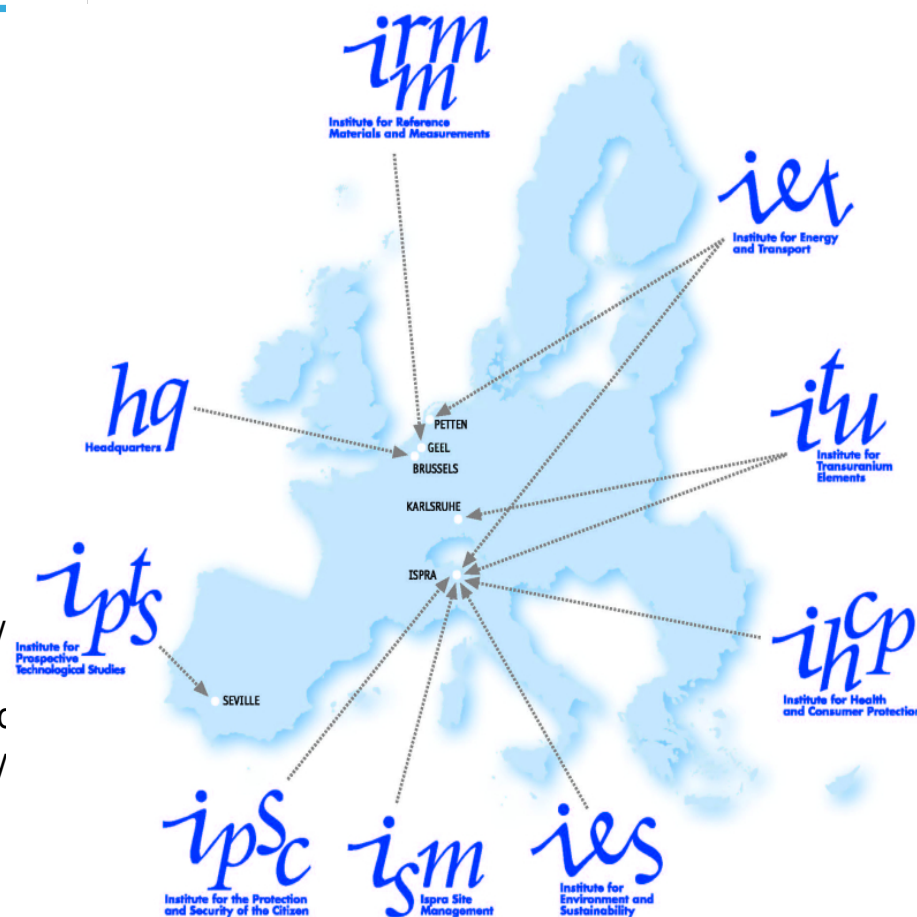
IPSC - IHCP - IES - Ispra Italy

- Institute for the Protection and the Security of the Citizen
- Institute for Health and Consumer Protection
- Institute for Environment and Sustainability
Staff: ≈ 425, 320, 450

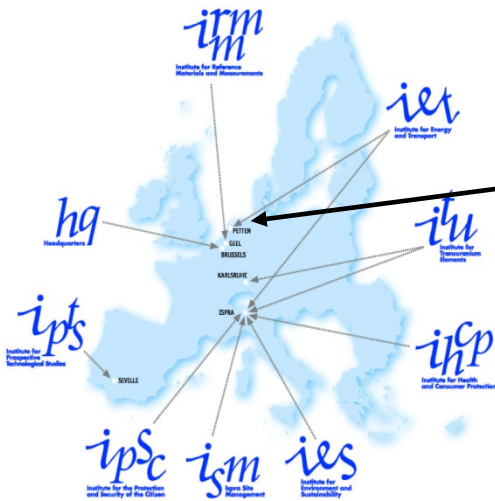


IPTS - Seville Spain

- Institute for Prospective Technological Studies
Staff: ≈ 170



Total staff: ~ 2500 people



iet
Institute for Energy
and Transport

Personnel:
275



“ Nuclear Reactor Safety Assessment Unit (NRSA)” M. Bièth

NURAM
G. Pascal

- Modelling of Severe Accidents
- Source Term Evaluation
- Support to DG ENER
- NUGENIA

SINSAC
B. Farrar

- INSC
- PHARE-IPA
- Support to DG DEVCO
- Support to DG ELARG

NUSAC
B. Zerger

- Clearinghouse (OEF)
- Safety operation of NPPs
- Support to DG ENER

Support to the EU "Stress Tests" for NPPs

European Clearinghouse on OEF

Members: all the nuclear regulators of EU Member States having NPPs and Switzerland

International cooperation through IAEA and OECD/NEA



EU Clearinghouse meeting 2013 03 06

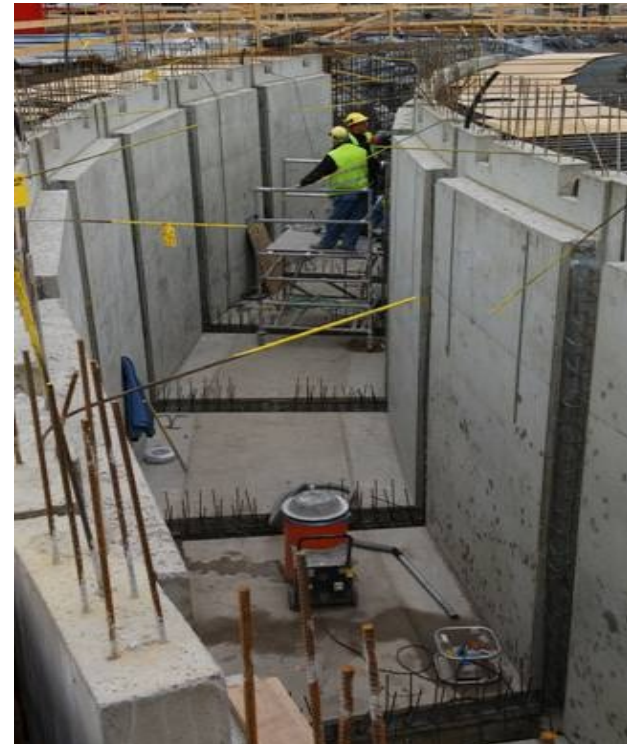
Activities of the EU Clearinghouse (1)

1. Technical & scientific work
 - Background Research.
 - Trend analysis of OEF Databases
 - Topical Operational Experience Reports
 - Support on specific OEF-related needs of CH members
2. Improvement of the communication on OEF between the members
 - Web site + Data Base
 - Review of draft IRS reports
 - OEF newsletter
3. International cooperation
4. Training of experts in RCA and event investigation

Activities of the EU CH (2)

1. 3 Scientific – Technical Reports; 2. 11 Topical Operational Experience Reports:

- Shika NPP criticality event of 18 June 1999
- Forsmark NPP event of 25 July 2006
- Maintenance events
- Operational experience related to nuclear fuel
- Construction & Commissioning events
- Loss of safety-classified electrical equipment due to generator high voltage peak (Olkiluoto 1, Forsmark 2)
- Supply of NPP components
- Plant Modifications
- Events related to Ageing
- External events
- Decommissioning





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Activities of the EU CH (3)

JRC Scientific and Technical Reports

APPLICATION AND SELECTION OF NUCLEAR EVENT INVESTIGATION METHODS, TOOLS AND TECHNIQUES

Final Technical Report

Stanislovas Ziedelis, Marc Noel

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European Clearinghouse:
Analysis of Nuclear Power Plants Modifications Events

Topical Report

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EVENTS RELATED TO THE SUPPLY OF NPP COMPONENTS

Topical Operational Experience Report

Stanislovas Ziedelis

JRC Scientific and Technical Reports

COMPARATIVE ANALYSIS OF NUCLEAR EVENT INVESTIGATION METHODS, TOOLS AND TECHNIQUES

Interim Technical Report

Stanislovas Ziedelis, Marc Noel

EUR xxxxx EN - 20xx

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Joint Research Centre

European Clearinghouse:
External Events at NPPs

Topical Operational Experience Report

Ulla Vuorio, Manuel Martin Ramos, Benoît Zenger
DG JRC - Institute for Energy and Transport
2012

European Clearinghouse

On NPP Operational Experience Feedback

Restricted distribution In co-operation with IAEA, OECD-NEA, IRSN and GRS

SIN/NUCL/EA/R12/01/002 Rev.00 - RESTRICTED DISTRIBUTION

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AGEING RELATED EVENTS

Topical Study

Alexander Duchac
DG JRC - Institute for Energy and Transport
2011

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On NPP Operational Experience Feedback

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Is the OEF system efficient enough?

- Numbers of annual events are not decreasing;
- Large scale accidents continue to happen;
- Are the similar events reported?
- Are analyses of previous events performed accurately?
- Is it problem to establish effective corrective action plans?
- Are the Human and Organisational errors adequately addressed?
- Is the previous experience used?
- Is the others experience used?...

