



Collecting Data for Mermos using a simulator

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Summary

1. Why we collect data
2. Which data for Mermos
3. Example : how we collect data
4. Our experience

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Why we collect data

How to model

Human reliability in an High Reliability Organisation

1.1 How to model (to predict)

Statistically

- $P = N \text{ of erroneous action } X / N \text{ of situations that require } X$

With a Generic Model of human failure

- $P = F(P_{sf1}, P_{sf2}, P_{sf3} \dots)$ with F function providing P given performing shaping factors P_{sfi} values

With a Specific Model of human failure (MERMOS)

- $P = P_{B1/S1} \times P_{S1/I} + P_{B2/S2} \times P_{S2/I} + P_{B3/S3} \times P_{S3/I} \dots\dots$

Bi behaviour i

Si situation i

I initiator

Prediction is very difficult, especially about the future.

Niels Bohr (1885 - 1962)

1.2 Human reliability in an High Reliability Organization

Zero « big » failures

Complexity of human failures

Actual operation \neq prescribed operation :

- to understand it, empirical observation is needed

Human reliability is at the level of the system (group and organisation)



CONCLUSION ABOUT MODEL

Statistical and Generic Models are too limited for HRO

HRA = elaboration of knowledge

« how the system can fail as designed and operated ? »

Data are elements of knowledge, specific to your own system

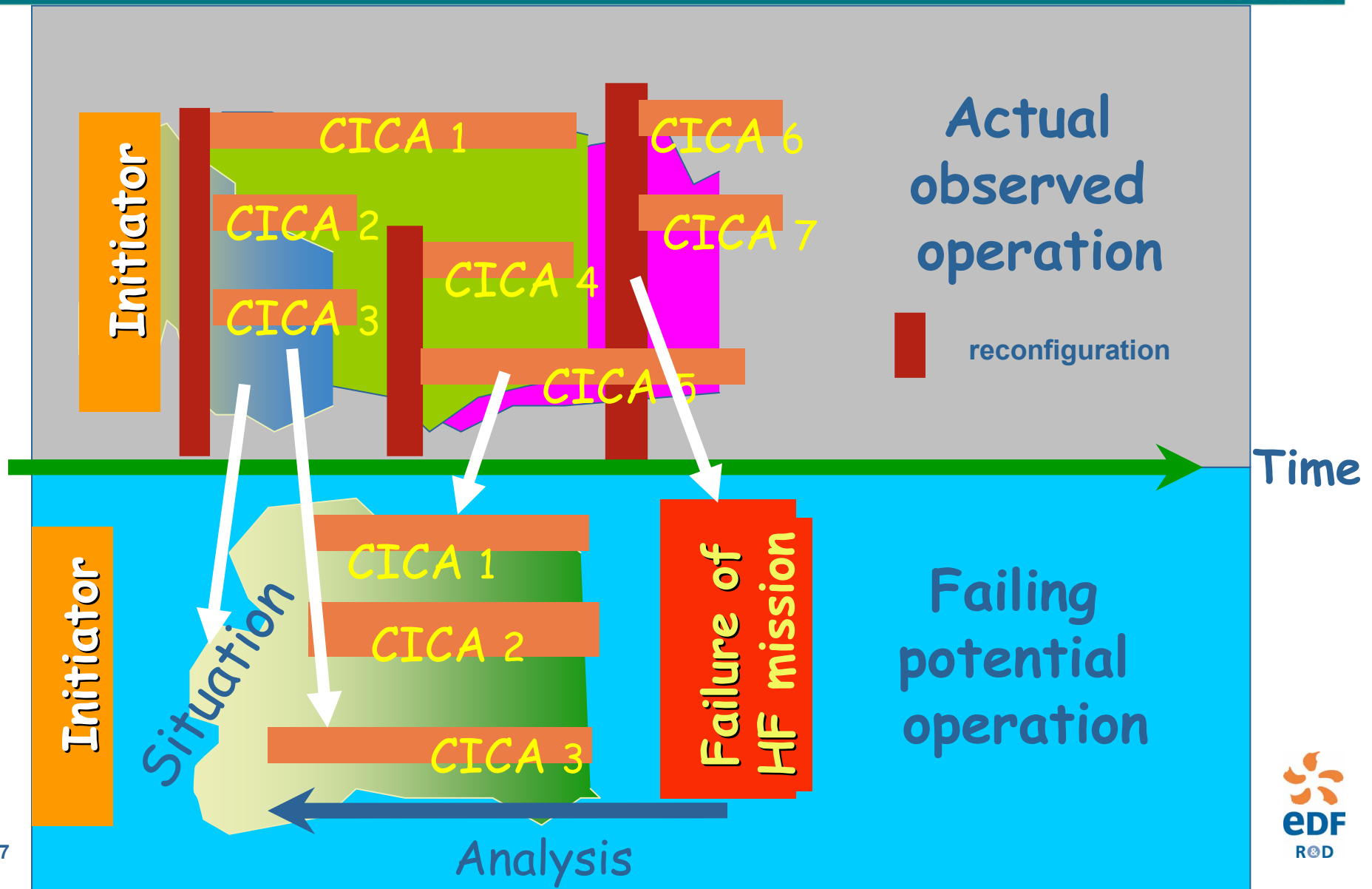
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Which data for Mermos ?