Why OEF isn't efficient enough?

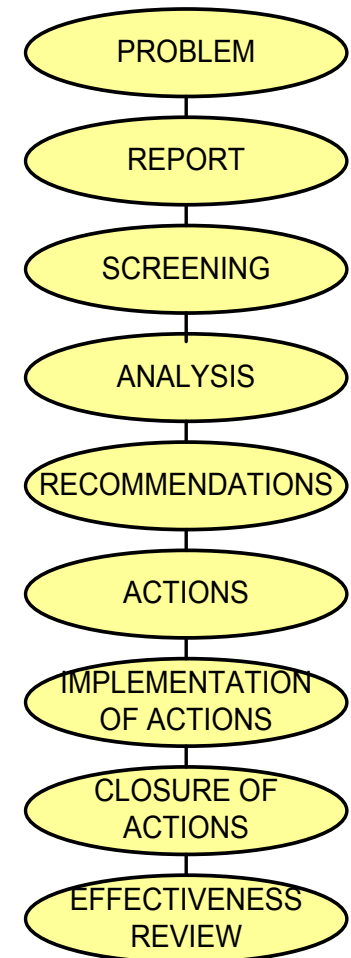
- Relevant OE information does not exist or is inaccurate due to weak event analyses;
- Correct OE information exists but is not accessible;
- No attempts were made to find existing info;
- Measures based on the lessons learned from the analogous event were inadequate or were not implemented adequately or on time...

What to do?

- The causes of analysed events must be well defined (the crucial step in whole process),

and then

- actions aimed to prevent future events can be efficiently defined.



What to do?

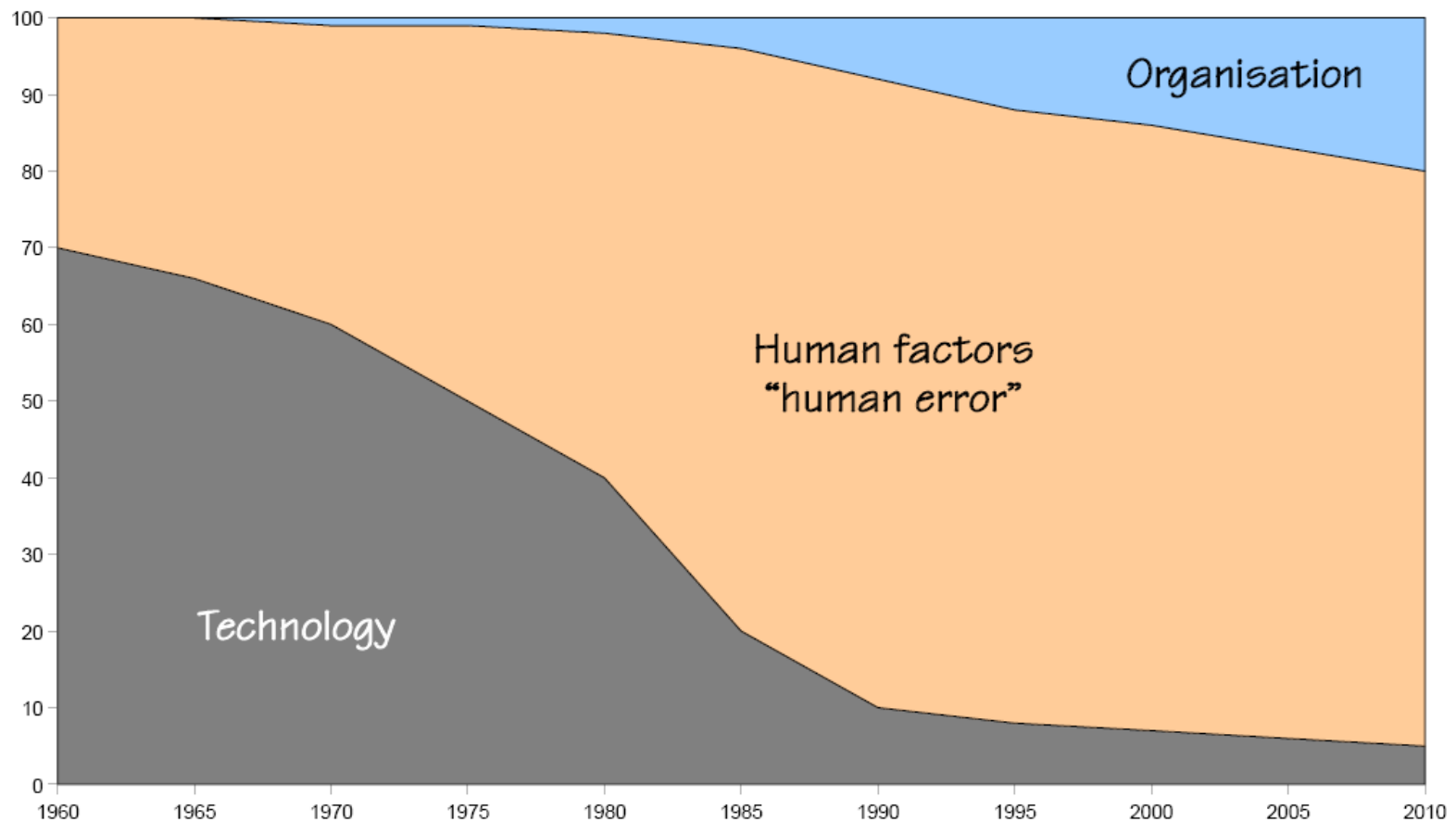
- Right information have to be transferred to stakeholders,

but in the forest of information

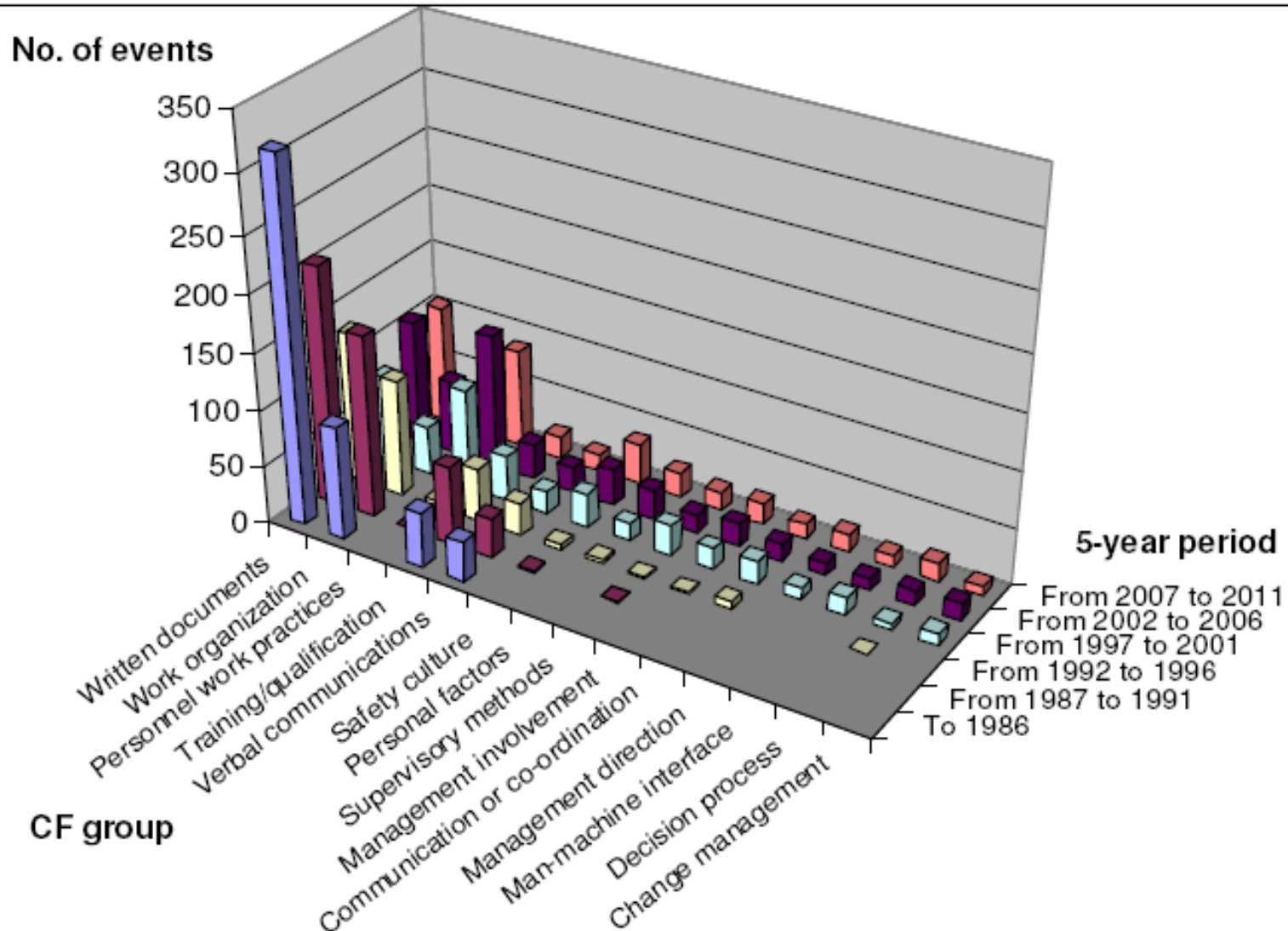
- we need good event database system to simplify retrieving and use of information.

The major contributor to quality of event DB system is good coding system.

Evolution in attribution of causes

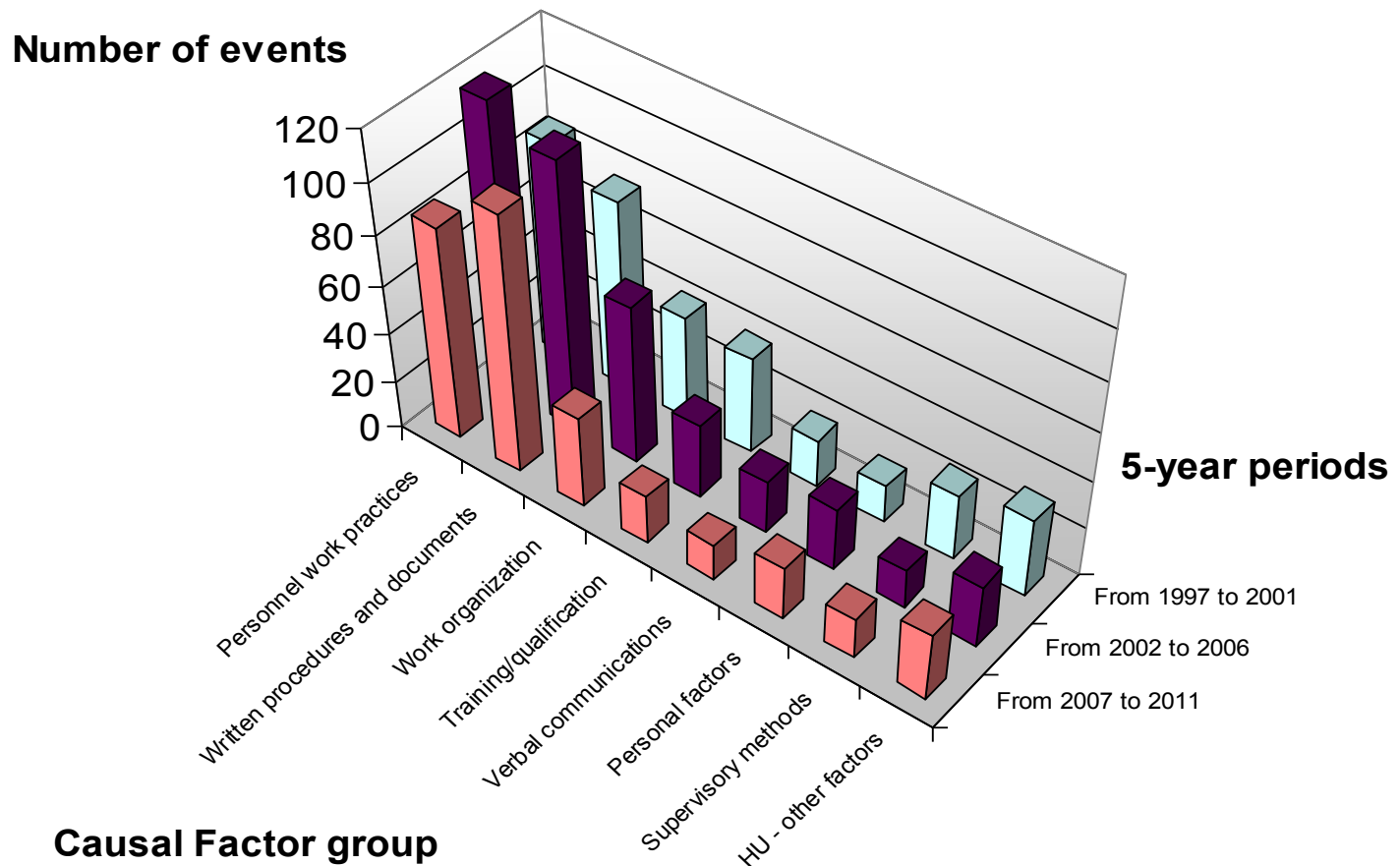


Evolution in attribution of causes: IRS reports



Evolution in attribution of causes: IRS reports

IRS database Human Causal Factors

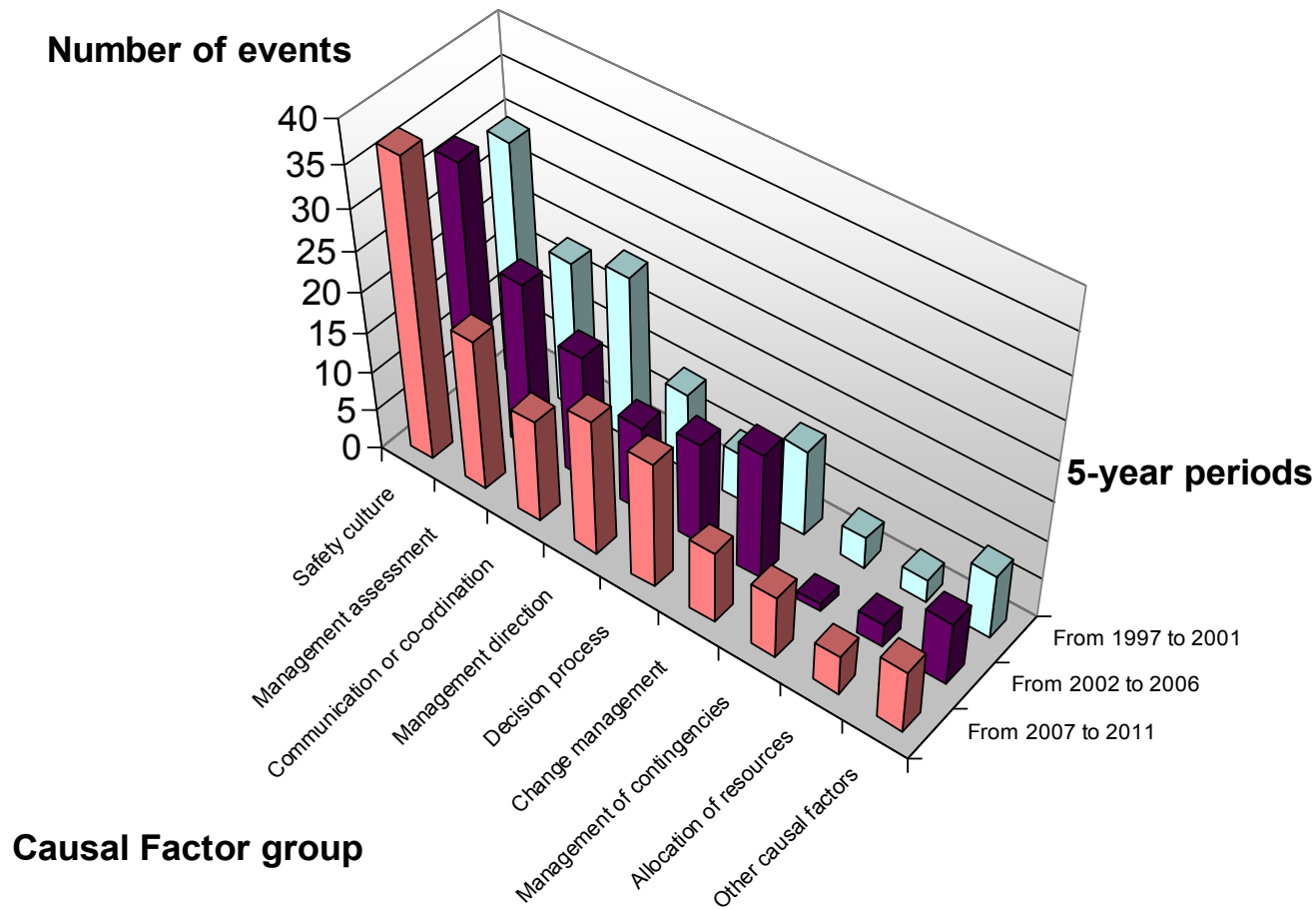




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Evolution in attribution of causes: IRS reports