Actual (successful) and potential
(failing) collective behaviour

Collected data

2.1 Actual (successful) and potential (failing) collective behaviour



2.2 Collected data (1)

Elements of situation that influence operation

- Minor disturbances impact
- Specificities of a transitory
- Influence of external information and relations with outside world

2.3 Collected data (2)

Repetitive or rare collective behaviour characteristics influencing orientation or configuration (cf Safe Regulation Model)

- Collective functioning
- Self organization
- Redundancy of Supervisor, Chief Operator and Safety Engineer,

CONCLUSION ABOUT COLLECTED DATA

Data are determined by the method. MERMOS data are :
-elements of situation that could trigger a special situation
-characteristics of collective behaviour, that could fail when it is transposed in a special situation

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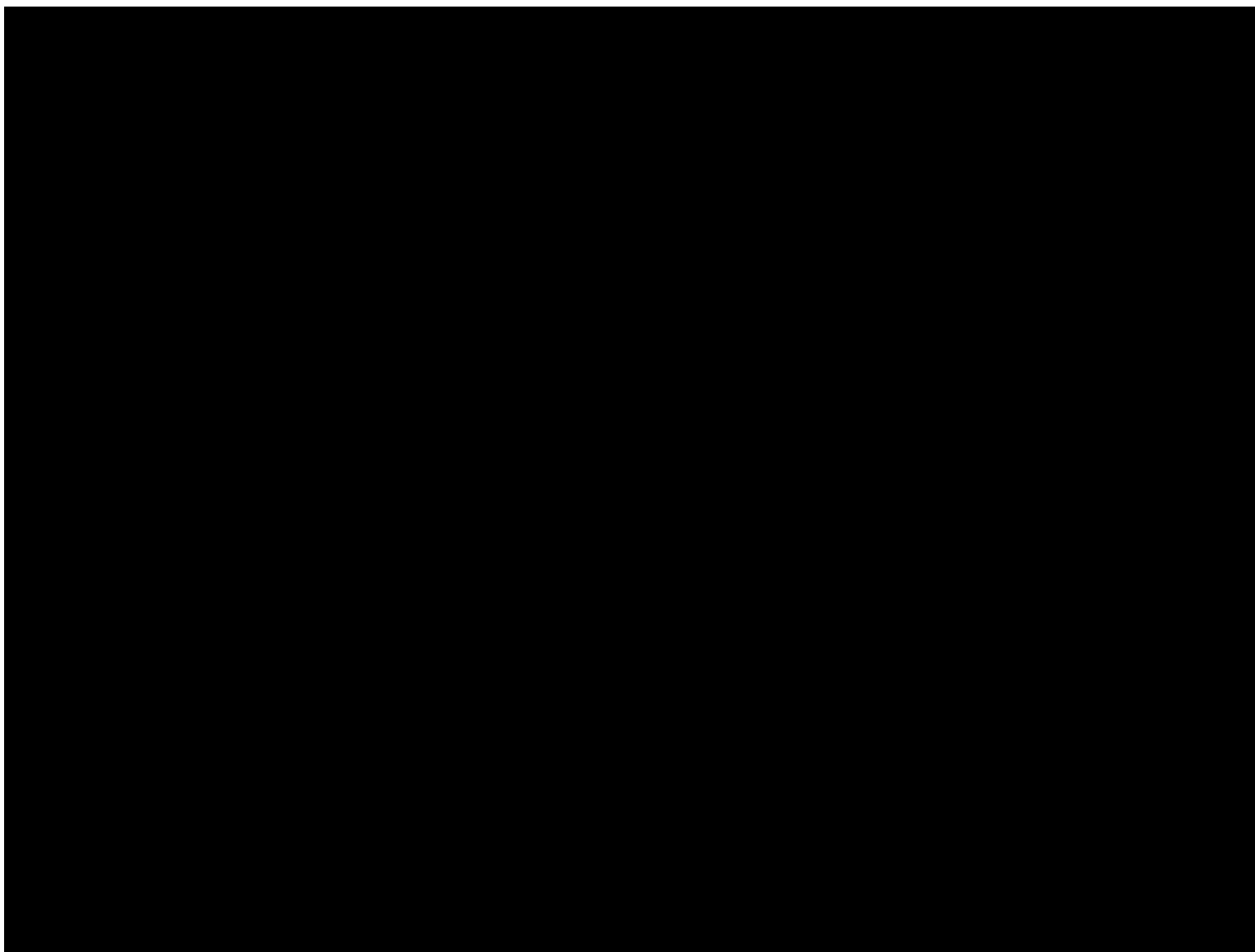
Example

2mn video of an
observation on simulator

3 of 4 observers are in the control room



Video :
an aggravating event during a small leak accident



Our Experience

HRA = elaboration of knowledge

Data are determined by the HRA method

Simulation is needed by HRO to learn