IRS database Organisational Causal Factors

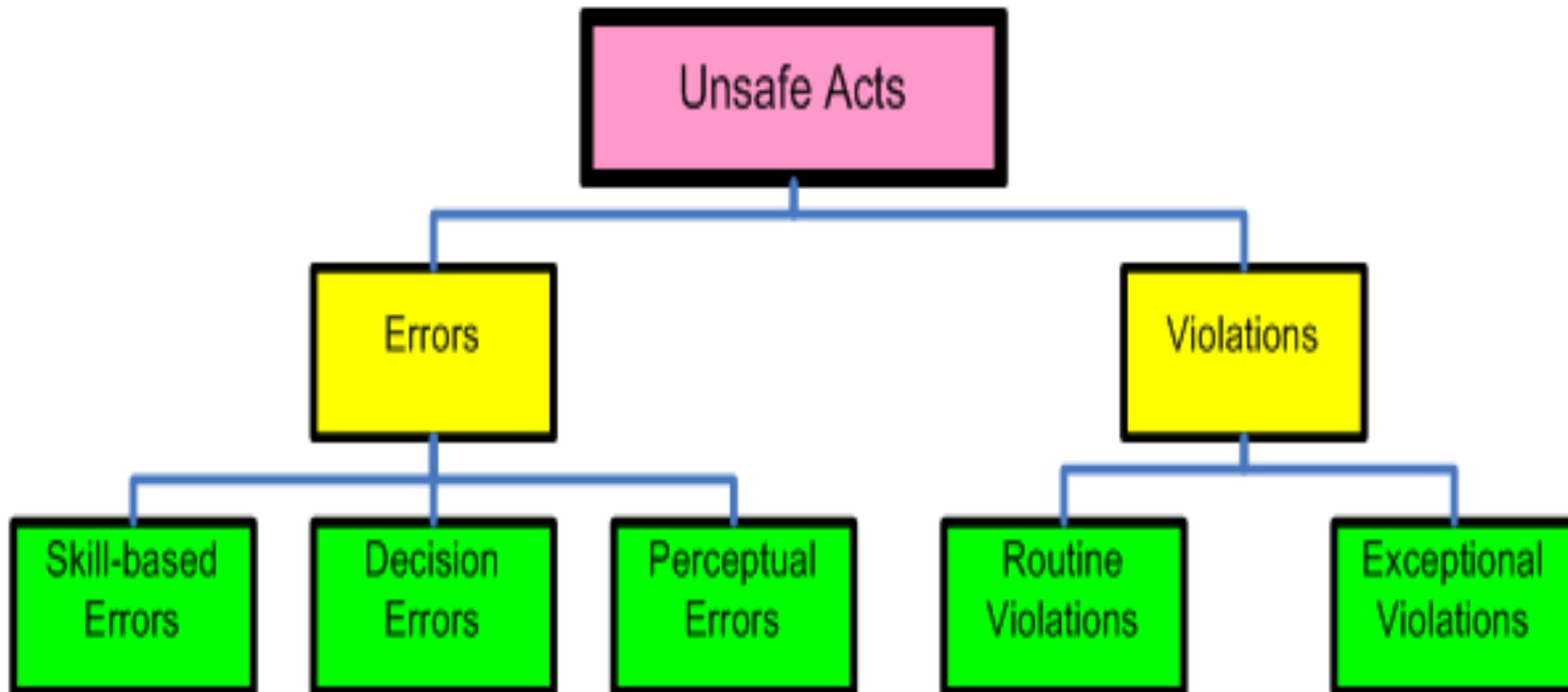


Human Factor Analysis and Classification System (HFACS): main principles

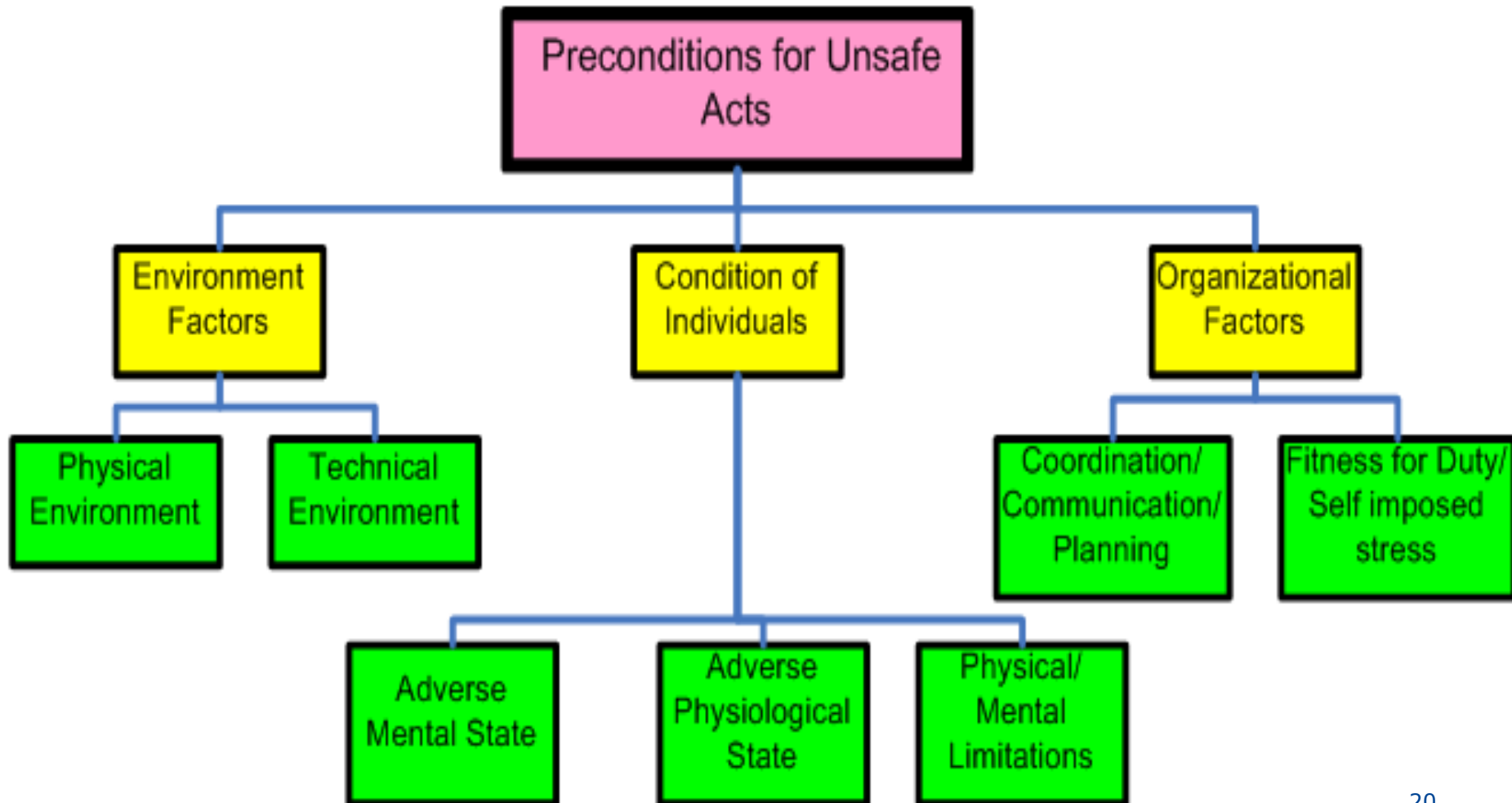
- 1. Incidents/accidents usually are caused by human errors which take root with the decisions made by those at the top of the organization** which in turn affect inferior managers, supervisors and personnel who perform day-to-day operations.
- 2. Analysis of events in HFACS is starting from unsafe acts of individuals and then is being continued upwards to the top through five hierarchical levels of management system,** examining preconditions of the unsafe acts and identifying latent organizational failures and deficiencies of management.

Methodology

HFACS: main principles



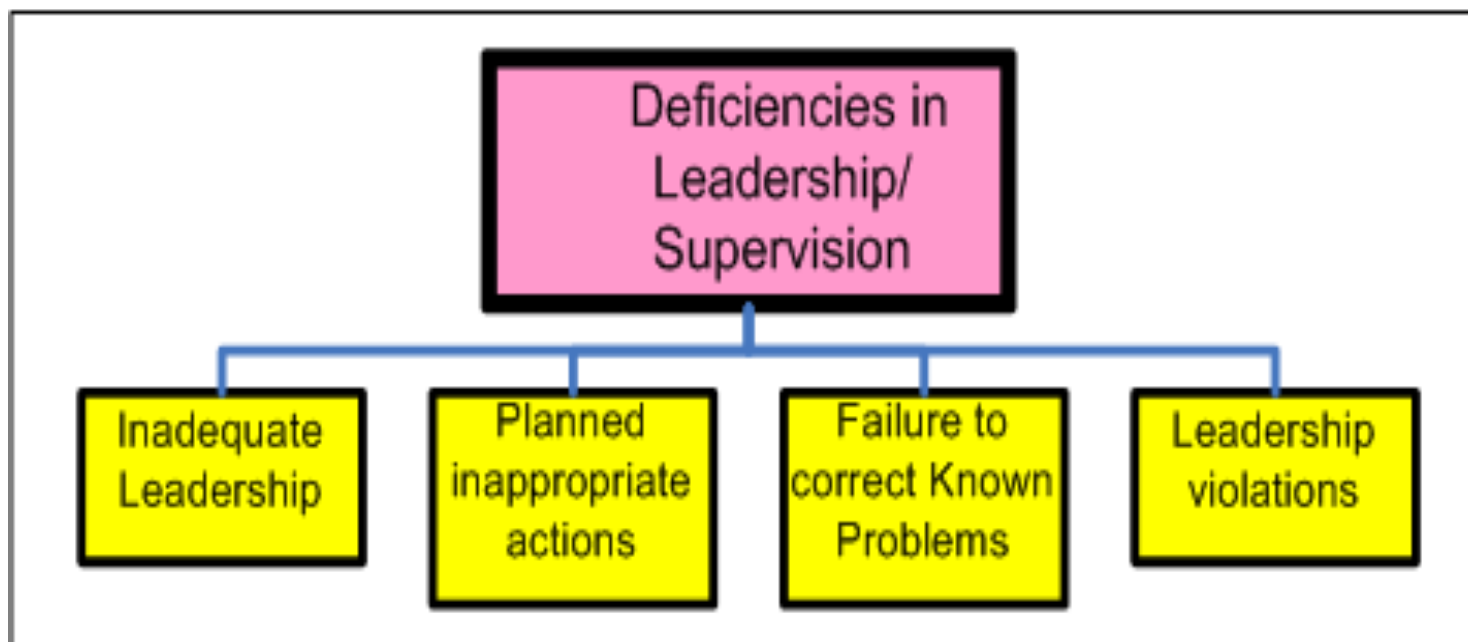
HFACS: main principles





Methodology

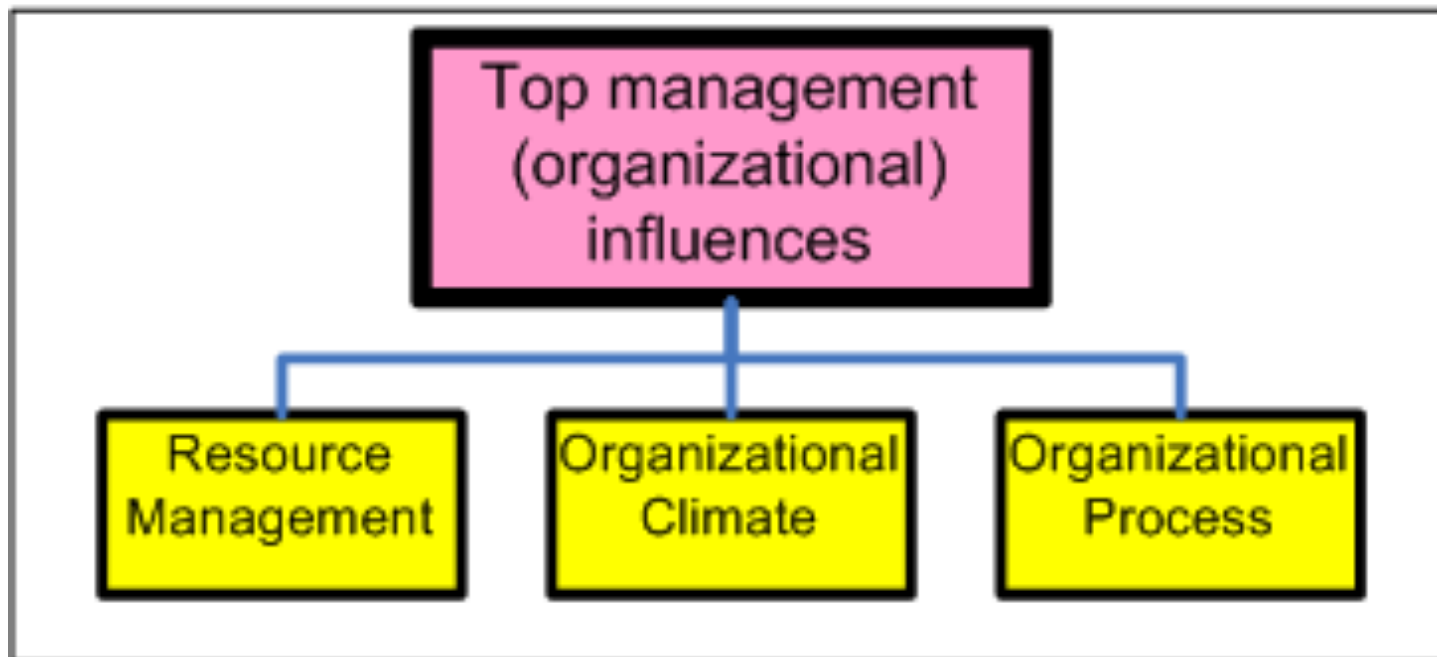
HFACS: main principles





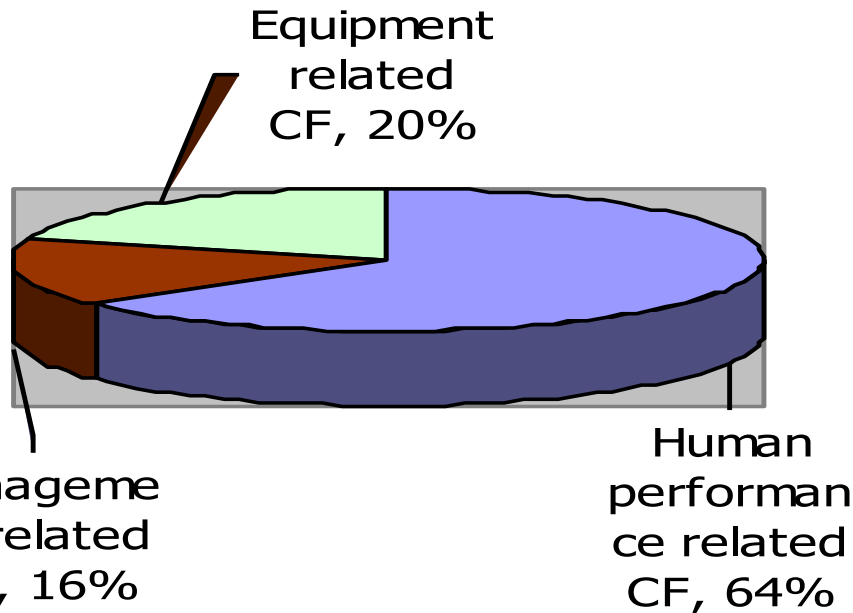
Methodology

HFACS: main principles

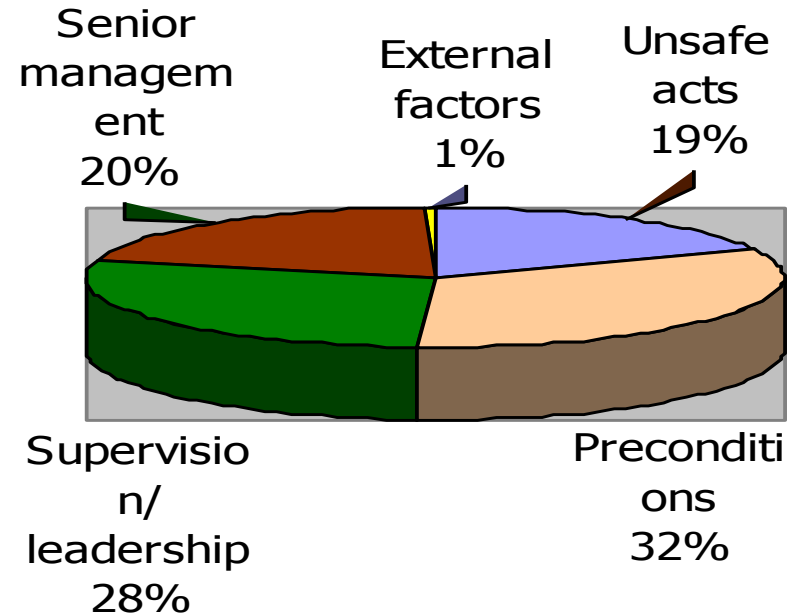


Results

Distribution of causal factors of events



IRS

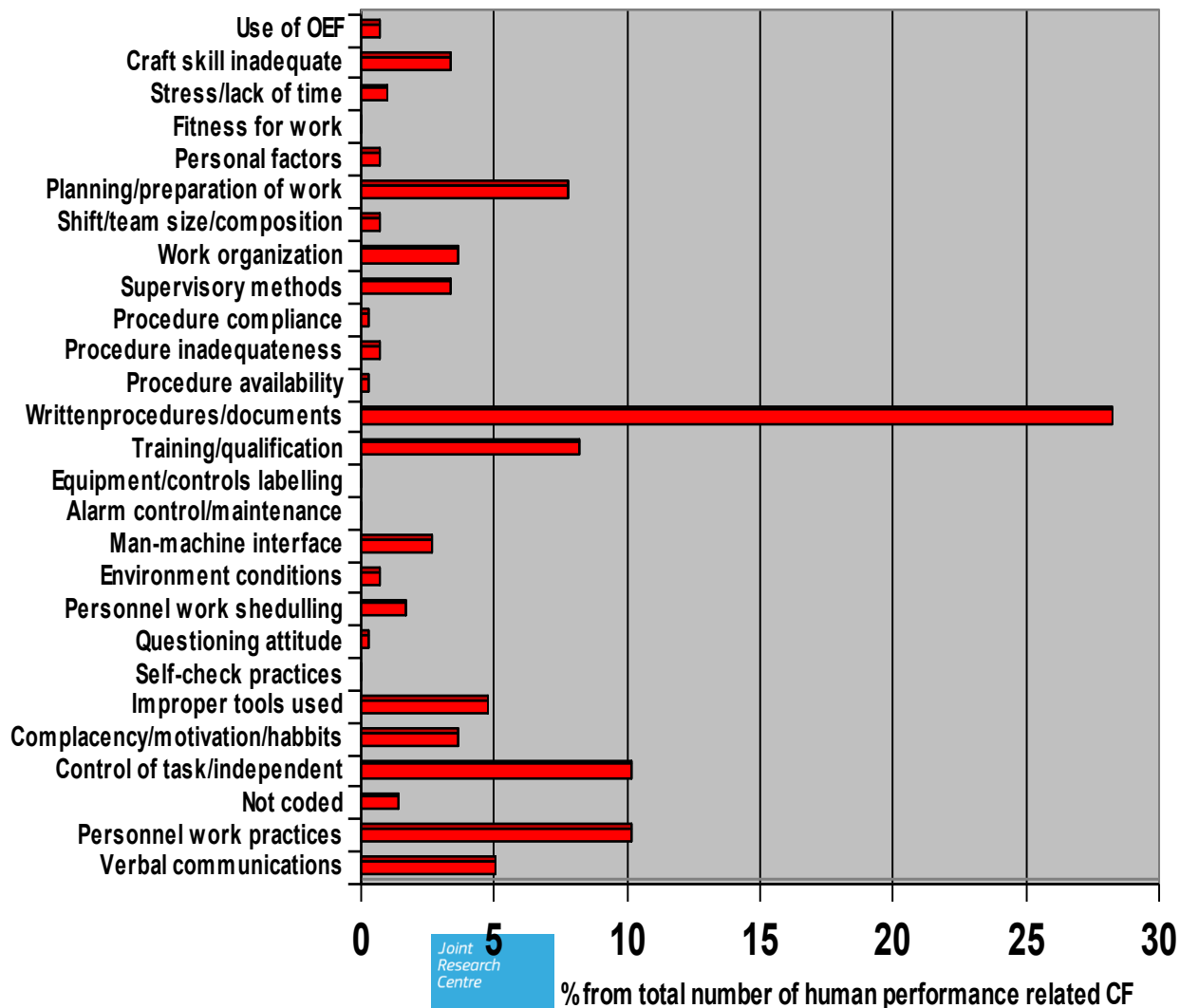


HFACS-NE



Distribution of human performance related CF according to IRS

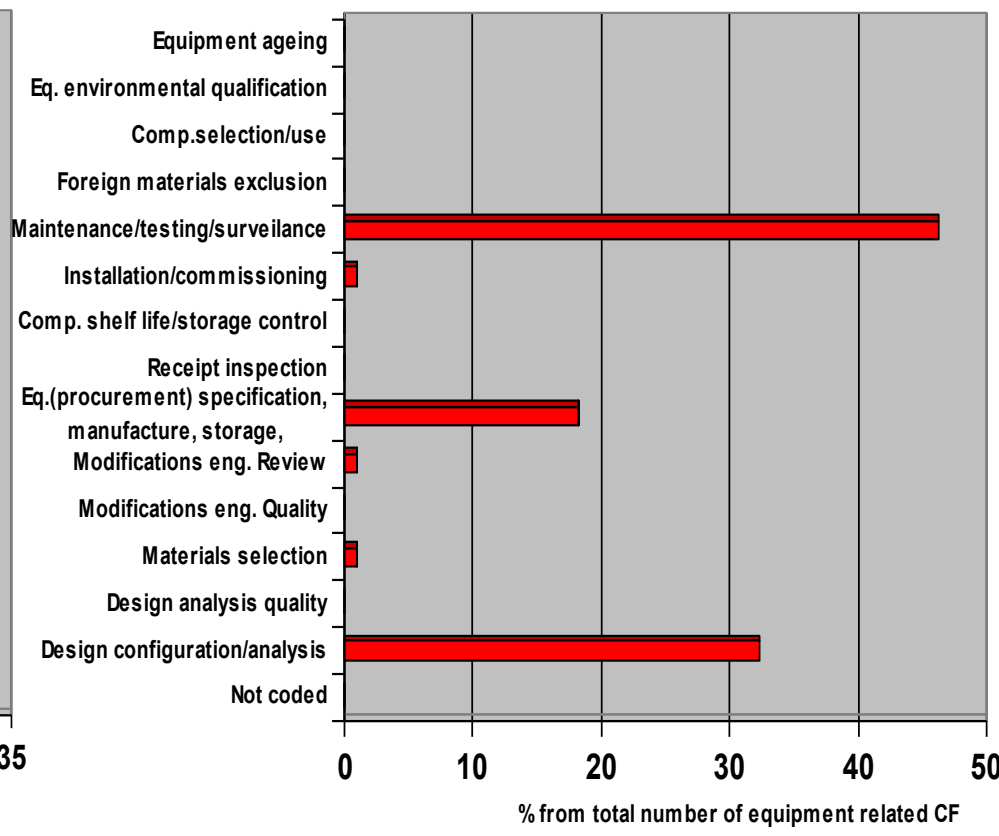
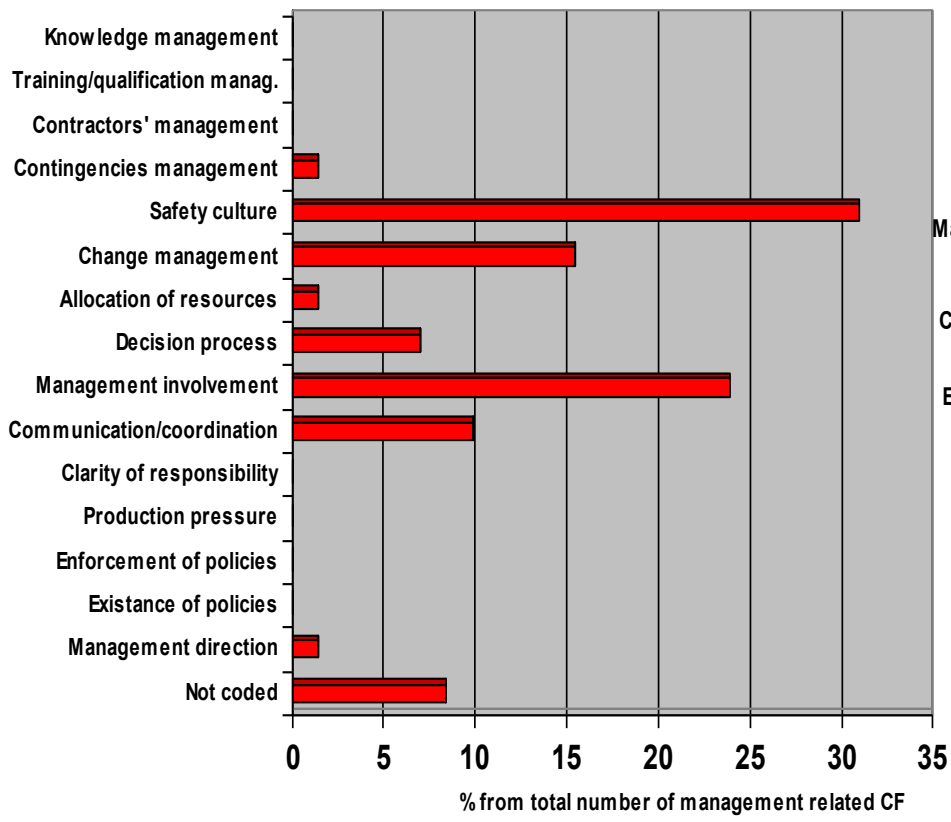
Results





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Distribution of management and equipment related CF according to IRS

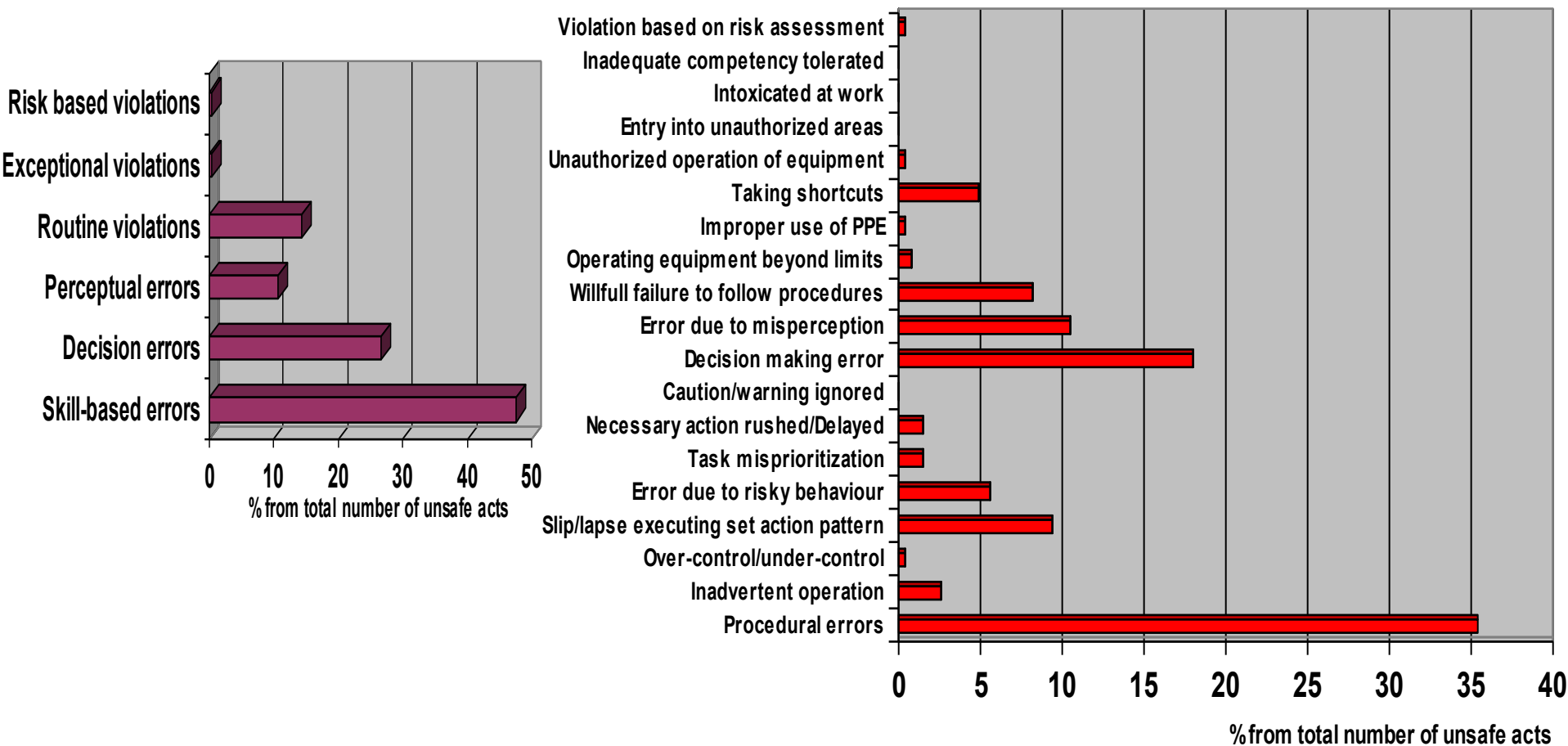


Results



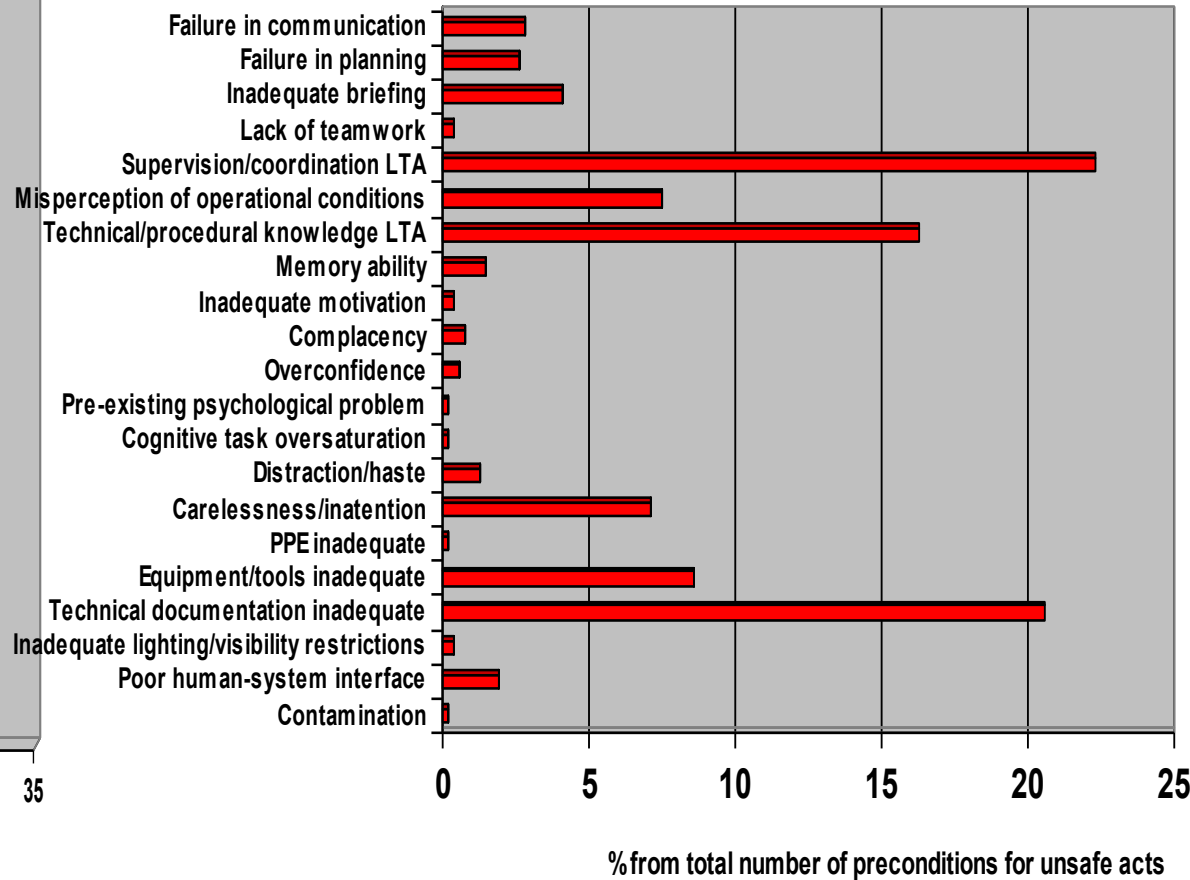
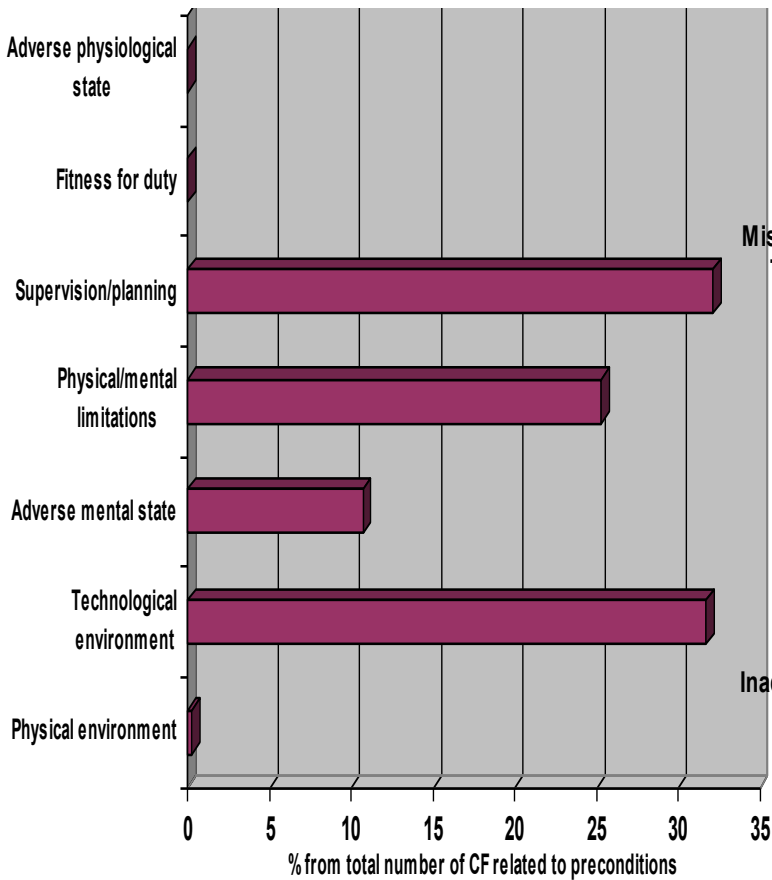
Results

HFACS-NE analysis: unsafe acts



Results HFACS-NE

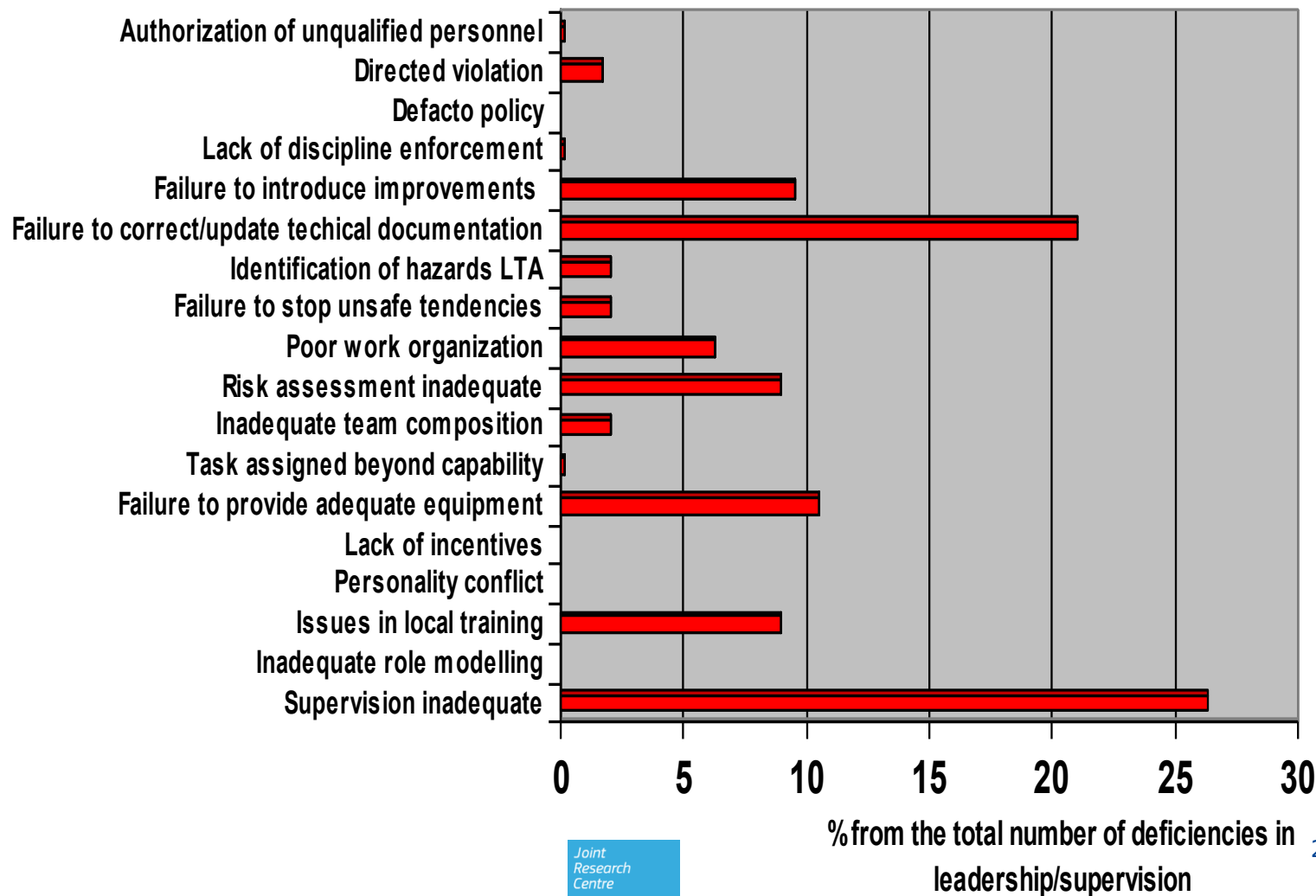
Preconditions of unsafe acts





Results HFACS-NE

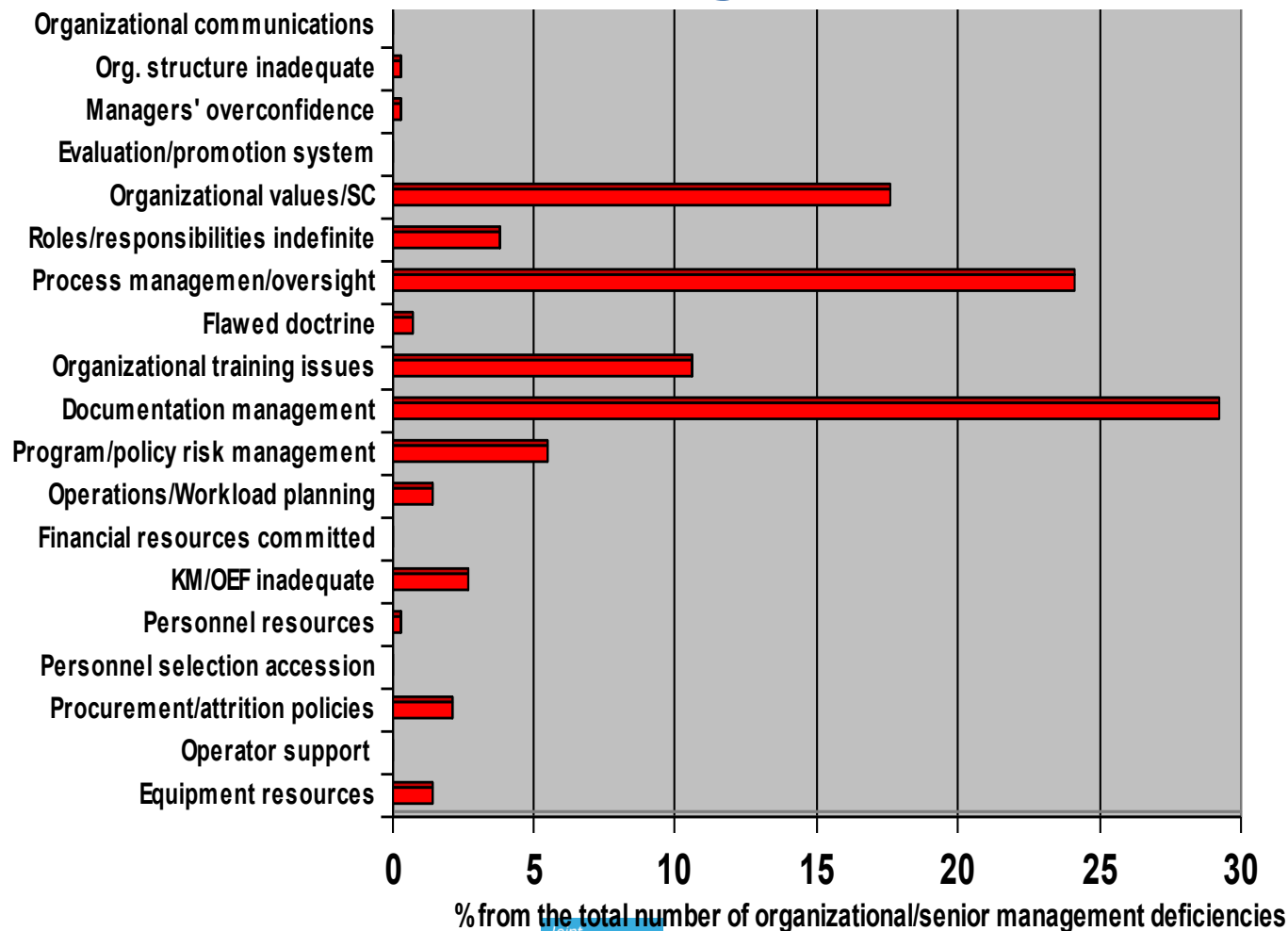
Deficiencies in leadership/supervision





Results HFACS-NE

Organizational/senior management deficiencies





Conclusions

- 1. Practices of nuclear events investigations are not enough focused on identification of latent root causes, related to HOF/management.**
- 2. Role of management in the events related to HOF often is underestimated and even misunderstood.**
- 3. Coding system of events submitted to IRS does not facilitate easy categorization of HOF/management related causal factors and needs to be improved.**
- 4. HFACS seems to be suitable for in-depth examination and comprehensive coding of influences created by HOF and management at different levels.**



Recommendations

To improve the effectiveness of OEF in general and quality of IRS reports specifically:

- **Human performance engineering or HOF specialists should be included in the event investigation teams;**
- **Event investigation methodologies and causal factors coding systems should be re-oriented to deeper organizational analysis of management impacts on individuals' performance;**
- **Level of independency of investigation should be increased, at least by including independent experts in the investigation team.**
- **The corrective actions and improvements should be based on reliable root cause analysis results but not on guesses and assumptions.**

THANK YOU FOR YOUR ATTENTION

